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What is AWS Security Hub?

AWS Security Hub provides you with a comprehensive view of your security state in AWS and helps you check your environment against security industry standards and best practices.

Security Hub collects security data from across AWS accounts, services, and supported third-party partner products and helps you analyze your security trends and identify the highest priority security issues.

Benefits of AWS Security Hub

**Reduced effort to collect and prioritize findings**

Security Hub reduces the effort to collect and prioritize security findings across accounts from integrated AWS services and AWS partner products.

Security Hub processes finding data using a standard finding format, which eliminates the need to manage findings data from multiple formats.

Security Hub then correlates findings across providers to prioritize the most important ones.

**Automatic security checks against best practices and standards**

Security Hub automatically runs continuous, account-level configuration and security checks based on AWS best practices and industry standards.

Security Hub provides the result of these checks as a readiness score, and identifies specific accounts and resources that require attention.

**Consolidated view of findings across accounts and providers**

Security Hub consolidates your security findings across accounts and provider products and displays results on the Security Hub console.

This allows you to view your overall current security status to spot trends, identify potential issues, and take the necessary remediation steps.

**Ability to automate remediation of findings**

Security Hub supports integration with Amazon EventBridge. To automate remediation of specific findings, you can define custom actions to take when a finding is received.

For example, you can configure custom actions to send findings to a ticketing system or to an automated remediation system.

How Security Hub works

You can use Security Hub in the following ways:
Security Hub console

Sign in to the AWS Management Console and open the AWS Security Hub console at https://console.aws.amazon.com/securityhub/.

Security Hub API

To access Security Hub programmatically, use the Security Hub API, which allows you to issue HTTPS requests directly to the service. For more information, see the AWS Security Hub API Reference.

When you enable Security Hub, it begins to consume, aggregate, organize, and prioritize findings from AWS services that you have enabled, such as Amazon GuardDuty, Amazon Inspector, and Amazon Macie. You can also enable integrations with AWS partner security products. Those partner products can then also send findings to Security Hub. See Product integrations (p. 462).

Security Hub also generates its own findings by running continuous, automated security checks based on AWS best practices and supported industry standards. See Standards and controls (p. 481).

Security Hub then correlates and consolidates findings across providers to help you to prioritize the most significant findings. See the section called “Viewing findings” (p. 99) and the section called “Taking action on findings” (p. 103).

You can also create insights in Security Hub. An insight is a collection of findings that are grouped together when you apply a Group by filter. Insights help you identify common security issues that may require remediation action. Security Hub includes several managed insights, or you can create your own custom insights. See Insights (p. 79).

Important

Security Hub only detects and consolidates findings that are generated after you enable Security Hub. It does not retroactively detect and consolidate security findings that were generated before you enabled Security Hub.

Security Hub only receives and processes findings from the Region where you enabled Security Hub in your account.

For full compliance with CIS AWS Foundations Benchmark security checks, you must enable Security Hub in all AWS Regions.

AWS Security Hub free trial, usage, and pricing

When you enable Security Hub for the first time, your AWS account is automatically enrolled in a 30-day Security Hub free trial.

When you use Security Hub during the free trial, you are charged for usage of other services that Security Hub interacts with, such as AWS Config items. You are not charged for AWS Config rules that are enabled by Security Hub security standards.

You are not charged for using Security Hub until your free trial ends.

Note

The Security Hub free trial is not supported in the China (Beijing) Region.

Viewing usage details and estimated cost

Security Hub provides usage information, including an estimated 30-day cost for using Security Hub. The usage details include the time remaining for the free trial. During the free trial, the usage information can help you to understand what the Security Hub cost will be after the free trial ends.

To display the usage information

2. In the navigation pane, choose Settings.
3. On the Settings page, choose Usage.

The estimated monthly cost is based on your account's Security Hub usage for findings and security checks projected over a 30-day period.

The estimated monthly cost is for only the current Region. It is not for all Regions in which Security Hub is enabled.

Viewing pricing details

For more information about how Security Hub charges for ingested findings and security checks, see Security Hub pricing.
Terminology and concepts

This topic describes the key concepts in AWS Security Hub to help you get started.

**Account**

A standard Amazon Web Services (AWS) account that contains your AWS resources. You can sign in to AWS with your account and enable Security Hub.

An account can also invite other accounts to enable Security Hub and become associated with that account in Security Hub. Accepting a membership invitation is optional. If the invitations are accepted, the account becomes a Security Hub administrator account, and the added accounts are member accounts. As the administrator account, you can view findings in your member accounts.

If you are enrolled in AWS Organizations, then your organization designates a Security Hub administrator account for the organization. The administrator account can enable other organization accounts as member accounts.

An account cannot be both a Security Hub administrator account and a member account at the same time. An account can only have one administrator account.

For more information, see Managing administrator and member accounts (p. 59).

**Archived finding**

A finding that has a RecordState set to ARCHIVED. Archiving a finding indicates that the finding provider believes that the finding is no longer relevant. The record state is separate from the workflow status, which tracks the status of an investigation into a finding.

Finding providers can use the `BatchImportFindings` operation of the Security Hub API to archive findings that they created. Security Hub automatically archives findings for controls if the control is disabled or the associated resource is deleted, based on one of the following criteria.

- The finding is not updated in three days.
- The associated AWS Config evaluation returns NOT_APPLICABLE.

By default, archived findings are excluded from findings lists in the Security Hub console. You can update the filter to include archived findings.

The `GetFindings` operation of the Security Hub API returns both active and archived findings. You can include a filter for the record state.

```json
"RecordState": [
    {
        "Comparison": "EQUALS",
        "Value": "ARCHIVED"
    }
],
```

**AWS Security Finding Format**

A standardized format for the contents of findings that Security Hub aggregates or generates. The AWS Security Finding Format enables you to use Security Hub to view and analyze findings that are generated by AWS security services, third-party solutions, or Security Hub itself from running security checks. For more information, see AWS Security Finding Format (ASFF) (p. 105).
Control

A safeguard or countermeasure prescribed for an information system or an organization designed to protect the confidentiality, integrity, and availability of its information and to meet a set of defined security requirements. A security standard consists of controls.

Custom action

A Security Hub mechanism for sending selected findings to EventBridge. A custom action is created in Security Hub. It is then linked to an EventBridge rule. The rule defines a specific action to take when a finding is received that is associated with the custom action ID. Custom actions can be used, for example, to send a specific finding, or a small set of findings, to a response or remediation workflow. For more information, see the section called “Creating a custom action (console)” (p. 719).

Finding

The observable record of a security check or security-related detection.

For more information about findings in Security Hub, see Findings (p. 92).

Note
Findings are deleted 90 days after the most recent update or 90 days after the creation date if no update occurs. To store findings for longer than 90 days, you can configure a rule in EventBridge that routes findings to your Amazon S3 bucket.

Finding ingestion

The import of findings into Security Hub from other AWS services and from third-party partner providers.

Finding ingestion events include both new findings and updates to existing findings.

Insight

A collection of related findings defined by an aggregation statement and optional filters. An insight identifies a security area that requires attention and intervention. Security Hub offers several managed (default) insights that you can't modify. You can also create custom Security Hub insights to track security issues that are unique to your AWS environment and usage. For more information, see Insights (p. 79).

Related requirements

A set of industry or regulatory requirements that are mapped to a control.

Rule

A set of automated criteria that is used to assess whether a control is being adhered to. When a rule is evaluated, it can pass or fail. If the evaluation cannot determine whether rule passes or fails, then the rule is in a warning state. If the rule cannot be evaluated, then it is in a not available state.

Security check

A specific point-in-time evaluation of a rule against a single resource resulting in a passed, failed, warning, or not available state. Running a security check produces a finding.

Security standard

A published statement on a topic specifying the characteristics, usually measurable and in the form of controls, that must be satisfied or achieved for compliance. Security standards can be based on regulatory frameworks, best practices, or internal company policies. To learn more about security standards in Security Hub, see Standards and controls (p. 481).

Workflow status

The status of an investigation into a finding. Tracked using the Workflow.Status attribute.
The workflow status is initially **NEW**. If you notified the resource owner to take action on the finding, you can set the workflow status to **NOTIFIED**. If the finding is not an issue, and does not require any action, set the workflow status to **SUPPRESSED**. After you review and remediate a finding, set the workflow status to **RESOLVED**.

By default, most finding lists only include findings with a workflow status of **NEW** or **NOTIFIED**. Finding lists for controls also include **RESOLVED** findings.

For the **GetFindings** operation, you can include a filter for the workflow status.

```json
"WorkflowStatus": [  
  {  
    "Comparison": "EQUALS",  
    "Value": "RESOLVED"  
  }],
```

The Security Hub console provides an option to set the workflow status for findings. Customers (or SIEM, ticketing, incident management, or SOAR tools working on behalf of a customer to update findings from finding providers) can also use **BatchUpdateFindings** to update the workflow status.
Prerequisites and recommendations

You must have an AWS account to enable AWS Security Hub. If you don't have an account, use the following procedure to create one.

**To sign up for AWS**

2. Follow the online instructions.

   Part of the sign-up procedure involves receiving a phone call and entering a verification code on the phone keypad.

Security Hub strongly recommends that you enable AWS Organizations. Using Organizations to manage your accounts streamlines the process of managing member accounts.

Security Hub requires that AWS Config is enabled in all accounts that have Security Hub enabled. Security Hub controls use AWS Config rules to complete security checks.

**Topics**

- Using AWS Organizations to manage accounts (p. 7)
- Enabling and configuring AWS Config (p. 7)

Using AWS Organizations to manage accounts

To help automate and streamline management of accounts, Security Hub strongly recommends that you enable AWS Organizations.

If you have Organizations enabled, then Security Hub automatically detects new accounts as they are added to your organization.

For information on setting up Organizations, see Creating and managing an organization in the [AWS Organizations User Guide](https://docs.aws.amazon.com/organizations/latest/userguide/).

After you set up your organization, your organization management account designates the Security Hub administrator account. See the section called “Designating a Security Hub administrator account” (p. 63). The Security Hub administrator account then enables and manages other organization accounts as Security Hub member accounts. See the section called “Managing organization member accounts” (p. 67).

Enabling and configuring AWS Config

AWS Security Hub uses service-linked AWS Config rules to perform most of its security checks for controls.

To support these controls, AWS Config must be enabled on all accounts – both the master account and member accounts – in each Region where Security Hub is enabled. AWS Config must be configured to record at a minimum the resources that are required for the standards that you have enabled.

- the section called “Required AWS Config resources” (p. 503)
Security Hub recommends that you enable resource recording in AWS Config before you enable Security Hub standards. If Security Hub tries to run security checks when resource recording is not enabled, the checks return errors.

Security Hub does not manage AWS Config for you. If you already have AWS Config enabled, you can continue to configure its settings through the AWS Config console or APIs.

If you enable AWS Config after you enable a standard, Security Hub still creates the AWS Config rules, but only if you enable AWS Config within 31 days after you enable the standard. If you do not enable AWS Config within 31 days, then you must disable and re-enable the standard after you enable AWS Config.

After you enable a standard, Security Hub tries to create the AWS Config rules up to six times during the 31 days.

- On the day you enable the standard
- The day after you enable the standard
- Three days after you enable the standard
- Seven days after you enable the standard
- 15 days after you enable the standard
- 31 days after you enable the standard

**How to enable AWS Config**

If you do not have AWS Config enabled, you can enable it manually using the console or API. See Getting started with AWS Config in the AWS Config Developer Guide.

To more easily enable AWS Config across a larger set of accounts, you can use the AWS CloudFormation template Enable AWS Config. To get access to the template, see AWS CloudFormation StackSets sample templates in the AWS CloudFormation User Guide. For more details on using this template, see the blog post Managing AWS Organizations accounts using AWS Config and AWS CloudFormation StackSets.

Security Hub offers a script in GitHub that allows you to enable multiple accounts across Regions. This script is useful if you are not integrated with Organizations, or if you have accounts that are not part of your organization. When you use this script to enable Security Hub, it also enables AWS Config for those accounts.

**Configuring resource recording in AWS Config**

When you enable resource recording as part of enabling AWS Config, choose to record the required resources that are supported in a given Region. You only need to record global resources in a single Region.

If you do not record global resources in all Regions, then in the Regions where you do not record global resources, you must disable the control the section called “2.5 – Ensure AWS Config is enabled” (p. 518). CIS 2.5 generates failed findings in Regions where global resources are not recorded. For details about other controls that you may want to disable in Regions where global resources are not recorded, see the following topics.

- the section called “Controls that you might want to disable” (p. 552)
- the section called “Controls that you might want to disable” (p. 607)
• the section called “Controls that you might want to disable” (p. 707)

Note that if you use the multi-account script to enable Security Hub, it automatically enables resource recording for all resources, including global resources, in all Regions. It does not limit recording of global resources to a single Region. You can then update the configuration to only record global resources in a single Region. See Selecting which resources AWS Config records in the AWS Config Developer Guide.

The following topics list the required resources for each standard. You can enable recording only for the required resources. However, Security Hub continues to add new controls and support new resources.

• the section called “Required AWS Config resources” (p. 503)
• the section called “Required AWS Config resources” (p. 553)
• the section called “Required AWS Config resources” (p. 608)

For details about the costs associated with resource recording, see the AWS Config pricing page.
## Quotas

The following AWS Security Hub quotas are per AWS account per Region.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Quota</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Security Hub member accounts</td>
<td>5000</td>
<td>The maximum number of Security Hub member accounts that can be added per administrator account per Region. This is a hard quota. You cannot request an increase to the allowed number of Security Hub member accounts.</td>
</tr>
<tr>
<td>Number of Security Hub outstanding invitations</td>
<td>1000</td>
<td>The maximum number of outstanding Security Hub member account invitations that can be sent per administrator account per Region. This is a hard quota. You cannot request an increase to the allowed number of Security Hub outstanding invitations.</td>
</tr>
<tr>
<td>Number of Security Hub custom insights</td>
<td>100</td>
<td>The maximum number of user-defined custom Security Hub insights that can be created per account per Region. This is a hard quota. You cannot request an increase to the allowed number of Security Hub custom insights.</td>
</tr>
<tr>
<td>Number of insight results</td>
<td>100</td>
<td>The maximum number of aggregated results returned for the <code>GetInsightsResults</code> API operation. This is a hard quota. You cannot request an increase to the number of insight results.</td>
</tr>
<tr>
<td>Number of custom actions</td>
<td>50</td>
<td>The maximum number of custom actions that can be created per account per Region. This is a hard quota. You cannot request an increase to the number of custom actions.</td>
</tr>
</tbody>
</table>
Supported Regions

To view the Regions that AWS Security Hub is available in, see Security Hub Service Endpoints.

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  - AWS GovCloud (US-East) (p. 32)
  - AWS GovCloud (US-West) (p. 34)

Integrations not supported in all Regions

Some integrations are not available in all Regions. If an integration is not supported, it is not listed on the Integrations page.

Integrations that are supported in China (Beijing) and China (Ningxia)

The China (Beijing) and China (Ningxia) Regions only support the following integrations with AWS services (p. 465):
• AWS Firewall Manager
• Amazon GuardDuty
• IAM Access Analyzer
• Systems Manager Explorer and OpsCenter
• Systems Manager Patch Manager

The China (Beijing) and China (Ningxia) Regions only support the following third-party integrations (p. 468):

• Cloud Custodian
• FireEye Helix
• Helecloud
• IBM QRadar
• PagerDuty
• Palo Alto Networks Cortex XSOAR
• Palo Alto Networks VM-Series
• Prowler
• RSA Archer
• Splunk Enterprise
• Splunk Phantom
• ThreatModeler

Integrations that are supported in AWS GovCloud (US-East) and AWS GovCloud (US-West)

The AWS GovCloud (US-East) and AWS GovCloud (US-West) Regions only support the following integrations with AWS services (p. 465):

• Amazon Detective
• AWS Firewall Manager
• Amazon GuardDuty
• Amazon Inspector
• IAM Access Analyzer

The AWS GovCloud (US-East) and AWS GovCloud (US-West) Regions only support the following third-party integrations (p. 468):

• Atlassian Jira Service Manager
• Atlassian OpsGenie
• Caveonix Cloud
• Cloud Custodian
• Cloud Storage Security Antivirus for Amazon S3
• cloudtamer.io
• CrowdStrike Falcon
• FireEye Helix
• Forcepoint CASB
• Forcepoint DLP
Controls that are not supported in all Regions

The following Regions do not support all of the Security Hub controls. For each Region, the list provides the controls that are not supported.

**US East (Ohio)**

The following controls are not supported in US East (Ohio).

- the section called “AWS Foundational Security Best Practices standard” (p. 607)
  - the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)
  - the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)
  - the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)
  - the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)
  - the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)
  - the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)
  - the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

**US West (N. California)**

The following controls are not supported in US West (N. California).
the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

US West (Oregon)

The following controls are not supported in US West (Oregon).

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

Africa (Cape Town)

The following controls are not supported in Africa (Cape Town).

the section called “CIS AWS Foundations Benchmark” (p. 502)

the section called “1.4 – Ensure access keys are rotated every 90 days or less” (p. 507)

the section called “1.12 – Ensure no root account access key exists” (p. 510)

the section called “1.20 - Ensure a support role has been created to manage incidents with AWS Support” (p. 513)
the section called “4.1 – Ensure no security groups allow ingress from 0.0.0.0/0 to port 22” (p. 550)

the section called “4.2 – Ensure no security groups allow ingress from 0.0.0.0/0 to port 3389” (p. 550)

the section called “Payment Card Industry Data Security Standard (PCI DSS)” (p. 553)

the section called “[PCI.CodeBuild.1] CodeBuild GitHub or Bitbucket source repository URLs should use OAuth” (p. 559)

the section called “[PCI.CodeBuild.2] CodeBuild project environment variables should not contain clear text credentials” (p. 560)

the section called “[PCI.DMS.1] AWS Database Migration Service replication instances should not be public” (p. 565)

the section called “[PCI.EC2.1] Amazon EBS snapshots should not be publicly restorable” (p. 567)

the section called “[PCI.EC2.4] Unused EC2 EIPs should be removed” (p. 570)

the section called “[PCI.EC2.5] Security groups should not allow ingress from 0.0.0.0/0 to port 22” (p. 571)

the section called “[PCI.ELBV2.1] Application Load Balancer should be configured to redirect all HTTP requests to HTTPS” (p. 573)

the section called “[PCI.GuardDuty.1] GuardDuty should be enabled” (p. 576)

the section called “[PCI.IAM.1] IAM root user access key should not exist” (p. 577)

the section called “[PCI.RDS.1] RDS snapshots should prohibit public access” (p. 590)

the section called “[PCI.SageMaker.1] Amazon SageMaker notebook instances should not have direct internet access” (p. 601)

the section called “[PCI.SSM.1] Amazon EC2 instances managed by Systems Manager should have a patch compliance status of COMPLIANT after a patch installation” (p. 603)

the section called “[PCI.SSM.2] Instances managed by Systems Manager should have an association compliance status of COMPLIANT” (p. 604)

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[ACM.1] Imported ACM certificates should be renewed after a specified time period” (p. 609)

the section called “[APIGateway.1] API Gateway REST and WebSocket API logging should be enabled” (p. 610)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)
the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)
the section called “[CodeBuild.1] CodeBuild GitHub or Bitbucket source repository URLs should use OAuth” (p. 624)
the section called “[CodeBuild.2] CodeBuild project environment variables should not contain clear text credentials” (p. 624)
the section called “[DMS.1] AWS Database Migration Service replication instances should not be public” (p. 627)
the section called “[EC2.1] Amazon EBS snapshots should not be public, determined by the ability to be restorable by anyone” (p. 629)
the section called “[EC2.3] Attached EBS volumes should be encrypted at rest” (p. 631)
the section called “[EC2.4] Stopped EC2 instances should be removed after a specified time period” (p. 631)
the section called “[EC2.8] EC2 instances should use IMDSv2” (p. 634)
the section called “[EFS.1] Amazon EFS should be configured to encrypt file data at rest using AWS KMS” (p. 642)
the section called “[EFS.2] Amazon EFS volumes should be in backup plans” (p. 643)
the section called “[ELB.4] Application load balancers should be configured to drop HTTP headers” (p. 646)
the section called “[ELBv2.1] Application Load Balancer should be configured to redirect all HTTP requests to HTTPS” (p. 648)
the section called “[EMR.1] Amazon EMR cluster master nodes should not have public IP addresses” (p. 649)
the section called “[ES.3] Elasticsearch domains should encrypt data sent between nodes” (p. 651)
the section called “[GuardDuty.1] GuardDuty should be enabled” (p. 654)
the section called “[IAM.3] IAM users' access keys should be rotated every 90 days or less” (p. 657)
the section called “[IAM.4] IAM root user access key should not exist” (p. 658)
the section called “[RDS.1] RDS snapshots should be private” (p. 668)
the section called “[RDS.9] Database logging should be enabled” (p. 673)
the section called “[RDS.10] IAM authentication should be configured for RDS instances” (p. 676)
the section called “[RDS.14] Amazon Aurora clusters should have backtracking enabled” (p. 678)
the section called “[Redshift.3] Amazon Redshift clusters should have automatic snapshots enabled” (p. 687)
the section called “[S3.1] S3 Block Public Access setting should be enabled” (p. 689)
the section called “[SageMaker.1] SageMaker notebook instances should not have direct internet access” (p. 695)
the section called “[SSM.2] All EC2 instances managed by Systems Manager should be compliant with patching requirements” (p. 702)
Asia Pacific (Hong Kong)

The following controls are not supported in Asia Pacific (Hong Kong).

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[RDS.10] IAM authentication should be configured for RDS instances” (p. 676)

the section called “[RDS.14] Amazon Aurora clusters should have backtracking enabled” (p. 678)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

Asia Pacific (Mumbai)

The following controls are not supported in Asia Pacific (Mumbai).

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)
Asia Pacific (Osaka)

The following controls are not supported in Asia Pacific (Osaka).

the section called “CIS AWS Foundations Benchmark” (p. 502)

the section called “1.12 – Ensure no root account access key exists” (p. 510)

the section called “1.20 - Ensure a support role has been created to manage incidents with AWS Support” (p. 513)

the section called “4.1 – Ensure no security groups allow ingress from 0.0.0.0/0 to port 22” (p. 550)

the section called “4.2 – Ensure no security groups allow ingress from 0.0.0.0/0 to port 3389” (p. 550)

the section called “Payment Card Industry Data Security Standard (PCI DSS)” (p. 553)

the section called “[PCI.CodeBuild.1] CodeBuild GitHub or Bitbucket source repository URLs should use OAuth” (p. 559)

the section called “[PCI.CodeBuild.2] CodeBuild project environment variables should not contain clear text credentials” (p. 560)

the section called “[PCI.DMS.1] AWS Database Migration Service replication instances should not be public” (p. 565)

the section called “[PCI.EC2.1] Amazon EBS snapshots should not be publicly restorable” (p. 567)

the section called “[PCI.EC2.5] Security groups should not allow ingress from 0.0.0.0/0 to port 22” (p. 571)

the section called “[PCI.ELBV2.1] Application Load Balancer should be configured to redirect all HTTP requests to HTTPS” (p. 573)

the section called “[PCI.ES.1] Elasticsearch domains should be in a VPC” (p. 574)

the section called “[PCI.ES.2] Elasticsearch domains should have encryption at rest enabled” (p. 576)

the section called “[PCI.GuardDuty.1] GuardDuty should be enabled” (p. 576)

the section called “[PCI.IAM.1] IAM root user access key should not exist” (p. 577)

the section called “[PCI.Lambda.1] Lambda functions should prohibit public access” (p. 587)

the section called “[PCI.Lambda.2] Lambda functions should be in a VPC” (p. 588)

the section called “[PCI.RDS.1] RDS snapshots should prohibit public access” (p. 590)

the section called “[PCI.Redshift.1] Amazon Redshift clusters should prohibit public access” (p. 593)

the section called “[PCI.S3.6] S3 Block Public Access setting should be enabled” (p. 600)

the section called “[PCI.SageMaker.1] Amazon SageMaker notebook instances should not have direct internet access” (p. 601)

the section called “[PCI.SSM.1] Amazon EC2 instances managed by Systems Manager should have a patch compliance status of COMPLIANT after a patch installation” (p. 603)
instances managed by Systems Manager should have an association compliance status of COMPLIANT” (p. 604)

the section called “AWS Foundational Security Best Practices standard” (p. 607)

API Gateway REST API stages should be configured to use SSL certificates for backend authentication” (p. 610)

API Gateway REST API stages should have AWS X-Ray tracing enabled” (p. 611)

API Gateway should be associated with an AWS WAF web ACL” (p. 611)

CloudFront distributions should have a default root object configured” (p. 613)

CloudFront distributions should have origin access identity enabled” (p. 614)

CloudFront distributions should require encryption in transit” (p. 615)

CloudFront distributions should have origin failover configured” (p. 616)

CloudFront distributions should have logging enabled” (p. 617)

CloudFront distributions should have AWS WAF enabled” (p. 619)

EC2 subnets should not automatically assign public IP addresses” (p. 637)

Unused network access control lists should be removed” (p. 638)

EC2 instances should not use multiple ENIs” (p. 638)

Security groups should only allow unrestricted incoming traffic for authorized ports” (p. 639)

Amazon ECS task definitions should have secure networking modes and user definitions” (p. 641)

Amazon ECS services should not have public IP addresses assigned to them automatically” (p. 642)

Elastic Beanstalk environments should have enhanced health reporting enabled” (p. 644)

Elastic Beanstalk managed platform updates should be enabled” (p. 644)

Application load balancers should be configured to drop HTTP headers” (p. 646)

IAM customer managed policies that you create should not allow wildcard actions for services” (p. 662)

AWS KMS keys should not be unintentionally deleted” (p. 665)
the section called “[RDS.9] Database logging should be enabled” (p. 673)
the section called “[RDS.10] IAM authentication should be configured for RDS instances” (p. 676)
the section called “[RDS.12] IAM authentication should be configured for RDS clusters” (p. 676)
the section called “[RDS.13] RDS automatic minor version upgrades should be enabled” (p. 677)
the section called “[RDS.14] Amazon Aurora clusters should have backtracking enabled” (p. 678)
the section called “[RDS.15] RDS DB clusters should be configured for multiple Availability Zones” (p. 679)
the section called “[Redshift.3] Amazon Redshift clusters should have automatic snapshots enabled” (p. 687)
the section called “[Redshift.7] Amazon Redshift clusters should use enhanced VPC routing” (p. 689)
the section called “[S3.8] S3 Block Public Access setting should be enabled at the bucket level” (p. 695)
the section called “[SecretsManager.3] Remove unused Secrets Manager secrets” (p. 698)
the section called “[SecretsManager.4] Secrets Manager secrets should be rotated within a specified number of days” (p. 699)
the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

Asia Pacific (Seoul)

The following controls are not supported in Asia Pacific (Seoul).

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)
the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)
the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)
the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)
the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)
the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)
the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

Asia Pacific (Singapore)

The following controls are not supported in Asia Pacific (Singapore).
Asia Pacific (Sydney)

The following controls are not supported in Asia Pacific (Sydney).

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

Asia Pacific (Tokyo)

The following controls are not supported in Asia Pacific (Tokyo).

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)
the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

Canada (Central)

The following controls are not supported in Canada (Central).

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

China (Beijing)

The following controls are not supported in China (Beijing).

the section called “CIS AWS Foundations Benchmark” (p. 502)

the section called “1.13 – Ensure MFA is enabled for the "root" account " (p. 511)

the section called “1.14 – Ensure hardware MFA is enabled for the "root" account “ (p. 511)

the section called “Payment Card Industry Data Security Standard (PCI DSS)” (p. 553)

the section called “[PCI.GuardDuty.1] GuardDuty should be enabled” (p. 576)

the section called “[PCI.IAM.4] Hardware MFA should be enabled for the root user” (p. 581)

the section called “[PCI.IAM.5] Virtual MFA should be enabled for the root user” (p. 582)
the section called “[PCI.Lambda.1] Lambda functions should prohibit public access” (p. 587)
the section called “[PCI.Lambda.2] Lambda functions should be in a VPC” (p. 588)
the section called “[PCI.SageMaker.1] Amazon SageMaker notebook instances should not have direct internet access” (p. 601)

the section called “AWS Foundational Security Best Practices standard” (p. 607)
the section called “[ACM.1] Imported ACM certificates should be renewed after a specified time period” (p. 609)
the section called “[APIGateway.2] API Gateway REST API stages should be configured to use SSL certificates for backend authentication” (p. 610)
the section called “[APIGateway.3] API Gateway REST API stages should have AWS X-Ray tracing enabled” (p. 611)
the section called “[APIGateway.4] API Gateway should be associated with an AWS WAF web ACL” (p. 611)
the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)
the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)
the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)
the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)
the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)
the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)
the section called “[EC2.15] EC2 subnets should not automatically assign public IP addresses” (p. 637)
the section called “[EC2.16] Unused network access control lists should be removed” (p. 638)
the section called “[ECS.1] Amazon ECS task definitions should have secure networking modes and user definitions” (p. 641)
the section called “[ElasticBeanstalk.1] Elastic Beanstalk environments should have enhanced health reporting enabled” (p. 644)
the section called “[ElasticBeanstalk.2] Elastic Beanstalk managed platform updates should be enabled” (p. 644)
the section called “[ES.3] Elasticsearch domains should encrypt data sent between nodes” (p. 651)
the section called “[ES.4] Elasticsearch domain error logging to CloudWatch Logs should be enabled” (p. 651)
the section called “[GuardDuty.1] GuardDuty should be enabled” (p. 654)
the section called “[IAM.6] Hardware MFA should be enabled for the root user” (p. 659)
the section called “[IAM.21] IAM customer managed policies that you create should not allow wildcard actions for services” (p. 662)
the section called “[Lambda.1] Lambda function policies should prohibit public access” (p. 666)
the section called “[Lambda.2] Lambda functions should use supported runtimes” (p. 667)
the section called “[RDS.7] RDS clusters should have deletion protection enabled” (p. 672)
the section called “[RDS.10] IAM authentication should be configured for RDS instances” (p. 676)
the section called “[RDS.12] IAM authentication should be configured for RDS clusters” (p. 676)
the section called “[RDS.13] RDS automatic minor version upgrades should be enabled” (p. 677)
the section called “[RDS.14] Amazon Aurora clusters should have backtracking enabled” (p. 678)
the section called “[RDS.15] RDS DB clusters should be configured for multiple Availability Zones” (p. 679)
the section called “[RDS.16] RDS DB clusters should be configured to copy tags to snapshots” (p. 680)
the section called “[Redshift.7] Amazon Redshift clusters should use enhanced VPC routing” (p. 689)
the section called “[S3.8] S3 Block Public Access setting should be enabled at the bucket level” (p. 695)
the section called “[SageMaker.1] SageMaker notebook instances should not have direct internet access” (p. 695)
the section called “[SecretsManager.3] Remove unused Secrets Manager secrets” (p. 698)
the section called “[SecretsManager.4] Secrets Manager secrets should be rotated within a specified number of days” (p. 699)
the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

China (Ningxia)

The following controls are not supported in China (Ningxia).

the section called “CIS AWS Foundations Benchmark” (p. 502)

the section called “1.13 – Ensure MFA is enabled for the "root" account " (p. 511)
the section called “1.14 – Ensure hardware MFA is enabled for the "root" account " (p. 511)
the section called “Payment Card Industry Data Security Standard (PCI DSS)” (p. 553)

the section called “[PCI.GuardDuty.1] GuardDuty should be enabled” (p. 576)
the section called “[PCI.IAM.4] Hardware MFA should be enabled for the root user” (p. 581)
the section called “[PCI.IAM.5] Virtual MFA should be enabled for the root user” (p. 582)
the section called “[PCI.Lambda.1] Lambda functions should prohibit public access” (p. 587)
the section called “[PCI.Lambda.2] Lambda functions should be in a VPC” (p. 588)
the section called “[PCI.SageMaker.1] Amazon SageMaker notebook instances should not have direct internet access” (p. 601)
the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[ACM.1] Imported ACM certificates should be renewed after a specified time period” (p. 609)

the section called “[APIGateway.2] API Gateway REST API stages should be configured to use SSL certificates for backend authentication” (p. 610)

the section called “[APIGateway.3] API Gateway REST API stages should have AWS X-Ray tracing enabled” (p. 611)

the section called “[APIGateway.4] API Gateway should be associated with an AWS WAF web ACL” (p. 611)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[EC2.15] EC2 subnets should not automatically assign public IP addresses” (p. 637)

the section called “[EC2.16] Unused network access control lists should be removed” (p. 638)

the section called “[ECS.1] Amazon ECS task definitions should have secure networking modes and user definitions” (p. 641)

the section called “[ElasticBeanstalk.1] Elastic Beanstalk environments should have enhanced health reporting enabled” (p. 644)

the section called “[ElasticBeanstalk.2] Elastic Beanstalk managed platform updates should be enabled” (p. 644)

the section called “[ES.3] Elasticsearch domains should encrypt data sent between nodes” (p. 651)

the section called “[ES.4] Elasticsearch domain error logging to CloudWatch Logs should be enabled” (p. 651)

the section called “[GuardDuty.1] GuardDuty should be enabled” (p. 654)

the section called “[IAM.6] Hardware MFA should be enabled for the root user” (p. 659)

the section called “[IAM.21] IAM customer managed policies that you create should not allow wildcard actions for services” (p. 662)

the section called “[Lambda.1] Lambda function policies should prohibit public access” (p. 666)

the section called “[Lambda.2] Lambda functions should use supported runtimes” (p. 667)
the section called “[RDS.7] RDS clusters should have deletion protection enabled” (p. 672)
the section called “[RDS.9] Database logging should be enabled” (p. 673)
the section called “[RDS.10] IAM authentication should be configured for RDS instances” (p. 676)
the section called “[RDS.12] IAM authentication should be configured for RDS clusters” (p. 676)
the section called “[RDS.13] RDS automatic minor version upgrades should be enabled” (p. 677)
the section called “[RDS.14] Amazon Aurora clusters should have backtracking enabled” (p. 678)
the section called “[RDS.15] RDS DB clusters should be configured for multiple Availability Zones” (p. 679)
the section called “[Redshift.3] Amazon Redshift clusters should have automatic snapshots enabled” (p. 687)
the section called “[Redshift.7] Amazon Redshift clusters should use enhanced VPC routing” (p. 689)
the section called “[S3.8] S3 Block Public Access setting should be enabled at the bucket level” (p. 695)
the section called “[SageMaker.1] SageMaker notebook instances should not have direct internet access” (p. 695)
the section called “[SecretsManager.3] Remove unused Secrets Manager secrets” (p. 698)
the section called “[SecretsManager.4] Secrets Manager secrets should be rotated within a specified number of days” (p. 699)
the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

Europe (Frankfurt)

The following controls are not supported in Europe (Frankfurt).

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)
the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)
the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)
the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)
the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)
the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)
the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)
Europe (Ireland)

The following controls are not supported in Europe (Ireland).

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

Europe (London)

The following controls are not supported in Europe (London).

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

Europe (Milan)

The following controls are not supported in Europe (Milan).

the section called “CIS AWS Foundations Benchmark” (p. 502)

the section called “1.4 – Ensure access keys are rotated every 90 days or less ” (p. 507)
the section called “1.20 - Ensure a support role has been created to manage incidents with AWS Support” (p. 513)

the section called “4.1 – Ensure no security groups allow ingress from 0.0.0.0/0 to port 22” (p. 550)

the section called “4.2 – Ensure no security groups allow ingress from 0.0.0.0/0 to port 3389” (p. 550)

the section called “Payment Card Industry Data Security Standard (PCI DSS)” (p. 553)

the section called “[PCI.CodeBuild.1] CodeBuild GitHub or Bitbucket source repository URLs should use OAuth” (p. 559)

the section called “[PCI.CodeBuild.2] CodeBuild project environment variables should not contain clear text credentials” (p. 560)

the section called “[PCI.DMS.1] AWS Database Migration Service replication instances should not be public” (p. 565)

the section called “[PCI.EC2.1] Amazon EBS snapshots should not be publicly restorable” (p. 567)

the section called “[PCI.EC2.4] Unused EC2 EIPs should be removed” (p. 570)

the section called “[PCI.EC2.5] Security groups should not allow ingress from 0.0.0.0/0 to port 22” (p. 571)

the section called “[PCI.ELBV2.1] Application Load Balancer should be configured to redirect all HTTP requests to HTTPS” (p. 573)

the section called “[PCI.GuardDuty.1] GuardDuty should be enabled” (p. 576)

the section called “[PCI.RDS.1] RDS snapshots should prohibit public access” (p. 590)

the section called “[PCI.S3.6] S3 Block Public Access setting should be enabled” (p. 600)

the section called “[PCI.SageMaker.1] Amazon SageMaker notebook instances should not have direct internet access” (p. 601)

the section called “[PCI.SSM.1] Amazon EC2 instances managed by Systems Manager should have a patch compliance status of COMPLIANT after a patch installation” (p. 603)

the section called “[PCI.SSM.2] Instances managed by Systems Manager should have an association compliance status of COMPLIANT” (p. 604)

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[ACM.1] Imported ACM certificates should be renewed after a specified time period” (p. 609)

the section called “[APIGateway.1] API Gateway REST and WebSocket API logging should be enabled” (p. 610)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)
the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[CodeBuild.1] CodeBuild GitHub or Bitbucket source repository URLs should use OAuth” (p. 624)

the section called “[CodeBuild.2] CodeBuild project environment variables should not contain clear text credentials” (p. 624)

the section called “[DMS.1] AWS Database Migration Service replication instances should not be public” (p. 627)

the section called “[EC2.1] Amazon EBS snapshots should not be public, determined by the ability to be restorable by anyone” (p. 629)

the section called “[EC2.3] Attached EBS volumes should be encrypted at rest” (p. 631)

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the section called “[EFS.2] Amazon EFS volumes should be in backup plans” (p. 643)

the section called “[ELB.4] Application load balancers should be configured to drop HTTP headers” (p. 646)

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the section called “[GuardDuty.1] GuardDuty should be enabled” (p. 654)

the section called “[IAM.3] IAM users’ access keys should be rotated every 90 days or less” (p. 657)

the section called “[KMS.3] AWS KMS keys should not be unintentionally deleted” (p. 665)

the section called “[RDS.1] RDS snapshots should be private” (p. 668)

the section called “[RDS.9] Database logging should be enabled” (p. 673)

the section called “[RDS.14] Amazon Aurora clusters should have backtracking enabled” (p. 678)

the section called “[Redshift.2] Connections to Amazon Redshift clusters should be encrypted in transit” (p. 686)

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the section called “[S3.1] S3 Block Public Access setting should be enabled” (p. 689)

the section called “[SageMaker.1] SageMaker notebook instances should not have direct internet access” (p. 695)

the section called “[SSM.2] All EC2 instances managed by Systems Manager should be compliant with patching requirements” (p. 702)

the section called “[SSM.3] Instances managed by Systems Manager should have an association compliance status of COMPLIANT ” (p. 703)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

Europe (Paris)

The following controls are not supported in Europe (Paris).

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

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the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

Europe (Stockholm)

The following controls are not supported in Europe (Stockholm).

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)
the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[RDS.14] Amazon Aurora clusters should have backtracking enabled” (p. 678)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

Middle East (Bahrain)

The following controls are not supported in Middle East (Bahrain).

the section called “Payment Card Industry Data Security Standard (PCI DSS)” (p. 553)

the section called “[PCI.GuardDuty.1] GuardDuty should be enabled” (p. 576)

the section called “[PCI.S3.6] S3 Block Public Access setting should be enabled” (p. 600)

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[GuardDuty.1] GuardDuty should be enabled” (p. 654)

the section called “[RDS.7] RDS clusters should have deletion protection enabled” (p. 672)

the section called “[RDS.12] IAM authentication should be configured for RDS clusters” (p. 676)

the section called “[RDS.14] Amazon Aurora clusters should have backtracking enabled” (p. 678)

the section called “[RDS.15] RDS DB clusters should be configured for multiple Availability Zones” (p. 679)

the section called “[RDS.16] RDS DB clusters should be configured to copy tags to snapshots” (p. 680)

the section called “[Redshift.6] Amazon Redshift should have automatic upgrades to major versions enabled” (p. 688)

the section called “[S3.1] S3 Block Public Access setting should be enabled” (p. 689)

the section called “[SSM.2] All EC2 instances managed by Systems Manager should be compliant with patching requirements” (p. 702)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)
South America (São Paulo)

The following controls are not supported in South America (São Paulo).

- the section called “AWS Foundational Security Best Practices standard” (p. 607)
- the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)
- the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)
- the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)
- the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)
- the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)
- the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)
- the section called “[RDS.7] RDS clusters should have deletion protection enabled” (p. 672)
- the section called “[RDS.12] IAM authentication should be configured for RDS clusters” (p. 676)
- the section called “[RDS.14] Amazon Aurora clusters should have backtracking enabled” (p. 678)
- the section called “[RDS.15] RDS DB clusters should be configured for multiple Availability Zones” (p. 679)
- the section called “[RDS.16] RDS DB clusters should be configured to copy tags to snapshots” (p. 680)
- the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

AWS GovCloud (US-East)

The following controls are not supported in AWS GovCloud (US-East).

- the section called “CIS AWS Foundations Benchmark” (p. 502)
- the section called “1.13 – Ensure MFA is enabled for the "root" account " (p. 511)
- the section called “1.14 – Ensure hardware MFA is enabled for the "root" account " (p. 511)
- the section called “Payment Card Industry Data Security Standard (PCI DSS)” (p. 553)
- the section called “[PCI.CodeBuild.1] CodeBuild GitHub or Bitbucket source repository URLs should use OAuth” (p. 559)
- the section called “[PCI.CodeBuild.2] CodeBuild project environment variables should not contain clear text credentials” (p. 560)
- the section called “[PCI.GuardDuty.1] GuardDuty should be enabled” (p. 576)
- the section called “[PCI.IAM.4] Hardware MFA should be enabled for the root user” (p. 581)
- the section called “[PCI.IAM.5] Virtual MFA should be enabled for the root user” (p. 582)
the section called “[PCI.SageMaker.1] Amazon SageMaker notebook instances should not have direct internet access” (p. 601)

the section called “AWS Foundational Security Best Practices standard” (p. 607)

the section called “[APIGateway.2] API Gateway REST API stages should be configured to use SSL certificates for backend authentication” (p. 610)

the section called “[APIGateway.3] API Gateway REST API stages should have AWS X-Ray tracing enabled” (p. 611)

the section called “[APIGateway.4] API Gateway should be associated with an AWS WAF web ACL” (p. 611)

the section called “[CloudFront.1] CloudFront distributions should have a default root object configured” (p. 613)

the section called “[CloudFront.2] CloudFront distributions should have origin access identity enabled” (p. 614)

the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[CodeBuild.1] CodeBuild GitHub or Bitbucket source repository URLs should use OAuth” (p. 624)

the section called “[CodeBuild.2] CodeBuild project environment variables should not contain clear text credentials” (p. 624)

the section called “[DynamoDB.1] DynamoDB tables should automatically scale capacity with demand” (p. 627)

the section called “[EC2.15] EC2 subnets should not automatically assign public IP addresses” (p. 637)

the section called “[EC2.16] Unused network access control lists should be removed” (p. 638)

the section called “[EC2.17] EC2 instances should not use multiple ENIs” (p. 638)

the section called “[ECS.1] Amazon ECS task definitions should have secure networking modes and user definitions” (p. 641)

the section called “[EFS.2] Amazon EFS volumes should be in backup plans” (p. 643)

the section called “[ElasticBeanstalk.1] Elastic Beanstalk environments should have enhanced health reporting enabled” (p. 644)

the section called “[ElasticBeanstalk.2] Elastic Beanstalk managed platform updates should be enabled” (p. 644)

the section called “[ES.4] Elasticsearch domain error logging to CloudWatch Logs should be enabled” (p. 651)

the section called “[GuardDuty.1] GuardDuty should be enabled” (p. 654)
the section called “[IAM.6] Hardware MFA should be enabled for the root user” (p. 659)
the section called “[IAM.21] IAM customer managed policies that you create should not allow wildcard actions for services” (p. 662)
the section called “[RDS.12] IAM authentication should be configured for RDS clusters” (p. 676)
the section called “[RDS.13] RDS automatic minor version upgrades should be enabled” (p. 677)
the section called “[RDS.14] Amazon Aurora clusters should have backtracking enabled” (p. 678)
the section called “[RDS.15] RDS DB clusters should be configured for multiple Availability Zones” (p. 679)
the section called “[Redshift.7] Amazon Redshift clusters should use enhanced VPC routing” (p. 689)
the section called “[S3.8] S3 Block Public Access setting should be enabled at the bucket level” (p. 695)
the section called “[SecretsManager.3] Remove unused Secrets Manager secrets” (p. 698)
the section called “[SecretsManager.4] Secrets Manager secrets should be rotated within a specified number of days” (p. 699)
the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)

AWS GovCloud (US-West)

The following controls are not supported in AWS GovCloud (US-West).

the section called “CIS AWS Foundations Benchmark” (p. 502)
the section called “1.13 – Ensure MFA is enabled for the "root" account ” (p. 511)
the section called “1.14 – Ensure hardware MFA is enabled for the "root" account ” (p. 511)
the section called “Payment Card Industry Data Security Standard (PCI DSS)” (p. 553)
the section called “[PCI.CodeBuild.1] CodeBuild GitHub or Bitbucket source repository URLs should use OAuth” (p. 559)
the section called “[PCI.CodeBuild.2] CodeBuild project environment variables should not contain clear text credentials” (p. 560)
the section called “[PCI.IAM.4] Hardware MFA should be enabled for the root user” (p. 581)
the section called “[PCI.IAM.5] Virtual MFA should be enabled for the root user” (p. 582)
the section called “AWS Foundational Security Best Practices standard” (p. 607)
the section called “[APIGateway.2] API Gateway REST API stages should be configured to use SSL certificates for backend authentication” (p. 610)
the section called “[APIGateway.3] API Gateway REST API stages should have AWS X-Ray tracing enabled” (p. 611)
the section called “[APIGateway.4] API Gateway should be associated with an AWS WAF web ACL” (p. 611)
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the section called “[CloudFront.3] CloudFront distributions should require encryption in transit” (p. 615)

the section called “[CloudFront.4] CloudFront distributions should have origin failover configured” (p. 616)

the section called “[CloudFront.5] CloudFront distributions should have logging enabled” (p. 617)

the section called “[CloudFront.6] CloudFront distributions should have AWS WAF enabled” (p. 619)

the section called “[CodeBuild.1] CodeBuild GitHub or Bitbucket source repository URLs should use OAuth” (p. 624)

the section called “[CodeBuild.2] CodeBuild project environment variables should not contain clear text credentials” (p. 624)

the section called “[DynamoDB.1] DynamoDB tables should automatically scale capacity with demand” (p. 627)

the section called “[EC2.15] EC2 subnets should not automatically assign public IP addresses” (p. 637)

the section called “[EC2.16] Unused network access control lists should be removed” (p. 638)

the section called “[EC2.17] EC2 instances should not use multiple ENIs” (p. 638)

the section called “[ECS.1] Amazon ECS task definitions should have secure networking modes and user definitions” (p. 641)

the section called “[EFS.2] Amazon EFS volumes should be in backup plans” (p. 643)

the section called “[ElasticBeanstalk.1] Elastic Beanstalk environments should have enhanced health reporting enabled” (p. 644)

the section called “[ElasticBeanstalk.2] Elastic Beanstalk managed platform updates should be enabled” (p. 644)

the section called “[ES.4] Elasticsearch domain error logging to CloudWatch Logs should be enabled” (p. 651)

the section called “[IAM.6] Hardware MFA should be enabled for the root user” (p. 659)

the section called “[IAM.21] IAM customer managed policies that you create should not allow wildcard actions for services” (p. 662)

the section called “[RDS.12] IAM authentication should be configured for RDS clusters” (p. 676)

the section called “[RDS.13] RDS automatic minor version upgrades should be enabled” (p. 677)

the section called “[RDS.14] Amazon Aurora clusters should have backtracking enabled” (p. 678)

the section called “[RDS.15] RDS DB clusters should be configured for multiple Availability Zones” (p. 679)

the section called “[Redshift.7] Amazon Redshift clusters should use enhanced VPC routing” (p. 689)
the section called “[S3.8] S3 Block Public Access setting should be enabled at the bucket level” (p. 695)

the section called “[SecretsManager.3] Remove unused Secrets Manager secrets” (p. 698)

the section called “[SecretsManager.4] Secrets Manager secrets should be rotated within a specified number of days” (p. 699)

the section called “[WAF.1] AWS WAF Classic global web ACL logging should be enabled” (p. 704)
Setting up AWS Security Hub

If you are integrated with AWS Organizations, accounts that belong to the organization do not need to enable Security Hub manually.

The organization management account designates the Security Hub administrator account. The Security Hub administrator account then has Security Hub enabled automatically. The organization management account does not need to enable Security Hub. See the section called “Designating a Security Hub administrator account” (p. 63).

The Security Hub administrator account chooses the organization accounts to enable as member accounts. Those accounts also have Security Hub enabled automatically. See the section called “Managing organization member accounts” (p. 67). The exception to this is the organization management account. The organization management account must enable Security Hub before the Security Hub administrator account enables the organization management account as a member account.

An account that is not part of an organization must enable Security Hub manually. The Security Hub administrator-member relationship is then established through manual invitations that the administrator account sends to the member accounts. See the section called “Managing member accounts that are not in an organization” (p. 70).

For both types of enablement, you need to enable AWS Config, which is needed for the security checks against security controls. See the section called “Enabling AWS Config” (p. 7).

Contents
• Enabling Security Hub manually (p. 37)
  • Attaching the required IAM policy to the IAM identity (p. 37)
  • Enabling Security Hub (console) (p. 38)
  • Enabling Security Hub (Security Hub API, AWS CLI) (p. 38)
  • Enabling Security Hub (Multi-account script) (p. 38)
• Service-linked role assigned to Security Hub (p. 39)

Enabling Security Hub manually

After you attach the required policy to the IAM identity, you use that identity to enable Security Hub. You can enable Security Hub from the AWS Management Console or the API.

Security Hub also provides a script in GitHub that allows you to enable multiple accounts across Regions.

Attaching the required IAM policy to the IAM identity

The IAM identity (user, role, or group) that you use to enable Security Hub must have the required permissions.

If you enable the integration with AWS Organizations, then accounts in your organization have Security Hub enabled automatically. The required permissions also are handled automatically.

Accounts that are not managed using Organizations must enable Security Hub manually. The IAM identity (user, role, or group) that you use to enable Security Hub must have the required permissions.

To grant the permissions required to enable Security Hub, attach the Security Hub managed policy AWSSecurityHubFullAccess (p. 53) to an IAM user, group, or role.
Enabling Security Hub (console)

When you enable Security Hub from the console, you also have the option to enable the supported security standards.

To enable Security Hub

1. Use the credentials of the IAM identity to sign in to the Security Hub console.
2. When you open the Security Hub console for the first time, choose Get Started.

   To enable a standard, select its check box.

   To disable a standard, clear its check box.

   You can enable or disable a standard or its individual controls at any time. For information about the security standards and how to manage them, see Standards and controls (p. 481).

Enabling Security Hub (Security Hub API, AWS CLI)

To enable Security Hub, you can use an API call or the AWS Command Line Interface.

To enable Security Hub (Security Hub API, AWS CLI)

- Security Hub API – Use the EnableSecurityHub operation. When you enable Security Hub from the API, it automatically enables these security standards.
  - CIS AWS Foundations Benchmark
  - AWS Foundational Security Best Practices Standard

   If you do not want to enable these standards, then set EnableDefaultStandards to false.

   You can also use the Tags parameter to assign tag values to the hub resource.

- AWS CLI – At the command line, run the enable-security-hub command. To enable the default standards, include --enable-default-standards. To not enable the default standards, include --no-enable-default-standards.

```bash
aws securityhub enable-security-hub [--tags <tag values>] [--enable-default-standards | --no-enable-default-standards]
```

Example

```bash
aws securityhub enable-security-hub --enable-default-standards --tags '{"Department": "Security")'
```

After you enable Security Hub, you can enable or disable standards. See the section called “Disabling or enabling a security standard” (p. 491).

Enabling Security Hub (Multi-account script)

The Security Hub multi-account enablement script in GitHub allows you to enable Security Hub across accounts and Regions. The script also automates the process of sending invitations to member accounts and enabling AWS Config.
The script automatically enables resource recording for all resources, including global resources, in all Regions. It does not limit recording of global resources to a single Region.

There is a corresponding script to disable Security Hub across accounts and Regions. The readme file provides details on how to use the script. It includes the following information:

- How to add the required IAM policy to the accounts
- How to configure the execution environment
- How to run the script

## Service-linked role assigned to Security Hub

When you enable Security Hub, it is assigned a service-linked role named \texttt{AWSServiceRoleForSecurityHub}. This service-linked role includes the permissions and trust policy that Security Hub requires to do the following:

- Detect and aggregate findings from Amazon GuardDuty, Amazon Inspector, and Amazon Macie
- Configure the requisite AWS Config infrastructure to run security checks for the supported standards (in this release, CIS AWS Foundations)

To view the details of \texttt{AWSServiceRoleForSecurityHub}, on the Enable Security Hub page, choose View service role permissions. For more information, see Using service-linked roles for AWS Security Hub (p. 50).

For more information about service-linked roles, see Using service-linked roles in the IAM User Guide.
Security in AWS Security Hub

Cloud security at AWS is the highest priority. As an AWS customer, you benefit from a data center and network architecture that is built to meet the requirements of the most security-sensitive organizations.

Security is a shared responsibility between AWS and you. The shared responsibility model describes this as security of the cloud and security in the cloud:

- **Security of the cloud** – AWS is responsible for protecting the infrastructure that runs AWS services in the AWS Cloud. AWS also provides you with services that you can use securely. Third-party auditors regularly test and verify the effectiveness of our security as part of the AWS compliance programs. To learn about the compliance programs that apply to AWS Security Hub, see AWS Services in Scope by Compliance Program.
- **Security in the cloud** – Your responsibility is determined by the AWS service that you use. You are also responsible for other factors including the sensitivity of your data, your company’s requirements, and applicable laws and regulations.

This documentation helps you understand how to apply the shared responsibility model when using Security Hub. The following topics show you how to configure Security Hub to meet your security and compliance objectives. You also learn how to use other AWS services that help you to monitor and secure your Security Hub resources.

**Topics**
- Data protection in AWS Security Hub (p. 40)
- AWS Identity and Access Management for AWS Security Hub (p. 41)
- Using service-linked roles for AWS Security Hub (p. 50)
- AWS managed policies for AWS Security Hub (p. 52)
- Compliance validation for AWS Security Hub (p. 57)
- Infrastructure security in AWS Security Hub (p. 57)

Data protection in AWS Security Hub

The AWS shared responsibility model applies to data protection in AWS Security Hub. As described in this model, AWS is responsible for protecting the global infrastructure that runs all of the AWS Cloud. You are responsible for maintaining control over your content that is hosted on this infrastructure. This content includes the security configuration and management tasks for the AWS services that you use. For more information about data privacy, see the Data Privacy FAQ. For information about data protection in Europe, see the AWS Shared Responsibility Model and GDPR blog post on the AWS Security Blog.

For data protection purposes, we recommend that you protect AWS account credentials and set up individual user accounts with AWS Identity and Access Management (IAM). That way each user is given only the permissions necessary to fulfill their job duties. We also recommend that you secure your data in the following ways:

- Use multi-factor authentication (MFA) with each account.
- Use SSL/TLS to communicate with AWS resources. We recommend TLS 1.2 or later.
- Set up API and user activity logging with AWS CloudTrail.
- Use AWS encryption solutions, along with all default security controls within AWS services.
- Use advanced managed security services such as Amazon Macie, which assists in discovering and securing personal data that is stored in Amazon S3.
• If you require FIPS 140-2 validated cryptographic modules when accessing AWS through a command line interface or an API, use a FIPS endpoint. For more information about the available FIPS endpoints, see Federal Information Processing Standard (FIPS) 140-2.

We strongly recommend that you never put confidential or sensitive information, such as your customers’ email addresses, into tags or free-form fields such as a Name field. This includes when you work with Security Hub or other AWS services using the console, API, AWS CLI, or AWS SDKs. Any data that you enter into tags or free-form fields used for names may be used for billing or diagnostic logs. If you provide a URL to an external server, we strongly recommend that you do not include credentials information in the URL to validate your request to that server.

Security Hub is a multi-tenant service offering. To ensure data protection, Security Hub encrypts data at rest and data in transit between component services.

AWS Identity and Access Management for AWS Security Hub

AWS Identity and Access Management (IAM) is an AWS service that helps an administrator securely control access to AWS resources. IAM administrators control who can be authenticated (signed in) and authorized (have permissions) to use Security Hub resources. IAM is an AWS service that you can use with no additional charge.

Topics
• Audience (p. 41)
• Authenticating with identities (p. 42)
• AWS account root user (p. 42)
• IAM users and groups (p. 42)
• IAM roles (p. 42)
• Managing access using policies (p. 43)
• How AWS Security Hub works with IAM (p. 45)

Audience

How you use AWS Identity and Access Management (IAM) differs, depending on the work that you do in Security Hub.

Service user – If you use the Security Hub service to do your job, then your administrator provides you with the credentials and permissions that you need. As you use more Security Hub features to do your work, you might need additional permissions. Understanding how access is managed can help you request the right permissions from your administrator. If you cannot access a feature in Security Hub, see Troubleshooting AWS Security Hub identity and access (p. 49).

Service administrator – If you’re in charge of Security Hub resources at your company, you probably have full access to Security Hub. It’s your job to determine which Security Hub features and resources your employees should access. You must then submit requests to your IAM administrator to change the permissions of your service users. Review the information on this page to understand the basic concepts of IAM. To learn more about how your company can use IAM with Security Hub, see How AWS Security Hub works with IAM (p. 45).

IAM administrator – If you’re an IAM administrator, you might want to learn details about how you can write policies to manage access to Security Hub. To view example Security Hub identity-based policies that you can use in IAM, see AWS Security Hub identity-based policy examples (p. 47).
**Authenticating with identities**

Authentication is how you sign in to AWS using your identity credentials. For more information about signing in using the AWS Management Console, see [Signing in to the AWS Management Console as an IAM user or root user](https://docs.aws.amazon.com/IAM/latest/UserGuide/index.html) in the IAM User Guide.

You must be authenticated (signed in to AWS) as the AWS account root user, an IAM user, or by assuming an IAM role. You can also use your company's single sign-on authentication or even sign in using Google or Facebook. In these cases, your administrator previously set up identity federation using IAM roles.

When you access AWS using credentials from another company, you are assuming a role indirectly. To sign in directly to the AWS Management Console, use your password with your root user email address or your IAM user name. You can access AWS programmatically using your root user or IAM users access keys. AWS provides SDK and command line tools to cryptographically sign your request using your credentials. If you don't use AWS tools, you must sign the request yourself. Do this using Signature Version 4, a protocol for authenticating inbound API requests. For more information about authenticating requests, see Signature Version 4 signing process in the AWS General Reference.

Regardless of the authentication method that you use, you might also be required to provide additional security information. For example, AWS recommends that you use multi-factor authentication (MFA) to increase the security of your account. To learn more, see [Using multi-factor authentication (MFA) in AWS](https://docs.aws.amazon.com/IAM/latest/UserGuide/index.html) in the IAM User Guide.

**AWS account root user**

When you first create an AWS account, you begin with a single sign-in identity that has complete access to all AWS services and resources in the account. This identity is called the AWS account root user and is accessed by signing in with the email address and password that you used to create the account. We strongly recommend that you do not use the root user for your everyday tasks, even the administrative ones. Instead, adhere to the best practice of using the root user only to create your first IAM user. Then securely lock away the root user credentials and use them to perform only a few account and service management tasks.

**IAM users and groups**

An IAM user is an identity within your AWS account that has specific permissions for a single person or application. An IAM user can have long-term credentials such as a user name and password or a set of access keys. To learn how to generate access keys, see [Managing access keys for IAM users](https://docs.aws.amazon.com/IAM/latest/UserGuide/creating_access_keys.html) in the IAM User Guide. When you generate access keys for an IAM user, make sure you view and securely save the key pair. You cannot recover the secret access key in the future. Instead, you must generate a new access key pair.

An IAM group is an identity that specifies a collection of IAM users. You can't sign in as a group. You can use groups to specify permissions for multiple users at a time. Groups make permissions easier to manage for large sets of users. For example, you could have a group named IAMAdmins and give that group permissions to administer IAM resources.

Users are different from roles. A user is uniquely associated with one person or application, but a role is intended to be assumable by anyone who needs it. Users have permanent long-term credentials, but roles provide temporary credentials. To learn more, see [When to create an IAM user (instead of a role)](https://docs.aws.amazon.com/IAM/latest/UserGuide/when-to-create-an-iam-user-instead-of-a-role.html) in the IAM User Guide.

**IAM roles**

An IAM role is an identity within your AWS account that has specific permissions. It is similar to an IAM user, but is not associated with a specific person. You can temporarily assume an IAM role in the AWS
Management Console by switching roles. You can assume a role by calling an AWS CLI or AWS API operation or by using a custom URL. For more information about methods for using roles, see Using IAM roles in the IAM User Guide.

IAM roles with temporary credentials are useful in the following situations:

- **Temporary IAM user permissions** – An IAM user can assume an IAM role to temporarily take on different permissions for a specific task.
- **Federated user access** – Instead of creating an IAM user, you can use existing identities from AWS Directory Service, your enterprise user directory, or a web identity provider. These are known as federated users. AWS assigns a role to a federated user when access is requested through an identity provider. For more information about federated users, see Federated users and roles in the IAM User Guide.
- **Cross-account access** – You can use an IAM role to allow someone (a trusted principal) in a different account to access resources in your account. Roles are the primary way to grant cross-account access. However, with some AWS services, you can attach a policy directly to a resource (instead of using a role as a proxy). To learn the difference between roles and resource-based policies for cross-account access, see How IAM roles differ from resource-based policies in the IAM User Guide.
- **Cross-service access** – Some AWS services use features in other AWS services. For example, when you make a call in a service, it's common for that service to run applications in Amazon EC2 or store objects in Amazon S3. A service might do this using the calling principal's permissions, using a service role, or using a service-linked role.
- **Principal permissions** – When you use an IAM user or role to perform actions in AWS, you are considered a principal. Policies grant permissions to a principal. When you use some services, you might perform an action that then triggers another action in a different service. In this case, you must have permissions to perform both actions. To see whether an action requires additional dependent actions in a policy, see Actions, resources, and condition keys for AWS Security Hub in the Service Authorization Reference.
- **Service role** – A service role is an IAM role that a service assumes to perform actions on your behalf. An IAM administrator can create, modify, and delete a service role from within IAM. For more information, see Creating a role to delegate permissions to an AWS service in the IAM User Guide.
- **Service-linked role** – A service-linked role is a type of service role that is linked to an AWS service. The service can assume the role to perform an action on your behalf. Service-linked roles appear in your IAM account and are owned by the service. An IAM administrator can view, but not edit the permissions for service-linked roles.
- **Applications running on Amazon EC2** – You can use an IAM role to manage temporary credentials for applications that are running on an EC2 instance and making AWS CLI or AWS API requests. This is preferable to storing access keys within the EC2 instance. To assign an AWS role to an EC2 instance and make it available to all of its applications, you create an instance profile that is attached to the instance. An instance profile contains the role and enables programs that are running on the EC2 instance to get temporary credentials. For more information, see Using an IAM role to grant permissions to applications running on Amazon EC2 instances in the IAM User Guide.

To learn whether to use IAM roles or IAM users, see When to create an IAM role (instead of a user) in the IAM User Guide.

### Managing access using policies

You control access in AWS by creating policies and attaching them to IAM identities or AWS resources. A policy is an object in AWS that, when associated with an identity or resource, defines their permissions. You can sign in as the root user or an IAM user, or you can assume an IAM role. When you then make a request, AWS evaluates the related identity-based or resource-based policies. Permissions in the policies determine whether the request is allowed or denied. Most policies are stored in AWS as JSON documents. For more information about the structure and contents of JSON policy documents, see Overview of JSON policies in the IAM User Guide.
Administrators can use AWS JSON policies to specify who has access to what. That is, which principal can perform actions on what resources, and under what conditions.

Every IAM entity (user or role) starts with no permissions. In other words, by default, users can do nothing, not even change their own password. To give a user permission to do something, an administrator must attach a permissions policy to a user. Or the administrator can add the user to a group that has the intended permissions. When an administrator gives permissions to a group, all users in that group are granted those permissions.

IAM policies define permissions for an action regardless of the method that you use to perform the operation. For example, suppose that you have a policy that allows the `iam:GetRole` action. A user with that policy can get role information from the AWS Management Console, the AWS CLI, or the AWS API.

### Identity-based policies

Identity-based policies are JSON permissions policy documents that you can attach to an identity, such as an IAM user, group of users, or role. These policies control what actions users and roles can perform, on which resources, and under what conditions. To learn how to create an identity-based policy, see Creating IAM policies in the IAM User Guide.

Identity-based policies can be further categorized as inline policies or managed policies. Inline policies are embedded directly into a single user, group, or role. Managed policies are standalone policies that you can attach to multiple users, groups, and roles in your AWS account. Managed policies include AWS managed policies and customer managed policies. To learn how to choose between a managed policy or an inline policy, see Choosing between managed policies and inline policies in the IAM User Guide.

### Resource-based policies

Resource-based policies are JSON policy documents that you attach to a resource. Examples of resource-based policies are IAM role trust policies and Amazon S3 bucket policies. In services that support resource-based policies, service administrators can use them to control access to a specific resource. For the resource where the policy is attached, the policy defines what actions a specified principal can perform on that resource and under what conditions. You must specify a principal in a resource-based policy. Principals can include accounts, users, roles, federated users, or AWS services.

Resource-based policies are inline policies that are located in that service. You can’t use AWS managed policies from IAM in a resource-based policy.

### Other policy types

AWS supports additional, less-common policy types. These policy types can set the maximum permissions granted to you by the more common policy types.

- **Permissions boundaries** – A permissions boundary is an advanced feature in which you set the maximum permissions that an identity-based policy can grant to an IAM entity (IAM user or role). You can set a permissions boundary for an entity. The resulting permissions are the intersection of entity’s identity-based policies and its permissions boundaries. Resource-based policies that specify the user or role in the Principal field are not limited by the permissions boundary. An explicit deny in any of these policies overrides the allow. For more information about permissions boundaries, see Permissions boundaries for IAM entities in the IAM User Guide.

- **Service control policies (SCPs)** – SCPs are JSON policies that specify the maximum permissions for an organization or organizational unit (OU) in AWS Organizations. AWS Organizations is a service for grouping and centrally managing multiple AWS accounts that your business owns. If you enable all features in an organization, then you can apply service control policies (SCPs) to any or all of your accounts. The SCP limits permissions for entities in member accounts, including each AWS account root user. For more information about Organizations and SCPs, see How SCPs work in the AWS Organizations User Guide.
• **Session policies** – Session policies are advanced policies that you pass as a parameter when you programmatically create a temporary session for a role or federated user. The resulting session's permissions are the intersection of the user or role's identity-based policies and the session policies. Permissions can also come from a resource-based policy. An explicit deny in any of these policies overrides the allow. For more information, see *Session policies* in the *IAM User Guide*.

### Multiple policy types

When multiple types of policies apply to a request, the resulting permissions are more complicated to understand. To learn how AWS determines whether to allow a request when multiple policy types are involved, see *Policy evaluation logic* in the *IAM User Guide*.

### How AWS Security Hub works with IAM

Before you use IAM to manage access to Security Hub, you should understand what IAM features are available to use with Security Hub. To get a high-level view of how Security Hub and other AWS services work with IAM, see *AWS Services That Work with IAM* in the *IAM User Guide*.

**Topics**

- Security Hub identity-based policies (p. 45)
- Security Hub resource-based policies (Not supported) (p. 47)
- Authorization based on Security Hub tags (p. 47)
- Security Hub IAM roles (p. 47)
- Service-linked roles (p. 47)
- Service roles (p. 47)
- AWS Security Hub identity-based policy examples (p. 47)

### Security Hub identity-based policies

With IAM identity-based policies, you can specify allowed or denied actions and resources as well as the conditions under which actions are allowed or denied. Security Hub supports specific actions, resources, and condition keys. To learn about all of the elements that you use in a JSON policy, see *IAM JSON Policy Elements Reference* in the *IAM User Guide*.

**Actions**

Administrators can use AWS JSON policies to specify who has access to what. That is, which principal can perform actions on what resources, and under what conditions.

The Action element of a JSON policy describes the actions that you can use to allow or deny access in a policy. Policy actions usually have the same name as the associated AWS API operation. There are some exceptions, such as permission-only actions that don't have a matching API operation. There are also some operations that require multiple actions in a policy. These additional actions are called dependent actions.

Include actions in a policy to grant permissions to perform the associated operation.

Policy actions in Security Hub use the following prefix before the action: `securityhub:`. For example, to grant a user permission to enable Security Hub using the `EnableSecurityHub` API operation, you include the `securityhub:EnableSecurityHub` action in the policy assigned to that user. Policy statements must include either an Action or NotAction element. Security Hub defines its own set of actions that describe tasks that you can perform with this service.

To specify multiple actions in a single statement, separate them with commas as follows:
You can specify multiple actions using wildcards (*). For example, to specify all actions that begin with the word Get, include the following line in your policy:

```json
"Action": "securityhub:Get*"
```

To see a list of Security Hub actions, see Actions defined by AWS Security Hub in the Service Authorization Reference.

**Resources**

Administrators can use AWS JSON policies to specify who has access to what. That is, which principal can perform actions on what resources, and under what conditions.

The Resource JSON policy element specifies the object or objects to which the action applies. Statements must include either a Resource or a NotResource element. As a best practice, specify a resource using its Amazon Resource Name (ARN). You can do this for actions that support a specific resource type, known as resource-level permissions.

For actions that don't support resource-level permissions, such as listing operations, use a wildcard (*) to indicate that the statement applies to all resources.

```json
"Resource": "*"
```

For more information about the format of ARNs, see Amazon Resource Names (ARNs) and AWS Service Namespaces.

To see a list of Security Hub resource types and their ARNs, see Resource types defined by AWS Security Hub in the Service Authorization Reference. To learn with which actions you can specify the ARN of each resource, see Actions defined by AWS Security Hub.

**Condition keys**

Administrators can use AWS JSON policies to specify who has access to what. That is, which principal can perform actions on what resources, and under what conditions.

The Condition element (or Condition block) lets you specify conditions in which a statement is in effect. The Condition element is optional. You can create conditional expressions that use condition operators, such as equals or less than, to match the condition in the policy with values in the request.

If you specify multiple Condition elements in a statement, or multiple keys in a single Condition element, AWS evaluates them using a logical AND operation. If you specify multiple values for a single condition key, AWS evaluates the condition using a logical OR operation. All of the conditions must be met before the statement's permissions are granted.

You can also use placeholder variables when you specify conditions. For example, you can grant an IAM user permission to access a resource only if it is tagged with their IAM user name. For more information, see IAM policy elements: variables and tags in the IAM User Guide.

AWS supports global condition keys and service-specific condition keys. To see all AWS global condition keys, see AWS global condition context keys in the IAM User Guide.

Security Hub defines its own set of condition keys and also supports using some global condition keys. To see all AWS global condition keys, see AWS Global Condition Context Keys in the IAM User Guide.
Security Hub actions support the securityhub:TargetAccount condition key.

To control access to BatchUpdateFindings, Security Hub supports the securityhub:ASFFSyntaxPath condition key. For details on configuring access to BatchUpdateFindings, see the section called “Configuring access to BatchUpdateFindings” (p. 96).

To see a list of Security Hub condition keys, see Condition keys for AWS Security Hub in the Service Authorization Reference. To learn with which actions and resources you can use a condition key, see Actions defined by AWS Security Hub.

Security Hub resource-based policies (Not supported)

Security Hub does not support resource-based policies.

Authorization based on Security Hub tags

You can add tags to Security Hub resources or pass tags in a request to Security Hub. To control access based on tags, you provide tag information in the condition element of a policy using the securityhub:ResourceTag/key-name, aws:RequestTag/key-name, or aws:TagKeys condition keys.

Security Hub IAM roles

An IAM role is an entity within your AWS account that has specific permissions.

Using temporary credentials with Security Hub

You can use temporary credentials to sign in with federation, assume an IAM role, or to assume a cross-account role. You obtain temporary security credentials by calling AWS STS API operations such as AssumeRole or GetFederationToken.

Security Hub supports using temporary credentials.

Service-linked roles

Service-linked roles allow AWS services to access resources in other services to complete an action on your behalf. Service-linked roles appear in your IAM account and are owned by the service. An IAM administrator can view but not edit the permissions for service-linked roles.

Security Hub supports service-linked roles.

Service roles

This feature allows a service to assume a service role on your behalf. This role allows the service to access resources in other services to complete an action on your behalf. Service roles appear in your IAM account and are owned by the account. This means that an IAM administrator can change the permissions for this role. However, doing so might break the functionality of the service.

Security Hub supports service roles.

AWS Security Hub identity-based policy examples

By default, IAM users and roles don't have permission to create or modify Security Hub resources. They also can't perform tasks using the AWS Management Console, AWS CLI, or AWS API. An IAM administrator must create IAM policies that grant users and roles permission to perform specific API
operations on the specified resources they need. The administrator must then attach those policies to
the IAM users or groups that require those permissions.

To learn how to create an IAM identity-based policy using these example JSON policy documents, see
Creating Policies on the JSON Tab in the IAM User Guide.

Topics

• Policy best practices (p. 48)
• Using the Security Hub console (p. 48)
• Troubleshooting AWS Security Hub identity and access (p. 49)

Policy best practices

Identity-based policies are very powerful. They determine whether someone can create, access, or delete
Security Hub resources in your account. These actions can incur costs for your AWS account. When you
create or edit identity-based policies, follow these guidelines and recommendations:

• Get started using AWS managed policies – To start using Security Hub quickly, use AWS managed
  policies to give your employees the permissions they need. These policies are already available in
  your account and are maintained and updated by AWS. For more information, see Get started using
  permissions with AWS managed policies in the IAM User Guide.

• Grant least privilege – When you create custom policies, grant only the permissions required
to perform a task. Start with a minimum set of permissions and grant additional permissions as
necessary. Doing so is more secure than starting with permissions that are too lenient and then trying
to tighten them later. For more information, see Grant least privilege in the IAM User Guide.

• Enable MFA for sensitive operations – For extra security, require IAM users to use multi-factor
  authentication (MFA) to access sensitive resources or API operations. For more information, see Using
  multi-factor authentication (MFA) in AWS in the IAM User Guide.

• Use policy conditions for extra security – To the extent that it's practical, define the conditions under
  which your identity-based policies allow access to a resource. For example, you can write conditions
to specify a range of allowable IP addresses that a request must come from. You can also write conditions
to allow requests only within a specified date or time range, or to require the use of SSL or MFA. For
  more information, see IAM JSON policy elements: Condition in the IAM User Guide.

Using the Security Hub console

To access the AWS Security Hub console, you must have a minimum set of permissions. These
permissions must allow you to list and view details about the Security Hub resources in your AWS
account. If you create an identity-based policy that is more restrictive than the minimum required
permissions, the console won't function as intended for entities (IAM users or roles) with that policy.

To ensure that those entities can still use the Security Hub console, also attach the following AWS
managed policy to the entities. For more information, see Adding permissions to a user in the IAM User
Guide:

```json
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "securityhub:*",
      "Resource": "*"
    },
    {
      "Effect": "Allow",
      "Action": "iam:CreateServiceLinkedRole",
      "Resource": "*"
    }
  ]
}
```

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You don't need to allow minimum console permissions for users that are making calls only to the AWS CLI or the AWS API. Instead, allow access to only the actions that match the API operation that you're trying to perform.

Troubleshooting AWS Security Hub identity and access

Use the following information to help you diagnose and fix common issues that you might encounter when working with Security Hub and IAM.

Topics

• I am not authorized to perform an action in Security Hub (p. 49)
• I am not authorized to perform iam:PassRole (p. 49)
• I want to view my access keys (p. 50)
• I'm an administrator and want to allow others to access Security Hub (p. 50)
• I want to allow people outside My AWS account to access my Security Hub resources (p. 50)

I am not authorized to perform an action in Security Hub

If the AWS Management Console tells you that you're not authorized to perform an action, then you must contact your administrator for assistance. Your administrator is the person that provided you with your user name and password.

The following example error occurs when the mateojackson IAM user tries to use the console to view details about a widget but does not have securityhub:GetWidget permissions.

User: arn:aws:iam::123456789012:user/mateojackson is not authorized to perform: securityhub:GetWidget on resource: my-example-widget

In this case, Mateo asks his administrator to update his policies to allow him to access the my-example-widget resource using the securityhub:GetWidget action.

I am not authorized to perform iam:PassRole

If you receive an error that you're not authorized to perform the iam:PassRole action, then you must contact your administrator for assistance. Your administrator is the person that provided you with your user name and password. Ask that person to update your policies to allow you to pass a role to Security Hub.

Some AWS services allow you to pass an existing role to that service, instead of creating a new service role or service-linked role. To do this, you must have permissions to pass the role to the service.

The following example error occurs when an IAM user named marymajor tries to use the console to perform an action in Security Hub. However, the action requires the service to have permissions granted by a service role. Mary does not have permissions to pass the role to the service.

User: arn:aws:iam::123456789012:user/marymajor is not authorized to perform: iam:PassRole
In this case, Mary asks her administrator to update her policies to allow her to perform the `iam:PassRole` action.

I want to view my access keys

After you create your IAM user access keys, you can view your access key ID at any time. However, you can’t view your secret access key again. If you lose your secret key, you must create a new access key pair.

Access keys consist of two parts: an access key ID (for example, `AKIAIOSFODNN7EXAMPLE`) and a secret access key (for example, `wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY`). Like a user name and password, you must use both the access key ID and secret access key together to authenticate your requests. Manage your access keys as securely as you do your user name and password.

**Important**

Do not provide your access keys to a third party, even to help find your canonical user ID. By doing this, you might give someone permanent access to your account.

When you create an access key pair, you are prompted to save the access key ID and secret access key in a secure location. The secret access key is available only at the time you create it. If you lose your secret access key, you must add new access keys to your IAM user. You can have a maximum of two access keys. If you already have two, you must delete one key pair before creating a new one. To view instructions, see Managing access keys in the *IAM User Guide*.

I’m an administrator and want to allow others to access Security Hub

To allow others to access Security Hub, you must create an IAM entity (user or role) for the person or application that needs access. They will use the credentials for that entity to access AWS. You must then attach a policy to the entity that grants them the correct permissions in Security Hub.

To get started right away, see Creating your first IAM delegated user and group in the *IAM User Guide*.

I want to allow people outside My AWS account to access my Security Hub resources

You can create a role that users in other accounts or people outside of your organization can use to access your resources. You can specify who is trusted to assume the role. For services that support resource-based policies or access control lists (ACLs), you can use those policies to grant people access to your resources.

To learn more, consult the following:

- To learn whether Security Hub supports these features, see How AWS Security Hub works with IAM (p. 45).
- To learn how to provide access to your resources across AWS accounts that you own, see Providing access to an IAM user in another AWS account that you own in the *IAM User Guide*.
- To learn how to provide access to your resources to third-party AWS accounts, see Providing access to AWS accounts owned by third parties in the *IAM User Guide*.
- To learn how to provide access through identity federation, see Providing access to externally authenticated users (identity federation) in the *IAM User Guide*.
- To learn the difference between using roles and resource-based policies for cross-account access, see How IAM roles differ from resource-based policies in the *IAM User Guide*.

Using service-linked roles for AWS Security Hub

AWS Security Hub uses AWS Identity and Access Management (IAM) service-linked roles. A service-linked role is a unique type of IAM role that is linked directly to Security Hub. Service-linked roles are
predefined by Security Hub and include all the permissions that Security Hub requires to call other AWS services on your behalf.

A service-linked role makes setting up Security Hub easier because you don't have to manually add the necessary permissions. Security Hub defines the permissions of its service-linked role, and unless the permissions are defined otherwise, only Security Hub can assume the role. The defined permissions include the trust policy and the permissions policy, and you can't attach that permissions policy to any other IAM entity.

Security Hub supports using service-linked roles in all of the Regions where Security Hub is available. For more information, see Supported Regions (p. 11).

You can delete the Security Hub service-linked role only after first disabling Security Hub in all Regions where it's enabled. This protects your Security Hub resources because you can't inadvertently remove permissions to access them.

For information about other services that support service-linked roles, see AWS services that work with IAM in the IAM User Guide and locate the services that have Yes in the Service-Linked Role column. Choose a Yes with a link to view the service-linked role documentation for that service.

### Service-linked role permissions for Security Hub

Security Hub uses the service-linked role named AWSServiceRoleForSecurityHub. It's a service-linked role required for AWS Security Hub to access your resources.

The AWSServiceRoleForSecurityHub service-linked role trusts the following services to assume the role:

- securityhub.amazonaws.com

The AWSServiceRoleForSecurityHub service-linked role uses the managed policy AWSSecurityHubServiceRolePolicy (p. 55).

You must configure permissions to allow an IAM entity (such as a user, group, or role) to create, edit, or delete a service-linked role. For the AWSServiceRoleForSecurityHub service-linked role to be successfully created, the IAM identity that you use Security Hub with must have the required permissions. To grant the required permissions, attach the following policy to this IAM user, group, or role.

```json
{
   "Version": "2012-10-17",
   "Statement": [
      {
         "Effect": "Allow",
         "Action": "securityhub:*",
         "Resource": "*"
      },
      {
         "Effect": "Allow",
         "Action": "iam:CreateServiceLinkedRole",
         "Resource": "*",
         "Condition": {
            "StringLike": {
               "iam:AWSServiceName": "securityhub.amazonaws.com"
            }
         }
      }
   ]
}
```
Creating a service-linked role for Security Hub

The AWSServiceRoleForSecurityHub service-linked role is automatically created when you enable Security Hub for the first time or enable Security Hub in a supported Region where you previously didn't have it enabled. You can also create the AWSServiceRoleForSecurityHub service-linked role manually using the IAM console, the IAM CLI, or the IAM API.

**Important**
The service-linked role that is created for the Security Hub administrator account doesn't apply to the Security Hub member accounts.

For more information about creating the role manually, see Creating a service-linked role in the *IAM User Guide*.

Editing a service-linked role for Security Hub

Security Hub doesn't allow you to edit the AWSServiceRoleForSecurityHub service-linked role. After you create a service-linked role, you can't change the name of the role because various entities might reference the role. However, you can edit the description of the role by using IAM. For more information, see Editing a service-linked role in the *IAM User Guide*.

Deleting a service-linked role for Security Hub

If you no longer need to use a feature or service that requires a service-linked role, we recommend that you delete that role. That way, you don't have an unused entity that isn't actively monitored or maintained.

**Important**
To delete the AWSServiceRoleForSecurityHub service-linked role, you must first disable Security Hub in all Regions where it's enabled.

If Security Hub isn't disabled when you try to delete the service-linked role, the deletion fails.

For more information, see Disabling AWS Security Hub (p. 722).

When you disable Security Hub, the AWSServiceRoleForSecurityHub service-linked role is not automatically deleted. If you enable Security Hub again, it starts using the existing AWSServiceRoleForSecurityHub service-linked role.

**To manually delete the service-linked role using IAM**

Use the IAM console, the IAM CLI, or the IAM API to delete the AWSServiceRoleForSecurityHub service-linked role. For more information, see Deleting a service-linked role in the *IAM User Guide*.

AWS managed policies for AWS Security Hub

To add permissions to users, groups, and roles, it is easier to use AWS managed policies than to write policies yourself. It takes time and expertise to create IAM customer managed policies that provide your team with only the permissions they need. To get started quickly, you can use our AWS managed policies. These policies cover common use cases and are available in your AWS account. For more information about AWS managed policies, see AWS managed policies in the *IAM User Guide*.

AWS services maintain and update AWS managed policies. You can't change the permissions in AWS managed policies. Services occasionally add additional permissions to an AWS managed policy to support new features. This type of update affects all identities (users, groups, and roles) where the policy is attached. Services are most likely to update an AWS managed policy when a new feature is launched.
or when new operations become available. Services do not remove permissions from an AWS managed policy, so policy updates won’t break your existing permissions.

Additionally, AWS supports managed policies for job functions that span multiple services. For example, the ViewOnlyAccess AWS managed policy provides read-only access to many AWS services and resources. When a service launches a new feature, AWS adds read-only permissions for new operations and resources. For a list and descriptions of job function policies, see AWS managed policies for job functions in the IAM User Guide.

**AWS managed policy: AWSSecurityHubFullAccess**

You can attach the AWSSecurityHubFullAccess policy to your IAM identities.

This policy grants administrative permissions that allow a principal full access to all Security Hub actions. This policy must be attached to a principal before they enable Security Hub manually for their account. For example, principals with these permissions can both view and update the status of findings. They can configure custom insights, and enable integrations. They can enable and disable standards and controls. Principals for an administrator account can also manage member accounts.

Permissions details

This policy includes the following permissions.

- **securityhub** – Allows principals full access to all Security Hub actions.
- **iam** – Allows principals to create a service-linked role.

```
{
   "Version": "2012-10-17",
   "Statement": [
       {
           "Effect": "Allow",
           "Action": "securityhub:*",
           "Resource": "*"
       },
       {
           "Effect": "Allow",
           "Action": "iam:CreateServiceLinkedRole",
           "Resource": "*",
           "Condition": {
               "StringLike": {
                   "iam:AWSServiceName": "securityhub.amazonaws.com"
               }
           }
       }
   ]
}
```

**Security Hub managed policy: AWSSecurityHubReadOnlyAccess**

You can attach the AWSSecurityHubReadOnlyAccess policy to your IAM identities.

This policy grants read-only permissions that allow users to view information in Security Hub. Principals with this policy attached cannot make any updates in Security Hub. For example, principals with these permissions can view the list of findings associated with their account, but cannot change the status of
a finding. They can view the results of insights, but cannot create or configure custom insights. They cannot configure controls or product integrations.

Permissions details

This policy includes the following permissions.

- `securityhub` - Allows users to perform actions that return either a list of items or details about an item. This includes API operations that start with `Get`, `List`, or `Describe`.

```json
{
  "Version": "2012-10-17",
  "Statement": [  
    {  
      "Effect": "Allow",
      "Action": [  
        "securityhub:Get*",
        "securityhub:List*",
        "securityhub:Describe*"
      ],
      "Resource": "*"
    }
  ]
}
```

AWS managed policy: AWSSecurityHubOrganizationsAccess

You can attach the `AWSSecurityHubOrganizationsAccess` policy to your IAM identities.

This policy grants administrative permissions in AWS Organizations that are required to support the Security Hub integration with Organizations.

These permissions allow the organization management account to designate the delegated administrator account for Security Hub. They also allow the delegated Security Hub administrator account to enable organization accounts as member accounts.

This policy only provides the permissions for Organizations. The organization management account and delegated Security Hub administrator account also require permissions for the associated actions in Security Hub. These permissions can be granted using the `AWSSecurityHubFullAccess` managed policy.

Permissions details

This policy includes the following permissions.

- `organizations:ListAccounts` - Allows principals to retrieve the list of accounts that belong to an organization.
- `organizations:DescribeOrganization` - Allows principals to retrieve information about the organization configuration.
- `organizations:EnableAWSServiceAccess` - Allows principals to enable the Security Hub integration with Organizations.
- `organizations:RegisterDelegatedAdministrator` - Allows principals to designate the delegated administrator account for Security Hub.
- `organizations:DeregisterDelegatedAdministrator` - Allows principals to remove the delegated administrator account for Security Hub.
AWS managed policy: AWSSecurityHubServiceRolePolicy

You can't attach AWSSecurityHubServiceRolePolicy to your IAM entities. This policy is attached to a service-linked role that allows Security Hub to perform actions on your behalf. For more information, see the section called "Using service-linked roles" (p. 50).

This policy grants administrative permissions that allow the service-linked role to perform the security checks for Security Hub controls.

Permissions details

This policy includes permissions to do the following:

- **cloudtrail** – Retrieve information about CloudTrail trails.
- **cloudwatch** – Retrieve the current CloudWatch alarms.
- **logs** – Retrieve the metric filters for CloudWatch logs.
- **sns** – Retrieve the list of subscriptions to an SNS topic.
- **config** – Retrieve information about configuration recorders, resources, and AWS Config rules. Also allows the service-linked role to create and delete AWS Config rules, and to run evaluations against the rules.
- **iam** – Get and generate credential reports for accounts.
• organizations – Retrieve account information for an organization.

```
{
   "Version": "2012-10-17",
   "Statement": [
   {
      "Effect": "Allow",
      "Action": [
      "cloudtrail:DescribeTrails",
      "cloudtrail:GetTrailStatus",
      "cloudtrail:GetEventSelectors",
      "cloudwatch:DescribeAlarms",
      "logs:DescribeMetricFilters",
      "sns:ListSubscriptionsByTopic",
      "config:DescribeConfigurationRecorders",
      "config:DescribeConfigurationRecorderStatus",
      "config:DescribeConfigRules",
      "config:BatchGetResourceConfig",
      "config:PutEvaluations",
      "config:SelectResourceConfig",
      "iam:GenerateCredentialReport",
      "iam:GetCredentialReport",
      "organizations:ListAccounts",
      "organizations:DescribeAccount",
      "organizations:DescribeOrganization"
      ],
      "Resource": "**"
   },
   {
      "Effect": "Allow",
      "Action": [
      "config:PutConfigRule",
      "config:DeleteConfigRule",
      "config:GetComplianceDetailsByConfigRule",
      "config:DescribeConfigRuleEvaluationStatus"
      ],
      "Resource": "arn:aws:config:*:*:config-rule/aws-service-rule/*securityhub*"
   }
   ]
}
```

Security Hub updates to AWS managed policies

View details about updates to AWS managed policies for Security Hub since this service began tracking these changes. For automatic alerts about changes to this page, subscribe to the RSS feed on the Security Hub Document history (p. 724) page.

<table>
<thead>
<tr>
<th>Change</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWSSecurityHubServiceRolePolicy</td>
<td>Security Hub moved the existing config:PutEvaluations permission to a different statement within the policy. The config:PutEvaluations permission is now applied to all resources.</td>
<td>July 14, 2021</td>
</tr>
</tbody>
</table>
Compliance validation for AWS Security Hub

Third-party auditors assess the security and compliance of AWS Security Hub as part of multiple AWS compliance programs. These include SOC, PCI, FedRAMP, HIPAA, and others.

For a list of AWS services in scope of specific compliance programs, see AWS Services in Scope by Compliance Program. For general information, see AWS Compliance Programs.

You can download third-party audit reports using AWS Artifact. For more information, see Downloading reports in AWS Artifact.

Your compliance responsibility when using Security Hub is determined by the sensitivity of your data, your company's compliance objectives, and applicable laws and regulations. AWS provides the following resources to help with compliance:

- **Security and Compliance Quick Start Guides** – These deployment guides discuss architectural considerations and provide steps for deploying security- and compliance-focused baseline environments on AWS.
- **AWS Compliance Resources** – This collection of workbooks and guides might apply to your industry and location.
- **AWS Config** – This AWS service assesses how well your resource configurations comply with internal practices, industry guidelines, and regulations.
- **AWS Security Hub** – This AWS service provides a comprehensive view of your security state within AWS that helps you check your compliance with security industry standards and best practices.

Infrastructure security in AWS Security Hub

As a managed service, AWS Security Hub is protected by the AWS global network security procedures that are described in the Amazon Web Services: Overview of Security Processes whitepaper.

You use AWS published API calls to access Security Hub through the network. Clients must support Transport Layer Security (TLS) 1.0 or later. We recommend TLS 1.2 or later. Clients must also support
cipher suites with perfect forward secrecy (PFS) such as Ephemeral Diffie-Hellman (DHE) or Elliptic Curve Ephemeral Diffie-Hellman (ECDHE). Most modern systems such as Java 7 and later support these modes.

Additionally, requests must be signed by using an access key ID and a secret access key that is associated with an IAM principal. Or you can use the AWS Security Token Service (AWS STS) to generate temporary security credentials to sign requests.
Managing administrator and member accounts

An AWS Security Hub administrator account can view data from and manage configuration for its member accounts. The Security Hub administrator-member relationship is established differently based on whether the accounts belong to an organization in AWS Organizations.

If you are integrated with Organizations, the organization management account designates the Security Hub administrator account. See the section called “Designating a Security Hub administrator account” (p. 63). The administrator account automatically has access to all of the accounts in the organization. The administrator account determines which accounts in the organization to enable as member accounts. See the section called “Managing organization member accounts” (p. 67). These member accounts cannot disassociate themselves from the administrator account.

If you are not integrated with Organizations, member accounts accept an invitation from an administrator account. The Security Hub administrator account for an organization can also invite member accounts that are not part of the organization. See the section called “Managing member accounts that are not in an organization” (p. 70). Accounts that are added by invitation can disassociate themselves from their administrator account.

Topics
- Restrictions and recommendations (p. 59)
- Making the transition to AWS Organizations for account management (p. 60)
- Allowed actions for accounts (p. 62)
- Designating a Security Hub administrator account (p. 63)
- Managing member accounts that belong to an organization (p. 67)
- Managing member accounts that are not in an organization (p. 70)
- Effect of account actions on Security Hub data (p. 77)

Restrictions and recommendations

Maximum number of member accounts

Security Hub supports up to 5,000 member accounts per administrator account in each Region.

Accounts and Regions

If you use AWS Organizations to manage accounts, the organization management account designates the Security Hub administrator account. The designated administrator account must be the same in all Regions. However, the organization management account must designate the administrator account separately in each Region. The administrator account also manages member accounts separately for each Region.
For member accounts created by invitation, the administrator-member account association is created only in the Region that the invitation is sent from. The administrator account must enable Security Hub in each Region that you want to use it in. The administrator account then invites each account to associate as a member account in that Region.

**Restrictions on administrator-member relationships**

An account cannot be a Security Hub administrator account and member account at the same time.

A member account can only be associated with one administrator account. If an organization account is enabled by the Security Hub administrator account, the account cannot accept an invitation from another account. If an account has accepted an invitation, the account cannot be enabled by the Security Hub administrator account for the organization. It also cannot receive invitations from other accounts.

For the manual invitation process, accepting a membership invitation is optional.

**Coordinating administrator accounts across services**

Security Hub aggregates findings from various AWS services, such as Amazon GuardDuty, Amazon Inspector, and Amazon Macie. Security Hub also allows users to pivot from a GuardDuty finding to start an investigation in Amazon Detective.

However, the administrator-member relationships that you set up in these other services do not automatically apply to Security Hub. Security Hub recommends that you use the same account as the administrator account for all of these services. This administrator account should be an account that is responsible for security tools. The same account should also be the aggregator account for AWS Config.

For example, a user from the GuardDuty administrator account A can see findings for GuardDuty member accounts B and C on the GuardDuty console. If account A then enables Security Hub, users from account A do not automatically see GuardDuty findings for accounts B and C in Security Hub. A Security Hub administrator-member relationship is also required for these accounts.

To do this, make account A the Security Hub administrator account and enable accounts B and C to become Security Hub member accounts.

**Making the transition to AWS Organizations for account management**

You might have an existing administrator account with member accounts that accepted a manual invitation. If you are enrolled in AWS Organizations, use the following steps to use Organizations to enable and manage member accounts instead of using the manual invitation process:

1. Designate a Security Hub administrator account for your organization. (p. 61)
2. Enable organization accounts under the administrator account. Existing member accounts are enabled automatically. (p. 61)

The following diagram shows an overview of the administrator and member account structure before the transition, the configuration in Organizations, and the account structure after the transition.
Designate a Security Hub administrator account for your organization

Your organization management account designates the Security Hub administrator account for your organization. See the section called “Designating a Security Hub administrator account” (p. 63).

To make the transition simpler, Security Hub recommends that you choose the current administrator account as the Security Hub administrator account for the organization. This is because a member account cannot belong to more than one administrator account. The administrator account for the organization cannot enable any organization accounts that are member accounts under another administrator account.

Enable organization accounts as member accounts

The administrator account for the organization determines which organization accounts to enable as member accounts. See the section called “Managing organization member accounts” (p. 67).

On the Accounts page, the administrator account sees all of the accounts in the organization. Organization accounts have a type of By organization, even if they were previously member accounts by invitation.

If the administrator account for the organization was already a Security Hub administrator account, all of their existing member accounts are enabled automatically. Existing member accounts that do not belong to the organization have a type of By invitation.

The Accounts page also provides an option to automatically enable new accounts as they are added to an organization. See the section called “Enabling new accounts automatically” (p. 68). The option is initially turned off (Auto-enable is off).
Until you enable that option, the Accounts page displays a message that contains an Enable button. When you choose **Enable**, Security Hub performs the following actions:

- Enables all of the organization accounts, except for accounts that are member accounts under another administrator account.

  Before the administrator account can enable those accounts, they must be disassociated from the other administrator account. See the section called “Disassociating member accounts” (p. 75).

- Toggles the setting to enable new accounts automatically (**Auto-enable is on**).

### Allowed actions for accounts

Administrator and member accounts have access to the following Security Hub actions. In the table, the values have the following meanings:

- **Any** – The account can perform the action for all of the accounts under the same administrator or account.
- **Self** – The account can only perform the action on their own account.

A dash (–) indicates that the account cannot perform the action.

This table reflects the default permissions for administrator and member accounts. You can use custom IAM policies to further restrict access to Security Hub features and functions. For guidance and examples, see the blog post [Aligning IAM policies to user personas for AWS Security Hub](https://aws.amazon.com/blogs/security/).

<table>
<thead>
<tr>
<th>Action</th>
<th>Delegated administrator account (Organization)</th>
<th>Administrator account (Invitation)</th>
<th>Member (Organization)</th>
<th>Member (Invitation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>View accounts</td>
<td>Any</td>
<td>Any</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Disassociate member account</td>
<td>Any</td>
<td>Any</td>
<td>-</td>
<td>Self</td>
</tr>
<tr>
<td>Delete member account</td>
<td>Any non-organization account</td>
<td>Any</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Disable Security Hub</td>
<td>-</td>
<td>Self - if there are no enabled member accounts</td>
<td>Self - if disassociated from the Security Hub administrator account</td>
<td>Self - if disassociated from the administrator account</td>
</tr>
<tr>
<td>View findings</td>
<td>Any</td>
<td>Any</td>
<td>Self</td>
<td>Self</td>
</tr>
<tr>
<td>Update findings</td>
<td>Any</td>
<td>Any</td>
<td>Self</td>
<td>Self</td>
</tr>
<tr>
<td>View insight results</td>
<td>Any</td>
<td>Any</td>
<td>Self</td>
<td>Self</td>
</tr>
<tr>
<td>View control details</td>
<td>Any</td>
<td>Any</td>
<td>Self</td>
<td>Self</td>
</tr>
</tbody>
</table>
Designating a Security Hub administrator account

The delegated AWS Security Hub administrator account manages Security Hub membership for an organization.

The organization management account designates the Security Hub administrator account for the organization. The administrator account selects the member accounts. See the section called “Managing organization member accounts” (p. 67) and the section called “Managing member accounts that are not in an organization” (p. 70).

The organization management account can designate any account in the organization. However, Security Hub recommends that the organization management account does not designate itself as the administrator account. The users who have access to the organization management account to manage billing are likely to be different from the users who need access to Security Hub for security management.
If you have an administrator account in place from the manual invitation process, then Security Hub recommends that you designate that account as the Security Hub administrator account for your organization. Member accounts can only be associated with a single administrator account. The administrator account for the organization cannot enable member accounts that belong to another administrator account.

The delegated administrator account must be the same in each Region. However, the organization management account must designate that same Security Hub administrator account separately in each Region.

The organization management account can also remove the current delegated Security Hub administrator account. When the organization management account uses the console to remove the administrator account in one Region, it is automatically removed in all Regions. The Security Hub API only removes the administrator account from the Region where the API call or command is issued. To remove the administrator account from all Regions, you can use the Organizations API.

Remember that all Security Hub accounts must have AWS Config enabled and configured to record all resources. For details on the requirement for AWS Config, see the section called “Enabling AWS Config” (p. 7).

**Required permissions to configure the Security Hub administrator account**

To designate and remove a Security Hub administrator account, the organization management account must have permissions for the `EnableOrganizationAdminAccount` and `DisableOrganizationAdminAccount` actions in Security Hub. The organization management account must also have administrative permissions for Organizations.

To grant all of the required permissions, attach the following Security Hub managed policies to the IAM principal for the organization management account:

- AWSSecurityHubFullAccess (p. 53)
- AWSSecurityHubOrganizationsAccess (p. 54)

**Designating a Security Hub administrator account (console)**

The organization management account can use the Security Hub console to designate the Security Hub administrator account.

The organization management account does not have to enable Security Hub in order to manage the Security Hub administrator account.

However, if the organization management account chooses itself as the Security Hub administrator account, it must have Security Hub enabled. If it does not already have Security Hub enabled, it must enable Security Hub manually. Security Hub cannot be enabled automatically for the organization management account.

**To designate a Security Hub administrator account from the Welcome to Security Hub page**

2. Choose **Go to Security Hub**.
3. If a Security Hub administrator account is currently assigned, then you must remove the current account before you can designate a new account.
To remove the current account, under **Delegated Administrator**, choose **Remove**.

4. Under **Delegated Administrator**, enter the account ID of the account to designate as the **Security Hub** administrator account.

   You must designate the same Security Hub administrator account in all Regions. If you designate an account that is different from the account designated in other Regions, Security Hub returns an error.

5. Choose **Delegate**.

If you have Security Hub enabled, then you can also designate the Security Hub administrator account from the **Settings** page.

To designate a Security Hub administrator account from the **Settings** page

2. In the Security Hub navigation pane, choose **Settings**. Then choose **General**.
3. If a Security Hub administrator account is currently assigned, then before you can designate a new account, you must remove the current account.

   Under **Delegated Administrator**, to remove the current account, choose **Remove**.

4. Enter the account ID of the account you want to designate as the **Security Hub** administrator account.

   You must designate the same Security Hub administrator account in all Regions. If you designate an account that is different from the account designated in other Regions, Security Hub returns an error.

5. Choose **Delegate**.

### Designating a Security Hub administrator account (Security Hub API, AWS CLI)

To designate the Security Hub administrator account, you can use an API call or the AWS Command Line Interface. You must use the organization management account credentials.

To designate the **Security Hub** administrator account (Security Hub API, AWS CLI)

- **Security Hub API** – Use the `EnableOrganizationAdminAccount` operation. You must provide the AWS account ID of the Security Hub administrator account.
- **AWS CLI** – At the command line, run the `enable-organization-admin-account` command.

```
aws securityhub enable-organization-admin-account --admin-account-id <admin account ID>
```

**Example**

```
aws securityhub enable-organization-admin-account --admin-account-id 777788889999
```
Removing a Security Hub administrator account (console)

The organization management account can remove the current Security Hub administrator account. When the organization management account uses the console to remove the Security Hub administrator account, the Security Hub administrator account is removed in all Regions.

When the Security Hub administrator account is removed, the member accounts are disassociated from the removed Security Hub administrator account.

The enabled member accounts still have Security Hub enabled. They become standalone accounts until a new Security Hub administrator enables them as member accounts.

If the organization management account is not an enabled account in Security Hub, then use the option on the Welcome to Security Hub page.

To remove the Security Hub administrator account from the Welcome to Security Hub page

2. Choose Go to Security Hub.
3. Under Delegated Administrator, choose Remove.

If the organization management account is an enabled account in Security Hub, then use the option on the General tab of the Settings page.

To remove the Security Hub administrator account from the Settings page

2. In the Security Hub navigation pane, choose Settings. Then choose General.
3. Under Delegated Administrator, choose Remove.

Removing a Security Hub administrator account (Security Hub API, AWS CLI)

To remove the Security Hub administrator account, you can use an API call or the AWS Command Line Interface. You must use the organization management account credentials.

When you use the API or AWS CLI to remove the Security Hub administrator account, it is only removed in the Region where the API call or command was issued.

To remove the Security Hub administrator account (Security Hub API, AWS CLI)

- **Security Hub API** – Use the DisableOrganizationAdminAccount operation. You must provide the account ID of the Security Hub administrator account.
- **AWS CLI** – At the command line, run the disable-organization-admin-account command.

```
aws securityhub disable-organization-admin-account --admin-account-id <admin account ID>
```

Example

```
aws securityhub disable-organization-admin-account --admin-account-id 777788889999
```
Removing a Security Hub administrator account (Organizations API, AWS CLI)

When you use the Security Hub API to remove the Security Hub administrator account, it is only removed in the Region where the API call or command was issued.

The Organizations API allows you to remove the Security Hub administrator account from all Regions at once.

To remove the Security Hub administrator account (Organizations API, AWS CLI)

- **Organizations API** – Use the `DeregisterDelegatedAdministrator` operation. You must provide the account ID of the Security Hub administrator account, and the service principal for Security Hub, which is `securityhub.amazonaws.com`.

- **AWS CLI** – At the command line, run the `deregister-delegated-administrator` command.

```bash
aws organizations deregister-delegated-administrator --account-id <admin account ID> --service-principal <Security Hub service principal>
```

**Example**

```bash
aws organizations deregister-delegated-administrator --account-id 777788889999 --service-principal securityhub.amazonaws.com
```

Managing member accounts that belong to an organization

For organization accounts, the Security Hub administrator account can perform the following actions:

- Enable organization accounts as Security Hub member accounts.
- Automatically enable new organization accounts as they are added to the organization.
- Disassociate accounts that belong to the organization. They cannot delete organization accounts.

To ensure that the administrator account has the required permissions to manage the organization accounts, attach the following managed policies to the associated IAM principal.

- `AWSSecurityHubFullAccess` (p. 53)
- `AWSSecurityHubOrganizationsAccess` (p. 54)

If the administrator account has not enabled the option to automatically enable new organization accounts, then the `Accounts` page displays a message at the top of the page. The message contains an **Enable** option.

When you choose **Enable**, Security Hub performs the following actions:

- Enables all of the current organization accounts as member accounts.
- For those accounts, enables the CIS AWS Foundations Benchmark standard and the AWS Foundational Best Practices standard.
Enabling new accounts automatically

- Enables the option to automatically enable new accounts as they are added to the organization.

Contents
- Automatically enabling new organization accounts (p. 68)
- Enabling member accounts from your organization (p. 69)
- Disassociating member accounts from your organization (p. 70)

Automatically enabling new organization accounts

The Security Hub administrator account can configure Security Hub to automatically enable new organization accounts as member accounts.

When new accounts are added to your organization, they are added to the list on the Accounts page. For organization accounts, Type is By organization.

By default, the new accounts are not enabled as member accounts. Their status is Not a member.

When you enable the automatic enablement setting, Security Hub begins to enable new accounts as member accounts when they are added to the organization. It does not enable existing organization accounts that are not yet enabled. Security Hub also cannot automatically enable accounts that already belong to another administrator account.

Remember that all Security Hub accounts must have AWS Config enabled and configured to record all resources. For details on the requirement for AWS Config, see the section called “Enabling AWS Config” (p. 7).

Enabling Security Hub automatically for new accounts (console)

The Accounts page includes a configuration option to automatically add new accounts.

To automatically enable new organization accounts as member accounts
2. In the Security Hub navigation pane, choose Settings.
4. On the Accounts tab, toggle the automatic enablement setting to Auto-enable is on.

Enabling Security Hub automatically for new organization accounts (Security Hub API, AWS CLI)

To determine whether to automatically enable new organization accounts, the administrator account can use the Security Hub API or the AWS Command Line Interface.

To automatically enable new organization accounts
- Security Hub API – Use the UpdateOrganizationConfiguration operation. To automatically enable new organization accounts, set autoEnable to true.
- AWS CLI – At the command line, run the update-organization-configuration command.

aws securityhub update-organization-configuration --auto-enable
Enabling member accounts from your organization

If you do not automatically enable new organization accounts, then you can enable those accounts manually. You must also manually enable accounts that you disassociated.

You cannot enable an account if it is already a member account for a different administrator account.

You also cannot enable an account that is currently suspended. If you try to enable a suspended account, the account status changes to Account Suspended.

When you enable an organization account, Security Hub is enabled automatically for that account. The account does not receive an invitation. The exception to this is the organization management account. Security Hub cannot be enabled automatically for the organization management account. The organization management account must enable Security Hub before you enable the organization management account as a member account.

Remember that all Security Hub accounts must have AWS Config enabled and configured to record all resources. For details on the requirement for AWS Config, see the section called “Enabling AWS Config” (p. 7).

Enabling an organization account as a member account (console)

In the Accounts list, an organization account that was either never enabled or that was disassociated from the Security Hub administrator account has a status of Not a member.

To enable an organization account as a member account

2. In the Security Hub navigation pane, choose Settings. Then choose Accounts.
3. In the Accounts list, select the check box for each organization account that you want to enable.
4. Choose Actions, then choose Add member.

Enabling an organization account as a member account (Security Hub API, AWS CLI)

The Security Hub administrator account can use the Security Hub API or AWS Command Line Interface to enable organization accounts. Unlike the manual invitation process, when you use CreateMembers to enable an organization account, you do not need to send an invitation.

To enable organization accounts as member accounts

- **Security Hub API** – Use the CreateMembers operation. For each account to enable, you provide the account ID.
- **AWS CLI** – At the command line, run the create-members command.

```bash
aws securityhub create-members --account-details '[["AccountId": <account ID>]]'
```

Example

```bash
aws securityhub create-members --account-details '[["AccountId": "123456789111"],
{"AccountId": "123456789222"}]
```
Disassociating member accounts from your organization

To stop receiving and viewing findings from an enabled member account, you can disassociate the member account.

When you disassociate a member account, the status changes to **Not a member**.

Disassociating member accounts (console)

**To disassociate member accounts**

2. In the navigation pane, choose **Settings**. Then choose **Accounts**.
3. In the **Accounts** list, select the accounts to disassociate. You can only disassociate **Enabled** accounts.
4. Choose **Actions**, and then choose **Disassociate account**.

Disassociating an account (Security Hub API, AWS CLI)

To disassociate member accounts, you can use the Security Hub API or the AWS Command Line Interface.

**To disassociate member accounts (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the **DisassociateMembers** operation. You must provide the AWS account IDs for the member accounts to disassociate. To view a list of member accounts, use the **ListMembers** operation.
- **AWS CLI** – At the command line, run the **disassociate-members** command.

```bash
aws securityhub disassociate-members --account-ids <accountIds>
```

**Example**

```bash
aws securityhub disassociate-members --account-ids "123456789111" "123456789222"
```

Managing member accounts that are not in an organization

AWS Security Hub also supports a manual invitation process. This process is intended for accounts that do not belong to an organization in AWS Organizations. You might not use AWS Organizations, or you might have accounts that are not part of the organization. For example, you might not include a test account in your organization.

On the **Accounts** tab of the **Settings** page, accounts that are not part of an organization have **Type** set to **By invitation**.

If you do not use Organizations at all, then an account becomes an administrator account when a member account accepts an invitation.
Adding and inviting member accounts

Your account becomes an AWS Security Hub administrator account when an account that you invite accepts your invitation.

When you accept an invitation from another account, your account becomes a member account.

If your account is an administrator account, you cannot accept an invitation to become a member account.

Adding a member account consists of the following steps:

1. The administrator account adds the member account to their list of member accounts.
2. The administrator account sends an invitation to the member account.
3. The member account accepts the invitation.

Adding member accounts (console)

From the Security Hub console, you can add accounts to your list of member accounts. You can select accounts individually, or upload a .csv file that contains the account information.

For each account, you must provide the account ID and an email address. The email address should be the email address to contact about security issues in the account. It is not used to verify the account.

To add accounts to your list of member accounts

2. In the left pane, choose Settings.
3. On the Settings page, choose Accounts and then choose Add accounts. You can then either add accounts individually or upload a .csv file containing the list of accounts.
4. To select the accounts, do one of the following:
   - To add the accounts individually, under Enter accounts, enter the account ID and email address of the account to add, and then choose Add.
   - To use a comma-separated values (.csv) file to add multiple accounts, first create the file. The file must contain the account ID and email address for each account to add.

   In your .csv list, accounts must appear one per line. The first line of the .csv file must contain the header. In the header, the first column is Account ID and the second column is Email.

   Each subsequent line must contain a valid account ID and email address for the account to add.

   Here is an example of a .csv file when viewed in a text editor.
Adding and inviting member accounts

<table>
<thead>
<tr>
<th>Account ID</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>1111111111</td>
<td><a href="mailto:user@example.com">user@example.com</a></td>
</tr>
</tbody>
</table>

In a spreadsheet program, the fields appear in separate columns. The underlying format is still comma-separated. You must format the account IDs as non-decimal numbers. For example, the account ID 444455556666 cannot be formatted as 444455556666.0. Also make sure that the number formatting does not remove any leading zeros from the account ID.

To select the file, on the console, choose **Upload list (.csv)**. Then choose **Browse**.

After you select the file, choose **Add accounts**.

5. After you finish adding accounts, under **Accounts to be added**, choose **Next**.

Inviting member accounts (console)

After you add the member accounts, you send an invitation to the member account. You can also resend an invitation to an account that you disassociated.

**To send an invitation to a new account**

2. In the navigation pane, choose **Settings**, and then choose **Accounts**.
3. For the account to invite, choose **Invite** in the **Status** column.
4. When prompted to confirm, choose **Invite**.

**To resend an invitation to accounts that you disassociated**

2. In the navigation pane, choose **Settings**, and then choose **Accounts**.
3. Select each disassociated account that you want to resend an invitation to.
4. From **Actions**, choose **Resend invitation**.

Adding member accounts (Security Hub API, AWS CLI)

To add member accounts, you can use an API call or the AWS Command Line Interface. You must use the administrator account credentials. Only the administrator account can perform this action.

**To add member accounts (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the `CreateMembers` operation. For each member account to add, you must provide the AWS account ID.
- **AWS CLI** – At the command line, run the `create-members` command.

```bash
aws securityhub create-members --account-details '[{"AccountId": "<accountID1>"}]
```

**Example**

```bash
aws securityhub create-members --account-details '[{"AccountId": "123456789111"},
{"AccountId": "123456789222"}]
```
Inviting member accounts (Security Hub API, AWS CLI)

To invite accounts that you added, you can use an API call or the AWS Command Line Interface. You use the same API operation or AWS CLI command to resend invitations to member accounts that you disassociated. You must use the administrator account credentials. Only the administrator account can perform this action.

To invite member accounts (Security Hub API, AWS CLI)

- **Security Hub API** – Use the `InviteMembers` operation. For each account to invite, you must provide the AWS account ID.
- **AWS CLI** – At the command line, run the `invite-members` command.

```
aws securityhub invite-members --account-ids <accountIDs>
```

Example

```
aws securityhub invite-members --account-ids "123456789111" "123456789222"
```

Responding to an invitation to be a member account

You can accept or decline an invitation to be a member account.

After you accept an invitation, your account becomes an AWS Security Hub member account. The account that sent the invitation becomes your Security Hub administrator account. The administrator account user can view findings for your member account in Security Hub.

If you decline the invitation, then your account is marked as Resigned on the administrator account's list of member accounts.

You can only accept one invitation to be a member account.

Before you can accept or decline an invitation, you must enable Security Hub. For information on how to enable Security Hub, see the section called “Enabling Security Hub manually” (p. 37).

Remember that all Security Hub accounts must have AWS Config enabled and configured to record all resources. For details on the requirement for AWS Config, see the section called “Enabling AWS Config” (p. 7).

Accepting an invitation (console)

On the **Accounts** page, **Administrator account** contains the invitation and membership information for an account.

**To accept an invitation to be a member account**

2. In the navigation pane, choose **Settings**, and then choose **Accounts**.
3. Under **Administrator account**, toggle **Accept** to the on position, and then choose **Accept invitation**.

Accepting an invitation (Security Hub API, AWS CLI)

To accept an invitation to be a member account, you can use an API call or the AWS Command Line Interface. You must use the credentials for the member account that received the invitation.
To accept an invitation (Security Hub API, AWS CLI)

- **Security Hub API** – Use the `AcceptAdministratorInvitation` operation. You must provide the invitation identifier and the AWS account ID of the administrator account. To retrieve details about the invitation, use the `ListInvitations` operation.
- **AWS CLI** – At the command line, run the `accept-administrator-invitation` command.

```bash
aws securityhub accept-administrator-invitation --administrator-id <administratorAccountID> --invitation-id <invitationID>
```

**Example**

```bash
aws securityhub accept-administrator-invitation --administrator-id 123456789012 --invitation-id 7ab938c5d52d7904ad09f9e7c20cc4eb
```

**Note**
The Security Hub console continues to use `AcceptInvitation`. It will eventually change to use `AcceptAdministratorInvitation`. Any IAM policies that specifically control access to this function must continue to use `AcceptInvitation`. You should also add `AcceptAdministratorInvitation` to your policies to ensure that the correct permissions are in place after the console begins to use `AcceptAdministratorInvitation`.

Declining an invitation (console)

You can decline an invitation to be a member account. When you decline an invitation, your account is marked as **Resigned** on the administrator account’s list of member accounts.

To decline an invitation to be a member account

2. In the navigation pane, choose **Settings**, and then choose **Accounts**.
3. Under **Administrator account**, choose **Decline invitation**.

Declining an invitation (Security Hub API, AWS CLI)

To decline an invitation, you can use an API call or the AWS Command Line Interface.

**To decline an invitation (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the `DeclineInvitations` operation. You must provide the AWS account ID of the administrator account that issued the invitation. To view information about your invitations, use the `ListInvitations` operation.
- **AWS CLI** – At the command line, run the `decline-invitations` command.

```bash
aws securityhub decline-invitations --account-ids "<administratorAccountId>"
```

**Example**

```bash
aws securityhub decline-invitations --account-ids "123456789012"
```
Disassociating member accounts

To stop receiving and viewing findings from an enabled member account, you can disassociate the member account. You must disassociate a member account before you can delete it.

When you disassociate a member account, it remains in your list of member accounts with a status of **Removed (Disassociated)**. Your account is removed from the administrator account information for the member account.

To resume receiving findings for the account, you can resend the invitation. To remove the member account entirely, you can delete the member account.

Disassociating member accounts (console)

From the **Accounts** page, you can disassociate one or more member accounts.

**To disassociate member accounts**

2. In the navigation pane, choose **Settings**, and then choose **Accounts**.
3. Under **Member accounts**, select the accounts to disassociate.
4. Choose **Actions**, and then choose **Disassociate accounts**.

Disassociating member accounts (Security Hub API, AWS CLI)

To disassociate member accounts, you can use an API call or the AWS Command Line Interface.

**To disassociate member accounts (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the **DisassociateMembers** operation. You must provide the AWS account IDs for the member accounts to disassociate. To view a list of member accounts, use the **ListMembers** operation.
- **AWS CLI** – At the command line, run the **disassociate-members** command.

```bash
aws securityhub disassociate-members --account-ids <accountIds>
```

**Example**

```bash
aws securityhub disassociate-members --account-ids "123456789111" "123456789222"
```

Deleting member accounts

As an administrator account, you can delete member accounts that were added by invitation. Before you can delete an enabled account, you must disassociate it.

When you delete a member account, it is completely removed from the list. To restore the account's membership, you must add it and invite it as if it were a completely new member account.

**Deleting member accounts (console)**

From the Security Hub console, you can delete one or more accounts.
To delete member accounts

2. In the navigation pane, choose Settings, and then choose Accounts.
3. Under Member accounts, select the accounts to delete.
4. Choose Actions, and then choose Delete accounts.

Deleting member accounts (Security Hub API, AWS CLI)

To delete member accounts, you can use an API call or the AWS Command Line Interface.

To delete member accounts (Security Hub API, AWS CLI)

- **Security Hub API** – Use the DeleteMembers operation. You must provide the AWS account IDs of the member accounts to delete. To retrieve the list of member accounts, use the ListMembers operation.
- **AWS CLI** – At the command line, run the delete-members command.

```
aws securityhub delete-members --account-ids <memberAccountIDs>
```

Example

```
aws securityhub delete-members --account-ids "123456789111" "123456789222"
```

Disassociating from your administrator account

Member accounts that were added by invitation can disassociate themselves from the administrator account. Member accounts that are managed using Organizations cannot disassociate their accounts from the administrator account.

When you disassociate from your administrator account, your account remains in the administrator account's member list with a status of Resigned. However, the administrator account does not receive any findings for your account.

After you disassociate yourself from the administrator account, you can accept the invitation again.

Disassociating from an administrator account (console)

You can decline an invitation to be a member account. To do this, you update the Accept option for the administrator account.

To disassociate from your administrator account

2. In the navigation pane, choose Settings, and then choose Accounts.
3. Under Administrator account, toggle Accept to the off position, and then choose Update.

Disassociating from an administrator account (Security Hub API, AWS CLI)

To disassociate your account from your administrator account, you can use an API call or the AWS Command Line Interface.
To disassociate from your administrator account (Security Hub API, AWS CLI)

- Security Hub API – Use the `DisassociateFromAdministratorAccount` operation.
- AWS CLI – At the command line, run the `disassociate-from-administrator-account` command.

```
aws securityhub disassociate-from-administrator-account
```

Note
The Security Hub console continues to use `DisassociateFromMasterAccount`. It will eventually change to use `DisassociateFromAdministratorAccount`. Any IAM policies that specifically control access to this function must continue to use `DisassociateFromMasterAccount`. You should also add `DisassociateFromAdministratorAccount` to your policies to ensure that the correct permissions are in place after the console begins to use `DisassociateFromAdministratorAccount`.

Effect of account actions on Security Hub data

These account actions have the following effects on AWS Security Hub data.

**Security Hub disabled**

When you disable Security Hub for an account, it is disabled only for that account in the AWS Region that is selected when you disable it.

You must disable Security Hub separately in each Region where you enabled it.

No new findings are generated for the administrator account while Security Hub is disabled. Existing findings are deleted after 90 days.

Integrations with Amazon Macie, Amazon GuardDuty, and Amazon Inspector are removed.

Other Security Hub data and settings, including custom actions, insights, and subscriptions to third-party products are not removed.

Enabled security standards are disabled.

**Member account disassociated from administrator account**

When a member account is disassociated from the administrator account, the administrator account loses permission to view findings in the member account.

Security Hub continues to run in both accounts.

Custom settings or integrations that are defined for the administrator account are not applied to findings from the former member account. For example, after the accounts are disassociated, you might have a custom action in the administrator account used as the event pattern in an Amazon EventBridge rule. However, this custom action cannot be used in the member account.
Member account is removed from an organization

When a member account is removed from an organization, the administrator account loses permission to view findings in the member account.

Security Hub continues to run in both accounts.

In the Accounts list for the administrator account, the account has a status of Disassociated.

Account is suspended

When an account is suspended in AWS, the account loses permission to view their findings in Security Hub. No new findings are generated for that account. The administrator account for a suspended account can view the existing account findings.

For an organization account, the member account status can also change to Account Suspended. This happens if the account is suspended at the same time that the administrator account attempts to enable the account. The administrator account for an Account Suspended account cannot view findings for that account.

Otherwise, the suspended status does not affect the member account status.

After 90 days, the account is either terminated or reactivated. When the account is reactivated, its Security Hub permissions are restored. If the member account status is Account Suspended, the administrator account must enable the account manually.

Account is closed

When an AWS account is closed, Security Hub responds to the closure as follows.

AWS retains the policy data for the account for 90 days from the effective date of the administrator account closure. At the end of the 90 day period, AWS permanently deletes all policy data for the account.

- To retain findings for more than 90 days, you can archive the policies. You can also use a custom action with an EventBridge rule to store the findings in an S3 bucket.
- As long as AWS retains the policy data, when you reopen the closed account, AWS reassigns the account as the service administrator and recovers the service policy data for the account.
- For more information, see Closing an account.

Important

For customers in the AWS GovCloud (US) Regions:

- Before closing your account, back up and then delete your policy data and other account resources. You will no longer have access to them after you close the account.
Insights in AWS Security Hub

An AWS Security Hub insight is a collection of related findings. It identifies a security area that requires attention and intervention. For example, an insight might point out EC2 instances that are the subject of findings that detect poor security practices. An insight brings together findings from across finding providers.

Each insight is defined by a group by statement and optional filters. The group by statement indicates how to group the matching findings, and identifies the type of item that the insight applies to. For example, if an insight is grouped by resource identifier, then the insight produces a list of resource identifiers. The optional filters narrow down the matching findings for the insight. For example, you might want to only see findings from specific providers or findings associated with specific types of resources.

Security Hub offers several built-in managed (default) insights. You cannot modify or delete managed insights.

To track security issues that are unique to your AWS environment and usage, you can create custom insights.

An insight only returns results if you have enabled product integrations or security standards that produce matching findings. For example, the managed insight 29. Top resources by counts of failed CIS checks only returns results if you enable the CIS AWS Foundations security standard.

Topics
- Viewing and taking action on insight results and findings (p. 79)
- Managed insights (p. 81)
- Managing custom insights (p. 88)

Viewing and taking action on insight results and findings

For each insight, AWS Security Hub first determines the findings that match the filter criteria, and then uses the grouping attribute to group the matching findings.

From the Insights console page, you can view and take action on the results and findings.

Viewing and taking action on insight results (console)

The insight results consist of a grouped list of the results for the insight. For example, if the insight is grouped by resource identifiers, then the insight results are the list of resource identifiers. Each item in the results list indicates the number of matching findings for that item.

Note that if the findings are grouped by resource identifier or resource type, then the results include all of the resources in the matching findings. This includes resources that have a different type from the resource type specified in the filter criteria. For example, an insight identifies findings that are associated with S3 buckets. If a matching finding contains both an S3 bucket resource and an IAM access key resource, then the insight results list both of those resources.

The results list is sorted from most to fewest matching findings.
Security Hub can only display 100 results. If there are more than 100 grouping values, you only see the first 100.

In addition to the results list, the insight results display a set of charts summarizing the number of matching findings for the following attributes.

- **Severity label** – Number of findings for each severity label
- **AWS account ID** – Top five account IDs for the matching findings
- **Resource type** – Top five resource types for the matching findings
- **Resource ID** – Top five resource IDs for the matching findings
- **Product name** – Top five finding providers for the matching findings

If you have configured custom actions, then you can send selected results to a custom action. The action must be associated with a CloudWatch rule for the Security Hub Insight Results event type. See Automated response and remediation (p. 711).

If you have not configured custom actions, then the Actions menu is disabled.

To display and take action on the list of insight results

2. In the navigation pane, choose Insights.
3. To display the list of insight results, choose the insight name.
4. Select the check box for each result to send to the custom action.
5. From the Actions menu, choose the custom action.

Viewing insight results (Security Hub API, AWS CLI)

To view insight results, you can use an API call or the AWS Command Line Interface.

**To view insight results (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the GetInsightResults operation. To identify the insight to return results for, you need the insight ARN. To obtain the insight ARNs for custom insights, use the GetInsights operation.
- **AWS CLI** – At the command line, run the `get-insight-results` command.

```
aws securityhub get-insight-results --insight-arn <insight ARN>
```

Example:

```
aws securityhub get-insight-results --insight-arn "arn:aws:securityhub:us-west-1:123456789012:insight/123456789012/custom/a1b2c3d4-5678-90ab-cdef-EXAMPLE11111"
```

Viewing findings for an insight result (console)

From the insight results list, you can display the list of findings for each result.

**To display and take action on insight findings**

2. In the navigation pane, choose **Insights**.
3. To display the list of insight results, choose the insight name.
4. To display the list of findings for an insight result, choose the item from the results list.

The findings list shows the active findings for the selected insight result that have a workflow status of **NEW** or **NOTIFIED**.

From the findings list, you can perform the following actions.

- Change the filters and grouping for the list (p. 99)
- View details for individual findings (p. 102)
- Update the workflow status of findings (p. 103)
- Send findings to custom actions (p. 104)

## Managed insights

AWS Security Hub provides several managed insights.

You cannot edit or delete Security Hub managed insights. You can view and take action on the insight results and findings (p. 79). You can also use a managed insight as the basis for a new custom insight (p. 90).

As with all insights, a managed insight only returns results if you have enabled product integrations or security standards that can produce matching findings.

For insights that are grouped by resource identifier, the results include the identifiers of all of the resources in the matching findings. This includes resources that have a different type from the resource type in the filter criteria. For example, insight 2 identifies findings that are associated with S3 buckets. If a matching finding contains both an S3 bucket resource and an IAM access key resource, then the insight results include both resources.

In the current release, Security Hub offers the following managed insights:

1. **AWS resources with the most findings**
   - **ARN:** `arn:aws:securityhub:::insight/securityhub/default/1`
   - **Grouped by:** Resource identifier
   - **Finding filters:**
     - Record state is **ACTIVE**
     - Workflow status is **NEW** or **NOTIFIED**

2. **S3 buckets with public write or read permissions**
   - **ARN:** `arn:aws:securityhub:::insight/securityhub/default/10`
   - **Grouped by:** Resource identifier
   - **Finding filters:**
     - Type starts with **Effects/Data Exposure**
     - Resource type is **AwsS3Bucket**
     - Record state is **ACTIVE**
     - Workflow status is **NEW** or **NOTIFIED**
3. AMIs that are generating the most findings

**ARN:** arn:aws:securityhub:::insight/securityhub/default/3

**Grouped by:** EC2 instance image ID

**Finding filters:**
- Resource type is AwsEc2Instance
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED

4. EC2 instances involved in known Tactics, Techniques, and Procedures (TTPs)

**ARN:** arn:aws:securityhub:::insight/securityhub/default/14

**Grouped by:** Resource ID

**Finding filters:**
- Type starts with TTPs
- Resource type is AwsEc2Instance
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED

5. AWS principals with suspicious access key activity

**ARN:** arn:aws:securityhub:::insight/securityhub/default/9

**Grouped by:** IAM access key principal name

**Finding filters:**
- Resource type is AwsIamAccessKey
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED

6. AWS resources instances that don't meet security standards / best practices

**ARN:** arn:aws:securityhub:::insight/securityhub/default/6

**Grouped by:** Resource ID

**Finding filters:**
- Type is Software and Configuration Checks/Industry and Regulatory Standards/AWS Security Best Practices
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED

7. AWS resources associated with potential data exfiltration

**ARN:** arn:aws:securityhub:::insight/securityhub/default/7

**Grouped by:** Resource ID

**Finding filters:**
- Type starts with Effects/Data Exfiltration/
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED
8. AWS resources associated with unauthorized resource consumption

ARN: arn:aws:securityhub:::insight/securityhub/default/8

Grouped by: Resource ID

Finding filters:
• Type starts with Effects/Resource Consumption
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED

9. S3 buckets that don't meet security standards / best practice

ARN: arn:aws:securityhub:::insight/securityhub/default/11

Grouped by: Resource ID

Finding filters:
• Resource type is AwsS3Bucket
• Type is Software and Configuration Checks/Industry and Regulatory Standards/AWS Security Best Practices
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED

10. S3 buckets with sensitive data

ARN: arn:aws:securityhub:::insight/securityhub/default/12

Grouped by: Resource ID

Finding filters:
• Resource type is AwsS3Bucket
• Type starts with Sensitive Data Identifications/
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED

11. Credentials that may have leaked

ARN: arn:aws:securityhub:::insight/securityhub/default/13

Grouped by: Resource ID

Finding filters:
• Type starts with Sensitive Data Identifications/Passwords/
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED

12. EC2 instances that have missing security patches for important vulnerabilities

ARN: arn:aws:securityhub:::insight/securityhub/default/16

Grouped by: Resource ID

Finding filters:
• Type starts with Software and Configuration Checks/Vulnerabilities/CVE
• Resource type is AwsEc2Instance
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED

13. EC2 instances with general unusual behavior

ARN: arn:aws:securityhub:::insight/securityhub/default/17

Grouped by: Resource ID

Finding filters:
• Type starts with Unusual Behaviors
• Resource type is AwsEc2Instance
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED.

14. EC2 instances that have ports accessible from the Internet

ARN: arn:aws:securityhub:::insight/securityhub/default/18

Grouped by: Resource ID

Finding filters:
• Type starts with Software and Configuration Checks/AWS Security Best Practices/Network Reachability
• Resource type is AwsEc2Instance
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED

15. EC2 instances that don't meet security standards / best practices

ARN: arn:aws:securityhub:::insight/securityhub/default/19

Grouped by: Resource ID

Finding filters:
• Type starts with one of the following:
  • Software and Configuration Checks/Industry and Regulatory Standards/
  • Software and Configuration Checks/AWS Security Best Practices
• Resource type is AwsEc2Instance
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED

16. EC2 instances that are open to the Internet

ARN: arn:aws:securityhub:::insight/securityhub/default/21

Grouped by: Resource ID

Finding filters:
• Type starts with Software and Configuration Checks/AWS Security Best Practices/Network Reachability
• Resource type is AwsEc2Instance
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED

17. EC2 instances associated with adversary reconnaissance

ARN: arn:aws:securityhub:::insight/securityhub/default/22
**Grouped by:** Resource ID

**Finding filters:**
- Type starts with TTPs/Discovery/Recon
- Resource type is AwsEc2Instance
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED

**18. AWS resources that are associated with malware**

**ARN:** arn:aws:securityhub:::insight/securityhub/default/23

**Grouped by:** Resource ID

**Finding filters:**
- Type starts with one of the following:
  - Effects/Data Exfiltration/Trojan
  - TTPs/Initial Access/Trojan
  - TTPs/Command and Control/Backdoor
  - TTPs/Command and Control/Trojan
  - Software and Configuration Checks/Backdoor
  - Unusual Behaviors/VM/Backdoor
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED

**19. AWS resources associated with cryptocurrency issues**

**ARN:** arn:aws:securityhub:::insight/securityhub/default/24

**Grouped by:** Resource ID

**Finding filters:**
- Type starts with one of the following:
  - Effects/Resource Consumption/Cryptocurrency
  - TTPs/Command and Control/CryptoCurrency
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED

**20. AWS resources with unauthorized access attempts**

**ARN:** arn:aws:securityhub:::insight/securityhub/default/25

**Grouped by:** Resource ID

**Finding filters:**
- Type starts with one of the following:
  - TTPs/Command and Control/UnauthorizedAccess
  - TTPs/Initial Access/UnauthorizedAccess
  - Effects/Data Exfiltration/UnauthorizedAccess
  - Unusual Behaviors/User/UnauthorizedAccess
  - Effects/Resource Consumption/UnauthorizedAccess
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED
21. Threat Intel indicators with the most hits in the last week

ARN: arn:aws:securityhub:::insight/securityhub/default/26

Finding filters:
• Created within the last 7 days

22. Top accounts by counts of findings

ARN: arn:aws:securityhub:::insight/securityhub/default/27

Grouped by: AWS account ID

Finding filters:
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED

23. Top products by counts of findings

ARN: arn:aws:securityhub:::insight/securityhub/default/28

Grouped by: Product ARN

Finding filters:
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED

24. Severity by counts of findings

ARN: arn:aws:securityhub:::insight/securityhub/default/29

Grouped by: Severity label

Finding filters:
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED

25. Top S3 buckets by counts of findings

ARN: arn:aws:securityhub:::insight/securityhub/default/30

Grouped by: Resource ID

Finding filters:
• Resource type is AwsS3Bucket
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED

26. Top EC2 instances by counts of findings

ARN: arn:aws:securityhub:::insight/securityhub/default/31

Grouped by: Resource ID

Finding filters:
• Resource type is AwsEc2Instance
• Record state is ACTIVE
• Workflow status is NEW or NOTIFIED
27. Top AMIs by counts of findings

**ARN:** arn:aws:securityhub:::insight/securityhub/default/32

**Grouped by:** EC2 instance image ID

**Finding filters:**
- Resource type is AwsEc2Image
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED

28. Top IAM users by counts of findings

**ARN:** arn:aws:securityhub:::insight/securityhub/default/33

**Grouped by:** IAM access key user name

**Finding filters:**
- Resource type is AwsIamAccessKey
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED

29. Top resources by counts of failed CIS checks

**ARN:** arn:aws:securityhub:::insight/securityhub/default/34

**Grouped by:** Resource ID

**Finding filters:**
- Generator ID starts with arn:aws:securityhub:::ruleset/cis-aws-foundations-benchmark/v/1.2.0/rule
- Updated in the last day
- Compliance status is FAILED
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED

30. Top integrations by counts of findings

**ARN:** arn:aws:securityhub:::insight/securityhub/default/35

**Grouped by:** Product ARN

**Finding filters:**
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED

31. Resources with the most failed security checks

**ARN:** arn:aws:securityhub:::insight/securityhub/default/36

**Grouped by:** Resource ID

**Finding filters:**
- Updated in the last day
- Compliance status is FAILED
- Record state is ACTIVE
- Workflow status is NEW or NOTIFIED
Managing custom insights

In addition to the AWS Security Hub managed insights, you can create custom insights to track issues and resources that are specific to your environment.

You can create completely new custom insights, or start from an existing custom or managed insight.

Each insight is configured with the following options.

- **Grouping attribute** – The grouping attribute determines which items are displayed in the insight results list. For example, if the grouping attribute is *Product name*, then the insight results display the number of findings that are associated with each finding provider.

- **Optional filters** – The filters narrow down the matching findings for the insight.

  When querying your findings, Security Hub applies Boolean AND logic to the set of filters. In other words, a finding only matches if it matches all of the provided filters. For example, if the filters are "Product name is GuardDuty" and "Resource type is AwsS3Bucket," then matching findings must match both of these criteria.

  However, Security Hub applies Boolean OR logic to filters that use the same attribute but different values. For example, if the filters are "Product name is GuardDuty" and "Product name is Amazon Inspector," then a finding matches if it was generated by either GuardDuty or Amazon Inspector.

  Note that if you use the resource identifier or resource type as the grouping attribute, then the insight results include all of the resources that are in the matching findings. The list is not limited to resources that match a resource type filter. For example, an insight identifies findings that are associated with S3 buckets, and groups those findings by resource identifier. A matching finding contains both an S3 bucket resource and an IAM access key resource. The insight results include both resources.

Creating a custom insight (console)

From the console, you can create a completely new insight.

**To create a custom insight**

2. In the navigation pane, choose Insights.
3. Choose Create insight.
4. To select the grouping attribute for the insight:
   a. Choose the search box to display the filter options.
   b. Choose Group by.
c. Select the attribute to use to group the findings that are associated with this insight.
d. Choose **Apply**.
5. (Optional) Choose any additional filters to use for this insight. For each filter, define the filter criteria, and then choose **Apply**.
6. Choose **Create insight**.
7. Enter an **Insight name**, then choose **Create insight**.

**Creating a custom insight (Security Hub API, AWS CLI)**

To create a custom insight, you can use an API call or the AWS Command Line Interface.

**To create a custom insight (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the `CreateInsight` operation. When you create a custom insight, you must provide the name, the filters, and the grouping attribute.
- **AWS CLI** – At the command line, run the `create-insight` command.

```
aws securityhub create-insight --name <insight name> --filters <filter values> --group-by-attribute <attribute name>
```

**Example**

```
aws securityhub create-insight --filters '{"ResourceType": [{ "Comparison": "EQUALS", "Value": "AwsIamRole"}], "SeverityLabel": [{"Comparison": "EQUALS", "Value": "CRITICAL"}]}' --group-by-attribute "ResourceId" --name "Critical role findings"
```

**Modifying a custom insight (console)**

You can modify an existing custom insight to change the grouping value and filters. After you make the changes, you can save the updates to the original insight, or save the updated version as a new insight.

**To modify an insight**

2. In the navigation pane, choose **Insights**.
3. Choose the custom insight to modify.
4. Edit the insight configuration as needed.
   - To change the attribute used to group findings in the insight:
     a. To remove the existing grouping, choose the X next to the **Group by** setting.
     b. Choose the search box.
     c. Select the attribute to use for grouping.
     d. Choose **Apply**.
   - To remove a filter from the insight, choose the circled X next to the filter.
   - To add a filter to the insight:
     a. Choose the search box.
     b. Select the attribute and value to use as a filter.
     c. Choose **Apply**.
5. When you complete the updates, choose **Save insight**.
6. When prompted, do one of the following:
   - To update the existing insight to reflect your changes, choose Update <Insight_Name> and then choose Save insight.
   - To create a new insight with the updates, choose Save new insight. Enter an Insight name, and then choose Save insight.

Modifying a custom insight (Security Hub API, AWS CLI)

To modify a custom insight, you can use an API call or the AWS Command Line Interface.

To modify a custom insight (Security Hub API, AWS CLI)

- **Security Hub API** – Use the UpdateInsight operation. To identify the custom insight, you provide the insight ARN. To obtain the insight ARNs for custom insights, use the GetInsights operation. You can then update the name, the filters, and the grouping value.
- **AWS CLI** – At the command line, run the update-insight command.

```
aws securityhub update-insight --insight-arn <insight ARN> [--name <new name>] [--filters <new filters>] [--group-by-attribute <new grouping attribute>]
```

**Example**

```
aws securityhub update-insight --insight-arn "arn:aws:securityhub:us-west-1:123456789012:insight/123456789012/custom/a1b2c3d4-5678-90ab-cdef-EXAMPLE11111" --filters '{"ResourceType": [{ "Comparison": "EQUALS", "Value": "AwsIamRole"}], "SeverityLabel": [{"Comparison": "EQUALS", "Value": "HIGH"}]}' --name "High severity role findings"
```

Creating a new custom insight from a managed insight (console)

You cannot save changes to or delete a managed insight. You can use a managed insight as the basis for a new custom insight.

**To create a new custom insight from a managed insight**

2. In the navigation pane, choose Insights.
3. Choose the managed insight to work from.
4. Edit the insight configuration as needed.
   - To change the attribute used to group findings in the insight:
     a. To remove the existing grouping, choose the X next to the Group by setting.
     b. Choose the search box.
     c. Select the attribute to use for grouping.
     d. Choose Apply.
   - To remove a filter from the insight, choose the circled X next to the filter.
   - To add a filter to the insight:
Deleting a custom insight (console)

When you no longer want a custom insight, you can delete it. You cannot delete managed insights.

**To delete a custom insight**

2. In the navigation pane, choose Insights.
3. Locate the custom insight to delete.
4. For that insight, choose the more options icon (the three dots in the top-right corner of the card).
5. Choose Delete.

Deleting a custom insight (Security Hub API, AWS CLI)

To delete a custom insight, you can use an API call or the AWS Command Line Interface.

**To delete a custom insight (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the DeleteInsight operation. To identify the custom insight to delete, you provide the insight ARN. To obtain the insight ARNs for custom insights, use the GetInsights operation.
- **AWS CLI** – At the command line, run the delete-insight command.

```bash
aws securityhub delete-insight --insight-arn <insight ARN>
```

**Example**

```bash
aws securityhub delete-insight --insight-arn "arn:aws:securityhub:us-west-1:123456789012:insight/123456789012/custom/a1b2c3d4-5678-90ab-cdef-EXAMPLE11111"
```
Findings in AWS Security Hub

AWS Security Hub eliminates the complexity of addressing large volumes of findings from multiple providers. It reduces the effort required to manage and improve the security of all of your AWS accounts, resources, and workloads.

Security Hub receives findings from the following sources.

- Integrations with AWS security services that you enable. See the section called “Available AWS service integrations” (p. 465).
- Integrations with third-party products that you enable. See the section called “Available third-party partner product integrations” (p. 468).
- Custom integrations that you configure. See the section called “Using custom product integrations” (p. 479).
- Security Hub checks against enabled controls. See the section called “Generating and updating control findings” (p. 483).

Security Hub consumes findings using a standard findings format called the AWS Security Finding Format. For more information about the finding format, see the section called “Finding format” (p. 105).

Security Hub correlates the findings across integrated products to prioritize the most important ones.

Finding providers can update findings to reflect additional instances of the finding. You can update findings to provide details about your investigation and its results.

Topics
- Creating and updating findings in AWS Security Hub (p. 92)
- Viewing findings in AWS Security Hub (p. 99)
- Taking action on findings in AWS Security Hub (p. 103)
- AWS Security Finding Format (ASFF) (p. 105)

Creating and updating findings in AWS Security Hub

In AWS Security Hub, a finding can originate from one of the following types of finding providers.

- An enabled integration with another AWS service
- An enabled integration with a third-party provider
- An enabled control in Security Hub

After a finding is created, it can be updated by the finding provider or by the customer.

- The finding provider uses the BatchImportFindings API operation to update the general information about a finding. Finding providers can only update findings that they created.
- The customer uses the BatchUpdateFindings API operation to reflect the status of the investigation into a finding. BatchUpdateFindings can also be used by a ticketing, incident management, orchestration, remediation, or SIEM tool on behalf of the customer.
From the Security Hub console, customers can manage the workflow status of findings and send findings to custom actions. See the section called “Taking action on findings” (p. 103).

Security Hub also automatically updates and deletes findings.

All findings are automatically deleted if they were not updated in the past 90 days.

**Topics**

- Using BatchImportFindings to create and update findings (p. 93)
- Using BatchUpdateFindings to update a finding (p. 96)

**Using BatchImportFindings to create and update findings**

Finding providers use the `BatchImportFindings` API operation to create new findings and to update information about the findings they created. They cannot update findings that they did not create.

Customers, SIEMs, ticketing tools, and SOAR tools use `BatchUpdateFindings` to make updates related to their processing of findings from finding providers. See the section called “Using BatchUpdateFindings” (p. 96).

Whenever AWS Security Hub receives a `BatchImportFindings` request to either create or update a finding, it automatically generates a `Security Hub Findings - Imported` event in Amazon EventBridge. See *Automated response and remediation* (p. 711).

**Requirements for accounts and batch size**

`BatchImportFindings` must be called by the account that is associated with the findings. The identifier of the associated account is the value of the `AwsAccountId` attribute for the finding.

Security Hub can only accept finding updates for accounts that have Security Hub enabled. The finding provider also must be enabled. If Security Hub is disabled, or the finding provider integration is not enabled, then the findings are returned in the `FailedFindings` list, with an `InvalidAccess` error.

`BatchImportFindings` accepts up to 100 findings per batch, up to 240 KB per finding, and up to 6 MB per batch. The throttle rate limit is 10 TPS per account per Region, with a burst of 30 TPS.

**Determining whether to create or update a finding**

To determine whether to create or update a finding, Security Hub checks the `ID` field. If the value of `ID` does not match an existing finding, then a new finding is created.

If `ID` does match an existing finding, then Security Hub checks the `UpdatedAt` field for the update.

- If `UpdatedAt` on the update matches or occurs before `UpdatedAt` on the existing finding, then the update is ignored.
- If `UpdatedAt` on the update occurs after `UpdatedAt` on the existing finding, then the existing finding is updated.

**Restricted attributes for BatchImportFindings**

For an existing finding, finding providers cannot use `BatchImportFindings` to update the following attributes and objects. These attributes can only be updated using `BatchUpdateFindings`. 
Using BatchImportFindings

- Note
- UserDefinedFields
- VerificationState
- Workflow

Security Hub ignores any content in `BatchImportFindings` for those attributes and objects. Customers, or other providers acting on their behalf, use `BatchUpdateFindings` to update them.

### Using FindingProviderFields

Finding providers also should not use `BatchImportFindings` to update the following attributes.

- Confidence
- Criticality
- RelatedFindings
- Severity
- Types

Instead, finding providers use the `FindingProviderFields` (p. 174) object to provide values for these attributes.

**Example**

```json
"FindingProviderFields": {  
  "Confidence": 42,  
  "Criticality": 99,  
  "RelatedFindings": {  
    "ProductArn": "arn:aws:securityhub:us-west-2::product/aws/guardduty",  
    "Id": "123e4567-e89b-12d3-a456-426655440000"  
  },  
  "Severity": {  
    "Label": "MEDIUM",  
    "Original": "MEDIUM"  
  },  
  "Types": [  "Software and Configuration Checks/Vulnerabilities/CVE"  ]
}
```

For `BatchImportFindings` requests, Security Hub handles values in the top-level attributes and in `FindingProviderFields` (p. 174) as follows.

**Preferred** `BatchImportFindings` provides a value for an attribute in `FindingProviderFields` (p. 174), but does not provide a value for the corresponding top-level attribute.

For example, `BatchImportFindings` provides `FindingProviderFields.Confidence`, but does not provide `Confidence`. This is the preferred option for `BatchImportFindings` requests.

Security Hub updates the value of the attribute in `FindingProviderFields` (p. 174).

It replicates the value to the top-level attribute only if the attribute was not already updated by `BatchUpdateFindings`. 
BatchImportFindings provides a value for a top-level attribute, but does not provide a value for the corresponding attribute in FindingProviderFields (p. 174).

For example, BatchImportFindings provides Confidence, but does not provide FindingProviderFields.Confidence.

Security Hub uses the value to update the attribute in FindingProviderFields (p. 174). It overwrites any existing value.

Security Hub updates the top-level attribute only if the attribute was not already updated by BatchUpdateFindings.

BatchImportFindings provides a value for both a top-level attribute and the corresponding attribute in FindingProviderFields (p. 174).

For example, BatchImportFindings provides both Confidence and FindingProviderFields.Confidence.

For a new finding, Security Hub uses the value in FindingProviderFields (p. 174) to populate both the top-level attribute and the corresponding attribute in FindingProviderFields (p. 174). It does not use the provided top-level attribute value.

For an existing finding, Security Hub uses both values. However, it updates the top-level attribute value only if the attribute was not already updated by BatchUpdateFindings.

Using the batch-import-findings command from the AWS CLI

In the AWS Command Line Interface, you use the batch-import-findings command to create or update findings.

You provide each finding as a JSON object.

Example

```bash
aws securityhub batch-import-findings --findings ' {
  "AwsAccountId": "123456789012",
  "CreatedAt": "2019-08-07T17:05:54.832Z",
  "Description": "Vulnerability in a CloudTrail trail",
  "FindingProviderFields": {
    "Severity": {
      "Label": "INFORMATIONAL",
      "Original": "0"
    },
    "Types": [
      "Software and Configuration Checks/Vulnerabilities/CVE"
    ]
  },
  "GeneratorId": "TestGeneratorId",
  "Id": "Id1",
  "Resources": [
    {
      "Id": "arn:aws:cloudtrail:us-west-1:123456789012:trail/TrailName",
      "Partition": "aws",
      "Region": "us-west-1",
      "Type": "AwsCloudTrailTrail"
    }
  ],
  "SchemaVersion": "2018-10-08",
  "Title": "CloudTrail trail vulnerability"
}'
```
Using BatchUpdateFindings

BatchUpdateFindings is used to update information related to a customer's processing of findings from finding providers. It can be used by a customer or by a SIEM, ticketing, incident management, or SOAR tool that works on behalf of a customer. BatchUpdateFindings cannot be used to create new findings. It can be used to update up to 100 findings at a time.

Whenever Security Hub receives a BatchUpdateFindings request to update a finding, it automatically generates a Security Hub Findings - Imported event in Amazon EventBridge. See Automated response and remediation (p. 711).

BatchUpdateFindings does not change the UpdatedAt field for the finding. UpdatedAt only reflects the most recent update from the finding provider.

Available fields for BatchUpdateFindings

Administrator accounts can use BatchUpdateFindings to update findings for their account or for their member accounts. Member accounts can use BatchUpdateFindings to update findings for their account.

Customers can only use BatchUpdateFindings to update the following fields and objects.

- Confidence
- Criticality
- Note
- RelatedFindings
- Severity
- Types
- UserDefinedFields
- VerificationState
- Workflow

By default, administrator and member accounts have access to all of the above fields and field values. Security Hub also provides context keys to allow you to restrict access to fields and field values.

For example, you might only allow member accounts to set Workflow.Status to RESOLVED. Or you might not want to allow member accounts to change Severity.Label.

Configuring access to BatchUpdateFindings

You can configure IAM policies to restrict access to using BatchUpdateFindings to update fields and field values.

In a statement to restrict access to BatchUpdateFindings, use the following values.

- Action is securityhub:BatchUpdateFindings
- Effect is Deny
- For Condition, you can deny a BatchUpdateFindings request based on the following:
  - The finding includes a specific field.
  - The finding includes a specific field value.
Condition keys

These are the condition keys for restricting access to BatchUpdateFindings.

ASFF field

The condition key for an ASFF field is as follows.

```
securityhub:ASFFSyntaxPath/<fieldName>
```

Replace `<fieldName>` with the ASFF field.

For example, to restrict access to the Workflow.Status field, use `securityhub:ASFFSyntaxPath/Workflow.Status`.

Disallowing all updates to a field

To prevent a user from making any update to a specific field, use a condition like this:

```
"Condition": {
  "Null": {
    "securityhub:ASFFSyntaxPath/<fieldName>": "false"
  }
}
```

For example, the following statement indicates that BatchUpdateFindings cannot be used to update the workflow status.

```
{
  "Sid": "VisualEditor0",
  "Effect": "Deny",
  "Action": "securityhub:BatchUpdateFindings",
  "Resource": "*",
  "Condition": {
    "Null": {
      "securityhub:ASFFSyntaxPath/Workflow.Status": "false"
    }
  }
}
```

Disallowing specific field values

To prevent a user from setting a field to a specific value, use a condition like this:

```
"Condition": {
  "StringEquals": {
    "securityhub:ASFFSyntaxPath/<fieldName>": "<fieldValue>"
  }
}
```

For example, the following statement indicates that BatchUpdateFindings cannot be used to set Workflow.Status to SUPPRESSED.

```
{
  "Sid": "VisualEditor0",
  "Effect": "Deny",
  "Action": "securityhub:BatchUpdateFindings",
  "Resource": "*",
  "Condition": {
    "StringEquals": {
      "securityhub:ASFFSyntaxPath/Workflow.Status": "SUPPRESSED"
    }
  }
}
```
"Resource": "+",
"Condition": { 
   "StringEquals": { 
      "securityhub:ASFFSyntaxPath/Workflow.Status": "SUPPRESSED"
   }
}

You can also provide a list of values that are not permitted.

"Condition": { 
   "ForAnyValue:StringEquals": { 
      "securityhub:ASFFSyntaxPath/<fieldName>": [ "{<fieldValue1>}", "{<fieldValue2>}", 
          "{<fieldValuen}>" ]
   }
}

For example, the following statement indicates that BatchUpdateFindings cannot be used to set Workflow.Status to either RESOLVED or SUPPRESSED.

{
   "Sid": "VisualEditor0",
   "Effect": "Deny",
   "Action": "securityhub:BatchUpdateFindings",
   "Resource": "+",
   "Condition": { 
      "ForAnyValue:StringEquals": { 
         "securityhub:ASFFSyntaxPath/Workflow.Status": [ 
            "RESOLVED",
            "NOTIFIED"
         ]
      }
   }
}

**Using the batch-update-findings command from the AWS CLI**

In the AWS Command Line Interface, you use the `batch-update-findings` command to update the findings.

For each finding to update, you provide both the finding ID and the ARN of the product that generated the finding.

`--finding-identifiers ID="<findingID1>",ProductArn="<productARN>"
ID="<findingID2>",ProductArn="<productARN2>"`

When you provide the attributes to update, you can either use a JSON format or a shortcut format.

Here is an example of an update to the Note object that uses the JSON format:

`--note '{"Text": "Known issue that is not a risk.", "UpdatedBy": "user1"}'`

Here is the same update that uses the shortcut format:

`--note Text="Known issue that is not a risk.",UpdatedBy="user1"`

The AWS CLI Command Reference provides the JSON and shortcut syntax for each field.

The following `batch-update-findings` example updates two findings to add a note, change the severity label, and resolve them.
### Viewing findings in AWS Security Hub

In the AWS Security Hub navigation pane, **Findings** displays a list of findings from all of the enabled product integrations and controls.

From **Integrations**, you can display a list of findings generated by an enabled integration. See the section called “Viewing the findings from an integration” (p. 465).

From **Insights**, you can display a list of findings for a matching insight result. See the section called “Viewing insight results and findings” (p. 79).

From **Security standards**, you can display a list of findings generated from a selected control. See the section called “Viewing and taking action on control findings” (p. 499).

You can also use the **GetFindings** API operation to retrieve a filtered list of findings.

#### Topics
- Filtering and grouping findings (console) (p. 99)
- Viewing finding details (console) (p. 102)
- Retrieving finding details (Security Hub API, AWS CLI) (p. 102)

### Filtering and grouping findings (console)

When you display a list of findings from the **Findings** page, the **Integrations** page, or the **Insights** page, the list is always filtered based on the record state and workflow status. This is in addition to the filters for an insight or integration.

The record state indicates whether the finding is active or archived. A finding can be archived by the finding provider. AWS Security Hub also automatically archives findings for controls if the associated resource is deleted. By default, a finding list only shows active findings.

The workflow status indicates the status of the investigation into the finding. The workflow status can only be updated by the Security Hub customer or a system that is operating on the customer's behalf. By default, a finding list only shows findings with a workflow status of **NEW** or **NOTIFIED**. The default finding list for a control also includes **RESOLVED** findings.

For information on working with the finding list for a control, see the section called “Filtering and sorting findings” (p. 500).
Adding filters

To change the scope of the list, you can add filters to it.

You can filter by up to 10 attributes. For each attribute, you can provide up to 20 filter values.

When filtering the finding list, Security Hub applies AND logic to the set of filters. In other words, a finding only matches if it matches all of the provided filters. For example, if you add GuardDuty as a filter for product name, and AwsS3Bucket as a filter for resource type, then matching findings must match both of these criteria.

However, Security Hub applies OR logic to filters that use the same attribute but different values. For example, you add both GuardDuty and Amazon Inspector as filter values for product name. In that case, a finding matches if it was generated by either GuardDuty or Amazon Inspector.

To add a filter to the finding list

2. To display a finding list, do one of the following:
   - In the Security Hub navigation pane, choose Findings.
   - In the Security Hub navigation pane, choose Insights. Choose an insight. Then on the results list, choose an insight result.
   - In the Security Hub navigation pane, choose Integrations. Choose See findings for an integration.
3. Choose the Add filters box.
4. In the menu, under Filters, choose a filter.
5. Choose the filter match type.
   - For a string filter, you can choose from the following comparison options:
     - is – Find a value that exactly matches the filter value.
     - starts with – Find a value that starts with the filter value.
     - is not – Find a value that does not match the filter value.
     - does not start with – Find a value that does not start with the filter value.
   - For a numeric filter, you can choose whether to provide a single number (Simple) or a range of numbers (Range).
   - For a date or time filter, you can choose whether to provide a length of time from the current date time (Rolling window) or a date range (Fixed range).

Adding multiple filters has the following interactions:

- is and starts with filters are joined by OR. A value matches if it contains any of the filter values. For example, if you specify Severity label is CRITICAL and Severity label is HIGH, the results include both critical and high severity findings.
- is not and does not start with filters are joined by AND. A value matches only if it does not contain any of those filter values. For example, if you specify Severity label is not LOW and Severity label is not MEDIUM, the results do not include either low or medium severity findings.

If you have an is filter on a field, you cannot have a is not or a does not start with filter on the same field.
6. Specify the filter value.

   Note that for string filters, the filter value is case sensitive.

   For example, for findings from Security Hub, **Product name** is Security Hub. If you use the **EQUALS** operator to see findings from Security Hub, you must enter **Security Hub** as the filter value. If you enter **security hub**, no findings are displayed.

   Similarly, if you use the **PREFIX** operator, and enter **Sec**, Security Hub findings are displayed. If you enter **sec**, no Security Hub findings are displayed.

7. Choose **Apply**.

**Grouping findings**

In addition to changing the filters, you can group the findings based on the values of a selected attribute.

When you group the findings, the list of findings is replaced with a list of values for the selected attribute in the matching findings. For each value, the list displays the number of findings that match the other filter criteria.

For example, if you group the findings by AWS account ID, you see a list of account identifiers, with the number of matching findings for each account.

Note that Security Hub can only display 100 values. If there are more than 100 grouping values, you only see the first 100.

When you choose an attribute value, the list of matching findings for that value is displayed.

**To group the findings in a findings list**

1. On the finding list, choose the **Add filters** box.
2. In the menu, under **Grouping**, choose **Group by**.
3. In the list, choose the attribute to use for the grouping.
4. Choose **Apply**.

**Changing a filter value or grouping attribute**

For an existing filter, you can change the filter value. You can also change the grouping attribute.

For example, you can change the **Record state** filter to look for **ARCHIVED** findings instead of **ACTIVE** findings.

**To edit a filter or grouping attribute**

1. On a filtered finding list, choose the filter or grouping attribute.
2. For **Group by**, choose the new attribute, then choose **Apply**.
3. For a filter, choose the new value, and then choose **Apply**.

**Deleting a filter or grouping attribute**

To delete a filter or grouping attribute, choose the **x** icon.

The list is updated automatically to reflect the change. When you remove the grouping attribute, the list changes from the list of field values back to a list of findings.
Viewing finding details (console)

From a finding list, you can display a details pane for a finding.

To view the findings detail pane

2. To display a finding list, do one of the following:
   - In the Security Hub navigation pane, choose **Findings**.
   - In the Security Hub navigation pane, choose **Insights**. Choose an insight. Then on the results list, choose an insight result.
   - In the Security Hub navigation pane, choose **Integrations**. Choose **See findings** for an integration.
3. Choose the finding title.

At the top of the finding details pane contains overview information about the finding, including the account, severity, dates, and status. If the account is an organization member account, then the information includes the account name. For accounts that are invited manually, the information only includes the account ID.

**Types and Related Findings** contains information about the finding type.

**Resources** contains information about the affected resource.

**Remediation** displays for control findings. It provides a link to the instructions for remediating the issue that triggered the finding.

**Finding Provider Fields** displays the values from the finding provider for confidence, criticality, related findings, severity, and finding type.

From the finding details pane, you can view more details and add field values to the filter.

- To display the complete JSON for the finding, choose the finding ID. From **Finding JSON**, you can download the finding JSON to a file.
- To add a field value to the finding list filter, choose the search icon next to the field.
- For findings that are based on AWS Config rules, to display a list of the applicable rules, choose **Rules**.

Retrieving finding details (Security Hub API, AWS CLI)

To retrieve details for selected findings programmatically, you can use an API call or the AWS Command Line Interface.

Note that when you filter by **CompanyName** or **ProductName**, Security Hub uses the values that are in **ProductFields**. It does not use the top-level **CompanyName** and **ProductName** fields.

To retrieve a list of findings (Security Hub API, AWS CLI)

- Security Hub API – Use the **GetFindings** API operation.
- AWS CLI – At the command line, run the **get-findings** command.

```
get-findings --filters <filter criteria JSON> --sort-criteria <sort criterion> --page-size <findings per page> --max-items <maximum number of results>
```

Example
Taking action on findings in AWS Security Hub

AWS Security Hub allows you to track the current status of your investigation into a finding. You can also send findings to custom actions for processing.

Topics

• Setting the workflow status for findings (p. 103)
• Sending findings to a custom action (p. 104)

Setting the workflow status for findings

For findings, the workflow status tracks the progress of your investigation into a finding. The workflow status is specific to an individual finding. It does not affect the generation of new findings. For example, setting the workflow status to SUPPRESSED or RESOLVED does not prevent a new finding for the same issue.

The workflow status has the following values:

NEW

The initial state of a finding before you review it.

Security Hub also resets the workflow status from either NOTIFIED or RESOLVED to NEW in the following cases:

• An archived finding is made active.
• The compliance status changes from PASSED to either WARNING, FAILED, or NOT_AVAILABLE.

These changes imply that additional investigation is required.

NOTIFIED

Indicates that you notified the resource owner about the security issue. You can use this status when you are not the resource owner, and you need intervention from the resource owner in order to resolve a security issue.

SUPPRESSED

Indicates that you reviewed the finding and do not believe that any action is needed. The finding is no longer updated.

RESOLVED

The finding was reviewed and remediated and is now considered resolved.

For findings from controls, if Compliance.Status is PASSED, then Security Hub automatically sets the workflow status to RESOLVED.

Setting the workflow status (console)

To set the workflow status from a finding details pane, from Workflow status, choose the status.
You can also set the workflow status for multiple selected findings in a finding list.

**To set the workflow status for multiple findings (console)**

2. To display a finding list, do one of the following:
   - In the Security Hub navigation pane, choose **Findings**.
   - In the Security Hub navigation pane, choose **Insights**. Choose an insight. Then on the results list, choose an insight result.
   - In the Security Hub navigation pane, choose **Integrations**. Choose **See findings** for an integration.
   - In the Security Hub navigation pane, choose **Security standards**. Choose **View results** to display a list of controls. Then choose the control name.
3. In the finding list, select the check box for each finding that you want to update.
4. At the top of the list, for **Workflow status**, choose the status.

**Setting the workflow status (Security Hub API, AWS CLI)**

To set the workflow status, you can use an API call or the AWS Command Line Interface.

**To set the workflow status of a finding (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the `BatchUpdateFindings` operation. To identify the finding to update, you must provide both the finding ID and the ARN of the product that generated the finding.
- **AWS CLI** – At the command line, run the `batch-update-findings` command.

```bash
batch-update-findings --finding-identifiers Id="<findingID>",ProductArn="<productARN>" --workflow Status="<workflowStatus>"
```

**Example**

```bash
```

**Sending findings to a custom action**

You can create AWS Security Hub custom actions to automate Security Hub with Amazon EventBridge. For custom actions, the event type is **Security Hub Findings - Custom Action**.

For more information and detailed steps on creating custom actions, see Automated response and remediation (p. 711).

After you set up a custom action, you can send findings to it.

**To send findings to a custom action**

2. To display a finding list, do one of the following:
   - In the Security Hub navigation pane, choose **Findings**.
   - In the Security Hub navigation pane, choose **Insights**. Choose an insight. Then on the results list, choose an insight result.
In the Security Hub navigation pane, choose **Integrations**. Choose **See findings** for an integration.

In the Security Hub navigation pane, choose **Security standards**. Choose **View results** to display a list of controls. Then choose the control name.

3. In the finding list, select the check box for each finding to send to the custom action.

You can send up to 20 findings at a time.

4. For **Actions**, choose the custom action.

---

**AWS Security Finding Format (ASFF)**

AWS Security Hub consumes, aggregates, organizes, and prioritizes findings from AWS security services and from the third-party product integrations. Security Hub processes these findings using a standard findings format called the AWS Security Finding Format (ASFF), which eliminates the need for time-consuming data conversion efforts. Then it correlates ingested findings across products to prioritize the most important ones.

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ASFF syntax

The following is the complete JSON syntax for the AWS Security Finding Format (ASFF).

```
"Findings": [
  {
    "Action": {
      "ActionType": "string",
      "AwsApiCallAction": {
        "AffectedResources": {
          "string": "string"
        },
        "Api": "string",
        "CallerType": "string",
        "DomainDetails": {
          "Domain": "string"
        },
        "FirstSeen": "string",
        "LastSeen": "string",
        "RemoteIpDetails": {
          "City": {
            "CityName": "string"
          },
          "Country": {
            "CountryCode": "string",
            "CountryName": "string"
          }
        }
      }
    }
  }
]```

ASFF syntax

The following is the complete JSON syntax for the AWS Security Finding Format (ASFF).

```
"Findings": [
  {
    "Action": {
      "ActionType": "string",
      "AwsApiCallAction": {
        "AffectedResources": {
          "string": "string"
        },
        "Api": "string",
        "CallerType": "string",
        "DomainDetails": {
          "Domain": "string"
        },
        "FirstSeen": "string",
        "LastSeen": "string",
        "RemoteIpDetails": {
          "City": {
            "CityName": "string"
          },
          "Country": {
            "CountryCode": "string",
            "CountryName": "string"
          }
        }
      }
    }
  }
]```
ASFF syntax

```
{
  "IpAddressV4": "string",
  "Geolocation": {
    "Lat": number,
    "Lon": number
  },
  "Organization": {
    "Asn": number,
    "AsnOrg": "string",
    "Isp": "string",
    "Org": "string"
  },
  "ServiceName": "string"
},
"DnsRequestAction": {
  "Blocked": boolean,
  "Domain": "string",
  "Protocol": "string"
},
"NetworkConnectionAction": {
  "Blocked": boolean,
  "ConnectionDirection": "string",
  "LocalPortDetails": {
    "Port": number,
    "PortName": "string"
  },
  "Protocol": "string",
  "RemoteIpDetails": {
    "City": {
      "CityName": "string"
    },
    "Country": {
      "CountryCode": "string",
      "CountryName": "string"
    },
    "IpAddressV4": "string",
    "Geolocation": {
      "Lat": number,
      "Lon": number
    },
    "Organization": {
      "Asn": number,
      "AsnOrg": "string",
      "Isp": "string",
      "Org": "string"
    }
  },
  "RemotePortDetails": {
    "Port": number,
    "PortName": "string"
  }
},
"PortProbeAction": {
  "Blocked": boolean,
  "PortProbeDetails": [
    {
      "LocalIpDetails": {
        "IpAddressV4": "string"
      },
      "LocalPortDetails": {
        "Port": number,
        "PortName": "string"
      },
      "RemoteIpDetails": {
        "City": {
          "CityName": "string"
        }
      }
    }
  ]
}
```
"CityName": "string",
"Country": {
"CountryCode": "string",
"CountryName": "string"
},
"GeoLocation": {
"Lat": number,
"Lon": number
},
"IpAddressV4": "string",
"Organization": {
"Asn": number,
"AsnOrg": "string",
"Isp": "string",
"Org": "string"
}
},
"AwsAccountId": "string",
"CompanyName": "string",
"Compliance": {
"RelatedRequirements": ["string"],
"Status": "string",
"StatusReasons": [
{
"Description": "string",
"ReasonCode": "string"
}
],
"Confidence": number,
"CreatedAt": "string",
"Criticality": number,
"Description": "string",
"FindingProviderFields": {
"Confidence": number,
"Criticality": number,
"RelatedFindings": [
{
"ProductArn": "string",
"Id": "string"
}
],
"Severity": {
"Label": "string",
"Original": "string"
},
"Types": ["string"]
},
"FirstObservedAt": "string",
"GeneratorId": "string",
"Id": "string",
"LastObservedAt": "string",
"Malware": [
{
"Name": "string",
"Path": "string",
"State": "string",
"Type": "string"
}
],
"Network": {

"DestinationDomain": "string",
"DestinationIpV4": "string",
"DestinationIpV6": "string",
"DestinationPort": number,
"Direction": "string",
"OpenPortRange": {
    "Begin": integer,
    "End": integer
},
"Protocol": "string",
"SourceDomain": "string",
"SourceIpV4": "string",
"SourceIpV6": "string",
"SourceMac": "string",
"SourcePort": number
},
"NetworkPath": [
    {
      "ComponentId": "string",
      "ComponentType": "string",
      "Egress": {
        "Destination": {
          "Address": ["string"],
          "PortRanges": [
            {
              "Begin": integer,
              "End": integer
            }
          ]
        },
        "Protocol": "string",
        "Source": {
          "Address": ["string"],
          "PortRanges": [
            {
              "Begin": integer,
              "End": integer
            }
          ]
        }
      }
    },
    "Ingress": {
      "Destination": {
        "Address": ["string"],
        "PortRanges": [
          {
            "Begin": integer,
            "End": integer
          }
        ]
      },
      "Protocol": "string",
      "Source": {
        "Address": ["string"],
        "PortRanges": [
          {
            "Begin": integer,
            "End": integer
          }
        ]
      }
    }
  ],
"Note": {
    "Text": "string"}
"UpdatedAt": "string",
"UpdatedBy": "string"
},
"PatchSummary": {
"FailedCount": number,
"Id": "string",
"InstalledCount": number,
"InstalledOtherCount": number,
"InstalledPendingReboot": number,
"InstalledRejectedCount": number,
"MissingCount": number,
"Operation": "string",
"OperationEndTime": "string",
"OperationStartTime": "string",
"RebootOption": "string"
},
"Process": {
"LaunchedAt": "string",
"Name": "string",
"ParentPid": number,
"Path": "string",
"Pid": number,
"TerminatedAt": "string"
},
"ProductArn": "string",
"ProductFields": {
"string": "string"
},
"ProductName": "string",
"RecordState": "string",
"Region": "string",
"RelatedFindings": [
{
"Id": "string",
"ProductArn": "string"
}
],
"Remediation": {
"Recommendation": {
"Text": "string",
"Url": "string"
}
},
"Resources": [
{
"DataClassification": {
"DetailedResultsLocation": "string",
"Result": {
"AdditionalOccurrences": boolean,
"CustomDataIdentifiers": {
"Detections": [
{
"Arn": "string",
"Count": integer,
"Name": "string",
"Occurrences": {
"Cells": [
{
"CellReference": "string",
"Column": integer,
"ColumnName": "string",
"Row": integer
}
],
"LineRanges": [
{
}}
]}
"LineRanges": [
"End": integer,
"Start": integer,
"StartColumn": integer
}
"OffsetRanges": [
{
"End": integer,
"Start": integer,
"StartColumn": integer
}
],
"Pages": [
{
"LineRange": {
"End": integer,
"Start": integer,
"StartColumn": integer
},
"OffsetRange": {
"End": integer,
"Start": integer,
"StartColumn": integer
},
"PageNumber": integer
}
],
"Records": [
{
"JsonPath": "string",
"RecordIndex": integer
}
]
],
"TotalCount": integer
},
"MimeType": "string",
"SensitiveData": [
{
"Category": "string",
"Detections": [
{
"Count": integer,
"Occurences": {
"Cells": [
{
"CellReference": "string",
"Column": integer,
"ColumnName": "string",
"Row": integer
}
],
"LineRanges": [
{
"End": integer,
"Start": integer,
"StartColumn": integer
}
],
"OffsetRanges": [
{
"End": integer,
"Start": integer,
"StartColumn": integer
}
ASFF syntax

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{
  "Pages": [
    {
      "LineRange": {
        "End": integer,
        "Start": integer,
        "StartColumn": integer
      },
      "OffsetRange": {
        "End": integer,
        "Start": integer,
        "StartColumn": integer
      },
      "PageNumber": integer
    }
  ],
  "Records": [
    {
      "JsonPath": "string",
      "RecordIndex": integer
    }
  ],
  "Type": "string"
},
"TotalCount": integer
},
"SizeClassified": integer,
"Status": {
  "Code": "string",
  "Reason": "string"
}
},
"Details": {
  "AwsApiGatewayRestApi": {
    "ApiKeySource": "string",
    "BinaryMediaTypes": [" string" ],
    "CreatedDate": "string",
    "Description": "string",
    "EndpointConfiguration": {
      "Types": [" string" ]
    },
    "Id": "string",
    "MinimumCompressionSize": number,
    "Name": "string",
    "Version": "string"
  },
  "AwsApiGatewayStage": {
    "AccessLogSettings": {
      "DestinationArn": "string",
      "Format": "string"
    },
    "CacheClusterEnabled": boolean,
    "CacheClusterSize": "string",
    "CacheClusterStatus": "string",
    "CanarySettings": {
      "DeploymentId": "string",
      "PercentTraffic": number,
      "StageVariable Overrides": [ {
        "string": "string"
      }
    ]
  }
}
"UseStageCache": boolean,
"ClientCertificateId": "string",
"CreatedDate": "string",
"DeploymentId": "string",
"Description": "string",
"DocumentationVersion": "string",
"LastUpdatedDate": "string",
"MethodSettings": [
  {
    "CacheDataEncrypted": boolean,
    "CachingEnabled": boolean,
    "CacheTtlInSeconds": number,
    "DataTraceEnabled": boolean,
    "HttpMethod": "string",
    "LoggingLevel": "string",
    "MetricsEnabled": boolean,
    "RequireAuthorizationForCacheControl": boolean,
    "ResourcePath": "string",
    "ThrottlingBurstLimit": number,
    "ThrottlingRateLimit": number,
    "UnauthorizedCacheControlHeaderStrategy": "string"
  }
],
"StageName": "string",
"TracingEnabled": boolean,
"Variables": {
  "string": "string"
},
"WebAclArn": "string"
},
"AwsApiGatewayV2Api": {
  "ApiEndpoint": "string",
  "ApiId": "string",
  "ApiKeySelectionExpression": "string",
  "CorsConfiguration": {
    "AllowCredentials": boolean,
    "AllowHeaders": [ "string" ],
    "AllowMethods": [ "string" ],
    "AllowOrigins": [ "string" ],
    "ExposeHeaders": [ "string" ],
    "MaxAge": number
  },
  "CreatedDate": "string",
  "Description": "string",
  "Name": "string",
  "ProtocolType": "string",
  "RouteSelectionExpression": "string",
  "Version": "string"
},
"AwsApiGatewayV2Stage": {
  "AccessLogSettings": {
    "DestinationArn": "string",
    "Format": "string"
  },
  "ApiGatewayManaged": boolean,
  "AutoDeploy": boolean,
  "ClientCertificateId": "string",
  "CreatedDate": "string",
  "DefaultRouteSettings": {
    "DataTraceEnabled": boolean,
    "DetailedMetricsEnabled": boolean,
    "LoggingLevel": "string",
    "ThrottlingBurstLimit": number,
    "ThrottlingRateLimit": number
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ASFF syntax

{},
"DeploymentId": "string",
"Description": "string",
"LastDeploymentStatusMessage": "string",
"LastUpdatedDate": "string",
"RouteSettings": {
  "DetailedMetricsEnabled": boolean,
  "LoggingLevel": "string",
  "DataTraceEnabled": boolean,
  "ThrottlingBurstLimit": number,
  "ThrottlingRateLimit": number
},
"StageName": "string",
"StageVariables": [
  { "string": "string" }
],
"AwsAutoScalingAutoScalingGroup": {
  "CreatedTime": "string",
  "HealthCheckGracePeriod": integer,
  "HealthCheckType": "string",
  "LaunchConfigurationName": "string",
  "LoadBalancerNames": [ "string" ]
},
"AwsAutoScalingLaunchConfiguration": {
  "AssociatePublicIpAddress": boolean,
  "BlockDeviceMappings": [
    { "DeviceName": "string",
      "Ebs": {
        "DeleteOnTermination": boolean,
        "Encrypted": boolean,
        "Iops": number,
        "SnapshotId": "string",
        "VolumeSize": number,
        "VolumeType": "string"
      },
      "NoDevice": boolean,
      "VirtualName": "string"
    }
  ],
  "ClassicLinkVpcId": "string",
  "ClassicLinkVpcSecurityGroups": [ "string" ],
  "CreatedAt": "string",
  "EbsOptimized": boolean,
  "IamInstanceProfile": "string",
},
"ImageId": "string",
"InstanceMonitoring": { "Enabled": boolean },
"InstanceType": "string",
"KernelId": "string",
"KeyName": "string",
"LaunchConfigurationName": "string",
"PlacementTenancy": "string",
"RamdiskId": "string",
"SecurityGroups": [ "string" ],
"SpotPrice": "string",
"UserData": "string"
},
"AwsCertificateManagerCertificate": {
  "CertificateAuthorityArn": "string",
  "CreatedAt": "string",
  "Certificate": "string"}
"DomainName": "string",
"DomainValidationOptions": [
  {
    "DomainName": "string",
    "ResourceRecord": {
      "Name": "string",
      "Type": "string",
      "Value": "string"
    },
    "ValidationDomain": "string",
    "ValidationEmails": [ "string" ],
    "ValidationMethod": "string",
    "ValidationStatus": "string"
  }
],
"ExtendedKeyUsages": [
  {
    "Name": "string",
    "OId": "string"
  }
],
"FailureReason": "string",
"ImportedAt": "string",
"InUseBy": [ "string" ],
"IssuedAt": "string",
"Issuer": "string",
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ASFF syntax

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}
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ASFF syntax

{

"AwsIamGroup": {
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  "PolicyVersionList": [
    {
      "CreateDate": "string",
      "IsDefaultVersion": boolean,
      "VersionId": "string"
    }
  ],
  "UpdateDate": "string"
},
"AwsIamRole": {
  "AssumeRolePolicyDocument": "string",
  "AttachedManagedPolicies": [
    {
      "PolicyArn": "string",
      "PolicyName": "string"
    }
  ],
  "CreateDate": "string",
  "InstanceProfileList": [
    {
      "Arn": "string",
      "CreateDate": "string",
      "InstanceProfileId": "string",
      "InstanceProfileName": "string",
      "Path": "string",
      "Roles": [
        {
          "Arn": "string",
          "AssumeRolePolicyDocument": "string",
          "CreateDate": "string",
          "Path": "string",
          "RoleId": "string",
          "RoleName": "string"
        }
      ]
    }
  ],
  "MaxSessionDuration": number,
"Path": "string",
"PermissionsBoundary": {
  "PermissionsBoundaryArn": "string",
  "PermissionsBoundaryType": "string"
},
"RoleId": "string",
"RoleName": "string",
"RolePolicyList": [
  {
    "PolicyName": "string"
  }
],
"AwsIamUser": {
  "AttachedManagedPolicies": [
    {
      "PolicyArn": "string",
      "PolicyName": "string"
    }
  ],
  "CreateDate": "string",
  "GroupList": ["string"],
  "Path": "string",
  "PermissionsBoundary": {
    "PermissionsBoundaryArn": "string",
    "PermissionsBoundaryType": "string"
  },
  "UserId": "string",
  "UserName": "string",
  "UserPolicyList": [
    {
      "PolicyName": "string"
    }
  ]
},
"AwsKmsKey": {
  "AWSAccountId": "string",
  "CreationDate": "string",
  "Description": "string",
  "KeyId": "string",
  "KeyManager": "string",
  "KeyRotationStatus": boolean,
  "KeyState": "string",
  "Origin": "string"
},
"AwsLambdaFunction": {
  "Code": {
    "S3Bucket": "string",
    "S3Key": "string",
    "S3ObjectVersion": "string",
    "ZipFile": "string"
  },
  "CodeSha256": "string",
  "DeadLetterConfig": {
    "TargetArn": "string"
  },
  "Environment": {
    "Variables": {
      "string": "string"
    },
    "Error": {
      "ErrorCode": "string",
      "Message": "string"
    }
  },
  "FunctionName": "string"
"Handler": "string",
"KmsKeyArn": "string",
"LastModified": "string",
"Layers": {
    "Arn": "string",
    "CodeSize": number
},
"RevisionId": "string",
"Role": "string",
"Runtime": "string",
"Timeout": "integer",
"TracingConfig": {
    "TracingConfig.Mode": "string"
},
"Version": "string",
"VpcConfig": {
    "SecurityGroupIds": [ "string" ],
    "SubnetIds": [ "string" ]
},
"MasterArn": "string",
"MemorySize": number
},
"AwsLambdaLayerVersion": {
    "CompatibleRuntimes": [ "string" ],
    "CreateDate": "string",
    "Version": number
},
"AwsRdsDbCluster": {
    "ActivityStreamStatus": "string",
    "AllocatedStorage": number,
    "AssociatedRoles": [ {
        "RoleArn": "string",
        "Status": "string"
    } ],
    "AvailabilityZones": [ "string" ],
    "BackupRetentionPeriod": integer,
    "ClusterCreateTime": "string",
    "CopyTagsToSnapshot": boolean,
    "CrossAccountClone": boolean,
    "CustomEndpoints": [ "string" ],
    "DatabaseName": "string",
    "DbClusterIdentifier": "string",
    "DbClusterMembers": [ {
        "DbClusterParameterGroupStatus": "string",
        "DbInstanceIdentifier": "string",
        "IsClusterWriter": boolean,
        "PromotionTier": integer
    } ],
    "DbClusterOptionGroupMemberships": [ {
        "DbClusterOptionGroupName": "string",
        "Status": "string"
    } ],
    "DbClusterParameterGroup": "string",
    "DbClusterResourceId": "string",
    "DbSubnetGroup": "string",
    "DeletionProtection": boolean,
    "DomainMemberships": [ {
        "DomainName": "string",
        "Status": "string"
    } ],
    "DomainResourceId": "string",
    "DomainType": "string",
    "Engine": "string",
    "EngineMode": "string",
    "EngineVersion": "string",
    "Encrypted": boolean,
    "EnhancedMonitoring": { 
        "EnhancedMonitoringResourceTypes": [ "string" ]
    },
    "EnhancedMonitoringOption": boolean,
    "Endpoint": "string",
    "HostedZoneId": "string",
    "MasterEndpoint": "string",
    "MasterPassword": "string",
    "MasterUser": "string"
}
"Domain": "string",
"Fqdn": "string",
"IamRoleName": "string",
"Status": "string"
}
],
"EnabledCloudwatchLogsExports": [ "string" ],
"Endpoint": "string",
"Engine": "string",
"EngineMode": "string",
"EngineVersion": "string",
"HostedZoneId": "string",
"HttpEndpointEnabled": boolean,
"IamDatabaseAuthenticationEnabled": boolean,
"KmsKeyId": "string",
"MasterUsername": "string",
"MultiAz": boolean,
"Port": integer,
"PreferredBackupWindow": "string",
"PreferredMaintenanceWindow": "string",
"ReaderEndpoint": "string",
"ReadReplicaIdentifiers": [ "string" ],
"Status": "string",
"StorageEncrypted": boolean,
"VpcSecurityGroups": [ 
  { 
    "Status": "string",
    "VpcSecurityGroupId": "string"
  }
],
"AwsRdsDbClusterSnapshot": { 
  "AllocatedStorage": integer,
  "AvailabilityZone": [ "string" ],
  "ClusterCreateTime": "string",
  "DbClusterIdentifier": "string",
  "DbClusterSnapshotIdentifier": "string",
  "Engine": "string",
  "EngineVersion": "string",
  "IamDatabaseAuthenticationEnabled": boolean,
  "KmsKeyId": "string",
  "LicenseModel": "string",
  "MasterUsername": "string",
  "PercentProgress": integer,
  "Port": integer,
  "SnapshotCreateTime": "string",
  "SnapshotType": "string",
  "Status": "string",
  "StorageEncrypted": boolean,
  "VpcId": "string"
},
"AwsRdsDbInstance": { 
  "AllocatedStorage": number,
  "AssociatedRoles": [ 
    { 
      "RoleArn": "string",
      "FeatureName": "string",
      "Status": "string"
    }
  ],
  "AutoMinorVersionUpgrade": boolean,
  "AvailabilityZone": "string",
  "BackupRetentionPeriod": number,
  "CACertificateIdentifier": "string",
  "CharacterSet": "string",
  "CopyTagsToSnapshot": boolean,
"DBClusterIdentifier": "string",
"DBInstanceClass": "string",
"DBInstanceIdentifier": "string",
"DbInstancePort": number,
"DBInstanceStatus": "string",
"DbResourceIdentifier": "string",
"DBName": "string",
"DbParameterGroups": [
  {
    "DbParameterGroupName": "string",
    "ParameterApplyStatus": "string"
  }
],
"DbSecurityGroups": [ "string" ],
"DbSubnetGroup": {
  "DbSubnetGroupArn": "string",
  "DbSubnetGroupDescription": "string",
  "DbSubnetGroupName": "string",
  "SubnetGroupStatus": "string",
  "Subnets": [
    {
      "SubnetAvailabilityZone": {
        "Name": "string"
      },
      "SubnetIdentifier": "string",
      "SubnetStatus": "string"
    }
  ],
  "VpcId": "string"
},
"DeletionProtection": boolean,
"Endpoint": {
  "Address": "string",
  "Port": number,
  "HostedZoneId": "string"
},
"DomainMemberships": [ {
  "Domain": "string",
  "Fqdn": "string",
  "IamRoleName": "string",
  "Status": "string"
}
],
"EnabledCloudwatchLogsExports": [ "string" ],
"Engine": "string",
"EngineVersion": "string",
"EnhancedMonitoringResourceArn": "string",
"IAMDatabaseAuthenticationEnabled": boolean,
"InstanceCreateTime": "string",
"Iops": number,
"KmsKeyId": "string",
"LatestRestorableTime": "string",
"LicenseModel": "string",
"ListenerEndpoint": {
  "Address": "string",
  "HostedZoneId": "string",
  "Port": number
},
"MasterUsername": "admin",
"MaxAllocatedStorage": number,
"MonitoringInterval": number,
"MonitoringRoleArn": "string",
"MultiAz": boolean,
"OptionGroupMemberships": [ {

"OptionGroupName": "string",
"Status": "string"
}

"PendingModifiedValues": {
  "AllocatedStorage": number,
  "BackupRetentionPeriod": number,
  "CaCertificateIdentifier": "string",
  "DbInstanceClass": "string",
  "DbInstanceIdentifier": "string",
  "DbSubnetGroupName": "string",
  "EngineVersion": "string",
  "Iops": number,
  "LicenseModel": "string",
  "MasterUserPassword": "string",
  "MultiAZ": boolean,
  "PendingCloudWatchLogsExports": {
    "LogTypesToDisable": [ "string" ],
    "LogTypesToEnable": [ "string" ]
  },
  "Port": number,
  "ProcessorFeatures": [
    
  ],
  "StorageType": "string"
},
"PerformanceInsightsEnabled": boolean,
"PerformanceInsightsKmsKeyId": "string",
"PerformanceInsightsRetentionPeriod": number,
"PreferredBackupWindow": "string",
"PreferredMaintenanceWindow": "string",
"ProcessorFeatures": [
  
],
"PromotionTier": number,
"PubliclyAccessible": boolean,
"ReadReplicaDBClusterIdentifiers": [ "string" ],
"ReadReplicaDBInstanceIdentifiers": [ "string" ],
"ReadReplicaSourceDBInstanceIdentifier": "string",
"SecondaryAvailabilityZone": "string",
"StatusInfos": [
  
],
"StorageEncrypted": boolean,
"TdeCredentialArn": "string",
"Timezone": "string",
"VpcSecurityGroups": [
  
],
"AwsRdsDbSnapshot": { 
  "AllocatedStorage": integer,
  "BackupRetentionPeriod": number,
  "CaCertificateIdentifier": "string",
  "DbInstanceClass": "string",
  "DbInstanceIdentifier": "string",
  "DbSubnetGroupName": "string",
  "EngineVersion": "string",
  "Iops": number,
  "LicenseModel": "string",
  "MasterUserPassword": "string",
  "MultiAZ": boolean,
  "PendingCloudWatchLogsExports": {
    "LogTypesToDisable": [ "string" ],
    "LogTypesToEnable": [ "string" ]
  },
  "Port": number,
  "ProcessorFeatures": [
    
  ],
  "StorageType": "string"}
"AvailabilityZone": "string",
"DbInstanceIdentifier": "string",
"DbiResourceId": "string",
"DbSnapshotIdentifier": "string",
"Encrypted": boolean,
"Engine": "string",
"EngineVersion": "string",
"IamDatabaseAuthenticationEnabled": boolean,
"InstanceCreateTime": "string",
"Iops": number,
"KmsKeyId": "string",
"LicenseModel": "string",
"MasterUsername": "string",
"OptionGroupName": "string",
"PercentProgress": integer,
"Port": integer,
"ProcessorFeatures": [],
"SnapshotCreateTime": "string",
"SourceType": "string",
"Status": "string",
"StorageType": "string",
"TdeCredentialArn": "string",
"VpcId": "string"
},
"AwsRdsSubscription": {
"CustomerAwsId": "string",
"CustSubscriptionId": "string",
"Enabled": boolean,
"EventCategoriesList": ["string"],
"EventSubscriptionArn": "string",
"SnsTopicArn": "string",
"SourceIdsList": ["string"],
"SourceType": "string",
"Status": "string",
"SubscriptionCreationTime": "string"
},
"AwsRedshiftCluster": {
"AllowVersionUpgrade": boolean,
"AutomatedSnapshotRetentionPeriod": number,
"AvailabilityZone": "string",
"ClusterAvailabilityStatus": "string",
"ClusterCreateTime": "string",
"ClusterIdentifier": "string",
"ClusterNodes": [
{
"NodeRole": "string",
"PrivateIPAddress": "string",
"PublicIPAddress": "string"
}
],
"ClusterParameterGroups": [
{
"ClusterParameterStatusList": [
{
"ParameterApplyErrorDescription": "string",
"ParameterApplyStatus": "string",
"ParameterName": "string"
}
],
"ParameterApplyStatus": "string",
"ParameterGroupName": "string"
}
]
"ClusterPublicKey": "string",
"ClusterRevisionNumber": "string",
"ClusterSecurityGroups": [
    {
        "ClusterSecurityGroupName": "string",
        "Status": "string"
    }
],
"ClusterSnapshotCopyStatus": {
    "DestinationRegion": "string",
    "ManualSnapshotRetentionPeriod": number,
    "RetentionPeriod": number,
    "SnapshotCopyGrantName": "string"
},
"ClusterStatus": "string",
"ClusterSubnetGroupName": "string",
"ClusterVersion": "string",
"DBName": "string",
"DeferredMaintenanceWindows": [
    {
        "DeferMaintenanceEndTime": "string",
        "DeferMaintenanceIdentifier": "string",
        "DeferMaintenanceStartTime": "string"
    }
],
"ElasticIpStatus": {
    "ElasticIp": "string",
    "Status": "string"
},
"ElasticResizeNumberOfNodeOptions": "string",
"Encrypted": boolean,
"Endpoint": {
    "Address": "string",
    "Port": number
},
"EnhancedVpcRouting": boolean,
"ExpectedNextSnapshotScheduleTime": "string",
"ExpectedNextSnapshotScheduleTimeStatus": "string",
"HsmStatus": {
    "HsmClientCertificateIdentifier": "string",
    "HsmConfigurationIdentifier": "string",
    "Status": "string"
},
"IamRoles": [
    {
        "ApplyStatus": "string",
        "IamRoleArn": "string"
    }
],
"KmsKeyId": "string",
"MaintenanceTrackName": "string",
"ManualSnapshotRetentionPeriod": "number",
"MasterUsername": "string",
"NextMaintenanceWindowStartTime": "string",
"NodeType": "string",
"NumberOfNodes": number,
"PendingActions": [ "string" ],
"PendingModifiedValues": {
    "AutomatedSnapshotRetentionPeriod": number,
    "ClusterIdentifier": "string",
    "ClusterType": "string",
    "ClusterVersion": "string",
    "EncryptionType": "string",
    "EnhancedVpcRouting": boolean,
    "MaintenanceTrackName": "string",
    "MasterUserPassword": "string"
"NodeType": "string",
"NumberOfNodes": number,
"PubliclyAccessible": "string"
},
"PreferredMaintenanceWindow": "string",
"PubliclyAccessible": boolean,
"ResizeInfo": {
  "AllowCancelResize": boolean,
  "ResizeType": "string"
},
"RestoreStatus": {
  "CurrentRestoreRateInMegaBytesPerSecond": number,
  "ElapsedTimeInSeconds": number,
  "EstimatedTimeToCompletionInSeconds": number,
  "ProgressInMegaBytes": number,
  "SnapshotSizeInMegaBytes": number,
  "Status": "string"
},
"SnapshotScheduleIdentifier": "string",
"SnapshotScheduleState": "string",
"VpcId": "string",
"VpcSecurityGroups": [
  {
    "Status": "string",
    "VpcSecurityGroupId": "string"
  }
],
"AwsS3AccountPublicAccessBlock": {
  "BlockPublicAcls": boolean,
  "BlockPublicPolicy": boolean,
  "IgnorePublicAcls": boolean,
  "RestrictPublicBuckets": boolean
},
"AwsS3Bucket": {
  "AccessControlList": "string",
  "BucketLifecycleConfiguration": {
    "Rules": [
      {
        "AbortIncompleteMultipartUpload": {
          "DaysAfterInitiation": number
        },
        "ExpirationDate": "string",
        "ExpirationInDays": number,
        "ExpiredObjectDeleteMarker": boolean,
        "Filter": {
          "Predicate": {
            "Operands": [
              {
                "Prefix": "string",
                "Type": "string"
              },
              {
                "Tag": {
                  "Key": "string",
                  "Value": "string"
                },
                "Type": "string"
              }
            ],
            "Type": "string"
          }
        },
        "Id": "string",
        "NoncurrentVersionExpirationInDays": number,
        "NoncurrentVersionTransitions": [
          {
            "StorageClass": "string",
            "TransitionInDays": number,
            "TransitionType": "string"
          }
        ]
      }
    ]
  }
}
{  
  "Days": number,  
  "StorageClass": "string"  
},  
"Prefix": "string",  
"Status": "string",  
"Transitions": [  
  {  
    "Date": "string",  
    "Days": number,  
    "StorageClass": "string"  
  }  
],  
"BucketLoggingConfiguration": {  
  "DestinationBucketName": "string",  
  "LogFilePrefix": "string"  
},  
"BucketNotificationConfiguration": {  
  "Configurations": [  
    {  
      "Destination": "string",  
      "Events": ["string"],  
      "Filter": {  
        "S3KeyFilter": {  
          "FilterRules": [  
            {  
              "Name": "string",  
              "Value": "string"  
            }  
          ]  
        }  
      }  
    },  
    "Type": "string"  
  ]  
},  
"BucketWebsiteConfiguration": {  
  "ErrorDocument": "string",  
  "IndexDocumentSuffix": "string",  
  "RedirectAllRequestsTo": {  
    "HostName": "string",  
    "Protocol": "string"  
  },  
  "RoutingRules": [  
    {  
      "Condition": {  
        "HttpErrorCodeReturnedEquals": "string",  
        "KeyPrefixEquals": "string"  
      },  
      "Redirect": {  
        "HostName": "string",  
        "HttpRedirectCode": "string",  
        "Protocol": "string",  
        "ReplaceKeyPrefixWith": "string",  
        "ReplaceKeyWith": "string"  
      }  
    }  
  ],  
  "CreatedAt": "string",  
  "OwnerId": "string",  
  "OwnerName": "string"  
}
"PublicAccessBlockConfiguration": {
    "BlockPublicAcls": boolean,
    "BlockPublicPolicy": boolean,
    "IgnorePublicAcls": boolean,
    "RestrictPublicBuckets": boolean
},
"ServerSideEncryptionConfiguration": {
    "Rules": [
    {
      "ApplyServerSideEncryptionByDefault": {
        "KMSMasterKeyID": "string",
        "SSEAlgorithm": "string"
      }
    }
    ]
},
"AwsS3Object": {
    "ContentType": "string",
    "ETag": "string",
    "LastModified": "string",
    "ServerSideEncryption": "string",
    "SSEKMSKeyId": "string",
    "VersionId": "string"
},
"AwsSecretsManagerSecret": {
    "Deleted": boolean,
    "Description": "string",
    "KmsKeyId": "string",
    "Name": "string",
    "RotationEnabled": boolean,
    "RotationLambdaArn": "string",
    "RotationOccurredWithinFrequency": boolean,
    "RotationRules": {
      "AutomaticallyAfterDays": integer
    }
},
"AwsSsmPatchCompliance": {
    "Patch": {
      "ComplianceSummary": {
        "ComplianceType": "string",
        "CompliantCriticalCount": integer,
        "CompliantHighCount": integer,
        "CompliantInformationalCount": integer,
        "CompliantLowCount": integer,
        "CompliantMediumCount": integer,
        "CompliantUnspecifiedCount": integer,
        "ExecutionType": "string",
        "NonCompliantCriticalCount": integer,
        "NonCompliantHighCount": integer,
        "NonCompliantInformationalCount": integer,
        "NonCompliantLowCount": integer,
        "NonCompliantMediumCount": integer,
        "NonCompliantUnspecifiedCount": integer,
        "OverallSeverity": "string",
        "PatchBaselineId": "string",
        "PatchGroup": "string",
        "Status": "string"
      }
    }
},
"AwsSnsTopic": {
    "KmsMasterKeyId": "string",
    "Owner": "string",
    "Subscription": {
      "Endpoint": "string",
      "ResourceArn": "string",
      "Sid": "string"
    }
}
"Protocol": "string",
"TopicName": "string",

"AwsSqsQueue": {
  "DeadLetterTargetArn": "string",
  "KmsDataKeyReusePeriodSeconds": number,
  "KmsMasterKeyId": "string",
  "QueueName": "string"
},

"AwsWafWebAcl": {
  "DefaultAction": "string",
  "Name": "string",
  "Rules": [
    {
      "Action": {
        "Type": "string"
      },
      "ExcludedRules": [
        {
          "RuleId": "string"
        }
      ],
      "OverrideAction": {
        "Type": "string"
      },
      "Priority": number,
      "RuleId": "string",
      "Type": "string"
    }
  ],
  "WebAclId": "string"
},

"Container": {
  "ImageId": "string",
  "ImageName": "string",
  "LaunchedAt": "string",
  "Name": "string"
},

"Other": {
  "string": "string"
}

", "Id": "string",
"Partition": "string",
"Region": "string",
"ResourceRole": "string",
"Tags": {
  "string": "string"
},

"Type": "string"

],
"SchemaVersion": "string",
"Severity": {
  "Label": "string",
  "Normalized": number,
  "Original": "string",
  "Product": number
},

"SourceUrl": "string",
"ThreatIntelligenceIndicators": [
  {
    "Category": "string",
    "LastObservedAt": "string",
    "Source": "string",
    "string": "string"
  }
]
ASFF attributes

The following list shows the attributes and objects for the AWS Security Finding Format (ASFF). To see the details for an object’s attributes and structure, choose the object name.
Required attributes

The following attributes are required for all findings.

**AwsAccountId**

Required

The AWS account ID that the finding applies to.

**Type:** String

**Maximum length:** 12 digits

**Example**

"AwsAccountId": "111111111111"

**CreatedAt**

Required

Indicates when the potential security issue captured by a finding was created.

The `CreatedAt` timestamp reflects the time when the finding record was created. Consequently, it can differ from the `FirstObservedAt` timestamp, which reflects the time when the event or vulnerability was first observed.

This timestamp must be provided on the first generation of the finding and cannot be changed upon subsequent updates to the finding.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

"CreatedAt": "2017-03-22T13:22:13.933Z"

**Note**

Findings are deleted 90 days after the most recent update or 90 days after the creation date if no update occurs. To store findings for longer than 90 days, you can configure a rule in Amazon EventBridge that routes findings to your S3 bucket.

**Description**

Required

A finding's description. This field can be nonspecific boilerplate text or details that are specific to the instance of the finding.

**Type:** String

**Maximum length:** 1,024

**Example**

"Description": "The version of openssl found on instance i-abcd1234 is known to contain a vulnerability."
GeneratorId

Required

The identifier for the solution-specific component (a discrete unit of logic) that generated a finding. In various solutions from security findings products, this generator can be called a rule, a check, a detector, a plugin, and so on.

**Type:** String or ARN

**Maximum length:** 512

**Example**

"GeneratorId": "acme-vuln-9ab348"

Id

Required

The product-specific identifier for a finding.

**Type:** String or ARN

**Maximum length:** 512 for string values, 2048 for ARN values

The finding ID must comply with the following constraints:

- The ID must be globally unique within the product. To enforce uniqueness, you can incorporate the public AWS Region name and account ID in the identifier.
- You *cannot* recycle identifiers regardless of whether the previous finding no longer exists.
- For services outside of AWS, the ID *cannot* be prefixed with the literal string "arn:"
- For AWS services, the ID *must* be the ARN of the finding if one is available. Otherwise, you can use any other unique identifier.

These constraints are expected to hold within a finding product but are not required to hold across finding products.

**Example**

"Id": "us-west-2/11111111111/98aebb2207407c87f51e89943f12b1ef"

ProductArn

Required

The ARN generated by Security Hub that uniquely identifies a third-party findings product after the product is registered with Security Hub.

**Type:** ARN

The format of this field is `arn:partition:securityhub:region:account-id:product/company-id/product-id`.

- For AWS services that are integrated with Security Hub, the `company-id` must be "aws", and the `product-id` must be the AWS public service name. Because AWS products and services aren't associated with an account, the `account-id` section of the ARN is empty. AWS services that are not yet integrated with Security Hub are considered third-party products.
- For public products, the `company-id` and `product-id` must be the ID values specified at the time of registration.
• For private products, the `company-id` must be the account ID. The `product-id` must be the reserved word "default" or the ID that was specified at the time of registration.

Example:

```
// Private ARN
"ProductArn": "arn:aws:securityhub:us-east-1:111111111111:product/111111111111/default"

// Public ARN
"ProductArn": "arn:aws:securityhub:us-west-2::product/aws/guardduty"
```

Resources (p. 191)

Required

A set of resource data types that describe the resources that the finding refers to.

**Type:** Array of resource objects

**Maximum number of objects:** 32

Example

```
"Resources": [
{
  "Type": "AwsEc2Instance",
  "Id": "i-cafebabe",
  "Partition": "aws",
  "Region": "us-west-2",
  "Tags": {
    "billingCode": "Lotus-1-2-3",
    "needsPatching": "true"
  },
  "Details": {
    "AwsEc2Instance": {
      "Type": "i3.xlarge",
      "ImageId": "ami-abcd1234",
      "IpV4Addresses": [ "54.194.252.215", "192.168.1.88" ],
      "IpV6Addresses": [ "2001:db8:1234:1a2b::123" ],
      "KeyName": "my_keypair",
      "IamInstanceProfileArn": "arn:aws:iam::111111111111:instance-profile/AdminRole",
      "VpcId": "vpc-11112222",
      "SubnetId": "subnet-56f5f633",
      "LaunchedAt": "2018-05-08T16:46:19.000Z"
    }
  }
}
```

SchemaVersion

Required

The schema version that a finding is formatted for. The value of this field must be one of the officially published versions identified by AWS.

In the current release, the AWS Security Finding Format schema version is 2018-10-08.

**Type:** String
**Maximum length:** 10

**Format:** YYYY-MM-DD

**Example**

```
"SchemaVersion": "2018-10-08"
```

---

**Severity (p. 451)**

Required

A finding's severity.

The finding must have either Label or Normalized populated. Label is the preferred attribute. Normalized is no longer relevant. Security Hub populates the Normalized attribute but does not otherwise use it. If neither attribute is populated, then the finding is invalid.

Severity should only be updated by **BatchUpdateFindings**.

To provide severity information, finding providers should use the Severity object under **FindingProviderFields** (p. 174). See the section called “Using FindingProviderFields” (p. 94).

**Type:** Object

**Example**

```
"Severity": {
  "Label": "CRITICAL",
  "Original": "8.3"
}
```

---

**Title**

Required

A finding's title. This field can contain nonspecific boilerplate text or details that are specific to this instance of the finding.

**Type:** String

**Maximum length:** 256

---

**Types**

Required

One or more finding types in the format of `namespace/category/classifier` that classify a finding.

Types should only be updated using **BatchUpdateFindings**.

Finding providers who want to provide a value for Types should use the Types attribute under **FindingProviderFields** (p. 174). See the section called “Using FindingProviderFields” (p. 94).

**Type:** Array of strings

**Maximum number of strings:** 50

- `namespace` must be a value from the predefined set of namespace values.
Valid values: Software and Configuration Checks | TTPs | Effects | Unusual Behaviors | Sensitive Data Identifications

- **category** might be any value, but it is recommended that finding products use categories from the finding type taxonomy in Types taxonomy for ASFF (p. 460).
- **classifier** might be any value, but it is recommended that finding providers use the identifier exactly as defined by published standards whenever possible.

Namespaces are required for all finding types, but categories and classifiers are optional. If you specify a classifier, you must also specify a category.

The ‘/’ character is reserved and must not be used in a category or classifier. Escaping the ‘/’ character is not supported.

**Example**

```json
"Types": [  "Software and Configuration Checks/Vulnerabilities/CVE"
]
```

**UpdatedAt**

**Required**

Indicates when the finding provider last updated the finding record.

This timestamp reflects the time when the finding record was last or most recently updated. Consequently, it can differ from the LastObservedAt timestamp, which reflects when the event or vulnerability was last or most recently observed.

When you update the finding record, you must update this timestamp to the current timestamp. Upon creation of a finding record, the CreatedAt and UpdatedAt timestamps must be the same. After an update to the finding record, the value of this field must be greater than all of the previous values that it contained.

Note that UpdatedAt is not updated by changes from BatchUpdateFindings. It is only updated by BatchImportFindings.

Findings are deleted 90 days after the most recent update or 90 days after the creation date if no update occurs. To store findings for longer than 90 days, you can configure a rule in CloudWatch Events that routes findings to your Amazon S3 bucket.

**Type:** String

**Format:** Uses the date–time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Other top-level attributes**

**Action (p. 163)**

**Optional**

Provides details about an action that affects or that was taken on a resource.

**Type:** Object

**CompanyName**

**Optional**
The name of the company for the product that generated the finding. For control-based findings, the company is AWS.

Security Hub populates this attribute automatically for each finding. You cannot update it using `BatchImportFindings` or `BatchUpdateFindings`. The exception to this is when you use a custom integration. See the section called “Using custom product integrations” (p. 479).

When you use the Security Hub console to filter findings by company name, you use this attribute. When you use the Security Hub API to filter findings by company name, you use the `aws/securityhub/CompanyName` attribute under `ProductFields`.

Security Hub does not synchronize those two attributes.

**Type:** String

**Compliance (p. 172)**

Optional

Finding details related to a control. Only returned for findings generated from a control.

**Type:** Object

**Example**

```
"Compliance": {
   "RelatedRequirements": ["Req1", "Req2"],
   "Status": "PASSED",
   "StatusReasons": [
      {
         "ReasonCode": "CLOUDWATCH_ALARMS_NOT_PRESENT",
         "Description": "CloudWatch alarms do not exist in the account"
      }
   ]
}
```

**Confidence**

Optional

A finding's confidence. Confidence is defined as the likelihood that a finding accurately identifies the behavior or issue that it was intended to identify.

Confidence should only be updated using `BatchUpdateFindings`.

Finding providers who want to provide a value for Confidence should use the `Confidence` attribute under `FindingProviderFields` (p. 174). See the section called “Using FindingProviderFields” (p. 94).

**Type:** Integer

**Minimum value:** 0

**Maximum value:** 100

Confidence is scored on a 0–100 basis using a ratio scale, where 0 means 0-percent confidence and 100 means 100-percent confidence.

However, a data exfiltration detection based on a statistical deviation of network traffic has a much lower confidence because an actual exfiltration hasn't been verified.

**Example**
"Confidence": 42

**Criticality**

Optional

The level of importance that is assigned to the resources that are associated with the finding. A score of 0 means that the underlying resources have no criticality, and a score of 100 is reserved for the most critical resources.

Criticality should only be updated by BatchUpdateFindings. It should not be updated by BatchImportFindings.

Finding providers who want to provide a value for Criticality should use the Criticality attribute under FindingProviderFields (p. 174). See the section called “Using FindingProviderFields” (p. 94).

**Type:** Integer

**Minimum value:** 0

**Maximum value:** 100

Criticality is scored on a 0–100 basis, using a ratio scale that supports only full integers. A score of 0 means that the underlying resources have no criticality, and a score of 100 is reserved for the most critical resources.

At a high level, when assessing criticality, you need to consider the following:

- Which findings impact resources that are more critical than other resources?
- How much more critical are those resources compared to other resources?

For each resource, consider the following:

- Does the affected resource contain sensitive data (for example, an S3 bucket with PII)?
- Does the affected resource enable an adversary to deepen their access or extend their capabilities to carry out additional malicious activity (for example, a compromised sysadmin account)?
- Is the resource a business-critical asset (for example, a key business system that if compromised could have significant revenue impact)?

You can use the following guidelines:

- A resource powering mission-critical systems or containing highly sensitive data can be scored in the 75–100 range.
- A resource powering important (but not critical systems) or containing moderately important data can be scored in the 25–75 range.
- A resource powering unimportant systems or containing nonsensitive data should be scored in the 0–24 range.

**Example**

"Criticality": 99

**FindingProviderFields (p. 174)**

Optional

In BatchImportFindings requests, finding providers use FindingProviderFields to provide values for attributes that should only be updated by BatchUpdateFindings. FindingProviderFields includes the following attributes:
FindingProviderFields can only be updated by `BatchImportFindings`. It cannot be updated by `BatchUpdateFindings`.

For details on how Security Hub handles updates from `BatchImportFindings` to FindingProviderFields and to the corresponding top-level attributes, see the section called “Using FindingProviderFields” (p. 94).

**Type:** Object

**Example**

```
"FindingProviderFields": {
  "Confidence": 42,
  "Criticality": 99,
  "RelatedFindings": [
    { "ProductArn": "arn:aws:securityhub:us-west-2::product/aws/guardduty",
      "Id": "123e4567-e89b-12d3-a456-426655440000"
    }
  ],
  "Severity": {
    "Label": "MEDIUM",
    "Original": "MEDIUM"
  },
  "Types": [ "Software and Configuration Checks/Vulnerabilities/CVE" ]
}
```

**FirstObservedAt**

Optional

Indicates when the potential security issue captured by a finding was first observed.

This timestamp reflects the time of when the event or vulnerability was first observed. Consequently, it can differ from the `CreatedAt` timestamp, which reflects the time this finding record was created.

This timestamp should be immutable between updates of the finding record but can be updated if a more accurate timestamp is determined.

**Type:** String

**Format:** Uses the date-time format specified in [RFC 3339 section 5.6](https://tools.ietf.org/html/rfc3339#section-5.6), Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"FirstObservedAt": "2017-03-22T13:22:13.933Z"
```

**LastObservedAt**

Optional
Indicates when the potential security issue that was captured by a finding was most recently observed by the security findings product.

This timestamp reflects the time when the event or vulnerability was last or most recently observed. Consequently, it can differ from the `UpdatedAt` timestamp, which reflects when this finding record was last or most recently updated.

You can provide this timestamp, but it isn't required upon the first observation. If you provide the field in this case, the timestamp should be the same as the `FirstObservedAt` timestamp. You should update this field to reflect the last or most recently observed timestamp each time a finding is observed.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"LastObservedAt": "2017-03-23T13:22:13.933Z"
```

**Malware (p. 175)**

Optional

A list of malware related to a finding.

**Type:** Array of malware objects

**Maximum number of objects:** 5

**Example**

```
"Malware": [ 
  
  { 
  "Name": "Stringler",
  "Type": "COIN_MINER",
  "Path": "/usr/sbin/stringler",
  "State": "OBSERVED"
  }
  ]
```

**Network (p. 177) (Deprecated)**

Optional

The details of network-related information about a finding.

This object is deprecated. To provide this data, either map the data to a resource in `Resources`, or use the `Action` object.

**Type:** Object

**Example**

```
"Network": {
  "Direction": "IN",
  "OpenPortRange": { 
  "Begin": 443,
  "End": 443
  },
```

157
"Protocol": "TCP",
"SourceIpV4": "1.2.3.4",
"SourceIpV6": "FE80:CD00:0000:0CDE:1257:0000:211E:729C",
"SourcePort": "42",
"SourceDomain": "example1.com",
"SourceMac": "00:0d:83:b1:c0:8e",
"DestinationIpV4": "2.3.4.5",
"DestinationIpV6": "FE80:CD00:0000:0CDE:1257:0000:211E:729C",
"DestinationPort": "80",
"DestinationDomain": "example2.com"
}

**NetworkPath (p. 180)**

Optional

A network path that is related to the finding.

Each entry in NetworkPath represents a component of the path.

**Type:** Array of objects

**Note (p. 183)**

Optional

A user-defined note that is added to a finding.

A finding provider can provide an initial note for a finding, but cannot add notes after that.

A note can only be updated using **BatchUpdateFindings**.

**Type:** Object

**Example**

```
"Note": {
    "Text": "Don't forget to check under the mat.",
    "UpdatedBy": "jsmith",
    "UpdatedAt": "2018-08-31T00:15:09Z"
}
```

**PatchSummary (p. 184)**

Optional

Provides a summary of patch compliance.

**Type:** Object

**Process (p. 187)**

Optional

The details of process-related information about a finding.

**Type:** Object

**Example:**

```
"Process": {
    "Name": "syslogd",
    "Path": "/usr/sbin/syslogd",
    "Path": "/usr/sbin/syslogd"
}
```
"Pid": 12345,
"ParentPid": 56789,
"LaunchedAt": "2018-09-27T22:37:31Z",
"TerminatedAt": "2018-09-27T23:37:31Z"
}

ProductFields

Optional

A data type where security findings products can include additional solution-specific details that are
not part of the defined AWS Security Finding Format.

For findings generated by Security Hub controls, ProductFields includes information about the
control. See the section called “Generating and updating control findings” (p. 483).

Type: Map of key-value pairs

Maximum number of pairs: 50

Maximum key length: 128

Maximum value length: 2048

This field should not contain redundant data and must not contain data that conflicts with AWS
Security Finding Format fields.

The "aws/" prefix represents a reserved namespace for AWS products and services only and must
not be submitted with findings from third-party integrations.

Although not required, products should format field names as company-id/product-id/field-
name, where the company-id and product-id match those supplied in the ProductArn of the
finding.

Field names can include the following characters: the following characters: A-Z, a-z, 0-9, blank
spaces, and . : + \ = @ _ / - (hyphen).

Example

"ProductFields": {
  "generico/secure-pro/Count": "6",
  "generico/secure-pro/Action.Type", "AWS_API_CALL",
  "API", "DeleteTrail",
  "Service_Name": "cloudtrail.amazonaws.com",
  "aws/inspector/AssessmentTemplateName": "My daily CVE assessment",
  "aws/inspector/AssessmentTargetName": "My prod env",
  "aws/inspector/RulesPackageName": "Common Vulnerabilities and Exposures"
}

ProductName

Optional

The name of the product that generated the finding. For control-based findings, the product name is
Security Hub.

Security Hub populates this attribute automatically for each finding. You cannot update it using
BatchImportFindings or BatchUpdateFindings. The exception to this is when you use a
custom integration. See the section called “Using custom product integrations” (p. 479).

When you use the Security Hub console to filter findings by product name, you use this attribute.
When you use the Security Hub API to filter findings by product name, you use the `aws/securityhub/ProductName` attribute under `ProductFields`.

Security Hub does not synchronize those two attributes.

**Type:** String

**RecordState**

Optional

The record state of a finding.

By default, when initially generated by a service, findings are considered **ACTIVE**.

The **ARCHIVED** state indicates that a finding should be hidden from view. Archived findings are not immediately deleted. You can search, review, and report on them.

`RecordState` is intended for finding providers, and can only be updated by `BatchImportFindings`. It cannot be updated using `BatchUpdateFindings`.

To track the status of your investigation into a finding, do not use `RecordState`. Instead, use **Workflow** (p. 459).

Finding providers update the record state. Security Hub also automatically archives control-based findings if the associated resource is deleted, the resource does not exist, or the control is disabled.

If the record state changes from **ARCHIVED** to **ACTIVE**, and the workflow status of the finding is either **NOTIFIED** or **RESOLVED**, then Security Hub automatically sets the workflow status to **NEW**.

**Type:** Enum

**Valid values:** ACTIVE | ARCHIVED

**Example**

```
"RecordState": "ACTIVE"
```

**Region**

Optional

The Region from which the finding was generated.

Security Hub populates this attribute automatically for each finding. You cannot update it using `BatchImportFindings` or `BatchUpdateFindings`.

**Type:** String

**RelatedFindings** (p. 189)

Optional

A list of related findings.

`RelatedFindings` should only be updated using `BatchUpdateFindings`. It should not be updated using `BatchImportFindings`.

To provide a list of related findings, finding providers should use the `RelatedFindings` object under `FindingProviderFields` (p. 174). See the section called “Using `FindingProviderFields`” (p. 94).
**Type:** Array of RelatedFinding objects

**Maximum number of objects:** 10

**Example**

```
"RelatedFindings": [
  {
    "ProductArn": "arn:aws:securityhub:us-west-2::product/aws/guardduty",
    "Id": "123e4567-e89b-12d3-a456-426655440000"
  },
  {
    "ProductArn": "arn:aws:securityhub:us-west-2::product/aws/guardduty",
    "Id": "AcmeNerfHerder-111111111111-x189dx7824"
  }
]
```

**Remediation (p. 189)**

Optional

The remediation options for a finding.

**Type:** Object

**Example**

```
"Remediation": {
  "Recommendation": {
    "Text": "Run sudo yum update and cross your fingers and toes.",
    "Url": "http://myfp.com/recommendations/dangerous_things_and_how_to_fix_them.html"
  }
}
```

**SourceUrl**

Optional

A URL that links to a page about the current finding in the finding product.

**Type:** URL

**ThreatIntelIndicators (p. 453)**

Optional

Threat intelligence details that are related to a finding.

**Type:** Array of threat intelligence indicator objects

**Maximum number of objects:** 5

**Example**

```
"ThreatIntelIndicators": [
  {
    "Type": "IPV4_ADDRESS",
    "Value": "8.8.8.8",
    "Category": "BACKDOOR",
    "LastObservedAt": "2018-09-27T23:37:31Z",
    "Source": "Threat Intel Weekly",
    "SourceUrl": "http://threatintelweekly.org/backdoors/8888"
  }
]
```
UserDefinedFields

Optional

A list of name-value string pairs that are associated with the finding. These are custom, user-defined fields that are added to a finding. These fields can be generated automatically through your specific configuration.

Findings products must not use this field for data that the product generates. Instead, findings products can use the ProductFields field for data that does not map to any standard AWS Security Finding Format field.

These fields can only be updated using BatchUpdateFindings.

**Type:** Map of key-value pairs

**Maximum number of pairs:** 50

**Format:** The key name can only contain letters, numbers, and the following special characters: -_=+@./:

**Example**

```
"UserDefinedFields": {
  "reviewedByCio": "true",
  "comeBackToLater": "Check this again on Monday"
}
```

VerificationState

Optional

The veracity of a finding. Findings products can provide the value of UNKNOWN for this field. A findings product should provide this value if there is a meaningful analog in the findings product’s system. This field is typically populated by a user determination or action after they investigate a finding.

A finding provider can provide an initial value for this attribute, but cannot update it after that. This attribute can only be updated using BatchUpdateFindings.

**Type:** Enum

**Valid values:**

- **UNKNOWN** – This is the default disposition of a security finding unless a user changes it.
- **TRUE_POSITIVE** – A user sets this value if the security finding has been confirmed.
- **FALSE_POSITIVE** – A user sets this value if the security finding has been determined to be a false alarm.
- **BENIGN_POSITIVE** – A user sets this value as a special case of TRUE_POSITIVE where the finding doesn’t pose any threat, is expected, or both.

Vulnerabilities (p. 455)

Optional

A list of vulnerabilities that apply to the finding.

**Type:** Array of objects

Workflow (p. 459)

Optional
Provides information about the status of the investigation into a finding.

The workflow status is not intended for finding providers. The workflow status can only be updated using BatchUpdateFindings. Customers can also update it from the console. See the section called "Setting the workflow status for findings" (p. 103).

**Type:** Object

**Example**

```json
Workflow: {
    "Status": "NEW"
}
```

**WorkflowState (Deprecated)**

**Optional**

This field is being replaced by the `Status` field of the `Workflow` object.

The workflow state of a finding. Findings products can provide the value of `NEW` for this field. A findings product can provide a value for this field if there is a meaningful analog in the findings product's system.

**Type:** Enum

**Valid values:**

- `NEW` – This can be associated with findings in the `Active` record state. This is the default workflow state for any new finding.
- `ASSIGNED` – This can be associated with findings in the `Active` record state. The finding has been acknowledged and given to someone to review or address.
- `IN_PROGRESS` – This can be associated with findings in the `Active` record state. Team members are actively working on the finding.
- `RESOLVED` – This can be associated with findings in the `Archived` record state. This differs from `DEFERRED` findings. If the finding were to occur again (be updated by the native service) or any new finding matching this, the finding appears to customers as an active, new finding.
- `DEFERRED` – This can be associated with findings in the `Archived` record state. It means that any additional findings that match this finding aren't shown for a set amount of time or indefinitely.

Either the customer doesn't consider the finding to be applicable, or it's a known issue that they don't want to include in the active dataset.

- `DUPLICATE` – This can be associated with findings in the `Archived` record state. It means that the finding is a duplicate of another finding.

**Example**

```json
"WorkflowState": "NEW"
```

**Action**

The `Action` object provides details about an action that affects or that was taken on a resource. The action can be one of the following:

- A remote IP address issued an AWS API call.
- A DNS request was received.
• A remote IP address attempted to connect to an EC2 instance.
• A remote IP address attempted a port probe on an EC2 instance.

Example

```
"Action": {
   "ActionType": "PORT_PROBE",
   "PortProbeAction": {
      "PortProbeDetails": [
         {
            "LocalPortDetails": {
               "Port": 80,
               "PortName": "HTTP"
            },
            "LocalIpDetails": {
               "IpAddressV4": "192.0.2.0"
            },
            "RemoteIpDetails": {
               "Country": {
                  "CountryName": "Example Country"
               },
               "City": {
                  "CityName": "Example City"
               },
               "GeoLocation": {
                  "Lon": 0,
                  "Lat": 0
               },
               "Organization": {
                  "AsnOrg": "ExampleASO",
                  "Org": "ExampleOrg",
                  "Isp": "ExampleISP",
                  "Asn": 64496
               }
            }
         },
         "Blocked": false
      }
   }
}
```

Action can have the following attributes.

**ActionType**

Optional

The type of action that was detected. The action type determines which of the other objects is provided in the Action object.

*Type: String*

**Valid values:** NETWORK_CONNECTION | AWS_API_CALL | DNS_REQUEST | PORT_PROBE

**AwsApiCallAction** (p. 165)

Optional

Included if ActionType is AWS_API_CALL.

Provides details about the API call that was detected.
**Type:** Object

**DnsRequestAction (p. 167)**

Optional

Included if `ActionType` is `DNS_REQUEST`.

Provides details about the DNS request that was detected.

**Type:** Object

**NetworkConnectionAction (p. 167)**

Optional

Included if `ActionType` is `NETWORK_CONNECTION`.

Provides details about the network connection that was detected.

**Type:** Object

**PortProbeAction (p. 168)**

Optional

Included if `ActionType` is `PORT_PROBE`.

Provides details about the port probe that was detected.

**Type:** Object

**AwsApiCallAction**

`AwsApiCallAction` is provided if `ActionType` is `AWS_API_CALL`. It provides details about the API call that was detected.

`AwsApiCallAction` can have the following attributes.

**AffectedResources**

Optional

Identifies the resources that were affected by the API call.

**Type:** Map of key-value pairs

**Api**

Optional

The name of the API method that was issued.

**Type:** String

**CallerType**

Optional

Indicates whether the API call originated from a remote IP address or from a DNS domain.

**Type:** String

**Valid values:** domain | remoteIp
DomainDetails (p. 166)

Optional

Provided if CallerType is domain. Provides information about the DNS domain that the API call originated from.

Type: Object

FirstSeen

Optional

Indicates when the API call was first observed.

Type: String

Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

LastSeen

Optional

Indicates when the API call was most recently observed.

Type: String

Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

RemoteIpDetails (p. 170)

Optional

Provided if CallerType is remoteIp. Provides information about the remote IP address that the API call originated from.

Type: Object

ServiceName

Optional

The name of the AWS service that the API call belongs to.

Type: String

DomainDetails

DomainDetails is provided if AwsApiCallAction.CallerType is domain. It provides information about the DNS domain that issued the API call.

DomainDetails can have the following attributes.

Domain

Optional

The name of the DNS domain that issued the API call.

Type: String
**DnsRequestAction**

*DnsRequestAction* is provided if *ActionType* is *DNS_REQUEST*. It provides details about the DNS request that was detected.

*DnsRequestAction* can have the following attributes.

**Blocked**
- Optional
- Indicates whether the DNS request was blocked.
  - **Type:** Boolean

**Domain**
- Optional
- The DNS domain that is associated with the DNS request.
  - **Type:** String

**Protocol**
- Optional
- The protocol that was used for the DNS request.
  - **Type:** String

**NetworkConnectionAction**

*NetworkConnectionAction* is provided if *ActionType* is *NETWORK_CONNECTION*. It provides details about the attempted network connection that was detected.

*NetworkConnectionAction* can have the following attributes.

**Blocked**
- Optional
- Indicates whether the network connection attempt was blocked.
  - **Type:** Boolean

**ConnectionDirection**
- Optional
- The direction of the network connection request.
  - **Type:** String
  - **Valid values:** IN | OUT

**LocalPortDetails (p. 169)**
- Optional
- Information about the port on the EC2 instance.
  - **Type:** Object
Protocol

Optional

The protocol used to make the network connection request.

Type: String

RemoteIpDetails (p. 170)

Optional

Information about the remote IP address that issued the network connection request.

Type: Object

RemotePortDetails (p. 168)

Optional

Information about the port on the remote IP address.

Type: Object

RemotePortDetails

RemotePortDetails provides information about the remote port that was involved in the attempted network connection.

RemotePortDetails can have the following attributes.

Port

Optional

The number of the port.

Type: Integer

PortName

Optional

The port name of the remote connection.

Type: String

PortProbeAction

PortProbeAction is provided if ActionType is PORT_PROBE. It provides details about the attempted port probe that was detected.

PortProbeAction can have the following attributes.

Blocked

Optional

Whether the port probe was blocked.

Type: Boolean
PortProbeDetails (p. 169)

Optional

Information about the ports affected by the port probe.

Type: Array of objects

PortProbeDetails

PortProbeDetails contains a list of port scans that were part of the port probe. For each scan, PortProbeDetails provides information about the local IP address and port that were scanned as well as the remote IP address that the scan originated from.

PortProbeDetails can have the following attributes.

LocalIpDetails

Optional

Provides information about the IP address where the scanned port is located.

Type: Object

LocalPortDetails (p. 169)

Optional

Provides information about the port that was scanned.

Type: Object

RemoteIpDetails (p. 170)

Optional

Provides information about the remote IP address that performed the scan.

Type: Object

LocalIpDetails can have the following attributes.

IpAddressV4

 Optional

The IP address.

Type: String

LocalPortDetails

For NetworkConnectionAction and PortProbeDetails, LocalPortDetails provides information about the local port that was involved in the action.

LocalPortDetails can have the following attributes.

Port

Optional
The number of the port.

**Type:** Integer

**PortName**

Optional

The port name of the local connection.

**Type:** String

**RemotetIpDetails**

In the details for `AwsApiCallAction`, `NetworkConnectionAction`, and `PortProbeAction`, the `RemoteIpDetails` object provides information about the remote IP address that was involved in the action.

`RemoteIpDetails` can have the following attributes.

**City** *(p. 170)*

Optional

The city where the remote IP address is located.

**Type:** Object

**Country** *(p. 171)*

Optional

The country where the remote IP address is located.

**Type:** Object

**Geolocation** *(p. 171)*

Optional

The coordinates of the location of the remote IP address.

**Type:** Object

**IpAddressV4**

Optional

The IP address.

**Type:** String

**Organization** *(p. 171)*

Optional

The internet service provider (ISP) organization that is associated with the remote IP address.

**Type:** Object

**City**

`City` contains information about the city where the remote IP address is located.
City can have the following attributes.

CityName
  Optional
  The name of the city where the remote IP address is located.
  **Type:** String

Country

Country identifies the country where the remote IP address is located.

Country can have the following attributes.

CountryCode
  Optional
  The 2-letter ISO 3166 country code for the country where the remote IP address is located.
  **Type:** String

CountryName
  Optional
  The name of the country where the remote IP address is located.
  **Type:** String

Geolocation

Geolocation provides the latitude and longitude coordinates of the remote IP address location.

Geolocation can have the following attributes.

Lat
  Optional
  The latitude of the location of the remote IP address.
  **Type:** Double

Lon
  Optional
  The longitude of the location of the remote IP address.
  **Type:** Double

Organization

Organization identifies the ISP organization that is associated with the remote IP address.

Organization can have the following attributes.
Asn
Optional
The Autonomous System Number (ASN) of the internet provider of the remote IP address.
*Type:* String

AsnOrg
Optional
The name of the organization that registered the ASN.
*Type:* String

Isp
Optional
The ISP information for the internet provider.
*Type:* String

Org
Optional
The name of the internet provider.
*Type:* String

**Compliance**
Contains finding details related to a control. Only returned for findings that are generated as the result of a check that is run on a control.

**Example**

```
"Compliance": {
   "RelatedRequirements": ["Req1", "Req2"],
   "Status": "FAILED",
   "StatusReasons": [
      {
         "ReasonCode": "CLOUDWATCH_ALARMS_NOT_PRESENT",
         "Description": "CloudWatch alarms do not exist in the account"
      }
   ]
}
```

The Compliance object can have the following attributes.

**RelatedRequirements**
Optional
For a Security Hub control, the industry or regulatory framework requirements that are related to the control. The check for that control is aligned with those requirements.

You can provide up to 32 related requirements.

To identify a requirement, use its identifier.
Type: Array of strings

Status

Optional

The result of a security check.

Type: Enum

Valid values:

- **PASSED** – Security check passed for all evaluated resources. If `Compliance.Status` is `PASSED`, then Security Hub automatically sets `Workflow.Status` to `RESOLVED`.

  If `Compliance.Status` for a finding changes from `PASSED` to `FAILED`, `WARNING`, or `NOT_AVAILABLE`, and `Workflow.Status` was either `NOTIFIED` or `RESOLVED`, then Security Hub automatically sets `Workflow.Status` to `NEW`.

- **WARNING** – Some information is missing, or this check is not supported given your configuration.

- **FAILED** – Security check failed for at least one evaluated resource.

- **NOT_AVAILABLE** – Check could not be performed due to a service outage or API error. The `NOT_AVAILABLE` status can also indicate that the result of the AWS Config evaluation was `NOT_APPLICABLE`. In that case, after 3 days, Security Hub automatically archives the finding.

Example

```
"Status": "PASSED"
```

**StatusReasons (p. 173)**

Optional

For findings generated from controls, a list of reasons behind the value of `Compliance.Status`.

For the list of status codes and their meanings, see the section called "Generating and updating control findings" (p. 483).

Type: String

Example:

```
"StatusReasons": [ 
  {
    "Description": "CloudWatch alarms do not exist in the account",
    "ReasonCode": "CW_ALARMS_NOT_PRESENT"
  }
]
```

**StatusReasons**

For findings generated from controls, a list of reasons for the value of `Compliance.Status`.

```
"StatusReasons": [ 
  {
    "Description": "CloudWatch alarms do not exist in the account",
    "ReasonCode": "CW_ALARMS_NOT_PRESENT"
  }
]
```
Each reason in the StatusReasons object can have the following attributes.

**Description**

Optional

The corresponding description for the reason.

**Type:** String

**ReasonCode**

Required

A code that represents a reason for the current control status.

**Type:** String

For the list of available status codes and their meanings, see the section called “Generating and updating control findings” (p. 483).

### FindingProviderFields

In a **BatchImportFindings** request, finding providers use FindingProviderFields to provide values for attributes that should only be updated by **BatchUpdateFindings**.

For details on how Security Hub handles updates from **BatchImportFindings** to FindingProviderFields and to the corresponding top-level attributes, see the section called "Using FindingProviderFields" (p. 94).

#### Example

```json
"FindingProviderFields": {
   "Confidence": 42,
   "Criticality": 99,
   "RelatedFindings": [
      {
         "ProductArn": "arn:aws:securityhub:us-west-2::product/aws/guardduty",
         "Id": "123e4567-e89b-12d3-a456-42665440000"
      }
   ],
   "Severity": {
      "Label": "MEDIUM",
      "Original": "MEDIUM"
   },
   "Types": [ "Software and Configuration Checks/Vulnerabilities/CVE" ]
}
```

FindingProviderFields can contain the following attributes.

**Confidence**

Optional

A finding's confidence. Confidence is defined as the likelihood that a finding accurately identifies the behavior or issue that it was intended to identify.

**Type:** Integer (range 0–100)

Confidence is scored on a 0–100 basis using a ratio scale, where 0 means 0-percent confidence and 100 means 100-percent confidence.
Criticality

Optional

The level of importance that is assigned to the resources that are associated with the finding. A score of 0 means that the underlying resources have no criticality, and a score of 100 is reserved for the most critical resources.

Type: Integer

Minimum value: 0

Maximum value: 100

Criticality is scored on a 0–100 basis, using a ratio scale that supports only full integers. A score of 0 means that the underlying resources have no criticality, and a score of 100 is reserved for the most critical resources.

RelatedFindings (p. 189)

Optional

A list of related findings.

Type: Array of RelatedFinding objects

Maximum number of objects: 10

Severity

Required

Details about the severity of the finding.

Finding providers can use the Severity object in FindingProviderFields to provide values for Label and Original.

For details on the available values for Label and Original, and guidance on how to assess severity, see the information for the Severity object (p. 451).

Type: Object

Types

Required

One or more finding types in the format of namespace/category/classifier that classify a finding.

Type: Array of strings

Maximum number of strings: 50

Malware

The Malware object provides a list of malware that is related to a finding. It is an array that can contain up to five malware objects.

Example

```
"Malware": [
    {
        "Name": "Stringler",
        "Type": "COIN_MINER",
    }
]
```
Each malware object can have the following attributes.

**Name**

Required

The name of the malware that was observed.

**Type:** String

**Maximum length:** 64

**Example**

```
"Name": "Stringler"
```

**Path**

Optional

The file path of the malware that was observed.

**Type:** String

**Maximum length:** 512

**Example**

```
"Path": "/usr/sbin/stringler"
```

**State**

Optional

The state of the malware that was observed.

**Type:** Enum

**Valid values:** OBSERVED | REMOVAL_FAILED | REMOVED

**Example**

```
"State": "OBSERVED"
```

**Type**

Optional

The type of the malware that was observed.

**Type:** Enum

**Valid values:** ADWARE | BLENDED_THREAT | BOTNET_AGENT | COIN_MINER | EXPLOIT_KIT | KEYLOGGER | MACRO | POTENTIALLY_UNWANTED | SPYWARE | RANSOMWARE | REMOTE_ACCESS | ROOTKIT | TROJAN | VIRUS | WORM
Example

"Type": "COIN_MINER"

Network (Deprecated)

The details of network-related information about a finding.

This object is deprecated. To provide this data, you can either map it to a resource in Resources, or use the Action object.

Example

"Network": {
  "Direction": "IN",
  "OpenPortRange": {
    "Begin": 443,
    "End": 443
  },
  "Protocol": "TCP",
  "SourceIpV4": "1.2.3.4",
  "SourceIpV6": "FE80:CD00:0000:0CDE:1257:0000:211E:729C",
  "SourcePort": "42",
  "SourceDomain": "example1.com",
  "SourceMac": "00:0d:83:b1:c0:8e",
  "DestinationIpV4": "2.3.4.5",
  "DestinationIpV6": "FE80:CD00:0000:0CDE:1257:0000:211E:729C",
  "DestinationPort": "80",
  "DestinationDomain": "example2.com"
}

The Network object can have the following attributes.

**DestinationDomain**

Optional

The destination domain of network-related information about a finding.

**Type:** String

**Maximum length:** 128

**Example**

"DestinationDomain": "there.com"

**DestinationIpV4**

Optional

The destination IPv4 address of network-related information about a finding.

**Type:** IPv4

**Example**

"DestinationIpV4": "2.3.4.5"
**DestinationIpV6**

Optional

The destination IPv6 address of network-related information about a finding.

**Type:** IPv6

**Example**

"DestinationIpV6": "FE80:CD00:0000:0CDE:1257:0000:211E:729C"

**DestinationPort**

Optional

The destination port of network-related information about a finding.

**Type:** Number

**Valid values:** Range of 0–65535

**Example**

"DestinationPort": "80"

**Direction**

Optional

The direction of network traffic that is associated with a finding.

**Type:** Enum

**Valid values:** IN | OUT

**Example**

"Direction": "IN"

**OpenPortRange (p. 180)**

Optional

The range of open ports that is present in the network.

**Type:** Object

**Protocol**

Optional

The protocol of network-related information about a finding.

**Type:** String

**Maximum length:** 16

The name should be the IANA registered name for the associated port except in the case where the finding product can determine a more accurate protocol.
Example

"Protocol": "TCP"

SourceDomain

Optional

The source domain of network-related information about a finding.

Type: String

Maximum length: 128

Example

"SourceDomain": "here.com"

SourceIpV4

Optional

The source IPv4 address of network-related information about a finding.

Type: IPv4

Example

"SourceIpV4": "1.2.3.4"

SourceIpV6

Optional

The source IPv6 address of network-related information about a finding.

Type: IPv6

Example

"SourceIpV6": "FE80:CD00:0000:0CD:1257:0000:211E:729C"

SourceMac

Optional

The source media access control (MAC) address of network-related information about a finding.

Type: String


Example

"SourceMac": "00:0d:83:b1:c0:8e"

SourcePort

Optional
The source port of network-related information about a finding.

**Type:** Number

**Valid values:** Range of 0–65535

**Example**

```
"SourcePort": "80"
```

---

**OpenPortRange**

Provides the beginning and end ports of the open port range.

OpenPortRange can have the following attributes.

**Begin**

Optional

The first port in the port range.

**Type:** Integer

**End**

Optional

The last port in the port range.

**Type:** Integer

---

**NetworkPath**

The **NetworkPath** object provides information about a network path that is relevant to a finding. Each entry under **NetworkPath** represents a component of that path.

**Example**

```
"NetworkPath" : [
    {
        "ComponentId": "abc-01a234bc56d8901ee",
        "ComponentType": "AWS::EC2::InternetGateway",
        "Egress": {
            "Destination": {
                "Address": [ "192.0.2.0/24" ],
                "PortRanges": [
                    {
                        "Begin": 443,
                        "End": 443
                    }
                ]
            },
            "Protocol": "TCP",
            "Source": {
                "Address": [ "203.0.113.0/24" ]
            }
        },
        "Ingress": {
```
Each component of the network path can have the following attributes.

**ComponentId**

Required

The identifier of a component in the network path.

**Type:** String

**ComponentType**

Required

The type of component.

**Type:** String

**Egress (p. 181)**

Optional

Information about the component that comes after the current component in the network path.

**Type:** Object

**Ingress (p. 182)**

Optional

Information about the component that comes before the current component in the network path.

**Type:** Object

**Egress**

The Egress object contains information about the component that comes after the current component in the network path. It can have the following attributes.

**Destination (p. 182)**

Optional

Information about the destination of the component.

**Type:** Object
**Protocol**

Optional

The protocol used for the component.

Type: String

**Source (p. 183)**

Optional

Information about the origin of the component.

Type: Object

**Ingress**

The Ingress object contains information about the previous component in the network path. It can have the following attributes.

**Destination (p. 182)**

Optional

Information about the destination for the previous component.

Type: Object

**Protocol**

Optional

The protocol used by the previous component.

Type: String

**Source (p. 183)**

Optional

Information about the origin of the previous component.

Type: Object

**Destination**

The Destination object in Egress or Ingress contains the destination information for the previous or next component. It can have the following attributes.

**Address**

Optional

IP addresses of the previous or next component.

Type: Array of strings

**PortRanges**

Optional

List of open port ranges for the destination of the previous or next component.
Type: Array of objects

**PortRanges.Begin**

Optional

For an open port range, the beginning of the range.

Type: Integer

**PortRanges.End**

Optional

For an open port range, the end of the range.

Type: Number

**Source**

The `Source` object under `Egress` or `Ingress` contains information about the origin of the previous or next component. It can have the following attributes.

**Address**

Optional

IP addresses for the origin of the previous or next component.

Type: Array of strings

**PortRanges**

Optional

List of open port ranges for the origin of the previous or next component.

Type: Array of objects

**PortRanges.Begin**

Optional

For an open port range, the beginning of the range.

Type: Integer

**PortRanges.End**

Optional

For an open port range, the end of the range.

Type: Number

**Note**

The `Note` object adds a user-defined note to the finding.

A finding provider can provide an initial note for a finding but cannot add notes after that. A note can only be updated using `BatchUpdateFindings`.

**Example**
"Note": {
  "Text": "Don't forget to check under the mat. ",
  "UpdatedBy": "jsmith",
  "UpdatedAt": "2018-08-31T00:15:09Z"
}

The Note object can have the following attributes.

**Text**

Required

The text of a finding note.

*Type:* String

*Maximum length:* 512

**Example**

"Text": "Example text."

**UpdatedAt**

Required

Indicates when the note was updated.

*Type:* String

*Format:* Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

"UpdatedAt": "2018-08-31T00:15:09Z"

**UpdatedBy**

Required

The principal that created a note.

*Type:* String or ARN

*Maximum length:* 512

**Example**

"UpdatedBy": "jsmith"

**PatchSummary**

The PatchSummary object provides an overview of the patch compliance status for an instance against a selected compliance standard.

**Example**
"PatchSummary" : {
    "Id" : "pb-123456789098",
    "InstalledCount" : "100",
    "MissingCount" : "100",
    "FailedCount" : "0",
    "InstalledOtherCount" : "1023",
    "InstalledRejectedCount" : "0",
    "InstalledPendingReboot" : "0",
    "RebootOption" : "RebootIfNeeded",
    "Operation" : "Install"
}

The `PatchSummary` object can have the following attributes.

**FailedCount**

Optional

The number of patches from the compliance standard with installation failures.

**Type:** Number

**Minimum value:** 0

**Maximum value:** 100,000

**Id**

Required

The identifier of the compliance standard that was used to determine the patch compliance status.

**Type:** String

**Minimum length:** 20

**Maximum length:** 128

**InstalledCount**

Optional

The number of patches from the compliance standard that were installed successfully.

**Type:** Number

**Minimum value:** 0

**Maximum value:** 100,000

**InstalledOtherCount**

Optional

The number of installed patches that are not part of the compliance standard.

**Type:** Number

**Minimum value:** 0

**Maximum value:** 100,000
**InstalledPendingReboot**

Optional

The number of patches that were applied but that require the instance to be rebooted in order to be marked as installed.

**Type:** Number

**Minimum value:** 0

**Maximum value:** 100,000

**InstalledRejectedCount**

Optional

The number of patches that are installed but are also on a list of patches that the customer rejected.

**Type:** Number

**Minimum value:** 0

**Maximum value:** 100,000

**MissingCount**

Optional

The number of patches that are part of the compliance standard but are not installed. The count includes patches with installation failures.

**Type:** Number

**Minimum value:** 0

**Maximum value:** 100,000

**Operation**

Optional

The type of patch operation that was performed.

For Patch Manager, the values are **SCAN** and **INSTALL**.

**Type:** String

**Maximum length:** 256

**OperationEndTime**

Optional

Indicates when the operation was completed.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"OperationEndTime": "2020-06-22T17:40:12.322Z"
```
**OperationStartTime**

Optional

Indicates when the operation started.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"OperationStartTime": "2020-06-22T17:40:12.322Z"
```

**RebootOption**

Optional

The reboot option specified for the instance.

**Type:** String

**Maximum length:** 256

**Valid values:** NoReboot | RebootIfNeeded.

**Process**

The Process object provides process-related details about the finding.

**Example**

```
"Process": {
   "Name": "syslogd",
   "Path": "/usr/sbin/syslogd",
   "Pid": 12345,
   "ParentPid": 56789,
   "LaunchedAt": "2018-09-27T22:37:31Z",
   "TerminatedAt": "2018-09-27T23:37:31Z"
}
```

The Process object can have the following attributes.

**LaunchedAt**

Optional

Indicates when the process was launched.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"LaunchedAt": "2018-09-27T22:37:31Z"
```
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Optional</th>
<th>Description</th>
<th>Type</th>
<th>Maximum length</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td></td>
<td>The name of the process.</td>
<td>String</td>
<td>64</td>
<td>&quot;Name&quot;: &quot;syslogd&quot;</td>
</tr>
<tr>
<td>ParentPid</td>
<td></td>
<td>The parent process ID.</td>
<td>Number</td>
<td></td>
<td>&quot;ParentPid&quot;: 56789</td>
</tr>
<tr>
<td>Path</td>
<td></td>
<td>The path to the process executable.</td>
<td>String</td>
<td>512</td>
<td>&quot;Path&quot;: &quot;/usr/sbin/syslogd&quot;</td>
</tr>
<tr>
<td>Pid</td>
<td></td>
<td>The process ID.</td>
<td>Number</td>
<td></td>
<td>&quot;Pid&quot;: 12345</td>
</tr>
<tr>
<td>TerminatedAt</td>
<td></td>
<td>Indicates when the process was terminated.</td>
<td>String</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"TerminatedAt": "2018-09-27T23:37:31Z"
```

**RelatedFindings**

The `RelatedFindings` object provides a list of findings that are related to the current finding.

For `BatchImportFindings` requests, finding providers should use the `RelatedFindings` object under `FindingProviderFields` (p. 174).

**Example**

```
"RelatedFindings": [
  { "ProductArn": "arn:aws:securityhub:us-west-2::product/aws/guardduty", "Id": "123e4567-e89b-12d3-a456-426655440000" },
  { "ProductArn": "arn:aws:securityhub:us-west-2::product/aws/guardduty", "Id": "AcmeNerfHerder-1111111111-1x189dx7824" }]
```

Each related finding object can have the following attributes.

**Id**

- **Required**
- The product-generated identifier for a related finding.
- **Type:** String or ARN
- **Maximum length:** 512

**Example**

```
"Id": "123e4567-e89b-12d3-a456-426655440000"
```

**ProductArn**

- **Required**
- The ARN of the product that generated a related finding.
- **Type:** ARN

**Example**

```
"ProductArn": "arn:aws:securityhub:us-west-2::product/aws/guardduty"
```

**Remediation**

The `Remediation` object provides information about recommended remediation steps to address the finding.
Example

```
"Remediation": {
    "Recommendation": {
        "Text": "Run sudo yum update and cross your fingers and toes.",
        "Url": "http://myfp.com/recommendations/dangerous_things_and_how_to_fix_them.html"
    }
}
```

The Remediation object can have the following attributes.

**Recommendation (p. 190)**

Optional

A recommendation on how to remediate the issue identified within a finding.

The Recommendation field is meant to facilitate manual instructions or details to resolve a finding.

If the recommendation object is present, then either the Text or Url field must be present and populated. Both fields can be present and populated.

**Type:** Object

**Example**

```
"Recommendation": {
    "Text": "Example text.",
    "Url": "http://myfp.com/recommendations/dangerous_things_and_how_to_fix_them.html"
}
```

**Recommendation**

The Recommendation object can have the following attributes.

**Text**

Optional

A free-form string that is the recommendation of what to do about the finding when presented to a user. This field can contain nonspecific boilerplate text or details that are specific to this instance of the finding.

**Type:** String

**Maximum length:** 512

**Example**

```
"Text": "Example text."
```

**Url**

Optional

A URL to link to general remediation information for the finding type of a finding.

This URL must not require credentials to access. It must be accessible from the public internet and must not expect any context or session.
Type: URL

Example

"Url": "http://myfp.com/recommendations/example_domain.html"

Resources

The Resources object provides information about the resources involved in a finding.

It contains an array of up to 32 resource objects.

Example

"Resources": [
  {
    "Type": "AwsEc2Instance",
    "Id": "arn:aws:ec2:us-west-2:111122223333:instance/i-1234567890abcdef0",
    "Partition": "aws",
    "Region": "us-west-2",
    "ResourceRole": "Target",
    "Tags": {
      "billingCode": "Lotus-1-2-3",
      "needsPatching": "true"
    },
    "Details": {
      "AwsEc2Instance": {
        "Type": "i3.xlarge",
        "ImageId": "ami-abcd1234",
        "IpV4Addresses": [ "54.194.252.215", "192.168.1.88" ],
        "IpV6Addresses": [ "2001:db8:1234:1a2b::123" ],
        "KeyName": "my_keypair",
        "IamInstanceProfileArn": "arn:aws:iam::111111111111:instance-profile/AdminRole",
        "VpcId": "vpc-11112222",
        "SubnetId": "subnet-56f5f633",
        "LaunchedAt": "2018-05-08T16:46:19.000Z"
      }
    }
  }
]

Each resource object can have the following attributes.

DataClassification (p. 197)

Optional

Used to provide details about sensitive data that was detected on a resource.

Type: Object

Details

Optional

This field provides additional details about a single resource using the appropriate objects.

Note that if the finding size exceeds the maximum of 240 KB, then the Details object is removed from the finding. For findings for controls that use AWS Config rules, you can view the resource details on the AWS Config console.
Each resource must be provided in a separate resource object in the Resources object.

Security Hub provides a set of available objects for its supported resource types. These objects correspond to values of the resource Type. Use the provided types and objects whenever possible.

- `AwsApiGatewayRestApi` (p. 206)
- `AwsApiGatewayStage` (p. 208)
- `AwsApiGatewayV2Api` (p. 214)
- `AwsApiGatewayV2Stage` (p. 217)
- `AwsAutoscalingAutoscalingGroup` (p. 221)
- `AwsAutoscalingLaunchConfiguration` (p. 222)
- `AwsCertificateManagerCertificate` (p. 228)
- `AwsCloudFrontDistribution` (p. 237)
- `AwsCloudTrailTrail` (p. 241)
- `AwsCodeBuildProject` (p. 244)
- `AwsDynamoDbTable` (p. 248)
- `AwsEc2Eip` (p. 261)
- `AwsEc2Instance` (p. 263)
- `AwsEc2NetworkAcl` (p. 264)
- `AwsEc2NetworkInterface` (p. 268)
- `AwsEc2SecurityGroup` (p. 271)
- `AwsEc2Subnet` (p. 275)
- `AwsEc2Volume` (p. 278)
- `AwsEc2Vpc` (p. 280)
- `AwsEc2VpnConnection` (p. 282)
- `AwsEcrContainerImage` (p. 288)
- `AwsEcsCluster` (p. 289)
- `AwsEcsService` (p. 293)
- `AwsEcsTaskDefinition` (p. 303)
- `AwsElasticBeanstalkEnvironment` (p. 325)
- `AwsElasticsearchDomain` (p. 330)
- `AwsElbLoadBalancer` (p. 337)
- `AwsElbv2LoadBalancer` (p. 347)
- `AwsIamAccessKey` (p. 349)
- `AwsIamGroup` (p. 352)
- `AwsIamPolicy` (p. 354)
- `AwsIamRole` (p. 357)
- `AwsIamUser` (p. 363)
- `AwsKmsKey` (p. 366)
- `AwsLambdaFunction` (p. 367)
- `AwsLambdaLayerVersion` (p. 372)
- `AwsRdsDbCluster` (p. 373)
- `AwsRdsDbClusterSnapshot` (p. 382)
- `AwsRdsDbInstance` (p. 385)
- `AwsRdsDbSnapshot` (p. 402)
- `AwsRdsEventSubscription` (p. 407)
• AwsRedshiftCluster (p. 409)
• AwsS3AccountPublicAccessBlock (p. 426)
• AwsS3Bucket (p. 427)
• AwsS3Object (p. 439)
• AwsSecretsManagerSecret (p. 440)
• AwsSnsTopic (p. 442)
• AwsSqsQueue (p. 443)
• AwsSsmPatchCompliance (p. 443)
• AwsWafWebAcl (p. 446)
• Container (p. 449)

For example, if the resource is an S3 bucket, then set the resource Type to AwsS3Bucket and provide the resource details in the AwsS3Bucket subfield.

The Other (p. 450) subfield allows you to provide custom fields and values. You use the Other subfield in the following cases.

• The resource type (the value of the resource Type) does not have a corresponding subfield. To provide details for the resource, you use the Other details subfield.

• The subfield for the resource type does not include all of the fields that you want to populate. In this case, use the subfield for the resource type to populate the available fields. Use the Other subfield to populate the fields that are not in the type-specific subfield.

• The resource type is not one of the provided types. In this case, set the resource Type to Other, and use the Other details subfield to populate the details.

**Type:** Object

**Example**

```
"Details": {
    "AwsEc2Instance": {
        "Type": "i3.xlarge",
        "ImageId": "ami-abcd1234",
        "IpV4Addresses": [ "54.194.252.215", "192.168.1.88" ],
        "IpV6Addresses": [ "2001:db8:1234:1a2b::123" ],
        "KeyName": "my_keypair",
        "IamInstanceProfileArn": "arn:aws:iam::111111111111:instance-profile/AdminRole",
        "VpcId": "vpc-11112222",
        "SubnetId": "subnet-56f5f633",
        "LaunchedAt": "2018-05-08T16:46:19.000Z"
    },
    "AwsS3Bucket": {
        "OwnerId": "da4d66ec431652a4d44d490a00500b6ded52c97d235b7b4752f9f688566fe6de",
        "OwnerName": "acmes3bucketowner"
    },
    "Other": [
        { "Key": "LightPen", "Value": "blinky" },
        { "Key": "SerialNo", "Value": "1234abcd" }
    ]
}
```

**Id**

**Required**

The canonical identifier for the given resource type.

For AWS resources that are identified by ARNs, this must be the ARN.
For all other AWS resource types that lack ARNs, this must be the identifier as defined by the AWS service that created the resource.

For non AWS resources, this should be a unique identifier that is associated with the resource.

**Type:** String or ARN

**Maximum length:** 512

**Example**

```
"Id": "arn:aws:s3:::example-bucket"
```

**Partition**

Optional

The canonical AWS partition name that the Region is assigned to.

**Type:** Enum

**Valid values:**

<table>
<thead>
<tr>
<th>Partition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>aws</td>
<td>All other Regions</td>
</tr>
<tr>
<td>aws-cn</td>
<td>China</td>
</tr>
<tr>
<td>aws-us-gov</td>
<td>AWS GovCloud (US)</td>
</tr>
</tbody>
</table>

**Example**

```
"Partition": "aws"
```

**Region**

Optional

The canonical AWS external Region name where this resource is located.

**Type:** String

**Maximum length:** 16

**Example**

```
"Region": "us-west-2"
```

**ResourceRole**

Optional

Identifies the role of the resource in the finding. A resource is either the target of the finding activity or the actor that performed the activity.

**Type:** String
Valid values: Actor | Target

Tags

Optional

A list of AWS tags that are associated with a resource at the time the finding was processed. Include the Tags attribute only for resources that have an associated tag. If a resource has no associated tag, don’t include a Tags attribute in the finding.

Type: Map of tags

Maximum number of tags: 50

Maximum length per value: 256

The following basic restrictions apply to tags:

- You can provide only tags that actually exist on an AWS resource in this field. To provide data for a resource type that isn’t defined in the AWS Security Finding Format, use the other details subfield.
- Values are limited to the following characters: A-Z, a-z, 0-9, blank spaces, and . : + = @ _ / - (hyphen).
- Values are limited to the AWS tag value length of 256 characters max.

Example

```
"Tags": {
   "billingCode": "Lotus-1-2-3",
   "needsPatching": "true"
}
```

Type

Required

The type of the resource that you are providing details for.

Whenever possible, use one of the provided resource types, such as AwsEc2Instance or AwsS3Bucket.

If the resource type does not match any of the provided resource types, then set the resource Type to Other, and use the Other details subfield to populate the details.

Type: String

Maximum length: 256

Supported values are as follows. If a type has a corresponding subfield, then to view the details for the subfield, choose the type name.

- AwsAccount
- AwsApiGatewayMethod
- AwsApiGatewayRestApi (p. 206)
- AwsApiGatewayStage (p. 208)
- AwsApiGatewayV2Api (p. 214)
- AwsApiGatewayV2Stage (p. 217)
- AwsAppStreamFleet
- AwsAutoscalingAutoscalingGroup (p. 221)
- `AwsAutoscalingLaunchConfiguration` (p. 222)
- `AwsCertificateManagerCertificate` (p. 228)
- `AwsCloudFormationStack`
- `AwsCloudFrontDistribution` (p. 237)
- `AwsCloudTrailTrail` (p. 241)
- `AwsCloudWatchAlarm`
- `AwsCodeBuildProject` (p. 244)
- `AwsCodeCommitRepository`
- `AwsCodeDeployApplication`
- `AwsCodeDeployDeploymentGroup`
- `AwsCodePipelinePipeline`
- `AwsCognitoIdentityPool`
- `AwsCognitoUserPool`
- `AwsDmsReplicationInstance`
- `AwsDynamoDbTable` (p. 248)
- `AwsEc2Eip` (p. 261)
- `AwsEc2Instance` (p. 263)
- `AwsEc2NetworkAcl` (p. 264)
- `AwsEc2NetworkInterface` (p. 268)
- `AwsEc2SecurityGroup` (p. 271)
- `AwsEc2Snapshot`
- `AwsEc2Subnet` (p. 275)
- `AwsEc2Volume` (p. 278)
- `AwsEc2Vpc` (p. 280)
- `AwsEc2VpnConnection` (p. 282)
- `AwsEcrContainerImage` (p. 288)
- `AwsEcsCluster` (p. 289)
- `AwsEcsService` (p. 293)
- `AwsEcsTaskDefinition` (p. 303)
- `AwsEfsFileSystem`
- `AwsEksCluster`
- `AwsElastiCacheCacheCluster`
- `AwsElasticBeanstalkEnvironment` (p. 325)
- `AwsElasticsearchDomain` (p. 330)
- `AwsElbLoadBalancer` (p. 337)
- `AwsElbv2LoadBalancer` (p. 347)
- `AwsEmrCluster`
- `AwsIamAccessKey` (p. 349)
- `AwsIamGroup` (p. 352)
- `AwsIamPolicy` (p. 354)
- `AwsIamRole` (p. 357)
- `AwsIamUser` (p. 363)
- `AwsKinesisStream`
- `AwsKmsKey` (p. 366)
- `AwsLambdaFunction` (p. 367)
ASFF attributes

- **AwsLambdaLayerVersion** (p. 372)
- **AwsLogsLogGroup**
- **AwsRdsDbCluster** (p. 373)
- **AwsRdsDbClusterSnapshot** (p. 382)
- **AwsRdsDbInstance** (p. 385)
- **AwsRdsDbSnapshot** (p. 402)
- **AwsRdsEventSubscription** (p. 407)
- **AwsRedshiftCluster** (p. 409)
- **AwsS3AccountPublicAccessBlock** (p. 426)
- **AwsS3Bucket** (p. 427)
- **AwsS3Object** (p. 439)
- **AwsSageMakerNotebookInstance**
- **AwsSecretsManagerSecret** (p. 440)
- **AwsSnsTopic** (p. 442)
- **AwsSqsQueue** (p. 443)
- **AwsSsmAssociationCompliance**
- **AwsSsmPatchCompliance** (p. 443)
- **AwsWafWebAcl** (p. 446)
- **Container** (p. 449)
- **Other** (p. 450)

**Example**

```
"Type": "AwsS3Bucket"
```

**DataClassification**

The `DataClassification` object contains information about sensitive data that was detected on the resource.

**Example**

```
"DataClassification": {
  "DetailedResultsLocation": "Path_to_Folder_Or_File",
  "Result": {
    "MimeType": "text/plain",
    "SizeClassified": 2966026,
    "AdditionalOccurrences": false,
    "Status": {
      "Code": "COMPLETE",
      "Reason": "Unsupportedfield"
    },
    "SensitiveData": [
      {
        "Category": "PERSONAL_INFORMATION",
        "Detections": [
          {
            "Count": 34,
            "Type": "GE_PERSONAL_ID",
            "Occurrences": {
              "LineRanges": [
                {
                  "Start": 1,
                }
              ]
            }
          }
        ]
      }
    ]
  }
}
```
DataClassification can contain the following attributes.

DetailedResultsLocation

Optional

The path to the folder or file that contains the sensitive data.

Type: String

Result (p. 199)

Optional

The details about the sensitive data that was detected on the resource.

Type: Object

Result

The Result object contains the details about the sensitive data that was detected on the resource.

Result can have the following attributes.

AdditionalOccurrences

Optional

Indicates whether there are additional occurrences of sensitive data that are not included in the finding. This occurs when the number of occurrences exceeds the maximum that can be included.

Type: Boolean

CustomDataIdentifiers (p. 200)

Optional

Provides details about sensitive data that was identified based on customer-defined configuration.

Type: Object

MimeType

Optional

The type of content that the finding applies to.

Type: String

Required format: Must be a MIME type.

Examples

- application/gzip, for a GNU Gzip compressed archive file
SensitiveData(p. 201)

Optional

Provides details about sensitive data that was identified based on built-in configuration.

**Type**: Object

SizeClassified

Optional

The total size in bytes of the affected data.

**Type**: Long

Status

Optional

Provides details about the current status of the detection.

**Type**: Object

Status.Code

Optional

The code that represents the status of the sensitive data detection.

**Type**: String

Status.Reason

Optional

A longer description of the current status of the sensitive data detection.

**Type**: String

CustomDataIdentifiers

CustomDataIdentifiers contains instances of sensitive data that were detected by user-defined identifiers.

CustomDataIdentifiers can have the following attributes.

**Detections (p. 201)**

Optional

The list of detected instances of sensitive data.

**Type**: Array of objects

TotalCount

Optional

The total number of occurrences of sensitive data.

**Type**: Integer
**SensitiveData**

*SensitiveData* contains detected instances of sensitive data that are based on built-in identifiers.

**Category**

Optional

The category of sensitive data that was detected. For example, the category might indicate that the sensitive data involved credentials, financial information, or personal information.

*Type*: String

**Detections** *(p. 201)*

Optional

The list of detected instances of sensitive data.

*Type*: Array of objects

**TotalCount**

Optional

The total number of occurrences of sensitive data.

*Type*: Integer

**Detections**

*Detections* contains the details of the sensitive data that was detected.

Each instance of detected sensitive data can have the following attributes.

**Arn**

Optional

The ARN of the custom identifier that was used to detect the sensitive data.

Arn is only provided in *Detections* instances under *CustomDataIdentifiers*. *Detections* instances under *SensitiveData* do not have the *Arn* attribute.

*Type*: String

**Count**

Optional

The total number of occurrences of sensitive data that were detected.

*Type*: Integer

**Name**

Optional

The name of the custom identifier that detected the sensitive data.

Name is only provided in *Detections* instances under *CustomDataIdentifiers*. *Detections* instances under *SensitiveData* do not have the *Name* attribute.

*Type*: String
Occurrences

Optional

Details about the sensitive data that was detected. Occurrences can contain the following objects. Each of these objects contains an array of objects.

- **Cells (p. 202)** – Contains occurrences of sensitive data detected in Microsoft Excel files, comma-separated value (.csv) files, or tab-separated value (.tsv) files
- **LineRanges (p. 203)** – Contains occurrences of sensitive data detected in nonbinary text files or Microsoft Word files
- **OffsetRanges (p. 203)** – Contains occurrences of sensitive data detected in binary text files
- **Pages (p. 204)** – Contains occurrences of sensitive data detected in Adobe Portable Document Format (.pdf) files
- **Records (p. 205)** – Contains occurrences of sensitive data detected in an Apache Avro object container or an Apache Parquet file

**Type:** Object

**Type**

Optional

The type of sensitive data that was detected. For example, the type might indicate that the data is an email address.

Type is only provided in Detections instances under SensitiveData. Detections instances under CustomDataIdentifiers do not have the Type attribute.

**Type:** String

**Cells**

*Cells* contains occurrences of sensitive data detected in Microsoft Excel workbooks, comma-separated value (.csv) files, or tab-separated value (.tsv) files.

For each occurrence, *Cells* identifies the cell that contains the sensitive data.

Each occurrence can contain the following attributes.

**CellReference**

Optional

For a Microsoft Excel workbook, provides the location of the cell, as an absolute cell reference, that contains the data. For example, Sheet2!C5 for cell C5 on Sheet2.

This attribute is null for .csv and .tsv files.

**Type:** String

**Column**

Optional

The column number of the column that contains the data. For a Microsoft Excel workbook, the column number corresponds to the alphabetical column identifiers. For example, a value of 1 for *Column* corresponds to the A column in the workbook.

**Type:** Integer
Column Name
Optional
The name of the column that contains the data.

Type: String

Row
Optional
The row number of the row that contains the data.

Type: Integer

Line Ranges
Line Ranges contains occurrences of sensitive data detected in a nonbinary text file or a Microsoft Word file. Nonbinary text files include files such as .html, .xml, .json, and .txt files.

For each occurrence, Line Ranges provides the location of the sensitive data. The location includes the line where the data is located and the position of the data on that line.

Each occurrence can have the following attributes.

End
Optional
The number of lines from the beginning of the file to the end of the sensitive data.

Type: Integer

Start
Optional
The number of lines from the beginning of the file to the end of the sensitive data.

Type: Integer

Start Column
Optional
In the line where the sensitive data begins, the column within the line where the sensitive data starts.

Type: Integer

Offset Ranges
Offset Ranges contains occurrences of sensitive data detected in a binary text file.

For each occurrence, Offset Ranges provides the location of the sensitive data. The location is the number of characters relative to the beginning of the file.

Each occurrence can have the following attributes.

End
Optional
The number of characters from the beginning of the file to the end of the sensitive data.

**Type:** Integer

**Start**

Optional

The number of characters from the beginning of the file to the beginning of the sensitive data.

**Type:** Integer

**StartColumn**

Optional

The column where the sensitive data begins.

**Type:** Integer

**Pages**

*Pages* provides occurrences of sensitive data in an Adobe Portable Document Format (.pdf) file.

For each occurrence, *Pages* identifies the page that contains the data, and provides the position of the data on the page. The position can be identified using either line numbers or numbers of characters.

Each occurrence can have the following attributes.

**LineRange**

Optional

Uses line numbers to identify the location of the sensitive data.

**Type:** Object

**LineRange.End**

Optional

The number of lines from the beginning of the file to the end of the sensitive data.

**Type:** Integer

**LineRange.Start**

Optional

The number of lines from the beginning of the file to the beginning of the sensitive data.

**Type:** Integer

**LineRange.StartColumn**

Optional

On the line where the sensitive data begins, the column number where the sensitive data begins.

**Type:** Integer
Identifies the location of the sensitive data based on the number of characters.

**Type:** Object

**OffsetRange.End**

Optional

The number of characters from the beginning of the file to the end of the sensitive data.

**Type:** Integer

**OffsetRange.Start**

Optional

The number of characters from the beginning of the file to the beginning of the sensitive data.

**Type:** Integer

**OffsetRange.StartColumn**

Optional

On the line where the sensitive data starts, the column number where it starts.

**Type:** Integer

**PageNumber**

Optional

The page number of the page that contains the sensitive data.

**Type:** Integer

**Records**

**Records** identifies occurrences of sensitive data in an Apache Avro object container or an Apache Parquet file.

For each occurrence, **Records** specifies the record index and the path to the field that contains the sensitive data.

Each occurrence can have the following attributes.

**JsonPath**

Optional

The path, as a JSONPath expression, to the field in the record that contains the data. If the field name is longer than 20 characters, it is truncated. If the path is longer than 250 characters, it is truncated.

**Type:** String

**RecordIndex**

Optional

The record index, starting from 0, for the record that contains the data.

**Type:** Integer
**AwsApiGatewayRestApi**

The `AwsApiGatewayRestApi` object contains information about a REST API in version 1 of Amazon API Gateway.

**Example**

```json
AwsApiGatewayRestApi: {
    "Id": "exampleapi",
    "Name": "Security Hub",
    "Description": "AWS Security Hub",
    "CreatedDate": "2018-11-18T10:20:05-08:00",
    "Version": "2018-10-26",
    "BinaryMediaTypes": ["-*~1*"],
    "MinimumCompressionSize": 1024,
    "ApiKeySource": "AWS_ACCOUNT_ID",
    "EndpointConfiguration": {
        "Types": ["REGIONAL"
    ]
}
}
```

`AwsApiGatewayRestApi` can have the following attributes.

**ApiKeySource**

Optional

The source of the API key for metering requests according to a usage plan.

- HEADER indicates whether to read the API key from the X-API-Key header of a request.
- AUTHORIZER indicates whether to read the API key from the `UsageIdentifierKey` from a custom authorizer.

**Type:** String

**Valid values:** HEADER | AUTHORIZER

**BinaryMediaTypes**

Optional

The list of binary media types supported by the REST API.

**Type:** Array of strings

**CreatedDate**

Optional

Indicates when the API was created.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example:**

```
"CreatedDate": "2017-03-22T13:22:13.933Z"
```
Description

Optional
A description of the REST API.

Type: String

**EndpointConfiguration (p. 207)**

Optional
The endpoint configuration of the REST API.

Type: Object

**Id**

Optional
The identifier of the REST API.

Type: String

**MinimumCompressionSize**

Optional
The minimum size in bytes of a payload before compression is enabled.
If null, then compression is disabled.
If 0, then all payloads are compressed.

Type: Number

Minimum value: 0

Maximum value: 10,485,760

**Name**

Optional
The name of the REST API.

Type: String

**Version**

Optional
The version identifier for the REST API.

Type: String

**EndpointConfiguration**

The `EndPointConfiguration` object contains information about the endpoints for the API.

`EndPointConfiguration` can have the following attributes.

**Types**

Optional
A list of endpoint types for the REST API.

For an edge-optimized API, the endpoint type is EDGE. For a Regional API, the endpoint type is REGIONAL. For a private API, the endpoint type is PRIVATE.

**Type:** Array of strings

**Valid values:** EDGE | REGIONAL | PRIVATE

**AwsApiGatewayStage**

The **AwsApiGatewayStage** object provides information about a version 1 Amazon API Gateway stage.

**Example**

```json
"AwsApiGatewayStage": {
  "DeploymentId": "n7hlmf",
  "ClientCertificateId": "a1b2c3",
  "StageName": "Prod",
  "Description": "Stage Description",
  "CacheClusterEnabled": false,
  "CacheClusterSize": "1.6",
  "CacheClusterStatus": "NOT_AVAILABLE",
  "MethodSettings": [
    {
      "MetricsEnabled": true,
      "LoggingLevel": "INFO",
      "DataTraceEnabled": false,
      "ThrottlingBurstLimit": 100,
      "ThrottlingRateLimit": 5.0,
      "CachingEnabled": false,
      "CacheTtlInSeconds": 300,
      "CacheDataEncrypted": false,
      "RequireAuthorizationForCacheControl": true,
      "UnauthorizedCacheControlHeaderStrategy": "SUCCEED_WITH_RESPONSE_HEADER",
      "Method": "POST",
      "ResourcePath": "/echo"
    }
  ],
  "Variables": {"test": "value"},
  "DocumentationVersion": "2.0",
  "AccessLogSettings": { "Format": "\"requestId\": \"$context.requestId\", \"extendedRequestId\": \"$context.extendedRequestId\", \"ownerAccountId\": \"$context.accountId\", \"callerPrincipal\": \"$context.identity.caller\", \"httpMethod\": \"$context.httpMethod\", \"resourcePath\": \"$context.resourcePath\", \"status\": \"$context.status\", \"requestTime\": \"$context.requestTime\", \"responseLatency\": \"$context.responseLatency\", \"errorMessage\": \"$context.error.message\", \"errorResponseType\": \"$context.error.responseType\", \"apiId\": \"$context.apiId\", \"awsEndpointRequestId\": \"$context.awsEndpointRequestId\", \"domainName\": \"$context.domainName\", \"stage\": \"$context.stage\", \"xrayTraceId\": \"$context.xrayTraceId\", \"sourceIp\": \"$context.identity.sourceIp\", \"user\": \"$context.identity.user\", \"userAgent\": \"$context.identity.userAgent\", \"arn\": \"$context.identity.arn\", \"integrationLatency\": \"$context.integrationLatency\", \"integrationStatus\": \"$context.integrationStatus\", \"authorizerIntegrationLatency\": \"$context.authorizer.integrationLatency\" },
  "CanarySettings": { "PercentTraffic": 0.0, 
  "DeploymentId": "ul73s8",
```

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AWSApiGatewayStage can have the following attributes.

**AccessLogSettings (p. 211)**

Optional

Settings for logging access for the stage.

Type: Object

**CacheClusterEnabled**

Optional

Indicates whether a cache cluster is enabled for the stage.

Type: Boolean

**CacheClusterSize**

Optional

If a cache cluster is enabled, the size of the cache cluster.

Type: String

**CacheClusterStatus**

Optional

If a cache cluster is enabled, the status of the cache cluster.

Type: String

**CanarySettings (p. 212)**

Optional

Information about settings for canary deployment in the stage.

Type: Object

**ClientCertificateId**

Optional

The identifier of the client certificate for the stage.

Type: String

**CreatedDate**

Optional
Indicates when the stage was created.

**Type:** String

**Format:** Uses the date–time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"CreatedDate": "2017-03-22T13:22:13.933Z"
```

**DeploymentId**

Optional

The identifier of the deployment that the stage points to.

**Type:** String

**Description**

Optional

A description of the stage.

**Type:** String

**DocumentationVersion**

Optional

The version of the API documentation that is associated with the stage.

**Type:** String

**LastUpdatedDate**

Optional

Indicates when the stage was most recently updated.

**Type:** String

**Format:** Uses the date–time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"LastUpdatedDate": "2017-03-22T13:22:13.933Z"
```

**MethodSettings (p. 212)**

Optional

Defines the method settings for the stage.

For each method, the key is the method path, which is defined as follows:

- For an individual method override, the key is `<resource_path>/http_method>`. For example, `accounts/DELETE`.
- To override all of the methods in the stage, the key is `/*/*`.

**Type:** Array of objects
StageName
Optional
The name of the stage.

Type: String

TracingEnabled
Optional
Indicates whether active tracing with AWS X-Ray is enabled for the stage.

Type: Boolean

Variables
Optional
A map that defines the stage variables for the stage.

Variable names can have the following characters: A-Z, a-z, 0-9, and _ (underscore).

Variable values can contain the following characters:
• Uppercase and lowercase letters
• Numbers
• Special characters . _ ~ : / ? # & = , - (hyphen)

Type: Map of strings

WebAclArn
Optional
The ARN of the web ACL associated with the stage.

Type: String

AccessLogSettings
The AccessLogSettings object contains information about settings for logging access for the stage.

AccessLogSettings can have the following attributes.

DestinationArn
Optional
The ARN of the CloudWatch Logs log group or Kinesis Data Firehose delivery stream that receives the access logs.

For a Kinesis Data Firehose delivery stream, the stream name always begins with amazon-apigateway-

Type: String

Format
Optional
A single-line format of the access logs of data, as specified by selected $context variables. The format must include at least $context.requestId.
Type: String

CanarySettings

The CanarySettings object contains information about settings for canary deployment in the stage. CanarySettings can have the following attributes.

DeploymentId

Optional

The deployment identifier for the canary deployment.

Type: String

PercentTraffic

Optional

The percentage of traffic that is diverted to a canary deployment.

Type: Number

Minimum value: 0

Maximum value: 100

StageVariableOverrides

Optional

Stage variables that are overridden in the canary release deployment. The variables include new stage variables that are introduced in the canary.

Each variable is represented as a string-to-string map between the stage variable name and the variable value.

"variableName" : "variableValue"

Type: Object

UseStageCache

Optional

Indicates whether the canary deployment uses the stage cache.

Type: Boolean

MethodSettings

The MethodSettings object defines the method settings for the stage.

Each method object in MethodSettings can have the following attributes.

CacheDataEncrypted

Optional

Indicates whether the cached responses are encrypted.
**Type:** Boolean

**CachingEnabled**

**Optional**

Indicates whether responses are cached and returned for requests. For responses to be cached, a cache cluster must be enabled on the stage.

**Type:** Boolean

**CacheTtlInSeconds**

**Optional**

Specifies the time to live (TTL), in seconds, for cached responses. The higher the TTL, the longer the response is cached.

**Type:** Number

**DataTraceEnabled**

**Optional**

Indicates whether data trace logging is enabled for the method. Data trace logging affects the log entries that are pushed to CloudWatch Logs.

**Type:** Boolean

**HttpMethod**

**Optional**

The HTTP method. You can use an asterisk (*) as a wildcard to apply method settings to multiple methods.

**Type:** String

**LoggingLevel**

**Optional**

The logging level for this method. The logging level affects the log entries that are pushed to CloudWatch Logs.

- If the logging level is **ERROR**, then the logs only include error-level entries.
- If the logging level is **INFO**, then the logs include both **ERROR** events and extra informational events.

**Type:** String

**Valid values:** OFF | ERROR | INFO

**MetricsEnabled**

**Optional**

Indicates whether CloudWatch metrics are enabled for the method.

**Type:** Boolean

**RequireAuthorizationForCacheControl**

**Optional**

Indicates whether authorization is required for a cache invalidation request.
**Type:** Boolean

**ResourcePath**

Optional

The resource path for this method. Forward slashes (/) are encoded as ~1. The initial slash must include a forward slash.

For example, the path value /resource/subresource must be encoded as /\~1resource\~1subresource.

To specify the root path, use only a slash (/). You can use an asterisk (*) as a wildcard to apply method settings to multiple methods.

**Type:** String

**ThrottlingBurstLimit**

Optional

The throttling burst limit for the method.

**Type:** Number (integer)

**ThrottlingRateLimit**

Optional

The throttling rate limit for the method.

**Type:** Number

**UnauthorizedCacheControlHeaderStrategy**

Optional

Indicates how to handle unauthorized requests for cache invalidation.

**Type:** String

**Valid values:** FAIL_WITH_403 | SUCCEED_WITH_RESPONSE_HEADER | SUCCEED_WITHOUT_RESPONSE_HEADER

---

**AwsApiGatewayV2Api**

The **AwsApiGatewayV2Api** object contains information about a version 2 API in Amazon API Gateway.

**Example**

```json
"AwsApiGatewayV2Api": {  
  "ApiEndpoint": "https://example.us-west-2.amazonaws.com",  
  "ApiId": "alb2c3d4",  
  "ApiKeySelectionExpression": "$request.header.x-api-key",  
  "CreatedDate": "2020-03-28T00:32:37Z",  
  "Description": "ApiGatewayV2 Api",  
  "Version": "string",  
  "Name": "my-api",  
  "ProtocolType": "HTTP",  
  "RouteSelectionExpression": "$request.method $request.path",  
  "CorsConfiguration": {  
    "AllowOrigins": [ "*" ],  
    "AllowCredentials": true,  
    "ExposeHeaders": [ "string" ]
  }
}
```
"MaxAge": 3000,
"AllowMethods": [
  "GET",
  "PUT",
  "POST",
  "DELETE",
  "HEAD"
],
"AllowHeaders": [ "*" ]
}

AWSApiGatewayV2Api can have the following attributes.

**ApiEndpoint**

Optional

The URI of the API.

**Type:** String

**Format:** <api-id>.execute-api.<region>.amazonaws.com

The stage name is typically appended to the URI to form a complete path to a deployed API stage.

**ApiId**

Optional

The identifier of the API.

**Type:** String

**ApiKeySelectionExpression**

Optional

An API key selection expression. Supported only for WebSocket API calls.

**Type:** String

**CorsConfiguration (p. 216)**

Optional

A cross-origin resource sharing (CORS) configuration. Supported only for HTTP API calls.

**Type:** Object

**CreatedDate**

Optional

Indicates when the API was created.

**Type:** String

**Format:** Uses the date–time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

"CreatedDate": "2017-03-22T13:22:13.933Z"
Description
Optional
A description of the API.
Type: String

Name
Optional
The name of the API.
Type: String

ProtocolType
Optional
The API protocol for the API.
Type: String
Valid values: WEBSOCKET | HTTP

RouteSelectionExpression
Optional
The route selection expression for the API.
For HTTP API calls, must be ${request.method} ${request.path}. This is the default value for HTTP API calls.
For WebSocket API calls, there is no default value.
Type: String

Version
Optional
The version identifier for the API.
Type: String

CorsConfiguration
The CorsConfiguration object contains the cross-origin resource sharing (CORS) configuration for the API. CORS is only supported for HTTP API calls.
CorsConfiguration can have the following attributes.

AllowCredentials
Optional
Indicates whether the CORS request includes credentials.
Type: Boolean

AllowHeaders
Optional
The allowed headers for CORS requests.

**Type:** Array of strings

**AllowMethods**
Optional
The allowed methods for CORS requests.

**Type:** Array of strings

**AllowOrigins**
Optional
The allowed origins for CORS requests.

**Type:** Array of strings

**ExposeHeaders**
Optional
The exposed headers for CORS requests.

**Type:** Array of strings

**MaxAge**
Optional
The number of seconds for which the browser caches preflight request results.

**Type:** Number

### AwsApiGatewayV2Stage

**AwsApiGatewayV2Stage** contains information about a version 2 stage for Amazon API Gateway.

**Example**

```
"AwsApiGatewayV2Stage": {
  "CreatedDate": "2020-04-08T00:36:05Z",
  "Description": "ApiGatewayV2",
  "DefaultRouteSettings": {
    "DetailedMetricsEnabled": false,
    "LoggingLevel": "INFO",
    "DataTraceEnabled": true,
    "ThrottlingBurstLimit": 100,
    "ThrottlingRateLimit": 50
  },
  "DeploymentId": "x1zwyv",
  "LastUpdatedDate": "2020-04-08T00:36:13Z",
  "RouteSettings": {
    "DetailedMetricsEnabled": false,
    "LoggingLevel": "INFO",
    "DataTraceEnabled": true,
    "ThrottlingBurstLimit": 100,
    "ThrottlingRateLimit": 50
  },
  "StageName": "prod",
  "StageVariables": [
    "function": "my-prod-function"
  ]
}```
### AWSApiGatewayV2Stage attributes

**AccessLogSettings** *(p. 220)*

- **Type**: Object
- **Optional**: Information about settings for logging access for the stage.

**ApiGatewayManaged**

- **Type**: Boolean
- **Optional**: Indicates whether the stage is managed by API Gateway.

**AutoDeploy**

- **Type**: Boolean
- **Optional**: Indicates whether updates to an API automatically trigger a new deployment.

**ClientCertificateId**

- **Type**: String
- **Optional**: The identifier of a client certificate for a stage. Supported only for WebSocket API calls.

**CreatedDate**

- **Type**: String
- **Optional**: Indicates when the stage was created.
**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

<table>
<thead>
<tr>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;CreatedDate&quot;: &quot;2017-03-22T13:22:13.933Z&quot;</td>
</tr>
</tbody>
</table>

**DefaultRouteSettings (p. 220)**

Optional

Default route settings for the stage.

**Type:** Object

**DeploymentId**

Optional

The identifier of the deployment that the stage is associated with.

**Type:** String

**Description**

Optional

The description of the stage.

**Type:** String

**LastDeploymentStatusMessage**

Optional

The status of the last deployment of a stage. Supported only if the stage has automatic deployment enabled.

**Type:** String

**LastUpdatedDate**

Optional

Indicates when the stage was most recently updated.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

<table>
<thead>
<tr>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;LastUpdatedDate&quot;: &quot;2017-03-22T13:22:13.933Z&quot;</td>
</tr>
</tbody>
</table>

**RouteSettings (p. 220)**

Optional

The route settings for the stage.

**Type:** Object
StageName

Optional
The name of the stage.

Type: String

StageVariables

Optional
A map that defines the stage variables for the stage.
Variable names can have the following characters: A-Z, a-z, 0-9, and _ (underscore).

Type: Map of strings

Valid values:
- Uppercase and lowercase letters
- Numbers
- Special characters . _ ~ : / ? # & =, (hyphen)

AccessLogSettings

The AccessLogSettings object contains information about settings for logging access for the stage.

AccessLogSettings can have the following attributes.

DestinationArn

Optional
The ARN of the CloudWatch Logs log group that receives the access logs.

Type: String

Format

Optional
A single-line format of the access logs of data, as specified by selected $context variables. The format must include at least $context.requestId.

Type: String

DefaultRouteSettings and RouteSettings

The DefaultRouteSettings object contains the default route settings for the stage.
The RouteSettings object contains the route settings for the stage.

These objects can have the following attributes.

DataTraceEnabled

Optional
Indicates whether data trace logging is enabled. Data trace logging affects the log entries that are pushed to CloudWatch Logs. Supported only for WebSocket API calls.
**Type**: Boolean

**DetailedMetricsEnabled**

*Optional*

Indicates whether detailed metrics are enabled.

**Type**: Boolean

**LoggingLevel**

*Optional*

The logging level. The logging level affects the log entries that are pushed to CloudWatch Logs. Supported only for WebSocket API calls.

If the logging level is `ERROR`, then the logs only include error-level entries.

If the logging level is `INFO`, then the logs include both `ERROR` events and extra informational events.

**Type**: String

**Valid values**: OFF | ERROR | INFO

**ThrottlingBurstLimit**

*Optional*

The throttling burst limit.

**Type**: Number

**ThrottlingRateLimit**

*Optional*

The throttling rate limit.

**Type**: Number

---

**awsAutoScalingAutoScalingGroup**

The `awsAutoScalingAutoScalingGroup` object provides details about an automatic scaling group.

**Example**

```json
"awsAutoScalingAutoScalingGroup": {  
"createdAt": "2017-10-17T14:47:11Z",
"healthCheckGracePeriod": 300,
"healthCheckType": "EC2",
"launchConfigurationName": "mylaunchconf",
"loadBalancerNames": []
}
```

The `awsAutoScalingAutoScalingGroup` object can have the following attributes.

**CreatedAt**

*Optional*

Indicates when the automatic scaling group was created.
**ASFF attributes**

**HealthCheckGracePeriod**

Optional

The amount of time, in seconds, that Amazon EC2 Auto Scaling waits before it checks the health status of an EC2 instance that has come into service.

**Type:** Integer

**HealthCheckType**

Optional

The service to use for the health checks.

**Type:** String

**Maximum length:** 32

**Valid values:** EC2 | ELB

**LaunchConfigurationName**

Optional

The name of the launch configuration.

**Type:** String

**Maximum length:** 32

**LoadBalancerNames**

Optional

The list of load balancers that are associated with the group.

**Type:** Array of strings

**Maximum length per string:** 255 characters

**AwsAutoScalingLaunchConfiguration**

The **AwsAutoScalingLaunchConfiguration** object provides details about a launch configuration.

**Example**

```json
AwsAutoScalingLaunchConfiguration: {
    "LaunchConfigurationName": "newtest",
    "ImageId": "ami-058a3739b02263842",
    "KeyName": "55hundrerdinstance",
    "SecurityGroups": [ "sg-01fcee87ad6e019725" ],
    "ClassicLinkVpcSecurityGroups": [ ],
    "UserData": "...Base64-Encoded user data...
    "InstanceType": "a1.metal",
    "KernelId": "",
    "RamdiskId": "ari-a51cf9cc",
    "BlockDeviceMappings": [ 
```

222
"DeviceName": "/dev/sdh",
"Ebs": {
  "VolumeSize": 30,
  "VolumeType": "gp2",
  "DeleteOnTermination": false,
  "Encrypted": true,
  "SnapshotId": "snap-ffaa1e69",
  "VirtualName": "ephemeral1"
},

"DeviceName": "/dev/sdb",
"NoDevice": true,

"DeviceName": "/dev/sda1",
"Ebs": {
  "SnapshotId": "snap-02420cd3d2dealbc0",
  "VolumeSize": 8,
  "VolumeType": "gp2",
  "DeleteOnTermination": true,
  "Encrypted": false
}

"DeviceName": "/dev/sdi",
"Ebs": {
  "VolumeSize": 20,
  "VolumeType": "gp2",
  "DeleteOnTermination": false,
  "Encrypted": true
}

"DeviceName": "/dev/sdc",
"NoDevice": true

"InstanceMonitoring": {
  "Enabled": false
},
"CreatedTime": 1620842933453,
"EbsOptimized": false,
"AssociatePublicIpAddress": true,
"SpotPrice": "0.045"

**AwsAutoScalingLaunchConfiguration** can have the following attributes.

**AssociatePublicIpAddress**

Optional

For Auto Scaling groups that run in a VPC, specifies whether to assign a public IP address to the group's instances.

**Type:** Boolean

**BlockDeviceMappings (p. 226)**

Optional

Specifies the block devices for the instance.

**Type:** Array of objects
**ClassicLinkVpcId**

Optional

The identifier of a ClassicLink-enabled VPC that EC2-Classic instances are linked to.

*Type: String*

*Minimum length: 1*

*Maximum length: 255*

**ClassicLinkVpcSecurityGroups**

Optional

The identifiers of one or more security groups for the VPC that is specified in ClassicLinkVpcId.

*Type: Array of strings*

**CreatedTime**

Optional

The creation date and time for the launch configuration.

*Type: String*

*Format:* Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**EbsOptimized**

Optional

Whether the launch configuration is optimized for Amazon EBS I/O.

*Type: Boolean*

**IamInstanceProfile**

Optional

The name or the ARN of the instance profile associated with the IAM role for the instance. The instance profile contains the IAM role.

*Type: String*

**ImageId**

Optional

The identifier of the Amazon Machine Image (AMI) that is used to launch EC2 instances.

*Type: String*

*Minimum length: 1*

*Maximum length: 255*

**InstanceMonitoring**

Optional

Indicates the type of monitoring for instances in the group.

*Type: Object*
**InstanceMonitoring.Enabled**

Optional

If set to `true`, then instances in the group launch with detailed monitoring.

If set to `false`, then instances in the group launch with basic monitoring.

**Type:** Boolean

**InstanceType**

Optional

The instance type for the instances.

**Type:** String

**Minimum length:** 1

**Maximum length:** 255

**KernelId**

Optional

The identifier of the kernel associated with the AMI.

**Type:** String

**Minimum length:** 1

**Maximum length:** 255

**KeyName**

Optional

The name of the key pair.

**Type:** String

**Minimum length:** 1

**Maximum length:** 255

**LaunchConfigurationName**

Optional

The name of the launch configuration.

**Type:** String

**Minimum length:** 1

**Maximum length:** 255

**PlacementTenancy**

Optional

The tenancy of the instance. An instance with dedicated tenancy runs on isolated, single-tenant hardware and can only be launched into a VPC.

**Type:** String
**Allowed values:** default | dedicated

**RamdiskId**

Optional

The identifier of the RAM disk associated with the AMI.

**Type:** String

**Minimum length:** 1

**Maximum length:** 255

**SecurityGroups**

Optional

The security groups to assign to the instances in the Auto Scaling group.

**Type:** Array of strings

**SpotPrice**

Optional

The maximum hourly price to be paid for any Spot Instance that is launched to fulfill the request.

**Type:** String

**UserData**

Optional

The user data to make available to the launched EC2 instances. Must be base64-encoded text.

**Type:** String

**Maximum length:** 21847

**BlockDeviceMappings**

The `BlockDeviceMappings` object specifies the block devices for the instance.

Each block device can have the following attributes.

**DeviceName**

Optional

The device name that is exposed to the EC2 instance. For example, `/dev/sdh` or `xvdh`.

**Type:** String

**Minimum length:** 1

**Maximum length:** 255

**Ebs (p. 227)**

Optional

Parameters that are used to automatically set up Amazon EBS volumes when an instance is launched.
You can provide either Ebs or VirtualName, but not both.

**Type:** Object

**NoDevice**

Optional

Whether to suppress the device that is included in the block device mapping of the AMI.

If NoDevice is true, then you cannot provide Ebs.

**Type:** Boolean

**VirtualName**

Optional

The name of the virtual device (for example, ephemeral0).

You can provide either VirtualName or Ebs, but not both.

**Type:** String

**Minimum length:** 1

**Maximum length:** 255

**Ebs**

The Ebs object contains parameters that are used to automatically set up Amazon EBS volumes when an instance is launched.

Ebs can have the following attributes.

**DeleteOnTermination**

Optional

Whether to delete the volume when the instance is terminated.

**Type:** Boolean

**Encrypted**

Optional

Whether to encrypt the volume.

**Type:** Boolean

**Iops**

Optional

The number of input/output (I/O) operations per second (IOPS) to provision for the volume.

Only supported for gp3 or io1 volumes. Required for io1 volumes. Not used with standard, gp2, st1, or sc1 volumes.

**Type:** Integer

**Allowed values:**
• gp3: 3,000-16,000
• io1: 100-64,000

**SnapshotId**

Optional

The snapshot ID of the volume to use.

You must specify either `VolumeSize` or `SnapshotId`.

**Type:** String

**Minimum length:** 1

**Maximum length:** 255

**VolumeSize**

Optional

The volume size, in GiBs. The following are the supported volumes sizes for each volume type:

• gp2 and gp3: 1-16,384
• io1: 4-16,384
• st1 and sc1: 125-16,384
• standard: 1-1,024

You must specify either `SnapshotId` or `VolumeSize`. If you specify both `SnapshotId` and `VolumeSize`, the volume size must be equal or greater than the size of the snapshot.

**Type:** Integer

**Minimum value:** 1

**Maximum value:** 16384

**VolumeType**

Optional

The volume type.

**Type:** String

**Valid values:** standard | io1 | gp2 | st1 | sc1 | gp3

**AwsCertificateManagerCertificate**

The `AwsCertificateManagerCertificate` object provides details about an AWS Certificate Manager (ACM) certificate.

**Example**

```json
"AwsCertificateManagerCertificate": {
  "CreatedAt": "2019-05-24T18:12:02.000Z",
  "DomainName": "example.amazondomains.com",
  "DomainValidationOptions": [
    {
      "DomainName": "example.amazondomains.com",
```
"ResourceRecord": {
  "Name": "_1bac61828d3a1020c40a560ceed08f7.example.amazondomains.com",
  "Type": "CNAME",
  "Value": "_example.acm-validations.aws.",
},
"ValidationDomain": "example.amazondomains.com",
"ValidationEmails": [],
"ValidationMethod": "DNS",
"ValidationStatus": "SUCCESS"
},
"ExtendedKeyUsages": [
  {
    "Name": "TLS_WEB_SERVER_AUTHENTICATION",
    "OId": "1.3.6.1.5.5.7.3.1"
  },
  {
    "Name": "TLS_WEB_CLIENT_AUTHENTICATION",
    "OId": "1.3.6.1.5.5.7.3.2"
  }
],
"FailureReason": "",
"ImportedAt": "2018-08-17T00:13:00.000Z",
"InUseBy": ["arn:aws:amazondomains:us-west-2:444455556666:loadbalancer/example"],
"IssuedAt": "2020-04-26T00:41:17.000Z",
"Issuer": "Amazon",
"KeyAlgorithm": "RSA-1024",
"KeyUsages": [
  {
    "Name": "DIGITAL_SIGNATURE",
  },
  {
    "Name": "KEY_ENCIPHERMENT",
  }
],
"NotAfter": "2021-05-26T12:00:00.000Z",
"NotBefore": "2020-04-26T00:00:00.000Z",
"Options": {
  "CertificateTransparencyLoggingPreference": "ENABLED",
},
"RenewalEligibility": "ELIGIBLE",
"RenewalSummary": {
  "DomainValidationOptions": [
    {
      "DomainName": "example.amazondomains.com",
      "ResourceRecord": {
        "Name": "_1bac61828d3a1020c40a560ceed08f7.example.amazondomains.com",
        "Type": "CNAME",
        "Value": "_example.acm-validations.aws.com",
      },
      "ValidationDomain": "example.amazondomains.com",
      "ValidationEmails": [],
      "ValidationMethod": "DNS",
      "ValidationStatus": "SUCCESS"
    }
  ],
  "RenewalStatus": "SUCCESS",
  "RenewalStatusReason": "",
  "UpdatedAt": "2020-04-26T00:41:35.000Z",
},
"SignatureAlgorithm": "SHA256WITHRSA",
"Status": "ISSUED",
"Subject": "CN=example.amazondomains.com",
"SubjectAlternativeNames": ["example.amazondomains.com"],
"Type": "AMAZON_ISSUED"
AWS Certificate Manager Certificate can have the following attributes.

**CertificateAuthorityArn**

Optional

The ARN of the private certificate authority (CA) that will be used to issue the certificate.

**Type:** String

**CreatedAt**

Optional

Indicates when the certificate was requested.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"CreatedAt": "2017-03-22T13:22:13.933Z"
```

**DomainName**

Optional

The fully qualified domain name (FQDN), such as www.example.com, that is secured by the certificate.

**Type:** String

**Minimum length:** 1

**Maximum length:** 253

**DomainValidationOptions (p. 234)**

Optional

Contains information about the initial validation of each domain name that occurs as a result of the RequestCertificate request.

Only provided if the certificate type is AMAZON_ISSUED.

**Type:** Array of objects

**ExtendedKeyUsages (p. 235)**

Optional

Contains a list of extended key usage X.509 v3 extension objects. Each object specifies a purpose for which the certificate public key can be used and consists of a name and an object identifier (OID).

**Type:** Array of objects

**FailureReason**

Optional
For a failed certificate request, the reason for the failure.

**Type:** String

**Valid values:**
- NO_AVAILABLE_CONTACTS
- ADDITIONAL_VERIFICATION_REQUIRED
- DOMAIN_NOT_ALLOWED
- INVALID_PUBLIC_DOMAIN
- DOMAIN_VALIDATION_DENIED
- CAA_ERROR
- PCA_LIMIT_EXCEEDED
- PCA_INVALID_ARN
- PCA_INVALID_STATE
- PCA_REQUEST_FAILED
- PCA_NAME_CONSTRAINTS_VALIDATION
- PCA_RESOURCE_NOT_FOUND
- PCA_INVALID_ARGS
- PCA_INVALID_DURATION
- PCA_ACCESS_DENIED
- SLR_NOT_FOUND
- OTHER

**ImportedAt**

Optional

Indicates when the certificate was imported. Provided if the certificate type is IMPORTED.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"ImportedAt": "2017-03-22T13:22:13.933Z"
```

**InUseBy**

Optional

The list of ARNs for the AWS resources that use the certificate.

**Type:** Array of strings

**IssuedAt**

Optional

Indicates when the certificate was issued. Provided if the certificate type is AMAZON_ISSUED.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"IssuedAt": "2017-03-22T13:22:13.933Z"
```

**Issuer**

Optional

The name of the certificate authority that issued and signed the certificate.

**Type:** String

**KeyAlgorithm**

Optional

The algorithm that was used to generate the public-private key pair.

**Type:** String
**Valid values:** RSA_2048 | RSA_1024 | RSA_4096 | EC_prime256v1 | EC_secp384r1 | EC_secp521r1

**KeyUsages (p. 235)**

Optional

A list of key usage X.509 v3 extension objects.

**Type:** Array of objects

**NotAfter**

Optional

The time after which the certificate becomes invalid.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
```

**NotBefore**

Optional

The time before which the certificate is not valid.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
```

**Options (p. 236)**

Optional

Provides a value that specifies whether to add the certificate to a transparency log.

**Type:** Object

**RenewalEligibility**

Optional

Whether the certificate is eligible for renewal.

**Type:** String

**Valid values:** ELIGIBLE | INELIGIBLE

**RenewalSummary (p. 236)**

Optional
Information about the status of the ACM managed renewal for the certificate. Provided only when the certificate type is AMAZON_ISSUED.

**Type:** Object

**Serial**

Optional

The serial number of the certificate.

**Type:** String

**SignatureAlgorithm**

Optional

The algorithm that was used to sign the certificate.

**Type:** String

**Status**

Optional

The status of the certificate.

**Type:** String

**Valid values:** PENDING_VALIDATION | ISSUED | INACTIVE | EXPIRED | VALIDATION_TIMED_OUT | REVOKED | FAILED

**Subject**

Optional

The name of the entity that is associated with the public key contained in the certificate.

**Type:** String

**SubjectAlternativeNames**

Optional

One or more domain names (subject alternative names) included in the certificate. This list contains the domain names that are bound to the public key that is contained in the certificate.

The subject alternative names include the canonical domain name (CN) of the certificate and additional domain names that can be used to connect to the website.

**Type:** Array of strings

**Minimum number of items:** 1

**Maximum number of items:** 100

**Minimum length per item:** 1

**Maximum length per item:** 253

**Type**

Optional

The source of the certificate. For certificates that ACM provides, **Type** is AMAZON_ISSUED. For certificates that are imported with ImportCertificate, **Type** is IMPORTED.
**Type:** String

**Valid values:** IMPORTED | AMAZON_ISSUED | PRIVATE

**DomainValidationOptions**

The `DomainValidationOptions` object contains information about one of the following:

- The initial validation of each domain name that occurs as a result of the `RequestCertificate` request
- The validation of each domain name in the certificate, as it pertains to ACM managed renewal

`DomainValidationOptions` can have the following attributes.

**DomainName**

Optional

A fully qualified domain name (FQDN) in the certificate.

**Type:** String

**ResourceRecord**

Optional

The CNAME record that is added to the DNS database for domain validation.

**Type:** Object

**ValidationDomain**

Optional

The domain name that ACM uses to send domain validation emails.

**Type:** String

**ValidationEmails**

Optional

A list of email addresses that ACM uses to send domain validation emails.

**Type:** Array of strings

**ValidationMethod**

Optional

The method used to validate the domain name.

**Type:** String

**ValidationStatus**

Optional

The validation status of the domain name.

**Type:** String

ResourceRecord provides the following details about the resource.
**Name**
Optional
The name of the resource.

**Type:** String

**Type**
Optional
The type of resource.

**Type:** String

**Value**
Optional
The value of the resource.

**Type:** String

**ExtendedKeyUsages**

*ExtendedKeyUsages* contains a list of extended key usage X.509 v3 extension objects. Each extension object can have the following attributes.

**Name**
Optional
The name of an extension value. Indicates the purpose for which the certificate public key can be used.

**Type:** String

**Oid**
Optional
An object identifier (OID) for the extension value.

**Type:** String

**Format:** Numbers separated by periods

**Example**

```
"Oid": "1.3.6.1.5.5.7.3.1"
```

**KeyUsages**
The **KeyUsages** object contains a list of key usage X.509 v3 extension objects. Each extension object can have the following attributes.

**Name**
Optional
The key usage extension name.

Type: String

Options

The Options object contains other options for the certificate.

Currently, the only option indicates whether to add the certificate to a transparency log.

Options can have the following attributes.

CertificateTransparencyLoggingPreference

Optional

Whether to add the certificate to a transparency log.

Type: String

Valid values: DISABLED | ENABLED

RenewalSummary

The RenewalSummary object contains information about the ACM managed renewal for an AMAZON_ISSUED certificate.

RenewalSummary can have the following attributes.

DomainValidationOptions (p. 234)

Optional

Information about the validation of each domain name in the certificate, as it pertains to ACM managed renewal. Provided only when the certificate type is AMAZON_ISSUED.

Type: Array of objects

RenewalStatus

Optional

The status of the ACM managed renewal of the certificate.

Type: String

Valid values: PENDING_AUTO_RENEWAL | PENDING_VALIDATION | SUCCESS | FAILED

RenewalStatusReason

Optional

The reason that a renewal request was unsuccessful.

Type: String

Valid values: NO_AVAILABLE_CONTACTS | ADDITIONAL_VERIFICATION_REQUIRED | DOMAIN_NOT_ALLOWED | INVALID_PUBLIC_DOMAIN | DOMAIN_VALIDATION_DENIED | CAA_ERROR | PCA_LIMIT_EXCEEDED | PCA_INVALID_ARN | PCA_INVALID_STATE | PCA_REQUEST_FAILED | PCA_NAME_CONSTRAINTS_VALIDATION | PCA_RESOURCE_NOT_FOUND | PCA_INVALID_ARGS | PCA_INVALID_DURATION | PCA_ACCESS_DENIED | SLR_NOT_FOUND | OTHER
UpdatedAt
Optional
Indicates when the renewal summary was last updated.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"UpdatedAt": "2017-03-22T13:22:13.933Z"
```

**AwsCloudFrontDistribution**

The `AwsCloudFrontDistribution` object provides details about a distribution configuration.

It can have the following attributes.

**CacheBehaviors (p. 238)**

Optional
Provides information about the cache configuration for the distribution.

**Type:** Object

**DefaultCacheBehavior (p. 239)**

Optional
The default cache behavior for the configuration.

**Type:** Object

**DefaultRootObject**

Optional
The object that CloudFront sends in response to requests from the origin when a viewer requests the root URL for the distribution instead of an object in your distribution. For example, in response to a request from index.html, the viewer requests http://www.example.com instead of http://www.example.com/product-description.html.

**Type:** String

**DomainName**

Optional
The domain name that corresponds to the distribution.

**Type:** String

**Etag**

Optional
The entity tag is a hash of the object.

**Type:** String
LastModifiedTime

Optional

Indicates when the distribution was last modified.

Type: String

Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

Logging (p. 239)

Optional

A complex type that controls whether access logs are written for the distribution.

Type: Object

OriginGroups (p. 240)

Optional

Provides information about the origin groups in the distribution.

Type: Object

Origins (p. 240)

Optional

A complex type that contains information about origins and origin groups for this distribution.

Type: String

Status

Optional

Indicates the current status of the distribution.

Type: String

WebAclId

Optional

A unique identifier that specifies the AWS WAF web ACL, if any, to associate with this distribution.

Type: String

CacheBehaviors

The CacheBehaviors object provides information about caching for the distribution. The CacheBehaviors object contains an Items array of objects. The Items objects represent cache behaviors.

Each object in Items can have the following attributes.

ViewerProtocolPolicy

Optional

The protocol that viewers can use to access the files in an origin. You can specify the following options:
• allow-all – Viewers can use HTTP or HTTPS.
• redirect-to-https – CloudFront responds to HTTP requests with an HTTP status code of 301 (Moved Permanently) and the HTTPS URL. The viewer then uses the new URL to resubmit.
• https-only – CloudFront responds to HTTP request with an HTTP status code of 403 (Forbidden).

Type: String

Valid values: allow-all | https-only | redirect-to-https

DefaultCacheBehavior

The DefaultCacheBehavior object contains information about the default cache configuration for the distribution.

DefaultCacheBehavior can have the following attributes.

ViewerProtocolPolicy

Optional

The protocol that viewers can use to access the files in an origin. You can specify the following options:
• allow-all – Viewers can use HTTP or HTTPS.
• redirect-to-https – CloudFront responds to HTTP requests with an HTTP status code of 301 (Moved Permanently) and the HTTPS URL. The viewer then uses the new URL to resubmit.
• https-only – CloudFront responds to HTTP request with an HTTP status code of 403 (Forbidden).

Type: String

Valid values: allow-all | https-only | redirect-to-https

Logging

The Logging object provides information about the logging for the distribution.

It can have the following attributes.

Bucket

Optional

The S3 bucket to store the access logs in.

Type: String

Enabled

Optional

With this field, you can enable or disable the selected distribution.

Type: Boolean

IncludeCookies

Optional
Specifies whether you want CloudFront to include cookies in access logs.

**Type:** Boolean

**Prefix**

Optional

An optional string that you want CloudFront to prefix to the access log file names for this distribution.

**Type:** String

**OriginGroups**

The **OriginGroups** object contains information about the origin groups for the distribution.

The structure is as follows:

```
"OriginGroups": {  
  "Items": [  
    {  
      "FailoverCriteria": {  
        "StatusCodes": {  
          "Items": [ number ],  
          "Quantity": number  
        }  
      }  
    }  
  ],
},
```

**OriginGroups** contains an **Items** array of objects. Each object represents an origin group.

Each **Items** object contains a **FailoverCriteria** object. The **FailoverCriteria** object provides information about when an origin group fails over.

The **FailoverCriteria** object contains a **StatusCodes** object. **StatusCodes** indicates the status codes that cause the failover.

**Items**

Optional

The list of status code values that can cause a failover to the next origin.

**Type:** Array of numbers.

**Quantity**

Optional

The number of status codes that can cause a failover.

**Type:** Number

**Origins**

The **Origins** object contains information about origins and origin groups for this distribution. It can contain the following attributes.
Items

Optional

A complex type that contains origins or origin groups for this distribution.

Type: Array of objects

Each item can have the following attributes.

DomainName

Optional

Amazon S3 origins: The DNS name of the S3 bucket from which you want CloudFront to get objects for this origin.

Type: String

Id

Optional

A unique identifier for the origin or origin group.

Type: String

OriginPath

Optional

An optional element that causes CloudFront to request your content from a directory in your S3 bucket or your custom origin.

Type: String

S3OriginConfig

Optional

An origin that is an S3 bucket that is not configured with static website hosting.

Type: Object

S3OriginConfig can have the following attributes.

OriginAccessIdentity

Optional

The CloudFront origin access identity to associate with the origin.

Type: String

AwsCloudTrailTrail

The AwsCloudTrailTrail object provides details about a CloudTrail trail.

Example

"AwsCloudTrailTrail": {
"CloudWatchLogsRoleArn": "arn:aws:iam::866482105055:role/CloudTrail_CloudWatchLogs",
"HasCustomEventSelectors": true,
"HomeRegion": "us-west-2",
"IncludeGlobalServiceEvents": true,
"IsMultiRegionTrail": true,
"IsOrganizationTrail": false,
"KmsKeyId": "kmsKeyId",
"LogFileValidationEnabled": true,
"Name": "regression-trail",
"S3BucketName": "cloudtrail-bucket",
"S3KeyPrefix": "s3KeyPrefix",
"SnsTopicName": "snsTopicName",
"TrailArn": "arn:aws:cloudtrail:us-west-2:123456789012:trail"
}

**AwsCloudTrailTrail** can have the following attributes.

**CloudWatchLogsLogGroupArn**

Optional

The ARN of the log group that CloudTrail logs are delivered to.

**Type:** String

**CloudWatchLogsRoleArn**

Optional

The ARN of the role that the CloudWatch Logs endpoint assumes when it writes to the log group.

**Type:** String

**HasCustomEventSelectors**

Optional

Indicates whether the trail has custom event selectors.

**Type:** Boolean

**HomeRegion**

Optional

The Region where the trail was created.

**Type:** String

**IncludeGlobalServiceEvents**

Optional

Indicates whether the trail publishes events from global services such as IAM to the log files.

**Type:** Boolean

**IsMultiRegionTrail**

Optional

Indicates whether the trail applies only to the current Region or to all Regions.
Type: Boolean

**IsOrganizationTrail**

Optional

Whether the trail is created for all accounts in an organization in AWS Organizations, or only for the current AWS account.

Type: Boolean

**KmsKeyId**

Optional

The AWS KMS key ID to use to encrypt the logs.

Type: String

**LogFileValidationEnabled**

Optional

Indicates whether CloudTrail log file validation is enabled.

Type: Boolean

**Name**

Optional

The name of the trail.

Type: String

**S3BucketName**

Optional

The name of the S3 bucket where the log files are published.

Type: String

Minimum length: 3

Maximum length: 63

**S3KeyPrefix**

Optional

The S3 key prefix. The key prefix is added after the name of the S3 bucket where the log files are published.

Type: String

Maximum length: 200

**SnsTopicArn**

Optional

The ARN of the SNS topic that is used for notifications of log file delivery.

Type: String
### SnsTopicName

Optional

The name of the SNS topic that is used for notifications of log file delivery.

**Type:** String

**Maximum length:** 255

### TrailArn

Optional

The ARN of the trail.

**Type:** String

### AwsCodeBuildProject

The `AwsCodeBuildProject` object provides information about an AWS CodeBuild project.

**Example**

```json
"AwsCodeBuildProject": {
  "EncryptionKey": "my-symm-key",
  "Environment": {
    "Type": "LINUX_CONTAINER",
    "Certificate": "myX509",
    "ImagePullCredentialsType": "CODEBUILD",
    "RegistryCredential": {
      "Credential": "my_dockerhub_secret",
      "CredentialProvider": "SECRETS_MANAGER"
    }
  },
  "Name": "my-cd-project",
  "Source": {
    "Type": "CODECOMMIT",
    "Location": "https://git-codecommit.us-east-2.amazonaws.com/v1/repos/MyDemoRepo",
    "GitCloneDepth": 1
  },
  "ServiceRole": "arn:aws:iam:myrole",
  "VpcConfig": {
    "VpcId": "vpc-1234456",
    "Subnets": ["sub-12344566"],
    "SecurityGroupIds": ["sg-123456789012"]
  }
}
```

The `AwsCodeBuildProject` object can have the following attributes.

#### EncryptionKey

Optional

The AWS KMS key to be used for encrypting the build output artifacts.

**Note**

You can use a cross-account KMS key to encrypt the build output artifacts if your service role has permission to that key.

You can specify either the ARN of the KMS key or, if available, the KMS key alias (using the format `alias/alias-name`).

---

244
Type: String
Minimum length: 1

**Environment (p. 245)**

Optional

Information about the build environment for this build project.

**Type:** Object

**Name**

Optional

The name of the build project.

**Type:** String

**Minimum length:** 2

**Maximum length:** 255

**Pattern:** [A-Za-z0-9][A-Za-z0-9\-_]{1,254}

**ServiceRole**

Optional

The ARN of the IAM role that enables CodeBuild to interact with dependent AWS services on behalf of the AWS account.

**Type:** String

**Minimum length:** 1

**Source (p. 247)**

Optional

Information about the build input source code for this build project.

**Type:** Object

**VpcConfig (p. 248)**

Optional

Information about the VPC configuration that CodeBuild accesses.

**Type:** Object

**Environment**

The Environment object provides information about the build environment for the build project.

It can have the following attributes.

**Certificate**

Optional

The certificate to use with this build project.
Type: String

ImagePullCredentialsType

Optional

The type of credentials CodeBuild uses to pull images in your build. There are two valid values:

- **CODEBUILD** specifies that CodeBuild uses its own credentials. This requires that you modify your ECR repository policy to trust the CodeBuild service principal.
- **SERVICE_ROLE** specifies that CodeBuild uses your build project's service role.

When you use a cross-account or private registry image, you must use **SERVICE_ROLE** credentials. When you use a CodeBuild curated image, you must use **CODEBUILD** credentials.

Type: String

**Valid values:** CODEBUILD | SERVICE_ROLE

RegistryCredential

Optional

The credentials for access to a private registry.

Type: Object

Type

Required

The type of build environment to use for related builds.

Type: String

**Valid values:** WINDOWS_CONTAINER | LINUX_CONTAINER | LINUX_GPU_CONTAINER | ARM_CONTAINER

Each registry credential in the RegistryCredentials object has the following attributes.

Credential

Required

The ARN or name of credentials created using AWS Secrets Manager.

**Note**

The credential can use the name of the credentials only if they exist in your current AWS Region.

Type: String

**Minimum length:** 1

CredentialProvider

Required

The service that created the credentials to access a private Docker registry. The valid value, SECRETS_MANAGER, is for Secrets Manager.
Valid values: SECRETS_MANAGER

Source

The Source object provides information about the build input source code for this build project.

It can have the following attributes.

GitCloneDepth

Optional

Information about the Git clone depth for the build project.

Type: Integer

Minimum value: 0

Location

Optional

Information about the location of the source code to be built.

Type: String

Valid values:

- For source code settings that are specified in the source action of a pipeline in AWS CodePipeline, location should not be specified. If it is specified, CodePipeline ignores it. This is because CodePipeline uses the settings in a pipeline's source action instead of this value.
- For source code in an AWS CodeCommit repository, the HTTPS clone URL to the repository that contains the source code and the build spec file (for example, https://git-codecommit.region-ID.amazonaws.com/v1/repos/repo-name).
- For source code in an S3 input bucket, one of the following.
  - The path to the .zip file that contains the source code (for example, bucket-name/path/to/object-name.zip).
  - The path to the folder that contains the source code (for example, bucket-name/path/to/source-code/folder/).
  - For source code in a GitHub repository, the HTTPS clone URL to the repository that contains the source and the build spec file.
  - For source code in a Bitbucket repository, the HTTPS clone URL to the repository that contains the source and the build spec file.

Type

Required

The type of repository that contains the source code to be built.

Type: String

Valid values:

- BITBUCKET - The source code is in a Bitbucket repository.
- CODECOMMIT - The source code is in a CodeCommit repository.
- CODEPIPELINE - The source code settings are specified in the source action of a pipeline in CodePipeline.
GITHUB - The source code is in a GitHub repository.
GITHUB_ENTERPRISE - The source code is in a GitHub Enterprise repository.
NO_SOURCE - The project does not have input source code.
S3 - The source code is in an Amazon S3 input bucket.

VpcConfig

The VpcConfig object provides information about the VPC configuration that CodeBuild accesses. It can have the following attributes.

SecurityGroupIds

Optional

A list of one or more security group IDs in your Amazon VPC.

Type: Array of strings

Array members: Maximum number of 5 items

Minimum length per item: 1

Subnets

Optional

A list of one or more subnet IDs in your Amazon VPC.

Type: Array of strings

Maximum number of strings: 16

Minimum length per item: 1

VpcId

Optional

The ID of the VPC.

Type: String

Minimum length: 1

AwsDynamoDbTable

The AwsDynamoDbTable object provides details about a DynamoDB table.

Example

```
"AwsDynamoDbTable": {
   "AttributeDefinitions": [
   {
      "AttributeName": "attribute1",
      "AttributeType": "value 1"
   },
   {...
```
"AttributeName": "attribute2",
"AttributeType": "value 2"
},
{
"AttributeName": "attribute3",
"AttributeType": "value 3"
}
],
"BillingModeSummary": {
"BillingMode": "PAY_PER_REQUEST",
"LastUpdateTimeToPayPerRequestDateTime": "2019-12-03T15:23:10.323Z"
},
"CreationDateTime": "2019-12-03T15:23:10.248Z",
"GlobalSecondaryIndexes": [
{
"Backfilling": false,
"IndexArn": "arn:aws:dynamodb:us-west-2:111122223333:table/exampleTable/index/exampleIndex",
"IndexName": "standardsControlArnIndex",
"IndexSizeBytes": 1862513,
"IndexStatus": "ACTIVE",
"ItemCount": 20,
"KeySchema": [
{
"AttributeName": "City",
"KeyType": "HASH"
},
{
"AttributeName": "Date",
"KeyType": "RANGE"
}
],
"Projection": {
"NonKeyAttributes": ["predictorName"],
"ProjectionType": "ALL"
},
"ProvisionedThroughput": {
"LastIncreaseDateTime": "2019-03-14T13:21:00.399Z",
"LastDecreaseDateTime": "2019-03-14T12:47:35.193Z",
"NumberOfDecreasesToday": 0,
"ReadCapacityUnits": 100,
"WriteCapacityUnits": 50
}
},
"GlobalTableVersion": "V1",
"ItemCount": 2705,
"KeySchema": [
{
"AttributeName": "zipcode",
"KeyType": "HASH"
}
],
"LocalSecondaryIndexes": [
{
"IndexArn": "arn:aws:dynamodb:us-east-1:111122223333:table/exampleGroup/index/exampleId",
"IndexName": "CITY_DATE_INDEX_NAME",
"KeySchema": [
{
"AttributeName": "zipcode",
"KeyType": "HASH"
}]}
It can have the following attributes.

**AttributeDefinitions (p. 253)**

Optional

A list of attribute definitions for the table.

**Type:** Array of objects
**BillingModeSummary (p. 253)**

Optional

Information about the billing for read/write capacity on the table.

*Type:* Object

**CreationDateTime**

Optional

Indicates when the table was created.

*Type:* String

*Format:* Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"CreationDateTime": "2020-06-22T17:40:12.322Z"
```

**GlobalSecondaryIndexes (p. 254)**

Optional

List of global secondary indexes for the table.

*Type:* Array of objects

**GlobalTableVersion**

Optional

The version of global tables being used.

*Type:* String

**ItemCount**

Optional

The number of items in the table.

*Type:* Number

**KeySchema (p. 255)**

Optional

The primary key structure for the table.

*Type:* Array of objects

**LatestStreamArn**

Optional

The ARN of the latest stream for the table.

*Type:* String

**LatestStreamLabel**

Optional
The label of the latest stream. The label is not a unique identifier.

**Type:** String

**LocalSecondaryIndexes (p. 255)**

Optional

The list of local secondary indexes for the table.

**Type:** Array of objects

**ProvisionedThroughput (p. 257)**

Optional

Information about the provisioned throughput for the table.

**Type:** Object

**Replicas (p. 258)**

Optional

The list of replicas of this table.

**Type:** Array of objects

**RestoreSummary (p. 259)**

Optional

Information about the restore for the table.

**Type:** Object

**SseDescription (p. 260)**

Optional

Information about the server-side encryption for the table.

**Type:** Object

**StreamSpecification (p. 260)**

Optional

The current DynamoDB Streams configuration for the table.

**Type:** Object

**TableId**

Optional

The identifier of the table.

**Type:** String

**TableName**

Optional

The name of the table.

**Type:** String
Minimum length: 3

Maximum length: 255

**TableSizeBytes**

Optional

The total size of the table in bytes.

**Type:** Integer

**TableStatus**

Optional

The current status of the table.

**Type:** String

**Valid values:** CREATING | UPDATING | DELETING | ACTIVE | INACCESSIBLE_ENCRYPTION_CREDENTIALS | ARCHIVING | ARCHIVED

**AttributeDefinitions**

The **AttributeDefinitions** object contains a list of attribute definitions for the table.

It can have the following attributes.

**AttributeName**

Optional

The name of the attribute.

**Type:** String

**AttributeType**

Optional

The type of the attribute.

**Type:** String

**BillingModeSummary**

The **BillingModeSummary** object provides information about the billing for read/write capacity on the table.

It can have the following attributes.

**BillingMode**

Optional

The method used to charge for read and write throughput and to manage capacity.

**Type:** String

**Valid values:** PROVISIONED | PAY_PER_REQUEST
**LastUpdateToPayPerRequestDateTime**

Optional

If the billing mode is `PAY_PER_REQUEST`, indicates when the billing mode was set to that value.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"LastUpdateToPayPerRequestDateTime": "2020-06-22T17:40:12.322Z"
```

**GlobalSecondaryIndexes**

The `GlobalSecondaryIndexes` object contains a list of global secondary indexes for the table. It can have the following attributes.

**Backfilling**

Optional

Whether the index is currently backfilling.

**Type:** Boolean

**IndexArn**

Optional

The ARN of the index.

**Type:** String

**IndexName**

Optional

The name of the index.

**Type:** String

**IndexSizeBytes**

Optional

The total size in bytes of the index.

**Type:** Number

**IndexStatus**

Optional

The current status of the index.

**Type:** String

**Valid values:** CREATING | UPDATING | DELETING | ACTIVE
**ItemCount**
Optional
The number of items in the index.
**Type:** Number

**KeySchema (p. 255)**
Optional
The key schema for the index.
**Type:** Array of objects

**Projection (p. 256)**
Optional
Attributes that are copied from the table into an index.
**Type:** Object

**ProvisionedThroughput (p. 257)**
Optional
Information about the provisioned throughput settings for the indexes.
**Type:** Object

**KeySchema**
The `KeySchema` object contains the key schema for the table, a global secondary index, or a local secondary index.

Each component of the key schema can have the following attributes.

**AttributeName**
Optional
The name of the attribute.
**Type:** String

**KeyType**
Optional
The type of key used for the attribute.
**Type:** String

**Valid values:** HASH | RANGE

**LocalSecondaryIndexes**

`LocalSecondaryIndexes` can have the following attributes.

**IndexArn**
Optional
The ARN of the index.

**Type:** String

**IndexName**

Optional

The name of the index.

**Type:** String

**Minimum length:** 3

**Maximum length:** 255

**KeySchema (p. 255)**

Optional

The complete key schema for the index.

**Type:** Array of objects

**Projection (p. 256)**

Optional

Attributes that are copied from the table into the index. These are in addition to the primary key attributes and index key attributes, which are automatically projected.

**Type:** Object

**Projection (for global and local secondary indexes)**

For global and local secondary indexes, the **Projection** object identifies the attributes that are copied from the table into the index.

It can have the following attributes.

**NonKeyAttributes**

Optional

The nonkey attributes that are projected into the index. For each attribute, provide the attribute name.

**Type:** Array of strings

**Maximum number of items:** 20

**Minimum length per attribute:** 1

**Maximum length per attribute:** 225

**ProjectionType**

Optional

The types of attributes that are projected into the index.

**Type:** String

**Valid values:** `ALL | KEYS_ONLY | INCLUDE`
**ProvisionedThroughput**

The *ProvisionedThroughput* object contains information about the provisioned throughput for the table or for a global secondary index.

It can have the following attributes.

**LastDecreaseDateTime**

Optional

Indicates when the provisioned throughput was last decreased.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"LastDecreaseDateTime": "2020-06-22T17:40:12.322Z"
```

**LastIncreaseDateTime**

Optional

Indicates when the provisioned throughput was last increased.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"LastIncreaseDateTime": "2020-06-22T17:40:12.322Z"
```

**NumberOfDecreasesToday**

Optional

The number of times during the current UTC calendar day that the provisioned throughput was decreased.

**Type:** Number

**ReadCapacityUnits**

Optional

The maximum number of strongly consistent reads consumed per second before DynamoDB returns a ThrottlingException.

**Type:** Number

**WriteCapacityUnits**

Optional

The maximum number of writes consumed per second before DynamoDB returns a ThrottlingException.
**Type:** Number

**Replicas**

The `Replicas` object contains the list of replicas of this table. Each replica can have the following attributes.

**GlobalSecondaryIndexes**

Optional

List of global secondary indexes for the replica.

**Type:** Array of objects

**GlobalSecondaryIndexes.IndexName**

Optional

The name of the index.

**Type:** String

**GlobalSecondaryIndexes.ProvisionedThroughputOverride**

Optional

Replica-specific configuration for the provisioned throughput for the index.

**Type:** Object

**KmsMasterKeyID**

Optional

The identifier of the AWS KMS key that will be used for AWS KMS encryption for the replica.

**Type:** String

**ProvisionedThroughputOverride**

Optional

Replica-specific configuration for the provisioned throughput.

**Type:** Object

**RegionName**

Optional

The name of the Region where the replica is located.

**Type:** String

**ReplicaStatus**

Optional

The current status of the replica.

**Type:** String

**Valid values:** CREATING | CREATION_FAILED | UPDATING | DELETING | ACTIVE
**ReplicaStatusDescription**

Optional

Detailed information about the replica status.

**Type:** String

The `ProvisionedThroughputOverride` object provides replica-specific configuration for the provisioned throughput for the table or the global secondary indexes.

It can have the following attributes.

**ReadCapacityUnits**

Optional

The read capacity units for the replica.

**Type:** Number

**Minimum value:** 1

**RestoreSummary**

The `RestoreSummary` object provides information about the restore for the table.

It can have the following attributes.

**RestoreDateTime**

Optional

Indicates the point in time that the table was restored to.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

"RestoreDateTime": "2020-06-22T17:40:12.322Z"

**InProgress**

Optional

Whether a restore is currently in progress.

**Type:** Boolean

**SourceBackupArn**

Optional

The ARN of the source backup from which the table was restored.

**Type:** String
SourceTableArn
Optional
The ARN of the source table for the backup.

Type: String

SseDescription
The SseDescription object provides information about the server-side encryption for the table.

It can have the following attributes.

InaccessibleEncryptionDateTime
Optional
If the key is inaccessible, the date and time when DynamoDB detected that the key was inaccessible.

Type: String

Format: Uses the date–time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

Example

"InaccessibleEncryptionDateTime": "2020-06-22T17:40:12.322Z"

KmsMasterKeyArn
Optional
The ARN of the KMS key that is used for the AWS KMS encryption.

Type: String

SseType
Optional
The type of server-side encryption.

Type: String

Valid values: KMS

Status
Optional
The status of the server-side encryption.

Type: String

Valid values: ENABLED | UPDATING

StreamSpecification
The StreamSpecification object contains the current DynamoDB Streams configuration for the table.
It can have the following attributes.

**StreamEnabled**

Optional

Indicates whether DynamoDB Streams is enabled on the table.

**Type:** Boolean

**StreamViewType**

Optional

Determines the information that is written to the table.

**Type:** String

**Valid values:** NEW_IMAGE | OLD_IMAGE | NEW_AND_OLD_IMAGES | KEYS_ONLY

**AwsEc2Eip**

The `AwsEc2Eip` object provides information about an Elastic IP address.

**Example**

```
"AwsEc2Eip": {
   "InstanceId": "instance1",
   "PublicIp": "192.0.2.04",
   "AllocationId": "eipalloc-example-id-1",
   "AssociationId": "eipassoc-example-id-1",
   "Domain": "vpc",
   "PublicIpv4Pool": "anycompany",
   "NetworkBorderGroup": "eu-central-1",
   "NetworkInterfaceId": "eni-example-id-1",
   "NetworkInterfaceOwnerId": "777788889999",
   "PrivateIpAddress": "192.0.2.03"
}
```

The `AwsEc2Eip` object can have the following attributes.

**AllocationId**

Optional

The identifier that AWS assigns to represent the allocation of the Elastic IP address for use with Amazon VPC.

**Type:** String

**AssociationId**

Optional

The identifier that represents the association of the Elastic IP address with an EC2 instance.

**Type:** String

**Domain**

Optional
The domain in which to allocate the address.

If the address is for use with EC2 instances in a VPC, then Domain is vpc. Otherwise, Domain is standard.

**Type:** String

**Valid values:** standard | vpc

**InstanceId**

Optional

The identifier of the EC2 instance.

**Type:** String

**NetworkBorderGroup**

Optional

The name of the location from which the Elastic IP address is advertised.

**Type:** String

**NetworkInterfaceId**

Optional

The identifier of the network interface.

**Type:** String

**NetworkInterfaceOwnerId**

Optional

The AWS account ID of the owner of the network interface.

**Type:** String

**Format:** Must be a 12-digit number.

**PrivateIpAddress**

Optional

The private IP address that is associated with the Elastic IP address.

**Type:** IPv4

**PublicIp**

Optional

A public IP address that is associated with the EC2 instance.

**Type:** IPv4

**PublicIpv4Pool**

Optional

The identifier of an IP address pool. This parameter allows Amazon EC2 to select an IP address from the address pool.
Type: String

**AwsEc2Instance**

The details of an Amazon EC2 instance.

Type: Object

The `AwsEc2Instance` object can have the following attributes.

**IamInstanceProfileArn**

Optional

The IAM profile ARN of the instance.

Type: String

Format: Conforms to the AWS ARN format

**ImageId**

Optional

The Amazon Machine Image (AMI) ID of the instance.

Type: String

Maximum length: 64

**IpV4Addresses**

Optional

The IPv4 addresses that are associated with the instance.

Type: Array of up to 10 IPv4 addresses

**IpV6Addresses**

Optional

The IPv6 addresses that are associated with the instance.

Type: Array of up to 10 IPv6 addresses

**KeyName**

Optional

The key name that is associated with the instance.

Type: String

Maximum length: 128

**LaunchedAt**

Optional

Indicates when the instance was launched.

Type: String
**Format:** Uses the date-time format specified in [RFC 3339 section 5.6, Internet Date/Time Format](https://tools.ietf.org/html/rfc3339). The value cannot contain spaces.

**NetworkInterfaces (p. 264)**

Optional

The identifiers of the network interfaces for the EC2 instance. The details for each network interface are in a corresponding *AwsEc2NetworkInterface* (p. 268) object.

**Type:** Array of objects.

**SubnetId**

Optional

The identifier of the subnet where the instance was launched.

**Type:** String

**Maximum length:** 32

**Type**

Optional

The instance type of the instance. This must be a valid *EC2 instance type*.

**Type:** String

**Maximum length:** 16

**VpcId**

Optional

The identifier of the VPC where the instance was launched.

**Type:** String

**Maximum length:** 32

**NetworkInterfaces**

The *NetworkInterfaces* object identifies the network interfaces for the EC2 instance. The details for each network interface are in a corresponding *AwsEc2NetworkInterface* (p. 268) object.

Each network interface can have the following attributes.

**NetworkInterfaceId**

Optional

The identifier of the network interface.

**Type:** String

**AwsEc2NetworkAcl**

The *AwsEc2NetworkAcl* object contains details about an Amazon EC2 network access control list (ACL).

**Example**
AWSEc2NetworkAcl: {
    "IsDefault": false,
    "NetworkAclId": "acl-1234567890abcdef0",
    "OwnerId": "123456789012",
    "VpcId": "vpc-1234abcd",
    "Associations": [{
        "NetworkAclAssociationId": "aclassoc-abcd1234",
        "NetworkAclId": "acl-021345abcdef6789",
        "SubnetId": "subnet-abcd1234"
    }],
    "Entries": [{
        "CidrBlock": "10.24.34.0/23",
        "Egress": true,
        "IcmpTypeCode": {
            "Code": 10,
            "Type": 30
        },
        "Ipv6CidrBlock": "2001:DB8::/32",
        "PortRange": {
            "From": 20,
            "To": 40
        },
        "Protocol": "tcp",
        "RuleAction": "allow",
        "RuleNumber": 100
    }]
}

AWSEc2NetworkAcl can have the following attributes.

**Associations (p. 266)**

Optional

Associations between the network ACL and subnets.

**Type:** Array of objects

**Entries (p. 266)**

Optional

The set of rules in the network ACL.

**Type:** Array of objects

**IsDefault**

Optional

Whether this is the default network ACL for the VPC.

**Type:** Boolean

**NetworkAclId**

Optional

The identifier of the network ACL.

**Type:** String

**OwnerId**

Optional
The identifier of the AWS account that owns the network ACL.

**Type:** String

**VpcId**

Optional

The identifier of the VPC for the network ACL.

**Type:** String

**Associations**

The **Associations** object contains the associations between the network ACL and subnets. Each association can have the following attributes.

**NetworkAclAssociationId**

Optional

The identifier of the association between the network ACL and the subnet.

**Type:** String

**NetworkAclId**

Optional

The identifier of the network ACL.

**Type:** String

**SubnetId**

Optional

The identifier of the subnet that is associated with the network ACL.

**Type:** String

**Entries**

The **Entries** object contains the rules for the network ACL. Each rule allows or denies access based on the IP address, traffic direction, port, and protocol. Each rule can have the following attributes.

**CidrBlock**

Optional

The IPV4 network range for which to deny or allow access.

**Type:** String

**Format:** Uses CIDR notation

**Egress**

Optional
Whether the rule is an egress rule. An egress rule is a rule that applies to traffic that leaves the subnet.

**Type:** Boolean

**IcmpTypeCode**

Optional

The Internet Control Message Protocol (ICMP) type and code for which to deny or allow access.

**Type:** Object

**IcmpTypeCode.Code**

Optional

The ICMP code for which to deny or allow access.

To deny or allow all codes, use the value `-1`.

**Type:** Number

**IcmpTypeCode.Type**

Optional

The ICMP type for which to deny or allow access.

To deny or allow all types, use the value `-1`.

**Type:** Number

**Ipv6CidrBlock**

The IPv6 network range for which to deny or allow access.

**Type:** String

**Format:** Uses CIDR notation

**PortRange**

Optional

For TCP or UDP protocols, the range of ports that the rule applies to.

**Type:** Object

**PortRange.From**

Optional

The first port in the port range.

**Type:** Number

**PortRange.To**

Optional

The last port in the port range.

**Type:** Number

**Protocol**

Optional
The protocol that the rule applies to.

To deny or allow access to all protocols, use the value -1.

**Type:** String

**RuleAction**

Optional

Whether the rule is used to allow access or deny access.

**Type:** String

**Valid values:** allow | deny

**RuleNumber**

Optional

The rule number. The rules are processed in order by their number.

**Type:** Number

**AwsEc2NetworkInterface**

The **AwsEc2NetworkInterface** object provides information about an Amazon EC2 network interface.

**Example**

```
"AwsEc2NetworkInterface": {
  "Attachment": {
    "AttachTime": "2019-01-01T03:03:21Z",
    "AttachmentId": "eni-attach-43348162",
    "DeleteOnTermination": true,
    "DeviceIndex": 123,
    "InstanceId": "i-1234567890abcdef0",
    "InstanceOwnerId": "123456789012",
    "Status": 'ATTACHED'
  },
  "SecurityGroups": [
    {
      "GroupName": "my-security-group",
      "GroupId": "sg-903004f8"
    },
  ],
  "NetworkInterfaceId": 'eni-686ea200,'
  "SourceDestCheck": false
}
```

The **AwsEc2NetworkInterface** object can have the following attributes.

**Attachment** *(p. 269)*

Optional

Information about the network interface attachment.

**Type:** Object

**Ipv6Addresses** *(p. 270)*

Optional
The IPv6 addresses that are associated with the network interface.

**Type:** Array of objects

**NetworkInterfaceId**

Optional

The ID of the network interface.

**Type:** String

**PrivateIpAddresses (p. 271)**

Optional

The private IPv4 addresses that are associated with the network interface.

**Type:** Array of objects

**PublicDnsName**

Optional

The public DNS name of the network interface.

**Type:** String

**PublicIp**

Optional

The address of the Elastic IP address bound to the network interface.

**Type:** String

**SecurityGroups (p. 271)**

Optional

Security groups for the network interface.

**Type:** Array of group objects

**SourceDestCheck**

Optional

Indicates whether traffic to or from the instance is validated.

**Type:** Boolean

**Attachment**

The Attachment object provides information about the network interface attachment. It can have the following attributes.

**AttachmentId**

Optional

The identifier of the network interface attachment

**Type:** String
AttachTime
Optional
Indicates when the attachment initiated.
Type: String
Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

DeleteOnTermination
Optional
Indicates whether the network interface is deleted when the instance is terminated.
Type: Boolean

DeviceIndex
Optional
The device index of the network interface attachment on the instance.
Type: Integer

InstanceId
Optional
The ID of the instance.
Type: String

InstanceOwnerId
Optional
The AWS account ID of the owner of the instance.
Type: String

Status
Optional
The attachment state.
Type: String
Valid values: attaching | attached | detaching | detached

Iv6Addresses
Iv6Addresses lists the IPV6 addresses that are associated with the network interface. Each IPV6 address can have the following attributes.

Iv6Address
Optional
The IPV6 address.
Type: String
PrivateIpAddresses

PrivateIpAddresses contains the list of private IPv4 addresses that are associated with the network interface.

Each private IPv4 address can have the following attributes.

PrivateDnsName

Optional

The private DNS name for the IP address.

Type: String

PrivateIpAddress

Optional

The IP address.

Type: String

SecurityGroups

The SecurityGroups object contains the list of security groups for the network interface.

Each security group can have the following attributes.

GroupId

Optional

The ID of the security group.

Type: String

GroupName

Optional

The name of the security group.

Type: String

AwsEc2SecurityGroup

The AwsEc2SecurityGroup object describes an Amazon EC2 security group.

Example

```
"AwsEc2SecurityGroup": {
  "GroupName": "MySecurityGroup",
  "GroupId": "sg-903004f8",
  "OwnerId": "123456789012",
  "VpcId": "vpc-1a2b3c4d",
  "IpPermissions": [
    {
      "IpProtocol": "-1",
      "IpRanges": [],
      "UserIdGroupPairs": []
    }
  ]
}
The `AwsEc2SecurityGroup` object can have the following attributes.

**GroupId**

Optional

The ID of the security group.

**Type:** String

**GroupName**

Optional

The name of the security group.

**Type:** String

**IpPermissions (p. 273)**

Optional

The inbound rules that are associated with the security group.

**Type:** Array of IP permission objects

**IpPermissionsEgress (p. 273)**

Optional

[VPC only] The outbound rules that are associated with the security group.

**Type:** Array of IP permission objects

**OwnerId**

Optional

The AWS account ID of the owner of the security group.

**Type:** String
VpcId

Optional

[VPC only] The ID of the VPC for the security group.

Type: String

IP permission object

The IpPermissions and IpPermissionsEgress objects both contain an array of IP permission objects.

Each IP permission object can have the following attributes.

**FromPort**

Optional

The start of the port range for the TCP and UDP protocols or an ICMP/ICMPv6 type number.

A value of $-1$ indicates all ICMP/ICMPv6 types. If you specify all ICMP/ICMPv6 types, you must specify all codes.

Type: Integer

**IpProtocol**

Optional

The IP protocol name (tcp, udp, icmp, icmpv6) or number (see the protocol numbers list).

[VPC only] Use $-1$ to specify all protocols.

When authorizing security group rules, specifying $-1$ or a protocol number other than tcp, udp, icmp, or icmpv6 allows traffic on all ports, regardless of any port range you specify.

For tcp, udp, and icmp, you must specify a port range.

For icmpv6, the port range is optional. If you omit the port range, traffic for all types and codes is allowed.

Type: String

**IpRanges**

Optional

The ranges of IP addresses.

Type: Array of IP range objects

**Ipv6Ranges**

Optional

The ranges of IPv6 addresses.

Type: Array of IPv6 range objects

**PrefixListIds**

Optional
[VPC only] The prefix list IDs for an AWS service. With outbound rules, this is the AWS service to access through a VPC endpoint from instances that are associated with the security group.

**Type:** Array of prefix list ID objects

**ToPort**

Optional

The end of the port range for the TCP and UDP protocols, or an ICMP/ICMPv6 code.

A value of -1 indicates all ICMP/ICMPv6 codes. If you specify all ICMP/ICMPv6 types, you must specify all codes.

**Type:** Integer

**UserIdGroupPairs**

Optional

The security group and AWS account ID pairs.

**Type:** Array of user ID group pair objects

Each entry in the IpRanges array can have the following attributes.

**CidrIp**

Optional

A range of IP addresses.

You can either specify a CIDR range or a source security group, but not both.

To specify a single IPv4 address, use the /32 prefix length.

To specify a single IPv6 address, use the /128 prefix length.

**Type:** String

Each entry in the Ipv6Ranges array can have the following attributes.

**CidrIpv6**

Optional

The IPv6 CIDR range.

You can specify either a CIDR range or a source security group, but not both.

To specify a single IPv6 address, use the /128 prefix length.

Each entry in the PrefixListIds array can have the following attributes.

**PrefixListId**

Optional

The ID of the prefix.

**Type:** String
Each entry in the `UserIdGroupPairs` array can have the following attributes.

**GroupId**
- **Optional**
  - The ID of the security group.
  - **Type:** String

**GroupName**
- **Optional**
  - The name of the security group.
  - **Type:** String

**PeeringStatus**
- **Optional**
  - The status of a VPC peering connection, if applicable.
  - **Type:** String

**UserId**
- **Optional**
  - The ID of an AWS account.
  - For a referenced security group in another VPC, the account ID of the referenced security group is returned in the response. If the referenced security group is deleted, this value is not returned.
  - [Amazon EC2-Classic] Required when adding or removing rules that reference a security group in another AWS account.
  - **Type:** String

**VpcId**
- The identifier of the VPC for the referenced security group, if applicable.
  - **Type:** String

**VpcPeeringConnectionId**
- The identifier of the VPC peering connection, if applicable.
  - **Type:** String

---

**AwsEc2Subnet**

The `AwsEc2Subnet` object provides information about a subnet in Amazon EC2.

**Example**

```json
AwsEc2Subnet: {
    "AssignIpv6AddressOnCreation": false,
    "AvailabilityZone": "us-west-2c",
    "AvailabilityZoneId": "usw2-az3",
    "AvailableIpAddressCount": 8185,
    "CidrBlock": "10.0.0.0/24",
    ...
```
"DefaultForAz": false,
"MapPublicIpOnLaunch": false,
"OwnerId": "123456789012",
"State": "available",
"SubnetId": "subnet-d5436c93",
"VpcId": "vpc-153ade70",
"Ipv6CidrBlockAssociationSet": [{
  "AssociationId": "subnet-cidr-assoc-EXAMPLE",
  "Ipv6CidrBlock": "2001:DB8::/32",
  "CidrBlockState": "associated"
}]
}

AWS EC2 Subnet can have the following attributes.

AssignIpv6AddressOnCreation

Optional

Whether to assign an IPV6 address to a network interface that is created in this subnet.

Type: Boolean

AvailabilityZone

Optional

The Availability Zone for the subnet.

Type: String

AvailabilityZoneId

Optional

The identifier of the Availability Zone for the subnet.

Type: String

AvailableIpAddressCount

Optional

The number of available IPV4 addresses in the subnet. Does not include addresses for stopped instances.

Type: Number

CidrBlock

Optional

The IPV4 CIDR block that is assigned to the subnet.

Type: String

Format: Uses CIDR notation

DefaultForAz

Optional

Whether this subnet is the default subnet for the Availability Zone.

Type: Boolean
**Ipv6CidrBlockAssociationSet** (p. 277)

Optional

The IPv6 CIDR blocks associated with the subnet.

**Type:** Array of objects

**MapPublicIpOnLaunch**

Optional

Whether instances in this subnet receive a public IP address.

**Type:** Boolean

**OwnerId**

Optional

The identifier of the AWS account that owns the subnet.

**Type:** String

**State**

Optional

The current state of the subnet.

**Type:** String

**Valid values:** pending | available

**SubnetArn**

Optional

The ARN of the subnet.

**Type:** String

**SubnetId**

Optional

The identifier of the subnet.

**Type:** String

**VpcId**

Optional

The identifier of the VPC that contains the subnet.

**Type:** String

**Ipv6CidrBlockAssociationSet**

*Ipv6CidrBlockAssociationSet* contains information about the IPv6 CIDR blocks that are associated with the subnet.

Each CIDR block can have the following attributes.
AssociationId
  Optional
  The identifier of the association.
  **Type:** String

Ipv6CidrBlock
  Optional
  The IPV6 CIDR block.
  **Type:** String
  **Format:** Uses CIDR notation

CidrBlockState
  Optional
  The state of the IPV6 CIDR block.
  **Type:** String
  **Valid values:** associating | associated | disassociating | disassociated | failing | failed

**AwsEc2Volume**

The **AwsEc2Volume** object provides details about an EC2 volume.

**Example**

```json
"AwsEc2Volume": {
  "Attachments": [
    {
      "AttachTime": "2017-10-17T14:47:11Z",
      "DeleteOnTermination": true,
      "InstanceId": "i-123abc456def789g",
      "Status": "attached"
    }
  ],
  "CreateTime": "2020-02-24T15:54:30Z",
  "Encrypted": true,
  "KmsKeyId": "arn:aws:kms:us-east-1:111122223333:key/wJalrXUtznFEMI/K7MDENG/bPxFxriCyEXAMPLEKEY",
  "Size": 80,
  "SnapshotId": "",
  "Status": "available"
}
```

The **AwsEc2Volume** object can have the following attributes.

**Attachments (p. 279)**

  Optional

  The volume attachments.
  **Type:** Array of objects
CreateTime

Optional

Indicates when the volume was created.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

Encrypted

Optional

Whether the volume is encrypted.

**Type:** Boolean

KmsKeyId

Optional

The ARN of the AWS KMS key that was used to protect the volume encryption key for the volume.

**Type:** String

Size

Optional

The size of the volume, in GiBs.

**Type:** Integer

SnapshotId

Optional

The snapshot from which the volume was created.

**Type:** String

Status

Optional

The volume state.

**Type:** String

**Valid values:** creating | available | in-use | deleting | deleted | error

Attachments

The `Attachments` object contains the set of attachments for the EC2 volume. Each attachment can have the following attributes.

AttachTime

Optional

The date and time when the attachment initiated.
Type: String (timestamp)

Format: yyyy-MM-ddTHH:mm:ssZ

DeleteOnTermination

Optional

Whether the EBS volume is deleted when the EC2 instance is terminated.

Type: Boolean

InstanceId

Optional

The identifier of the EC2 instance.

Type: String

Status

Optional

The attachment state of the volume.

Type: String

Valid values: attaching | attached | detaching | detached | busy

AwsEc2Vpc

The AwsEc2Vpc object provides details about an EC2 virtual private cloud (VPC).

Example

```
"AwsEc2Vpc": {
  "CidrBlockAssociationSet": [
    { "AssociationId": "vpc-cidr-assoc-0dc4c852f52abda97", "CidrBlock": "192.0.2.0/24", "CidrBlockState": "associated"
    }
  ],
  "DhcpOptionsId": "dopt-4e42ce28",
  "Ipv6CidrBlockAssociationSet": [
    { "AssociationId": "vpc-cidr-assoc-0dc4c852f52abda97", "Ipv6CidrBlock": "192.0.2.0/24"
    }
  ],
  "State": "available"
}
```

The AwsEc2Vpc object can have the following attributes.

CidrBlockAssociationSet (p. 281)

Optional

Information about the IPv4 CIDR blocks that are associated with the VPC.
**Type:** Array of objects

**DhcpOptionsId**

Optional

The identifier of the set of Dynamic Host Configuration Protocol (DHCP) options that are associated with the VPC. If the default options are associated with the VPC, then this is default.

**Type:** String

**Maximum length:** 32

**IpV6CidrBlockAssociationSet (p. 282)**

Optional

Information about the IPv6 CIDR blocks that are associated with the VPC.

**Type:** Array of objects.

**State**

Optional

The current state of the VPC.

**Type:** String

**Maximum length:** 32

**Valid values:** pending | available

**CidrBlockAssociationSet**

The CidrBlockAssociationSet object provides a list of IPv4 CIDR block associations. Each CIDR block association can contain the following attributes.

**AssociationId**

Optional

The association ID for the IPv4 CIDR block.

**Type:** String

**Maximum length:** 32

**CidrBlock**

Optional

The IPv4 CIDR block.

**Type:** CIDR IPV4

**CidrBlockState**

Optional

Information about the state of the CIDR block.

**Type:** String
**Maximum length: 32**

**IpV6CidrBlockAssociationSet**

The `IpV6CidrBlockAssociationSet` object provides a list of IPv6 CIDR block associations. Each CIDR block association can contain the following attributes.

**AssociationId**

Optional

The association ID for the IPv6 CIDR block.

**Type:** String

**Maximum length: 32**

**CidrBlockState**

Optional

Information about the state of the CIDR block.

**Type:** String

**Maximum length: 32**

**IpV6CidrBlock**

Optional

The IPv6 CIDR block.

**Type:** CIDR IPV6

**AwsEc2VpnConnection**

The `AwsEc2VpnConnection` object provides details about an Amazon EC2 VPN connection.

**Example**

```
"AwsEc2VpnConnection": { 
   "VpnConnectionId": "vpn-205e4f41", 
   "State": "available", 
   "CustomerGatewayConfiguration": "", 
   "CustomerGatewayId": "cgw-5699703f", 
   "Type": "ipsec.1", 
   "VpnGatewayId": "vgw-2c6b2245", 
   "Category": "VPN" 
   "TransitGatewayId": "tgw-09b6f3a6592b5elf", 
   "VgwTelemetry": [ 
       { 
           "OutsideIpAddress": "92.0.2.11", 
           "Status": "DOWN", 
           "LastStatusChange": "2016-11-11T23:09:32.000Z", 
           "StatusMessage": "IPSEC IS DOWN", 
           "AcceptedRouteCount": 0 
       }, 
       { 
           "OutsideIpAddress": "92.0.2.12", 
           "Status": "DOWN", 
```
"LastStatusChange": "2016-11-11T23:10:51.000Z",
"StatusMessage": "IPSEC IS DOWN",
"AcceptedRouteCount": 0
}
],
"Routes": [{
  "DestinationCidrBlock": "10.24.34.0/24",
  "State": "available"
}]
},
"Options": {
  "StaticRoutesOnly": true
  "TunnelOptions": [{
    "DpdTimeoutSeconds": 30,
    "IkeVersions": ["ikev1", "ikev2"],
    "Phase1DhGroupNumbers": [14, 15, 16, 17, 18],
    "Phase1EncryptionAlgorithms": ["AES128", "AES256"],
    "Phase1IntegrityAlgorithms": ["SHA1", "SHA2-256"],
    "Phase1LifetimeSeconds": 28800,
    "Phase2DhGroupNumbers": [14, 15, 16, 17, 18],
    "Phase2EncryptionAlgorithms": ["AES128", "AES256"],
    "Phase2IntegrityAlgorithms": ["SHA1", "SHA2-256"],
    "Phase2LifetimeSeconds": 28800,
    "PreSharedKey": "RltXC3REhTw1RAdiM2s1uMfkkSDLyGJoelQEWeGxqKQ=",
    "RekeyFuzzPercentage": 100,
    "RekeyMarginTimeSeconds": 540,
    "ReplayWindowSize": 1024,
    "TunnelInsideCidr": "10.24.34.0/23"
  }
}]

AWS Ec2VpnConnection can have the following attributes.

**Category**

Optional

The category of the VPN connection. VPN indicates an AWS VPN connection. VPN-Classic indicates an AWS Classic VPN connection.

**Type:** String

**Valid values:** VPN | VPN-Classic

**CustomerGatewayConfiguration**

Optional

The configuration information for the VPN connection's customer gateway, in the native XML format.

**Type:** String

**Minimum length:** 1

**Maximum length:** 131072

**CustomerGatewayId**

Optional

The identifier of the customer gateway that is at your end of the VPN connection.

**Type:** String
Options (p. 285)

Optional

The VPN connection options.

Type: Object

Routes (p. 287)

Optional

The static routes that are associated with the VPN connection.

Type: Array of objects

State

Optional

The current state of the VPN connection.

Type: String

Valid values: pending | available | deleting | deleted

TransitGatewayId

Optional

The identifier of the transit gateway that is associated with the VPN connection.

Type: String

Type

Optional

The type of VPN connection.

Type: String

Valid values: ipsec.1

VgwTelemetry (p. 287)

Optional

Information about the VPN tunnel.

Type: Array of objects

VpnConnectionId

Optional

The identifier of the VPN connection.

Type: string

VpnGatewayId

Optional

The identifier of the virtual private gateway that is at the AWS side of the VPN connection.
**Type:** String

**Options**

The **Options** object provides the VPN connection options. Options can have the following attributes.

**StaticRoutesOnly**

Optional

Whether the VPN connection uses static routes only.

**Type:** Boolean

**TunnelOptions**

Optional

The VPN tunnel options

**Type:** Array of objects

Each object in **TunnelOptions** can have the following attributes

**DpdTimeoutSeconds**

Optional

The number of seconds after which a Dead Peer Detection (DPD) timeout occurs.

**Type:** Integer

**IkeVersions**

Optional

The Internet Key Exchange (IKE) versions that are permitted for the VPN tunnel.

**Type:** Array of strings

**OutsideIpAddress**

Optional

The external IP address of the VPN tunnel.

**Type:** String

**Phase1DhGroupNumbers**

Optional

The permitted Diffie-Hellman group numbers for the VPN tunnel for phase 1 IKE negotiations.

**Type:** Array of numbers

**Phase1EncryptionAlgorithms**

Optional

The permitted encryption algorithms for the VPN tunnel for phase 1 IKE negotiations.
**Phase 1 Integrity Algorithms**
Optional
The permitted integrity algorithms for the VPN tunnel for phase 1 IKE negotiations.
*Type:* Array of strings

**Phase 1 Lifetime Seconds**
Optional
The lifetime for phase 1 of the IKE negotiation, in seconds.
*Type:* Integer

**Phase 2 Diffie-Hellman Group Numbers**
Optional
The permitted Diffie-Hellman group numbers for the VPN tunnel for phase 2 IKE negotiations.
*Type:* Array of numbers

**Phase 2 Encryption Algorithms**
Optional
The permitted encryption algorithms for the VPN tunnel for phase 2 IKE negotiations.
*Type:* Array of strings

**Phase 2 Integrity Algorithms**
Optional
The permitted integrity algorithms for the VPN tunnel for phase 2 IKE negotiations.
*Type:* Array of strings

**Phase 2 Lifetime Seconds**
Optional
The lifetime for phase 2 of the IKE negotiation, in seconds.
*Type:* Integer

**Pre-Shared Key**
Optional
The preshared key to establish initial authentication between the virtual private gateway and the customer gateway.
*Type:* String

**Rekey Fuzz Percentage**
Optional
The percentage of the rekey window, which is determined by `RekeyMarginTimeSeconds` during which the rekey time is randomly selected.
*Type:* Integer
**RekeyMarginTimeSeconds**
Optional
The margin time, in seconds, before the phase 2 lifetime expires, during which the AWS side of the VPN connection performs an IKE rekey.
*Type: Integer*

**ReplayWindowSize**
Optional
The number of packets in an IKE replay window.
*Type: Integer*

**TunnelInsideCidr**
Optional
The range of inside IPv4 addresses for the tunnel.
*Type: String*

**Routes**
The `Routes` object contains information about the static routes associated with the VPN connection. Each route can have the following attributes:

**DestinationCidrBlock**
Optional
The CIDR block associated with the local subnet of the customer data center.
*Type: String*

**State**
Optional
The current state of the static route.
*Type: String*
*Valid values:* pending | available | deleting | deleted

**VgwTelemetry**
The `VgwTelemetry` object contains information about the VPN tunnel. Each entry in `VgwTelemetry` can have the following attributes:

**AcceptedRouteCount**
Optional
The number of accepted routes.
*Type: Integer*
CertificateArn
Optional
The ARN of the VPN tunnel endpoint certificate.

Type: String

LastStatusChange
Optional
The date and time of the last change in status.

Type: String

Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

OutsideIpAddress
Optional
The Internet-routable IP address of the virtual private gateway's outside interface.

Type: String

Status
Optional
The status of the VPN tunnel.

Type: String

Valid values: UP | DOWN

StatusMessage
Optional
If an error occurs, a description of the error.

Type: String

AwsEcrContainerImage

The AwsEcrContainerImage object provides information about an Amazon ECR image.

Example

```
"AwsEcrContainerImage": {
  "RegistryId": "123456789012",
  "RepositoryName": "repository-name",
  "Architecture": "amd64",
  "ImageDigest": "sha256:a568e5c7a953fbeaa2904ac83401f93e4a076972dc1bae527832f5349cd2fb10",
  "ImageTags": ["00000000-0000-0000-0000-000000000000"],
  "ImagePublishedAt": "2019-10-01T20:06:12Z"
}
```

AwsEcrContainerImage can have the following attributes.
**Architecture**

Optional

The architecture of the image.

**Type:** String

**Valid values:** i386 | x86_64 | arm64

**ImageDigest**

Optional

The sha256 digest of the image manifest.

**Type:** String

**ImagePublishedAt**

Optional

The date and time when the image was pushed to the repository.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**ImageTags**

Optional

The list of tags that are associated with the image.

**Type:** Array of strings

**Maximum length per item:** 128

**Minimum number of items:** 1

**Maximum number of items:** 300

**RegistryId**

Optional

The AWS account identifier that is associated with the registry that the image belongs to.

**Type:** String

**RepositoryName**

Optional

The name of the repository that the image belongs to.

**Type:** String

**Minimum length:** 2

**Maximum length:** 256

**AwsEcsCluster**

The `AwsEcsCluster` object provides details about an ECS cluster.
Example

```
"AwsEcsCluster": {
  "CapacityProviders": [],
  "ClusterSettings": [
    {
      "Name": "containerInsights",
      "Value": "enabled"
    }
  ],
  "Configuration": {
    "ExecuteCommandConfiguration": {
      "KmsKeyId": "kmsKeyId",
      "LogConfiguration": {
        "CloudWatchEncryptionEnabled": true,
        "CloudWatchLogGroupName": "cloudWatchLogGroupName",
        "S3BucketName": "s3BucketName",
        "S3EncryptionEnabled": true,
        "S3KeyPrefix": "s3KeyPrefix"
      },
      "Logging": "DEFAULT"
    },
    "DefaultCapacityProviderStrategy": [
      {
        "Base": 0,
        "CapacityProvider": "capacityProvider",
        "Weight": 1
      }
    ]
  }
}
```

**AwsEcsCluster** can have the following attributes.

**CapacityProviders**

Optional

The short name of one or more capacity providers to associate with the cluster.

**Type**: Array of strings

**ClusterSettings** *(p. 291)*

Optional

The setting to use to create the cluster. Specifically, ClusterSettings is used to configure whether to enable CloudWatch Container Insights for the cluster.

**Type**: Array of objects

**Configuration** *(p. 291)*

Optional

The run command configuration for the cluster.

**Type**: Object

**DefaultCapacityProviderStrategy** *(p. 292)*

Optional

The default capacity provider strategy for the cluster. The default capacity provider strategy is used when services or tasks are run without a specified launch type or capacity provider strategy.
**Type**: Array of objects

**ClusterSettings**

The `ClusterSettings` object indicates whether to enable CloudWatch Container Insights for the ECS cluster.

`ClusterSettings` is an array that contains a single object. That object has the following attributes.

**Name**

Optional

The name of the setting.

**Type**: String

**Valid values**: containerInsights

**Value**

Optional

The value of the setting.

**Type**: String

**Valid values**: enabled | disabled

**Configuration**

The `Configuration` object contains the run command configuration for the cluster.

`Configuration` contains an `ExecuteCommandConfiguration` object.

`ExecuteCommandConfiguration` can have the following attributes.

**KmsKeyId**

Optional

The identifier of the KMS key that is used to encrypt the data between the local client and the container.

**Type**: String

**LogConfiguration (p. 292)**

Optional

The log configuration for the results of the run command actions. Must be provided if `Logging` is NONE.

**Type**: Object

**Logging**

Optional

The log setting to use for redirecting logs for run command results.

**Type**: String
**Valid values:** DEFAULT | NONE | OVERRIDE

**LogConfiguration**

The LogConfiguration object contains the log configuration for the results of the execute command actions. The logs can be sent to CloudWatch Logs or to an S3 bucket.

LogConfiguration can have the following attributes.

**CloudWatchEncryptionEnabled**

Optional

Whether to enable encryption on the CloudWatch logs.

**Type:** Boolean

**CloudWatchLogGroupName**

Optional

The name of the CloudWatch log group to send the logs to.

**Type:** String

**S3BucketName**

Optional

The name of the S3 bucket to send logs to.

**Type:** String

**S3EncryptionEnabled**

Optional

Whether to encrypt the logs that are sent to the S3 bucket.

**Type:** Boolean

**S3KeyPrefix**

Optional

Identifies the folder in the S3 bucket to send the logs to.

**Type:** String

**DefaultCapacityProviderStrategy**

The DefaultCapacityProviderStrategy object provides the default capacity provider strategy for the cluster. The default capacity provider strategy is used when services or tasks are run without a specified launch type or capacity provider strategy.

Each capacity provider in DefaultCapacityProviderStrategy can have the following attributes.

**Base**

Optional

The minimum number of tasks to run on the specified capacity provider.

**Type:** Number
**Format:** Integer

CapacityProvider

Optional

The name of the capacity provider.

**Type:** String

Weight

Optional

The relative percentage of the total number of tasks launched that should use the capacity provider.

**Type:** Number

**AwsEcsService**

The **AwsEcsService** object provides details about a service within an Amazon ECS cluster.

**Example**

```json
"AwsEcsService": {  
  "CapacityProviderStrategy": [  
    {  
      "Base": 12,  
      "CapacityProvider": "",  
      "Weight": ""  
    }  
  ],  
  "DeploymentConfiguration": {  
    "DeploymentCircuitBreaker": {  
      "Enable": false,  
      "Rollback": false  
    },  
    "MaximumPercent": 200,  
    "MinimumHealthyPercent": 100  
  },  
  "DeploymentController": "",  
  "DesiredCount": 1,  
  "EnableEcsManagedTags": false,  
  "EnableExecuteCommand": false,  
  "HealthCheckGracePeriodSeconds": 1,  
  "LaunchType": "FARGATE",  
  "LoadBalancers": [  
    {  
      "ContainerName": "",  
      "ContainerPort": 23,  
      "LoadBalancerName": "",  
      "TargetGroupArn": ""  
    }  
  ],  
  "Name": "sample-app-service",  
  "NetworkConfiguration": {  
    "AwsVpcConfiguration": {  
      "Subnets": [  
        "Subnet-example1",  
        "Subnet-example2"  
      ]  
    },  
    "SecurityGroups": [  
      "Sg-0ce48e9a6e5b457f5"  
    ]  
  }  
}  
```
},
  "AssignPublicIp": "ENABLED"
}
},
  "PlacementConstraints": [
    {
      "Expression": "",
      "Type": ""
    }
  ],
  "PlacementStrategies": [
    {
      "Field": "",
      "Type": ""
    }
  ],
  "PlatformVersion": "LATEST",
  "PropagateTags": "",
  "Role": "arn:aws:iam::111122223333:role/aws-servicerole/ecs.amazonaws.com/ServiceRoleForECS",
  "SchedulingStrategy": "REPLICA",
  "ServiceName": "sample-app-service",
  "ServiceRegistries": [
    {
      "ContainerName": "",
      "ContainerPort": 1212,
      "Port": 1221,
      "RegistryArn": ""
    }
  ],
  "TaskDefinition": "arn:aws:ecs:us-east-1:111122223333:task-definition/example-taskdef:1"
}

_AwsEcsService_ can have the following attributes.

**CapacityProviderStrategy (p. 297)**

Optional

The capacity provider strategy that the service uses.

**Type:** Array of objects

_Cluster_

Optional

The ARN of the cluster that hosts the service.

**Type:** String

**DeploymentConfiguration (p. 298)**

Optional

Deployment parameters for the service. Includes the number of tasks that run and the order in which to start and stop tasks.

**Type:** Object

_DeploymentController (p. 299)_

Optional
Contains the deployment controller type that the service uses.

**Type:** Object

**DesiredCount**

Optional

The number of instantiations of the task definition to run on the service.

**Type:** Integer

**EnableEcsManagedTags**

Optional

Whether to enable Amazon ECS managed tags for the tasks in the service.

**Type:** Boolean

**EnableExecuteCommand**

Optional

Whether the execute command functionality is enabled for the service.

**Type:** Boolean

**HealthCheckGracePeriodSeconds**

Optional

After a task starts, the amount of time in seconds that the Amazon ECS service scheduler ignores unhealthy Elastic Load Balancing target health checks.

**Type:** Integer

**LaunchType**

Optional

The launch type that the service uses.

**Type:** String

- **Valid values:** EC2 | FARGATE | EXTERNAL

**LoadBalancers** *(p. 299)*

Optional

Information about the load balancers that the service uses.

**Type:** Array of objects

**Name**

Optional

The name of the service.

**Type:** String

**NetworkConfiguration** *(p. 300)*

Optional

For tasks that use the awsvpc networking mode, the VPC subnet and security group configuration.
**Type:** Object

**PlacementConstraints (p. 301)**

*Optional*

The placement constraints for the tasks in the service.

**Type:** Array of objects

**PlacementStrategies (p. 301)**

*Optional*

Information about how tasks for the service are placed.

**Type:** Array of objects

**PlatformVersion**

*Optional*

The platform version on which to run the service. Only specified for tasks that are hosted on AWS Fargate. If a platform version is not specified, the _LATEST_ platform version is used by default.

**Type:** String

**PropagateTags**

*Optional*

Indicates whether to propagate the tags from the task definition to the task or from the service to the task. If no value is provided, then tags are not propagated.

**Type:** String

**Valid values:** TASK_DEFINITION | SERVICE

**Role**

*Optional*

The ARN of the IAM role that is associated with the service. The role allows the Amazon ECS container agent to register container instances with an Elastic Load Balancing load balancer.

**Type:** String

**SchedulingStrategy**

*Optional*

The scheduling strategy to use for the service.

The REPLICA scheduling strategy places and maintains the desired number of tasks across the cluster. By default, the service scheduler spreads tasks across Availability Zones. Task placement strategies and constraints are used to customize task placement decisions.

The DAEMON scheduling strategy deploys exactly one task on each active container instance that meets all of the task placement constraints that are specified in the cluster. The service scheduler also evaluates the task placement constraints for running tasks and stops tasks that do not meet the placement constraints.

**Type:** String

**Valid values:** REPLICA | DAEMON
ServiceArn
Optional
The ARN of the service.
Type: String
Format: arn:aws:ecs:<region>:<account>:service/<service name>

ServiceName
Optional
The name of the service.
Type: String
Maximum length: 255
Allowed characters: A-Z, a-z, 0-9, underscores, and hyphens

ServiceRegistries (p. 302)
Optional
Information about the service discovery registries to assign to the service.
Type: Array of objects

TaskDefinition
Optional
The task definition to use for tasks in the service.
Type: String

CapacityProviderStrategy
The CapacityProviderStrategy object provides information about the capacity provider strategy that the service uses.

Each strategy item can have the following attributes.

Base
Optional
The minimum number of tasks to run on the capacity provider. Only one strategy item can specify a value for Base.
Type: Number
Minimum value: 0
Maximum value: 100000

CapacityProvider
Optional
The short name of the capacity provider.
Type: String

Weight

Optional

The relative percentage of the total number of tasks that should use the capacity provider.

If no weight is specified, the default value is 0. At least one capacity provider must have a weight greater than 0.

Type: Integer

Minimum value: 0

Maximum value: 1000

DeploymentConfiguration

The DeploymentConfiguration object provider provides optional deployment parameters.

DeploymentConfiguration can have the following attributes.

DeploymentCircuitBreaker (p. 299)

Optional

Determines whether a service deployment fails if a service cannot reach a steady state.

Type: Object

MaximumPercent

Optional

For a service that uses the rolling update (ECS) deployment type, the maximum number of tasks in a service that are allowed in the RUNNING or PENDING state during a deployment, and for tasks that use the EC2 launch type, when any container instances are in the DRAINING state. Provided as a percentage of the desired number of tasks. The default value is 200%.

For a service that uses the blue/green (CODE_DEPLOY) or EXTERNAL deployment types, and tasks that use the EC2 launch type, the maximum number of tasks in the service that remain in the RUNNING state while the container instances are in the DRAINING state.

For the Fargate launch type, the maximum percent value is not used.

Type: Integer

MinimumHealthyPercent

Optional

For a service that uses the rolling update (ECS) deployment type, the minimum number of tasks in a service that must remain in the RUNNING state during a deployment, and while any container instances are in the DRAINING state if the service contains tasks using the EC2 launch type. Expressed as a percentage of the desired number of tasks. The default value is 100%.

For a service that uses the blue/green (CODE_DEPLOY) or EXTERNAL deployment types and tasks that use the EC2 launch type, the minimum number of the tasks in the service that remain in the RUNNING state while the container instances are in the DRAINING state.

Type: Integer
**DeploymentCircuitBreaker**

The `DeploymentCircuitBreaker` object determines whether a service deployment fails if a service cannot reach a steady state.

`DeploymentCircuitBreaker` can have the following attributes.

**Enable**

Optional

Whether to enable the deployment circuit breaker logic for the service.

**Type:** Boolean

**Rollback**

Optional

Whether to roll back the service if a service deployment fails. If rollback is enabled, when a service deployment fails, the service is rolled back to the last deployment that completed successfully.

**Type:** Boolean

**DeploymentController**

The `DeploymentController` object contains information about the deployment controller type that the service uses.

`DeploymentController` can have the following attributes.

**Type**

Optional

The type of deployment controller.

The rolling update (ECS) deployment type replaces the current running version of the container with the latest version.

The blue/green (CODE_DEPLOY) deployment type uses the blue/green deployment model that is powered by AWS CodeDeploy. This deployment model a new deployment of a service can be verified before production traffic is sent to it.

The external (EXTERNAL) deployment type allows the use of any third-party deployment controller for full control over the deployment process for an Amazon ECS service.

**Type:** String

**Valid values:** ECS | CODE_DEPLOY | EXTERNAL

**LoadBalancers**

The `LoadBalancers` object contains information about the load balancers that the service uses.

Each load balancer can have the following attributes.

**ContainerName**

Optional
The name of the container to associate with the load balancer.

**Type:** String

**ContainerPort**

Optional

The port on the container to associate with the load balancer. This port must correspond to a containerPort in the task definition the tasks in the service are using. For tasks that use the EC2 launch type, the container instance they are launched on must allow ingress traffic on the hostPort of the port mapping.

**Type:** Integer

**LoadBalancerName**

Optional

The name of the load balancer to associate with the Amazon ECS service or task set.

Only specified when using a Classic Load Balancer. For an Application Load Balancer or a Network Load Balancer, the load balancer name is omitted.

**Type:** String

**TargetGroupArn**

Optional

The ARN of the Elastic Load Balancing target group or groups associated with a service or task set.

Only specified when using an Application Load Balancer or a Network Load Balancer. For a Classic Load Balancer, the target group ARN is omitted.

**Type:** String

**NetworkConfiguration**

For tasks that use the awsvpc networking mode, the NetworkConfiguration object contains the VPC subnet and security group configuration.

NetworkConfiguration contains an AwsVpcConfiguration object.

AwsVpcConfiguration can have the following attributes.

**AssignPublicIp**

Optional

Whether the task's elastic network interface receives a public IP address. The default value is DISABLED.

**Type:** String

**Valid values:** ENABLED | DISABLED

**SecurityGroups**

Optional

The identifiers of the security groups associated with the task or service.
ASFF attributes

**Type:** Array of strings

**Maximum number of values:** 5

**Subnets**

Optional

The identifiers of the subnets associated with the task or service.

**Type:** Array of strings

**Maximum number of values:** 16

**PlacementConstraints**

The PlacementConstraints object contains the placement constraints for the tasks in the service.

Each placement constraint can have the following attributes.

**Expression**

Optional

A cluster query language expression to apply to the constraint. You cannot specify an expression if the constraint type is distinctInstance.

**Type:** String

**Type**

Optional

The type of constraint. Use distinctInstance to run each task in a particular group on a different container instance. Use memberOf to restrict the selection to a group of valid candidates.

**Type:** String

**Valid values:** distinctInstance | memberOf

**PlacementStrategies**

The PlacementStrategies object contains the placement strategy that determines how to place the tasks for the service.

Each placement strategy can have the following attributes.

**Field**

Optional

The field to apply the placement strategy against.

For the spread placement strategy, valid values are instanceId (or host, which has the same effect), or any platform or custom attribute that is applied to a container instance, such as attribute:ecs.availability-zone.

For the binpack placement strategy, valid values are cpu and memory.

For the random placement strategy, this attribute is not used.

**Type:** String
Type

Optional

The type of placement strategy.

The random placement strategy randomly places tasks on available candidates.

The spread placement strategy spreads placement across available candidates evenly based on the value of Field.

The binpack strategy places tasks on available candidates that have the least available amount of the resource that is specified in Field.

**Type:** String

**Valid values:** random | spread | binpack

ServiceRegistries

The ServiceRegistries object provides information about the service discovery registries to assign to the service.

Each service discovery registry can have the following attributes.

**ContainerName**

Optional

The container name value to use for the service discovery service.

If the task definition uses the bridge or host network mode, you must specify ContainerName and ContainerPort.

If the task definition uses the awsvpc network mode and a type SRV DNS record, you must specify either ContainerName and ContainerPort, or Port, but not both.

**Type:** String

**ContainerPort**

Optional

The port value to use for the service discovery service.

If the task definition uses the bridge or host network mode, you must specify ContainerName and ContainerPort.

If the task definition uses the awsvpc network mode and a type SRV DNS record, you must specify either ContainerName and ContainerPort, or Port, but not both.

**Type:** Integer

**Port**

Optional

The port value to use for a service discovery service that specifies an SRV record. This field can be used if both the awsvpc network mode and SRV records are used.

**Type:** Integer
RegistryArn

Optional

The ARN of the service registry. The currently supported service registry is AWS Cloud Map.

**Type:** String

**AwsEcsTaskDefinition**

The `AwsEcsTaskDefinition` object contains details about a task definition. A task definition describes the container and volume definitions of an Amazon Elastic Container Service task.

**Example**

```json
"AwsEcsTaskDefinition": {
    "ContainerDefinitions": [
        {
            "Command": ['ruby', 'hi.rb'],
            "Cpu": 128,
            "Essential": true,
            "HealthCheck": {
                "Command": "CMD-SHELL", "curl -f http://localhost/ || exit 1"],
                "Interval": 10,
                "Retries": 3,
                "StartPeriod": 5,
                "Timeout": 20
            },
            "Image": "tongue rooftop/sinatra:latest",
            "Interactive": true,
            "Links": [],
            "LogConfiguration": {
                "LogDriver": "awslogs",
                "Options": {
                    "awslogs-group": "/ecs/sinatra-hi",
                    "awslogs-region": "ap-southeast-1",
                    "awslogs-stream-prefix": "ecs"
                },
                "SecretOptions": []
            },
            "MemoryReservation": 128,
            "Name": "web",
            "PortMappings": [
                {
                    "ContainerPort": 4567,
                    "HostPort": 4567,
                    "Protocol": "tcp"
                }
            ],
            "Privileged": true,
            "StartTimeout": 10,
            "StopTimeout": 100,
        }
    ],
    "Family": "sinatra-hi",
    "NetworkMode": "host",
    "RequiresCompatibilities": ["EC2"],
    "TaskRoleArn": "arn:aws:iam::111122223333:role/ecsTaskExecutionRole",
}
```

**AwsEcsTaskDefinition** can have the following attributes.
ContainerDefinitions (p. 306)

Optional

The list of container definitions that describe the containers that make up the task.

**Type:** Array of objects

Cpu

Optional

The number of CPU units used by the task.

**Type:** String

**Valid values:** For the EC2 launch type, there are no restrictions on the value.

For the Fargate launch type, the value must be one of the following: 256 (.25 vCPU) | 512 (.5 vCPU) | 1024 (1 vCPU) | 2048 (2 vCPU) | 4096 (4 vCPU)

ExecutionRoleArn

Optional

The ARN of the task execution role that grants the Amazon ECS container agent permission to make AWS API calls on behalf of the container user.

**Type:** String

Family

Optional

The name of a family that this task definition is registered to.

**Type:** String

**Maximum length:** 255

**Allowed characters:** A-Z, a-z, 0-9, - _

InferenceAccelerators (p. 321)

Optional

The Elastic Inference accelerators to use for the containers in the task.

**Type:** Array of objects

IpcMode

Optional

The IPC resource namespace to use for the containers in the task.

**Type:** String

**Valid values:** host | task | none

Memory

Optional

The amount (in MiB) of memory used by the task.

**Type:** String
For the EC2 launch type, can provide either a task-level memory value or a container-level memory value.

For the Fargate launch type, the available values for memory are based on the value of the `Cpu` attribute.

<table>
<thead>
<tr>
<th>Cpu</th>
<th>Available values for Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>256 (.25 vCPU)</td>
<td>512 (0.5 GB)</td>
</tr>
<tr>
<td>512 (.5 vCPU)</td>
<td>1024 (1 GB)</td>
</tr>
<tr>
<td>1024 (1 vCPU)</td>
<td>2048 (2 GB)</td>
</tr>
<tr>
<td>2048 (2 vCPU)</td>
<td>Between 4096 (4 GB) and 16384 (16 GB) in increments of 1024 (1 GB)</td>
</tr>
<tr>
<td>4096 (4 vCPU)</td>
<td>Between 8192 (8 GB) and 30720 (30 GB) in increments of 1024 (1 GB)</td>
</tr>
</tbody>
</table>

**NetworkMode**

Optional

The Docker networking mode to use for the containers in the task.

**Type:** String

**Valid values:** `awsvpc` | `bridge` | `host` | `none`

**PidMode**

Optional

The process namespace to use for the containers in the task.

**Type:** String

**Valid values:** `host` | `task`

**PlacementConstraints**

Optional

The placement constraint objects to use for tasks.

**Type:** Array of objects

**ProxyConfiguration**

Optional

The configuration details for the App Mesh proxy.

**Type:** Object

**RequiresCompatibilities**

Optional

The task launch types that the task definition was validated against.
**TaskRoleArn**

Optional

The short name or ARN of the IAM role that grants containers in the task permission to call AWS API operations on your behalf.

**Volumes**

Optional

The data volume definitions for the task.

**Type:** Array of objects

---

**ContainerDefinitions**

The `ContainerDefinitions` object contains the list of container definitions that describe the containers that make up the task.

Each container definition can have the following attributes.

**Command**

Optional

The command that is passed to the container.

**Type:** Array of strings

**Cpu**

Optional

The number of CPU units reserved for the container.

**Type:** Number

**DependsOn** *(p. 311)*

Optional

The dependencies that are defined for container startup and shutdown.

**Type:** Array of objects

**DisableNetworking**

Optional

Whether to disable networking within the container.

**Type:** Boolean

**DnsSearchDomains**

Optional

A list of DNS search domains that are presented to the container.

**Type:** Array of strings
DnsServers

Optional

A list of DNS servers that are presented to the container.

**Type:** Array of strings

DockerLabels

Optional

A key-value map of labels to add to the container.

**Type:** Map of strings

DockerSecurityOptions

Optional

A list of strings to provide custom labels for SELinux and AppArmor multi-level security systems.

**Type:** Array of strings

EntryPoint

Optional

The entry point that is passed to the container.

**Type:** Array of strings

Environment (p. 311)

Optional

The environment variables to pass to a container.

**Type:** Array of objects

EnvironmentFiles (p. 312)

Optional

A list of files containing the environment variables to pass to a container.

**Type:** Array of objects

Essential

Optional

Whether the container is essential.

If `true` (the default value), then if the container fails or stops, the other containers in the task also stop.

If `false`, then the container failure does not affect the other containers in the task.

All tasks must have at least one essential container.

**Type:** Boolean

ExtraHosts (p. 312)

Optional
A list of hostnames and IP address mappings to append to the /etc/hosts file on the container.

**Type:** Array of objects

**FirelensConfiguration (p. 312)**

Optional

The FireLens configuration for the container. Specifies and configures a log router for container logs.

**Type:** Object

**HealthCheck (p. 313)**

Optional

The container health check command and associated configuration parameters for the container.

**Type:** Object

**Hostname**

Optional

The hostname to use for the container.

**Type:** String

**Image**

Optional

The image used to start the container.

**Type:** String

**Interactive**

Optional

If set to true, then containerized applications can be deployed that require stdin or a tty to be allocated.

**Type:** Boolean

**Links**

Optional

A list of links for the container in the form `container_name:alias`. Allows containers to communicate with each other without the need for port mappings.

**Type:** Array of strings

**LinuxParameters (p. 314)**

Optional

Linux-specific modifications that are applied to the container, such as Linux kernel capabilities.

**Type:** Object

**LogConfiguration (p. 317)**

Optional

The log configuration specification for the container.
**Type:** Object

**Memory**

Optional

The amount (in MiB) of memory to present to the container. If the container attempts to exceed the memory specified here, the container is shut down. The total amount of memory reserved for all containers within a task must be lower than the task memory value, if one is specified.

**Type:** Number

**MemoryReservation**

Optional

The soft limit (in MiB) of memory to reserve for the container.

**Type:** Number

**MountPoints (p. 318)**

Optional

The mount points for the data volumes in the container.

**Type:** Array of objects

**Name**

Optional

The name of the container.

**Type:** String

**PortMappings (p. 318)**

Optional

The list of port mappings for the container.

**Type:** Array of objects

**Privileged**

Optional

Whether the container is given elevated privileges on the host container instance. The elevated privileges are similar to the root user.

**Type:** Boolean

**PseudoTerminal**

Optional

Whether to allocate a TTY to the container.

**Type:** Boolean

**ReadOnlyRootFilesystem**

Optional

Whether the container is given read-only access to its root file system.

**Type:** Boolean
RepositoryCredentials (p. 319)
Optional
The private repository authentication credentials to use.
Type: Object

ResourceRequirements (p. 319)
Optional
The type and amount of a resource to assign to a container. The only supported resource is a GPU.
Type: Array of objects

Secrets (p. 319)
Optional
The secrets to pass to the container.
Type: Array of objects

StartTimeout
Optional
The number of seconds to wait before giving up on resolving dependencies for a container.
Type: Number

StopTimeout
Optional
The number of seconds to wait before the container is stopped if it doesn't shut down normally on its own.
Type: Number

SystemControls (p. 320)
Optional
A list of namespaced kernel parameters to set in the container.
Type: Array of objects

Ulimits (p. 320)
Optional
A list of ulimits to set in the container.
Type: Array of objects

User
Optional
The user to use inside the container.
Type: String
The value can use one of the following formats.
• user
ASFF attributes

- user:group
- uid
- uid:gid
- user:gid
- uid:group

VolumesFrom (p. 321)

Optional

Data volumes to mount from another container.

**Type:** Array of objects

WorkingDirectory

Optional

The working directory in which to run commands inside the container.

**Type:** String

ContainerDefinitions.DependsOn

The DependsOn object contains the list of dependencies that are defined for container startup and shutdown.

Each dependency can have the following attributes.

**Condition**

Optional

The dependency condition of the dependent container. Indicates the required status of the dependent container before the current container can start.

**Type:** String

**Valid values:** START | COMPLETE | SUCCESS | HEALTHY

ContainerName

Optional

The name of the dependent container.

**Type:** String

ContainerDefinitions.Environment

The Environment object lists the environment variables to pass to the container.

Each variable can have the following attributes.

**Name**

Optional

The name of the environment variable.

**Type:** String
Value

Optional

The value of the environment variable.

Type: String

**ContainerDefinitions.EnvironmentFiles**

The `EnvironmentFiles` object contains a list of files that contain the environment variables to pass to a container.

Each file can have the following attributes.

Type

Optional

The type of environment file.

Type: String

**Valid values**: s3

Value

Optional

The ARN of the S3 object that contains the environment variable file.

Type: String

**ContainerDefinitions.ExtraHosts**

The `ExtraHosts` object contains a list of hostnames and IP address mappings to append to the `/etc/hosts` file on the container.

Each entry can have the following attributes.

Hostname

Optional

The hostname to use in the `/etc/hosts` entry.

Type: String

IpAddress

Optional

The IP address to use in the `/etc/hosts` entry.

Type: String

**ContainerDefinitions.FirelensConfiguration**

The `FirelensConfiguration` object describes the FireLens configuration for the container. The configuration specifies and configures a log router for container logs.
FireLensConfiguration can have the following attributes.

**Options**

Optional

The options to use to configure the log router.

**Type:** Map of strings

The valid option keys are as follows:

- `enable-ecs-log-metadata`. The value can be `true` or `false`.
- `config-file-type`. The value can be `s3` or `file`.
- `config-file-value`. The value is either an S3 ARN or a file path.

**Type**

Optional

The log router to use.

**Type:** string

**Valid values:** fluentd, fluentbit

**ContainerDefinitions.HealthCheck**

The `HealthCheck` object contains the container health check command and associated configuration parameters for the container.

`HealthCheck` can have the following attributes.

**Command**

Optional

The command that the container runs to determine whether it is healthy.

**Type:** Array of strings

**Interval**

Optional

The time period in seconds between each health check execution. The default value is 30 seconds.

**Type:** Number

**Minimum value:** 5

**Maximum value:** 300

**Retries**

Optional

The number of times to retry a failed health check before the container is considered unhealthy. The default value is 3.

**Type:** Number

**Minimum value:** 1
Maximum value: 10

StartPeriod

Optional

The optional grace period in seconds that allows containers time to bootstrap before failed health checks count towards the maximum number of retries.

Type: Number

Minimum value: 0

Maximum value: 300

Timeout

Optional

The time period in seconds to wait for a health check to succeed before it is considered a failure. The default value is 5.

Type: number

Minimum value: 2

Maximum value: 60

ContainerDefinitions.LinuxParameters

The LinuxParameters object contains Linux-specific modifications that are applied to the container, such as Linux kernel capabilities.

LinuxParameters can have the following attributes.

Capabilities (p. 315)

Optional

The Linux capabilities for the container that are added to or dropped from the default configuration provided by Docker.

Type: Object

Devices (p. 316)

Optional

The host devices to expose to the container.

Type: Array of objects

InitProcessEnabled

Optional

Whether to run an init process inside the container that forwards signals and reaps processes.

Type: Boolean

MaxSwap

Optional
The total amount of swap memory (in MiB) that a container can use.

**Type:** Number

**SharedMemorySize**

Optional

The value for the size (in MiB) of the /dev/shm volume.

**Type:** Number

**Swappiness**

Optional

Configures the container's memory swappiness behavior. Determines how aggressively pages are swapped. The higher the value, the more aggressive the swappiness. The default is 60.

**Type:** Number

**Minimum value:** 0

**Maximum value:** 100

**Tmpfs (p. 316)**

Optional

The container path, mount options, and size (in MiB) of the tmpfs mount.

**Type:** Array of objects

**Capabilities**

The **Capabilities** object lists the Linux capabilities for the container that are added to or dropped from the default configuration provided by Docker.

Capabilities can have the following attributes.

**Add**

Optional

The Linux capabilities for the container that were added to the default configuration provided by Docker.

**Type:** Array of strings

**Valid values:**

"ALL" | "AUDIT_CONTROL" | "AUDIT_WRITE" | "BLOCK_SUSPEND" | "CHOWN" | "DAC_OVERRIDE" | "DAC_READ_SEARCH" | "FOWNER" | "FSETID" | "IPC_LOCK" | "IPC_OWNER" | "KILL" | "LEASE" | "LINUX_IMMUTABLE" | "MAC_ADMIN" | "MAC_OVERRIDE" | "MKNOD" | "NET_ADMIN" | "NET_BIND_SERVICE" | "NET_BROADCAST" | "NET_RAW" | "SETFCAP" | "SETGID" | "SETPCAP" | "SETUID" | "SYS_ADMIN" | "SYS_BOOT" | "SYS_CHROOT" | "SYS_MODULE" | "SYS_NICE" | "SYS_PACCT" | "SYS_PTRACE" | "SYS_RAWIO" | "SYS_RESOURCE" | "SYS_TIME" | "SYS_TTY_CONFIG" | "SYSLOG" | "WAKE_ALARM"

**Drop**

Optional

The Linux capabilities for the container that were removed from the default configuration provided by Docker.
Type: Array of strings

Valid values: "ALL" | "AUDIT_CONTROL" | "AUDIT_WRITE" | "BLOCK_SUSPEND" | "CHOWN" | "DAC_OVERRIDE" | "DAC_READ_SEARCH" | "FOWNER" | "FSETID" | "IPC_LOCK" | "IPC_OWNER" | "KILL" | "LEASE" | "LINUX_IMMUTABLE" | "MAC_ADMIN" | "MAC_OVERRIDE" | "MKNOD" | "NET_ADMIN" | "NET_BIND_SERVICE" | "NET_BROADCAST" | "NET_RAW" | "SETFCAP" | "SETGID" | "SETPCAP" | "SETUID" | "SYS_ADMIN" | "SYS_BOOT" | "SYS_CHROOT" | "SYS_MODULE" | "SYS_NICE" | "SYS_PACCT" | "SYS_PTRACE" | "SYS_RAWIO" | "SYS_RESOURCE" | "SYS_TIME" | "SYS_TTY_CONFIG" | "SYSLOG" | "WAKE_ALARM"

Devices

The Devices object contains the host devices to expose to the container.

Each device can have the following attributes.

- **ContainerPath**
  - Optional
  - The path inside the container at which to expose the host device.
  - **Type:** string

- **HostPath**
  - Optional
  - The path for the device on the host container instance.
  - **Type:** string

- **Permissions**
  - Optional
  - The explicit permissions to provide to the container for the device. By default, the container has permissions for read, write, and \#mknod for the device.
  - **Type:** Array of strings

Tmpfs

The Tmpfs object contains the container path, mount options, and size (in MiB) of the tmpfs mount.

Each entry can have the following attributes.

- **ContainerPath**
  - Optional
  - The absolute file path where the tmpfs volume is to be mounted.
  - **Type:** string

- **MountOptions**
  - Optional
  - The list of tmpfs volume mount options.
  - **Type:** Array of strings

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Valid values: "defaults" | "ro" | "rw" | "suid" | "nosuid" | "dev" | "nodev" | "exec" | "noxexec" | "sync" | "async" | "dirsync" | "remount" | "mand" | "nomand" | "atime" | "noatime" | "diratime" | "nodiratime" | "bind" | "rbind" | "unbindable" | "runbindable" | "private" | "rprivate" | "shared" | "rshared" | "slave" | "rslave" | "relatime" | "norelatime" | "strictatime" | "nosecstrictatime" | "mode" | "uid" | "gid" | "nr_inodes" | "nr_blocks" | "mpol"

Size
Optional

The maximum size (in MiB) of the tmpfs volume.

Type: number

ContainerDefinitions.LogConfiguration

The LogConfiguration object contains the log configuration specification for the container. LogConfiguration can have the following attributes.

LogDriver
Optional

The log driver to use for the container.

Type: String

Valid values on AWS Fargate: awslogs | splunk | awsfirelens

Valid values on EC2 instances: awslogs | fluentd | gelf | json-file | journald | logentries | syslog | splunk | awsfirelens

Options
Optional

The configuration options to send to the log driver. Requires version 1.19 of the Docker Remote API or greater on your container instance.

Type: Map of strings

SecretOptions (p. 317)
Optional

The secrets to pass to the log configuration.

Type: Array of objects

SecretOptions

The SecretOptions object contains the secrets to pass to the log configuration.

Each secret can have the following attributes.

Name
Optional

The name of the secret.
**Type:** string

ValueFrom

Optional

The secret to expose to the container.

The value is either the full ARN of the Secrets Manager secret or the full ARN of the parameter in the Systems Manager Parameter Store.

**Type:** String

**ContainerDefinitions.MountPoints**

The MountPoints object lists the mount points for the data volumes in the container.

Each mount point can have the following attributes.

**ContainerPath**

Optional

The path on the container to mount the host volume at.

**Type:** String

**ReadOnly**

Optional

Whether the container has read-only access to the volume.

**Type:** Boolean

**SourceVolume**

Optional

The name of the volume to mount. Must match the name of a volume listed in the Volumes (p. 323) object for the task definition.

**Type:** String

**ContainerDefinitions.PortMappings**

The PortMappings object contains the list of port mappings for the container.

Each port mapping can have the following attributes.

**ContainerPort**

Optional

The port number on the container that is bound to the user-specified or automatically assigned host port.

**Type:** Number

**HostPort**

Optional
The port number on the container instance to reserve for the container.

**Type**: Number

**Protocol**

Optional

The protocol used for the port mapping. The default is tcp.

**Type**: String

**Valid values**: tcp | udp

**ContainerDefinitions.RepositoryCredentials**

The `RepositoryCredentials` object contains the private repository authentication credentials to use. `RepositoryCredentials` can have the following attributes.

**CredentialsParameter**

Optional

The ARN of the secret that contains the private repository credentials.

**Type**: string

**ContainerDefinitions.ResourceRequirements**

The `ResourceRequirements` object contains the list of resources to assign to a container.

Each resource can have the following attributes.

**Type**

Optional

The type of resource to assign to a container.

**Type**: String

**Valid values**: GPU | InferenceAccelerator

**Value**

Optional

The value for the specified resource type.

For GPU, the value is the number of physical GPUs the Amazon ECS container agent reserves for the container.

For InferenceAccelerator, the value should match the `DeviceName` attribute of an entry in the `InferenceAccelerators` (p. 321) object.

**Type**: String

**ContainerDefinitions.Secrets**

The `Secrets` object contains the secrets to pass to the container.
Each secret can have the following attributes.

**Name**

Optional

The name of the secret.

**Type:** String

**ValueFrom**

Optional

The secret to expose to the container. The value is either the full ARN of the Secrets Manager secret or the full ARN of the parameter in the Systems Manager Parameter Store.

**Type:** String

**containerDefinitions.systemControls**

The `SystemControls` object contains a list of namespaced kernel parameters to set in the container.

Each parameter can have the following attributes.

**Namespace**

Optional

The namespaced kernel parameter for which to set a value.

**Type:** String

**Value**

Optional

The value of the parameter.

**Type:** String

**containerDefinitions.ulimits**

The `Ulimits` object contains a list of ulimits to set in the container.

Each ulimit can have the following attributes.

**HardLimit**

Optional

The hard limit for the ulimit type.

**Type:** Number

**Name**

Optional

The type of the ulimit.

**Type:** String
ASFF attributes

Valid values: core | cpu | data | fsize | locks | memlock | msgqueue | nice | nofile | nproc | rss | rt prio | rttime | sigpending | stack

SoftLimit

Optional

The soft limit for the ulimit type.

Type: Number

ContainerDefinitions.VolumesFrom

The VolumesFrom object contains a list of data volumes to mount from another container. Each data volume can have the following attributes.

ReadOnly

Optional

Whether the container has read-only access to the volume.

Type: Boolean

SourceContainer

Optional

The name of another container within the same task definition from which to mount volumes.

Type: String

InferenceAccelerators

The InferenceAccelerators object contains the list of Elastic Inference accelerators to use for the containers in the task. Each accelerator can have the following attributes.

DeviceName

Optional

The Elastic Inference accelerator device name.

Type: String

DeviceType

Optional

The Elastic Inference accelerator type to use.

Type: String

PlacementConstraints

The PlacementConstraints object contains the list of placement constraint objects to use for tasks. Each placement constraint can have the following attributes.
Expression

Optional

A cluster query language expression to apply to the constraint.

Type: String

Type

Optional

The type of constraint.

Type: String

ProxyConfiguration

The ProxyConfiguration object contains the configuration details for the App Mesh proxy. ProxyConfiguration can have the following attributes.

ContainerName

Optional

The name of the container that will serve as the App Mesh proxy.

Type: String

ProxyConfigurationProperties

The ProxyConfigurationProperties object contains the set of network configuration parameters to provide to the Container Network Interface (CNI) plugin, specified as key-value pairs.

Type: Array of objects

Type

Optional

The proxy type.

Type: String

Valid values: APPMESH

ProxyConfigurationProperties

The ProxyConfigurationProperties object contains the set of network configuration parameters to provide to the Container Network Interface (CNI) plugin.

Each entry can have the following attributes.

Name

Optional

The name of the property.

Type: String
Value
  Optional
  The value of the property.
  **Type:** String

**Volumes**
The `Volumes` object lists the data volumes to mount from another container.

Each data volume can have the following attributes.

*DockerVolumeConfiguration* *(p. 323)*
  Optional
  Information about a Docker volume.
  **Type:** Object

*EfsVolumeConfiguration* *(p. 324)*
  Information about the Amazon Elastic File System file system that is used for task storage.
  Optional
  **Type:** Object

*Host* *(p. 325)*
  Information about a bind mount host volume.
  **Type:** Object

**Name**
  The name of the data volume.
  Optional
  **Type:** String

*DockerVolumeConfiguration*
The `DockerVolumeConfiguration` object provides information about a Docker volume.

*DockerVolumeConfiguration* can have the following attributes.

**Autopropvision**
  Optional
  Whether to create the Docker volume automatically if it does not already exist.
  **Type:** Boolean

**Driver**
  Optional

323
The Docker volume driver to use.

**Type:** String

**DriverOpts**

Optional

A map of Docker driver-specific options that are passed through.

**Type:** Map of strings

**Labels**

Optional

Custom metadata to add to the Docker volume.

**Type:** Map of strings

**Scope**

Optional

The scope for the Docker volume that determines its lifecycle. Docker volumes that are scoped to a task are provisioned automatically when the task starts and destroyed when the task stops. Docker volumes that are shared persist after the task stops.

**Type:** String

**Valid values:** shared | task

**EfsVolumeConfiguration**

The `EfsVolumeConfiguration` object provides information about the Amazon Elastic File System (Amazon EFS) file system that is used for task storage.

`EfsVolumeConfiguration` can have the following attributes.

**AuthorizationConfig**

Optional

The authorization configuration details for the Amazon EFS file system.

**Type:** Object

**AuthorizationConfig.AccessPointId**

Optional

The Amazon EFS access point identifier to use.

**Type:** String

**AuthorizationConfig.Iam**

Optional

Whether to use the Amazon ECS task IAM role defined in a task definition when mounting the Amazon EFS file system.

**Type:** String
Valid values: DISABLED | ENABLED

FilesystemId

Optional

The Amazon EFS file system identifier to use.

Type: String

RootDirectory

Optional

The directory within the Amazon EFS file system to mount as the root directory inside the host.

Type: String

TransitEncryption

Optional

Whether to enable encryption for Amazon EFS data in transit between the Amazon ECS host and the Amazon EFS server.

Type: String

Valid values: DISABLED | ENABLED

TransitEncryptionPort

Optional

The port to use when sending encrypted data between the Amazon ECS host and the Amazon EFS server.

Type: Number

Host

The Host object provides information about a bind mount host volume.

Host can have the following attributes.

SourcePath

Optional

The path on the host container instance that is presented to the container. Not supported for the Fargate launch type.

Type: String

AwsElasticBeanstalkEnvironment


Example

"AwsElasticBeanstalkEnvironment": {

AwsElasticBeanstalkEnvironment can have the following attributes.

ApplicationName

Optional

The name of the application that is associated with the environment.

Type: String
Minimum length: 1

Maximum length: 100

Cname
Optional
The URL to the CNAME for this environment.

Type: String

Minimum length: 1

Maximum length: 255

DateCreated
Optional
The creation date for this environment.

Type: String

Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

DateUpdated
Optional
The date when this environment was last modified.

Type: String

Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

Description
Optional
A description of the environment.

Type: String

EndpointUrl
Optional
For load-balanced, autoscaling environments, the URL to the load balancer. For single-instance environments, the IP address of the instance.

Type: String

EnvironmentArn
Optional
The ARN of the environment.

Type: String

EnvironmentId
Optional
The identifier of the environment.

**Type:** String

(EnvironmentLinks (p. 329)

Optional

Links to other environments that are in the same group.

**Type:** Array of objects

(EnvironmentName

Optional

The name of the environment.

**Type:** String

(OptionSettings (p. 329)

Optional

The configuration setting for the environment.

**Type:** Array of objects

(PlatformArn

Optional

The ARN of the platform version for the environment.

**Type:** String

(SolutionStackName

Optional

The name of the solution stack that is deployed with the environment.

**Type:** String

(Status

Optional

The current operational status of the environment.

**Type:** String

(Valid values: Aborting | Launching | Updating | LinkingFrom | LinkingTo | Ready | Terminating | Terminated

(Tier (p. 330)

Optional

The tier of the environment.

**Type:** Object

(VersionLabel

Optional

The application version of the environment.
**Type**: String

**EnvironmentLinks**

The `EnvironmentLinks` object contains information about links to other environments that are in the same group.

Each environment link can have the following attributes.

- **EnvironmentName**
  - Optional
  - The name of the linked environment.
  - **Type**: String

- **LinkName**
  - Optional
  - The name of the environment link.
  - **Type**: String

**OptionSettings**

The `OptionSettings` object contains the configuration option settings for the environment. For more information about setting configuration options in Elastic Beanstalk, see [Configuration options](#) in the AWS Elastic Beanstalk Developer Guide.

Each setting is provided in an object that has the following attributes:

- **Namespace**
  - Optional
  - Used to identify the resource that the configuration option is associated with.
  - **Type**: String

- **OptionName**
  - Optional
  - The name of the option.
  - **Type**: String

- **ResourceName**
  - Optional
  - The resource name for the configuration setting.
  - **Type**: String
  - **Minimum length**: 1
  - **Maximum length**: 256
  - **Value**
    - Optional
The value of the configuration setting.

**Type:** String

**Tier**

The Tier object contains information about the tier of the environment.

Tier can have the following attributes.

**Name**

Optional

The name of the environment tier.

**Type:** String

**Valid values:** WebServer | Worker

**Type**

Optional

The type of environment tier.

**Type:** String

**Valid values:** Standard | SQS/HTTP

**Version**

Optional

The version of the environment tier.

**Type:** String

**AwsElasticSearchDomain**

The AwsElasticSearchDomain object provides details about an Elasticsearch domain.

It can have the following attributes.

**AccessPolicies**

Optional

IAM policy document specifying the access policies for the Elasticsearch domain.

**Type:** String

**DomainEndpointOptions (p. 331)**

Optional

Additional options for the domain endpoint.

**Type:** Object

**DomainStatus (p. 332)**

Optional
Details about the domain status.

**Type:** Object

**ElasticsearchClusterConfig (p. 333)**

Optional

Information about an Elasticsearch cluster configuration.

**Type:** Object

**ElasticsearchVersion**

Optional

OpenSearch version.

**Type:** String

**EncryptionAtRestOptions (p. 334)**

Optional

Details about the configuration for encryption at rest.

**Type:** Object

**LogPublishingOptions (p. 334)**

Optional

Configures the CloudWatch Logs to publish for the Elasticsearch domain.

**Type:** Object

**NodeToNodeEncryptionOptions (p. 335)**

Optional

Details about the configuration for node-to-node encryption.

**Type:** Object

**ServiceSoftwareOptions (p. 335)**

Optional

Information about the status of a domain relative to the latest service software.

**Type:** Object

**VPCOptions (p. 336)**

Optional

Information that OpenSearch Service derives based on VPCOptions for the domain.

**Type:** Object

**DomainEndpointOptions**

The `DomainEndpointOptions` object provides information about additional options for the domain endpoint.
It can have the following attributes.

**EnforceHTTPS**
- **Optional**
  - Whether to require that all traffic to the domain arrive over HTTPS.
  - **Type:** Boolean

**TLSSecurityPolicy**
- **Optional**
  - The TLS security policy to apply to the HTTPS endpoint of the Elasticsearch domain.
  - **Type:** String
  - **Valid values:**
    - Policy-Min-TLS-1-0-2019-07, which supports TLSv1.0 and later
    - Policy-Min-TLS-1-2-2019-07, which only supports TLSv1.2

**DomainStatus**

The DomainStatus object provides details about the domain status.

It can have the following attributes.

**DomainId**
- **Optional**
  - Unique identifier for an Elasticsearch domain.
  - **Type:** String

**DomainName**
- **Optional**
  - Name of an Elasticsearch domain.
  - Domain names are unique across all domains owned by the same account within an AWS Region.
  - **Minimum length:** 3 characters
  - **Maximum length:** 28 characters
  - **Valid values:** Begin with a lowercase letter and use a-z (lowercase only), 0-9, and – (hyphen)
  - **Type:** String

**Endpoint**
- **Optional**
  - Domain-specific endpoint used to submit index, search, and data upload requests to an Elasticsearch domain.
  - The endpoint is a service URL.
  - **Type:** String
Endpoints

Optional
The key-value pair that exists if the Elasticsearch domain uses VPC endpoints.

**Type:** Map of key-value pairs

**Example**

```
"vpc": "<VPC_ENDPOINT>"
```

ElasticsearchClusterConfig

The ElasticsearchClusterConfig object provides details about the configuration of an Elasticsearch cluster.

ElasticsearchClusterConfig can have the following attributes.

**DedicatedMasterCount**

Optional
The number of instances to use for the master node. If this attribute is specified, then DedicatedMasterEnabled must be true.

**Type:** Integer

**DedicatedMasterEnabled**

Optional
Whether to use a dedicated master node for the Elasticsearch domain. A dedicated master node performs cluster management tasks, but doesn't hold data or respond to data upload requests.

**Type:** Boolean

**DedicatedMasterType**

Optional
The hardware configuration of the computer that hosts the dedicated master node. For example, m3.medium.elasticsearch. If this attribute is specified, then DedicatedMasterEnabled must be true.

**Type:** String

**Valid values:** See [Supported instance types](#) in the Amazon OpenSearch Service Developer Guide.

**InstanceCount**

Optional
The number of data nodes to use in the Elasticsearch domain.

**Type:** Integer

**InstanceType**

Optional
The instance type for your data nodes. For example, m3.medium.elasticsearch.
ASFF attributes

**ZoneAwarenessConfig**

Optional

Configuration options for zone awareness. Provided if ZoneAwarenessEnabled is true.

**Type:** Object

**ZoneAwarenessConfig.AvailabilityZoneCount**

Optional

The number of Availability Zones that the domain uses. Valid values are 2 and 3. The default is 2.

**Type:** Integer

**Valid values:** 2 | 3

**ZoneAwarenessEnabled**

Optional

Whether to enable zone awareness for the Elasticsearch domain. When zone awareness is enabled, OpenSearch allocates the cluster's nodes and replica index shards across Availability Zones (AZs) in the same Region. This prevents data loss and minimizes downtime if a node or data center fails.

**Type:** Boolean

**EncryptionAtRestOptions**

The EncryptionAtRestOptions object provides details about the configuration for encryption at rest. It can have the following attributes.

**Enabled**

Optional

Whether encryption at rest is enabled.

**Type:** Boolean

**KmsKeyId**

Optional

The AWS KMS key ID. Takes the form 1a2a3a4-1a2a-3a4a-5a6a-1a2a3a4a5a6a.

**Type:** String

**LogPublishingOptions**

The LogPublishingOptions object configures the CloudWatch Logs to publish for the Elasticsearch domain.

The AuditLogs object configures the OpenSearch audit logs publishing.

The IndexSlowLogs object configures the OpenSearch index logs publishing.
The `SearchSlowLogs` object configures the OpenSearch search slow log publishing. Each of these objects has the following attributes.

```plaintext
CloudWatchLogsLogGroupArn
  Optional
  The ARN of the CloudWatch Logs group to publish the logs to.

  **Type:** String
  **Enabled**
  Optional
  Whether the log publishing is enabled.
  **Type:** Boolean
```

**NodeToNodeEncryptionOptions**

The `NodeToNodeEncryptionOptions` object provides details about the configuration for node-to-node encryption. It can have the following attributes.

```plaintext
**Enabled**
  Optional
  Whether node-to-node encryption is enabled.
  **Type:** Boolean
```

**ServiceSoftwareOptions**

The `ServiceSoftwareOptions` object provides information about the state of the domain relative to the latest service software.

`ServiceSoftwareOptions` can have the following attributes.

```plaintext
**AutomatedUpdateDate**
  Optional
  The epoch time when the deployment window closes for required updates. After this time, Amazon OpenSearch Service schedules the software upgrade automatically.
  **Type:** String

  **Cancellable**
  Optional
  Whether a request to update the domain can be canceled.
  **Type:** Boolean

  **CurrentVersion**
  Optional
```
The version of the service software that is currently installed on the domain.

**Type:** String  
**Description**  
Optional
A more detailed description of the service software status.

**Type:** String

**NewVersion**  
Optional
The most recent version of the service software.

**Type:** String

**UpdateAvailable**  
Optional
Whether a service software update is available for the domain.

**Type:** Boolean

**UpdateStatus**  
Optional
The status of the service software update.

**Type:** String

**Valid values:** ELIGIBLE | PENDING_UPDATE | IN_PROGRESS | COMPLETED | NOT_ELIGIBLE

**VpcOptions**

The VpcOptions object contains information that OpenSearch Service derives based on the VPCOptions for the domain.

It can have the following attributes.

**AvailabilityZones**  
Optional
The list of Availability Zones that are associated with the VPC subnets.

**Type:** Array of strings

**SecurityGroupIds**  
Optional
The list of security group IDs that are associated with the VPC endpoints for the domain.

**Type:** Array of strings

**SubnetIds**  
Optional
A list of subnet IDs that are associated with the VPC endpoints for the domain.
**Type:** Array of strings

**VPCId**

Optional

The identifier for the VPC.

**Type:** String

**AwsElbLoadBalancer**

The `AwsElbLoadBalancer` object contains details about a Classic Load Balancer.

**Example**

```json
"AwsElbLoadBalancer": {
    "AvailabilityZones": ["us-west-2a"],
    "BackendServerDescriptions": [
        {
            "InstancePort": 80,
            "PolicyNames": ["doc-example-policy"]
        }
    ],
    "CanonicalHostedZoneName": "Z3DZXE0EXAMPLE",
    "CanonicalHostedZoneNameID": "my-load-balancer-444455556666.us-west-2.elb.amazonaws.com",
    "CreatedTime": "2020-08-03T19:22:44.637Z",
    "DnsName": "my-load-balancer-444455556666.us-west-2.elb.amazonaws.com",
    "HealthCheck": {
        "HealthyThreshold": 2,
        "Interval": 30,
        "Target": "HTTP:80/png",
        "Timeout": 3,
        "UnhealthyThreshold": 2
    },
    "Instances": [
        {
            "InstanceId": "i-example"
        }
    ],
    "ListenerDescriptions": [
        {
            "Listener": {
                "InstancePort": 443,
                "InstanceProtocol": "HTTPS",
                "LoadBalancerPort": 443,
                "Protocol": "HTTPS",
                "SslCertificateId": "arn:aws:iam::444455556666:server-certificate/my-server-cert"
            },
            "PolicyNames": ["ELBSecurityPolicy-TLS-1-2-2017-01"]
        }
    ],
    "LoadBalancerAttributes": {
        "AccessLog": {
            "EmitInterval": 60,
            "Enabled": true,
            "S3BucketName": "doc-example-bucket",
            "S3BucketPrefix": "doc-example-prefix"
        },
        "ConnectionDraining": {
            "Enabled": false,
            "Timeout": 300
        }
    }
}  ```
AWSElbLoadBalancer can have the following attributes.

**AvailabilityZones**

Optional

The list of Availability Zones for the load balancer.

*Type:* Array of strings

**BackendServerDescriptions** *(p. 340)*

Optional

Information about the configuration of the EC2 instances.

*Type:* Array of objects

**CanonicalHostedZoneName**

Optional

The name of the Amazon Route 53 hosted zone for the load balancer.

*Type:* String
CanonicalHostedZoneNameID

Optional

The ID of the Amazon Route 53 hosted zone for the load balancer.

Type: String

CreatedTime

Optional

Indicates when the load balancer was created.

Type: String

Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

Example


DnsName

Optional

The DNS name of the load balancer.

Type: String

HealthCheck (p. 341)

Optional

Information about the health checks that are conducted on the load balancer.

Type: Object

Instances (p. 342)

Optional

List of EC2 instances for the load balancer.

Type: Array of objects

ListenerDescriptions (p. 342)

Optional

The policies that are enabled for the load balancer listeners.

Type: Array of objects

LoadBalancerAttributes (p. 344)

Optional

The attributes for a load balancer.

Type: Object

LoadBalancerName

Optional
The name of the load balancer.

**Type:** String

**Policies (p. 346)**

Optional

The policies for a load balancer.

**Type:** Object

**Scheme**

Optional

The type of load balancer. Only provided if the load balancer is in a VPC.

If `Scheme` is `internet-facing`, the load balancer has a public DNS name that resolves to a public IP address.

If `Scheme` is `internal`, the load balancer has a public DNS name that resolves to a private IP address.

**Type:** String

**Valid values:** internet-facing | internal

**SecurityGroups**

Optional

The security groups for the load balancer. Only provided if the load balancer is in a VPC.

**Type:** Array of strings

**SourceSecurityGroup (p. 347)**

Optional

Information about the security group for the load balancer. This is the security group that is used for inbound rules.

**Type:** Object

**Subnets**

Optional

The list of subnet identifiers for the load balancer.

**Type:** Array of strings

**VpcId**

Optional

The identifier of the VPC for the load balancer.

**Type:** String

**BackendServerDescriptions**

The `BackendServerDescriptions` object provides information about the configuration of the EC2 instances for the load balancer.
For each EC2 instance, `BackendServerDescriptions` can have the following attributes.

**InstancePort**
- Optional
- The port on which the EC2 instance is listening.
  - **Type:** Number

**PolicyNames**
- Optional
- The names of the policies that are enabled for the EC2 instance.
  - **Type:** Array of strings

**HealthCheck**
- The `HealthCheck` object contains information about the health checks that are conducted on the load balancer.

HealthCheck can have the following attributes.

**HealthyThreshold**
- Optional
- The number of consecutive health check successes required before the instance is moved to the Healthy state.
  - **Type:** Number
  - **Minimum value:** 2
  - **Maximum value:** 10

**Interval**
- Optional
- The approximate interval, in seconds, between health checks of an individual instance.
  - **Type:** number
  - **Minimum value:** 5
  - **Maximum value:** 300

**Target**
- Optional
- The instance that is being checked. The target specifies the protocol and port. The available protocols are TCP, SSL, HTTP, and HTTPS. The range of valid ports is 1 through 65535.
  - For the HTTP and HTTPS protocols, the target also specifies the ping path.
  - For the TCP protocol, the target is specified as `TCP: <port>`.
  - For the SSL protocol, the target is specified as `SSL:<port>`.
For the HTTP and HTTPS protocols, the target is specified as `<protocol>:<port>/<path to ping>`.

**Type:** String

**Maximum length:** 1,024

**Example:** HTTP:80/png

**Timeout**

Optional

The amount of time, in seconds, during which no response means a failed health check.

**Type:** Number

**Minimum value:** 2

**Maximum value:** 60

**UnhealthyThreshold**

Optional

The number of consecutive health check failures that must occur before the instance is moved to the Unhealthy state.

**Type:** Number

**Minimum value:** 2

**Maximum value:** 10

**Instances**

The `Instances` object contains the list of EC2 instances for the load balancer.

Each EC2 instance can have the following attributes.

**InstanceId**

Optional

The instance identifier.

**Type:** String

**ListenerDescriptions**

The `ListenerDescriptions` object lists the policies that are enabled for the load balancer listeners. `ListenerDescriptions` can have the following attributes.

**Listener**

Optional

Information about the listener.

**Type:** Object
**PolicyNames**

Optional

The policies enabled for the listener.

**Type:** Array of strings

The **Listener** object contains information about the listener. **Listener** can have the following attributes.

**InstancePort**

Optional

The port on which the instance is listening.

**Type:** Number

**Minimum value:** 1

**Maximum value:** 65,535

**InstanceProtocol**

Optional

The protocol to use to route traffic to instances.

**Type:** String

**Valid values:** HTTP | HTTPS | TCP | SSL

**LoadBalancerPort**

Optional

The port on which the load balancer is listening.

On EC2-VPC, you can specify any port from the range 1-65535.

On EC2-Classic, you can specify any port from the following list: 25, 80, 443, 465, 587, 1024-65535.

**Type:** Number

**Protocol**

Optional

The load balancer transport protocol to use for routing.

**Type:** String

**Valid values:** HTTP | HTTPS | TCP | SSL

**SslCertificateId**

Optional

The ARN of the server certificate.

**Type:** String
LoadBalancerAttributes

The `LoadBalancerAttributes` object contains attributes for the load balancer.

`LoadBalancerAttributes` can have the following attributes.

**AccessLog**

Optional

Information about the access log configuration for the load balancer.

If the access log is enabled, the load balancer captures detailed information about all requests. It delivers the information to a specified S3 bucket.

**Type:** Object

**ConnectionDraining**

Optional

Information about the connection draining configuration for the load balancer.

If connection draining is enabled, the load balancer allows existing requests to complete before it shifts traffic away from a deregistered or unhealthy instance.

**Type:** Object

**ConnectionSettings**

Optional

Connection settings for the load balancer.

If an idle timeout is configured, the load balancer allows connections to remain idle for the specified duration. When a connection is idle, no data is sent over the connection.

**Type:** Object

**CrossZoneLoadBalancing**

Optional

Cross-zone load balancing settings for the load balancer.

If cross-zone load balancing is enabled, the load balancer routes the request traffic evenly across all instances regardless of the Availability Zones.

**Type:** Object

The `AccessLog` object contains information about the access log configuration for the load balancer. `AccessLog` can have the following attributes.

**EmitInterval**

Optional

The interval in minutes for publishing the access logs.

You can publish access logs either every 5 minutes or every 60 minutes.

**Type:** Number
Valid values: 5 | 60

Enabled

Optional
Indicates whether access logs are enabled for the load balancer.

Type: Boolean

S3BucketName

Optional
The name of the S3 bucket where the access logs are stored.

Type: String

S3BucketPrefix

Optional
The logical hierarchy that was created for the S3 bucket.
If a prefix is not provided, the log is placed at the root level of the bucket.

Type: String

The ConnectionDraining object contains information about the connection draining configuration for the load balancer.

ConnectionDraining can have the following attributes.

Enabled

Optional
Indicates whether connection draining is enabled for the load balancer.

Type: Boolean

Timeout

Optional
The maximum time, in seconds, to keep the existing connections open before deregistering the instances.

Type: Number

The ConnectionSettings object contains connection settings for the load balancer.

ConnectionSettings can have the following attributes.

IdleTimeout

Optional
The time, in seconds, that the connection can be idle (no data is sent over the connection) before it is closed by the load balancer.

Type: Number
The CrossZoneLoadBalancing object contains cross-zone load balancing settings for the load balancer.

CrossZoneLoadBalancing can have the following attributes.

**Enabled**

Optional
Indicates whether cross-zone load balancing is enabled for the load balancer.

**Type:** Boolean

**Policies**

The Policies object contains information about the policies for a load balancer.

Policies can have the following attributes.

**AppCookieStickinessPolicies**

Optional
The stickiness policies that are created using CreateAppCookieStickinessPolicy.

**Type:** Array of objects

**LbCookieStickinessPolicies**

Optional
The stickiness policies that are created using CreateLBCookieStickinessPolicy.

**Type:** Array of objects

**OtherPolicies**

Optional
The policies other than the stickiness policies.

**Type:** Array of strings

The AppCookieStickinessPolicies object contains information about stickiness policies that are created using CreateAppCookieStickinessPolicy.

Each policy can have the following attributes.

**CookieName**

Optional
The name of the application cookie that is used for stickiness.

**Type:** String

**PolicyName**

Optional
The mnemonic name for the policy being created. The name must be unique within the set of policies for the load balancer.
Type: String

The LbCookieStickinessPolicies object contains information about the stickiness policies that are created using CreateLBCookieStickinessPolicy.

Each policy can have the following attributes.

CookieExpirationPeriod
  Optional
  The amount of time, in seconds, after which the cookie is considered stale. If an expiration period is not specified, the stickiness session lasts for the duration of the browser session.

  Type: Number

PolicyName
  Optional
  The name of the policy. The name must be unique within the set of policies for the load balancer.

  Type: String

SourceSecurityGroup

The SourceSecurityGroup object contains information about the security group for the load balancer.

SourceSecurityGroup can have the following attributes.

GroupName
  Optional
  The name of the security group.

  Type: String

OwnerAlias
  Optional
  The owner of the security group.

  Type: String

AwsElbv2LoadBalancer

The AwsElbv2LoadBalancer object provides information about a load balancer.

It can have the following attributes.

AvailabilityZones (p. 349)
  Optional
  The Availability Zones for the load balancer.

  Type: Object
CanonicalHostedZoneId

Optional
The ID of the Amazon Route 53 hosted zone that is associated with the load balancer.

Type: String

CreatedTime

Optional
Indicates when the load balancer was created.

Type: String

Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

DNSName

Optional
The public DNS name of the load balancer.

Type: String

IpAddressType

Optional
The type of IP addresses used by the subnets for your load balancer.

The possible values are ipv4 (for IPv4 addresses) and dualstack (for IPv4 and IPv6 addresses).

Type: String

Scheme

Optional
The nodes of an Internet-facing load balancer have public IP addresses.

Type: String

SecurityGroups

Optional
The IDs of the security groups for the load balancer.

Type: Array of strings

State (p. 349)

Optional
The state of the load balancer.

Type: Object

Type

Optional
The type of load balancer.

Type: String
VpcId

Optional

The ID of the VPC for the load balancer.

Type: String

AvailabilityZones

Specifies the Availability Zones for the load balancer.

Each Availability Zone can have the following attributes.

SubnetId

Optional

The ID of the subnet.

Type: String

ZoneName

Optional

The name of the Availability Zone.

Type: String

State

Information about the state of the load balancer.

The State object can have the following attributes.

Code

Optional

The state code.

The initial state of the load balancer is provisioning.

After the load balancer is fully set up and ready to route traffic, its state is active.

If the load balancer could not be set up, its state is failed.

Type: String

Reason

Optional

A description of the state.

Type: String

AwsIamAccessKey

The AwsIamAccessKey object contains details about an IAM access key that is related to a finding.
The `AwsIamAccessKey` object can have the following attributes.

**AccessKeyId**
- Optional
- The identifier of the access key.
- **Type:** String
- **Minimum length:** 16
- **Maximum length:** 128

**AccountId**
- Optional
- The AWS account ID of the account for the key.
- **Type:** String

**CreatedAt**
- Optional
- Indicates when the related IAM access key was created.
- **Type:** String
- **Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**PrincipalId**
- Optional
- The ID of the principal that is associated with an access key.
- **Type:** String

**PrincipalName**
- Optional
- The name of the principal.
- **Type:** String

**PrincipalType**
- Optional
- The type of principal.
- **Type:** String

**SessionContext (p. 351)**
- Optional
- Information about the session that the key was used for.
- **Type:** Object

**Status**
- Optional
The status of the IAM access key that is related to a finding. Valid values are **ACTIVE** and **INACTIVE**.

**Type:** Enum

**UserName**

This attribute is deprecated. Instead, use **PrincipalName**.

The name of the IAM user that the key is assigned to.

**Type:** String

**SessionContext**

The **SessionContext** object provides information about the session that the key was used for.

**Attributes** can have the following attributes.

**Attributes**

Optional

Attributes of the session that the key was used for.

**Type:** Object

**SessionIssuer**

Optional

Information about the entity that created the session.

**Type:** Object

The **Attributes** object can have the following attributes.

**CreationDate**

Optional

Indicates when the session was created.

**Type:** String

**Format:** Uses the date–time format specified in [RFC 3339 section 5.6, Internet Date/Time Format](https://tools.ietf.org/html/rfc3339). The value cannot contain spaces.

**Example**

```
"CreationDate": "2017-03-22T13:22:13.933Z"
```

**MfaAuthenticated**

Optional

Indicates whether the session used multi-factor authentication (MFA).

**Type:** Boolean

The **SessionIssuer** object can have the following attributes.
**AccountId**
Optional
The identifier of the AWS account that created the session.

**Type:** String

**Arn**
Optional
The ARN of the session.

**Type:** String

**PrincipalId**
Optional
The principal ID of the principal (user, role, or group) that created the session.

**Type:** String

**Type**
Optional
The type of principal (user, role, or group) that created the session.

**Type:** String

**UserName**
Optional
The name of the principal that created the session.

**Type:** String

**AwsIamGroup**
The **AwsIamGroup** object contains details about an IAM group.

**Example**

```json
"AwsIamGroup": {
  "AttachedManagedPolicies": [ {
    "PolicyArn": "arn:aws:iam::aws:policy/ExampleManagedAccess",
    "PolicyName": "ExampleManagedAccess",
  },
  ],
  "CreateDate": "2020-04-28T14:08:37.000Z",
  "GroupId": "AGPA4TPS3VLP7QEXAMPLE",
  "GroupName": "Example_User_Group",
  "GroupPolicyList": [ {
    "PolicyName": "ExampleGroupPolicy"
  },
  ],
  "Path": "/"
}
```
**AwsIamGroup** can have the following attributes.

**AttachedManagedPolicies (p. 354)**

Optional

A list of the managed policies that are attached to the IAM group.

**Type:** Array of objects

**CreateDate**

Optional

Indicates when the IAM group was created.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"CreateDate": "2017-03-22T13:22:13.933Z"
```

**GroupId**

Optional

The identifier of the IAM group.

**Type:** String

**Minimum length:** 16

**Maximum length:** 128

**GroupName**

Optional

The name of the IAM group.

**Type:** String

**Minimum length:** 1

**Maximum length:** 128

**GroupPolicyList (p. 354)**

Optional

The list of inline policies that are embedded in the group.

**Type:** Array of objects

**Path**

Optional

The path to the group.
**Type**: String

**Minimum length**: 1

**Maximum length**: 512

**AttachedManagedPolicies**

The `AttachedManagedPolicies` object contains the list of the managed policies that are attached to the IAM group.

Each policy can have the following attributes.

**PolicyArn**

Optional

The ARN of the policy.

**Type**: String

**Minimum length**: 20

**Maximum length**: 2,048

**PolicyName**

Optional

The name of the policy.

**Type**: String

**Minimum length**: 1

**Maximum length**: 128

**GroupPolicyList**

The `GroupPolicyList` object contains the list of inline policies that are embedded in the group.

Each policy can have the following attributes.

**PolicyName**

Optional

The name of the policy.

**Type**: String

**Minimum length**: 1

**Maximum length**: 128

**AwsIamPolicy**

The `AwsIamPolicy` object represents an IAM permissions policy.

**Example**
"AwsIamPolicy": {
  "AttachmentCount": 1,
  "CreateDate": "2017-09-14T08:17:29.000Z",
  "DefaultVersionId": "v1",
  "Description": "Example IAM policy",
  "IsAttachable": true,
  "Path": "/",
  "PermissionsBoundaryUsageCount": 5,
  "PolicyId": "ANPAJ2UCCR6DPCEXAMPLE",
  "PolicyName": "EXAMPLE-MANAGED-POLICY",
  "PolicyVersionList": [
    {
      "VersionId": "v1",
      "IsDefaultVersion": true,
      "CreateDate": "2017-09-14T08:17:29.000Z"
    }
  ],
  "UpdateDate": "2017-09-14T08:17:29.000Z"
}

It can have the following attributes.

**AttachmentCount**

Optional

The number of users, groups, and roles that the policy is attached to.

**Type:** Number

**CreateDate**

Optional

When the policy was created.

**Type:** String

**Format:** Uses the date–time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

"CreateDate": "2020-06-22T17:40:12.322Z"

**DefaultVersionId**

Optional

The identifier of the default version of the policy.

**Type:** String

**Description**

Optional

A description of the policy.

**Type:** String

**Maximum length:** 1,000
IsAttachable

Optional

Whether the policy can be attached to a user, group, or role.

Type: Boolean

Path

Optional

The path to the policy.

Type: String

Minimum length: 1

Maximum length: 512

For more information about paths, see IAM Identifiers in the IAM User Guide.

PermissionsBoundaryUsageCount

Optional

The number of users and roles that use the policy to set the permissions boundary.

Type: Number

PolicyId

Optional

The unique identifier of the policy.

Type: String

Minimum length: 16

Maximum length: 128

PolicyName

Optional

The name of the policy.

Type: String

Minimum length: 1

Maximum length: 128

PolicyVersionList (p. 357)

Optional

List of versions of the policy.

Type: Array of objects

UpdateDate

Optional

When the policy was most recently updated.
Type: String

Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

Example

"UpdateDate": "2020-06-22T17:40:12.322Z"

PolicyVersionList

The PolicyVersionList object contains a list of versions of the IAM policy.

Each version can have the following attributes.

CreateDate

Optional

Indicates when the version was created.

Type: String

Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

Example

"CreateDate": "2020-06-22T17:40:12.322Z"

IsDefaultVersion

Optional

Whether the version is the default version.

Type: Boolean

VersionId

Optional

The identifier of the policy version.

Type: String

AwsIamRole

The AwsIamRole object contains information about an IAM role, including all of the role's policies.

Example

"AwsIamRole": {
   "AssumeRolePolicyDocument": "
   "Version": "2012-10-17",
   "Statement": [{"Effect": 'Allow',
   "Action": 'sts:AssumeRole'
   }],
   "AttachedManagedPolicies": [
   { "PolicyArn": "arn:aws:iam::aws:policy/ExamplePolicy1",}]},
The `AwsIamRole` object can have the following attributes.

**AssumeRolePolicyDocument**
Optional

The trust policy that grants permission to assume the role.

**Type:** String

**AttachedManagedPolicies (p. 359)**
Optional

The list of the managed policies that are attached to the role.

**Type:** Array of objects

**CreateDate**
Optional

Indicates when the role was created.
Type: String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**InstanceProfileList (p. 360)**

Optional

The list of instance profiles that contain this role.

**Type:** Array of objects

**PermissionsBoundary (p. 362)**

Optional

The permissions boundary for the role.

**Type:** Object

**RoleId**

Optional

The stable and unique string identifying the role.

**Type:** String

**RoleName**

Optional

The friendly name that identifies the role.

**Type:** String

**RolePolicyList (p. 363)**

Optional

The list of inline policies that are embedded in the role.

**Type:** Array of objects

**MaxSessionDuration**

Optional

The maximum session duration (in seconds) that you want to set for the specified role.

**Type:** Integer

**Path**

Optional

The path to the role.

**Type:** String

**AttachedManagedPolicies**

The AttachedManagedPolicies object contains a list of the managed policies that are attached to the role.
Each policy can have the following attributes.

**PolicyArn**

Optional

The ARN of the policy.

Type: String

Minimum length: 20

Maximum length: 2,048

**PolicyName**

Optional

The name of the policy.

Type: String

Minimum length: 1

Maximum length: 128

**InstanceProfileList**

The `InstanceProfileList` object contains a list of instance profiles that contain this role.

Each instance profile can have the following attributes.

**Arn**

Optional

The ARN of the instance profile.

Type: String

**CreateDate**

Optional

Indicates when the instance profile was created.

Type: String

Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

Example

```
"CreateDate": "2017-03-22T13:22:13.933Z"
```

**InstanceProfileId**

Optional

The identifier of the instance profile.

Type: String
Minimum length: 16
Maximum length: 128

**InstanceProfileName**

Optional
The name of the instance profile.

**Type:** String

Minimum length: 1
Maximum length: 128

**Path**

Optional
The path to the instance profile.

**Type:** String

Minimum length: 1
Maximum length: 128

**Roles**

Optional
The roles associated with the instance profile.

**Type:** Array of objects

Each role in **Roles** can have the following attributes.

**Arn**

Optional
The ARN of the role.

**Type:** String

**AssumeRolePolicyDocument**

Optional
The policy that grants an entity permission to assume the role.

**Type:** String

Minimum length: 1
Maximum length: 131,072

**CreateDate**

Optional
Indicates when the role was created.

**Type:** String
**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"CreateDate": "2017-03-22T13:22:13.933Z"
```

**Path**

Optional

The path to the role.

**Type:** String

**Minimum length:** 1

**Maximum length:** 512

**RoleId**

Optional

The identifier of the role.

**Type:** String

**Minimum length:** 16

**Maximum length:** 128

**RoleName**

Optional

The name of the role.

**Type:** String

**Minimum length:** 1

**Maximum length:** 64

**PermissionsBoundary**

The PermissionsBoundary object provides information about the permissions boundary for the role. PermissionsBoundary can have the following attributes.

**PermissionsBoundaryArn**

Optional

The ARN of the policy that is used to set the permissions boundary.

**Type:** String

**PermissionsBoundaryType**

Optional

The type of resource that is used to set the permissions boundary.
Type: String
Valid values: Policy

RolePolicyList
The RolePolicyList object contains the list of inline policies that are embedded in the role.

Each policy can have the following attributes.

PolicyName
Optional
The name of the policy.

Type: String
Minimum length: 1
Maximum length: 128

AwsIamUser
The AwsIamUser object provides information about an IAM user.

Example

```json
"AwsIamUser": {
    "AttachedManagedPolicies": [
    {
        "PolicyName": "ExamplePolicy",
        "PolicyArn": "arn:aws:iam::aws:policy/ExampleAccess"
    },
    "CreateDate": "2018-01-26T23:50:05.000Z",
    "GroupList": [],
    "Path": "/",
    "PermissionsBoundary": {
        "PermissionsBoundaryArn": "arn:aws:iam::aws:policy/AdministratorAccess",
        "PermissionsBoundaryType": "PermissionsBoundaryPolicy"
    },
    "UserId": "AIDACKCEVSQ6C2EXAMPLE",
    "UserName": "ExampleUser",
    "UserPolicyList": [
    {
        "PolicyName": "InstancePolicy"
    }
    ]
}
```

It can have the following attributes.

AttachedManagedPolicies (p. 365)
Optional
A list of the managed policies that are attached to the user.

Type: Array of objects

**CreateDate**

Optional

Indicates when the user was created.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

"CreateDate": "2020-06-22T17:40:12.322Z"

**GroupList**

Optional

A list of IAM groups that the user belongs to.

**Type:** Array of strings

**Minimum length:** 1

**Maximum length:** 128

**Path**

Optional

The path to the user.

**Type:** String

**Minimum length:** 1

**Maximum length:** 512

**PermissionsBoundary (p. 365)**

Optional

The permissions boundary for the user.

**Type:** Object

**UserId**

Optional

The unique identifier for the user.

**Type:** String

**Minimum length:** 16

**Maximum length:** 128

**UserName**

Optional

The name of the user.
**UserPolicyList (p. 366)**

Optional

The list of inline policies that are embedded in the user.

**Type:** Array of objects

**AttachedManagedPolicies**

The `AttachedManagedPolicies` object contains the list of managed policies that are attached to the IAM user.

Each policy can have the following attributes.

**PolicyArn**

Optional

The ARN of the policy.

**Type:** String

**PolicyName**

Optional

The name of the policy.

**Type:** String

**PermissionsBoundary**

The `PermissionsBoundary` object contains information about the policy used to set the permissions boundary for the user.

It can have the following attributes.

**PermissionsBoundaryArn**

Optional

The ARN of the policy used to set the permissions boundary for the user.

**Type:** String

**Minimum length:** 20

**Maximum length:** 2,048
**Type:** String

The value must be `PermissionsBoundaryPolicy`.

**UserPolicyList**

The `UserPolicyList` object contains the list of inline policies that are embedded in the user. Each policy can have the following attributes.

**PolicyName**

Optional

The name of the policy.

**Type:** String

**Minimum length:** 1

**Maximum length:** 128

**AwsKmsKey**

The `AwsKmsKey` object provides details about an AWS KMS key. The `AwsKmsKey` object can have the following attributes.

**AWSAccountId**

Optional

The AWS account identifier of the account that owns the KMS key.

**Type:** String

**CreationDate**

Optional

Indicates when the KMS key was created.

**Type:** String

**Format:** Uses the date–time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Description**

Optional

A description of the key.

**Type:** String

**KeyId**

Required

The globally unique identifier for the KMS key.

**Type:** String
Minimum length: 1

Maximum length: 2,048

**KeyManager**

Optional

The manager of the KMS key. KMS keys in an AWS account are either customer managed or AWS managed.

*Type: String

*Valid values: AWS | CUSTOMER.

**KeyRotationStatus**

Optional

Whether the key has key rotation enabled.

*Type: Boolean

**KeyState**

Optional

The state of the KMS key.

*Type: String

*Valid values: Enabled | Disabled | PendingDeletion | PendingImport | Unavailable

**Origin**

Optional

The source of the KMS key material.

When this value is `AWS_KMS`, AWS KMS created the key material.

When this value is `EXTERNAL`, either the key material was imported from your existing key management infrastructure, or the KMS key lacks key material.

When this value is `AWS_CLOUDHSM`, the key material was created in the AWS CloudHSM cluster that is associated with a custom key store.

*Type: String

*Valid values: AWS_KMS | EXTERNAL | AWS_CLOUDHSM

**AwsLambdaFunction**

The `AwsLambdaFunction` object provides details about a Lambda function's configuration.

It can have the following attributes.

**Code (p. 370)**

Optional

An `AwsLambdaFunctionCode` object.
Type: Object

**CodeSha256**

Optional

The SHA256 hash of the function’s deployment package.

Type: String

**DeadLetterConfig (p. 370)**

Optional

The function’s dead letter queue.

Type: Object

**Environment (p. 370)**

Optional

A function’s environment variable settings.

Type: Object

**FunctionName**

Optional

The name of the function.

Type: String

**Handler**

Optional

The function that Lambda calls to begin running your function.

Type: String

**KmsKeyArn**

Optional

The AWS KMS key that’s used to encrypt the function’s environment variables. This key is only returned if you’ve configured a customer managed key.

Type: String

**LastModified**

Optional

The date and time that the function was last updated, in ISO-8601 format (YYYY-MM-DDThh:mm:ss.sTZD).

Type: String

**Layers (p. 371)**

Optional

The function’s layers.

Type: Object
**MasterArn**  
Optional  
For Lambda@Edge functions, the ARN of the master function.  
*Type: String*

**MemorySize**  
Optional  
The memory that is allocated to the function.  
*Type: Integer*

**RevisionId**  
Optional  
The latest updated revision of the function or alias.  
*Type: String*

**Role**  
Optional  
The function's execution role.  
*Type: String*

**Runtime**  
Optional  
The runtime environment for the Lambda function.  
*Type: String*

**Timeout**  
Optional  
The amount of time that Lambda allows a function to run before stopping it.  
*Type: Integer*

**TracingConfig** *(p. 371)*  
Optional  
The function's AWS X-Ray tracing configuration.  
*Type: Object*

**Version**  
Optional  
The version of the Lambda function.  
*Type: String*

**VpcConfig** *(p. 372)*  
Optional
The function's networking configuration.

**Type:** Object

**Code**

An `AwsLambdaFunctionCode` object.

The `Code` object can have the following attributes.

**S3Bucket**

Optional

An S3 bucket in the same AWS Region as your function. The bucket can be in a different AWS account.

**Type:** String

**S3Key**

Optional

The Amazon S3 key of the deployment package.

**Type:** String

**S3ObjectVersion**

Optional

For versioned objects, the version of the deployment package object to use.

**Type:** String

**ZipFile**

Optional

The base64-encoded contents of the deployment package. AWS SDK and AWS CLI clients handle the encoding for you.

**Type:** String

**DeadLetterConfig**

Contains information about the Lambda function's dead letter queue.

The `DeadLetterConfig` object can have the following attributes.

**TargetArn**

Optional

The Amazon Resource Name (ARN) of the Amazon SQS queue or Amazon SNS topic containing the dead letter queue.

**Type:** String

**Environment**

Contains the Lambda function's environment variable settings.
The **Environment** object can have the following attributes.

**Variables**

Optional

Environment variable key-value pairs.

**Type:** String to string map

**Error**

Optional

Error messages for environment variables that couldn't be applied.

**Type:** Object

The **Error** object can have the following attributes.

**ErrorCode**

Optional

The error code.

**Type:** String

**Message**

Optional

The error message.

**Type:** String

**Layers**

The Lambda function's layers.

Each layer object can have the following attributes.

**Arn**

Optional

The ARN of the function layer.

**Type:** String

**CodeSize**

Optional

The size of the layer archive in bytes.

**Type:** Integer

**TracingConfig**

Contains the function's AWS X-Ray tracing configuration.
The TracingConfig object can have the following attributes.

**Mode**
Optional
The tracing mode.
**Type:** String

**VpcConfig**
Contains the Lambda function's networking configuration.
The VpcConfig object can have the following attributes.

**SecurityGroupId**s
Optional
A list of VPC security groups IDs.
**Type:** Array of strings

**SubnetIds**
Optional
A list of VPC subnet IDs.
**Type:** Array of strings

**AwsLambdaLayerVersion**
The AwsLambdaLayerVersion object provides details about a Lambda layer version.

**Example**

```json
"AwsLambdaLayerVersion": {
    "Version": 2,
    "CompatibleRuntimes": [
        "java8"
    ],
    "CreatedDate": "2019-10-09T22:02:00.274+0000"
}
```

The AwsLambdaLayerVersion object can have the following attributes.

**CompatibleRuntimes**
Optional
The layer's compatible runtimes.
**Type:** Array of strings

**Maximum number of items:** 5

**Valid values:** nodejs10.x | nodejs12.x | java8 | java11 | python2.7 | python3.6 | python3.7 | python3.8 | dotnetcore1.0 | dotnetcore2.1 | go1.x | ruby2.5 | provided
**CreatedAt**

Optional

Indicates when the layer version was created.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Version**

Optional

The version number.

**Type:** Long

**AwsRdsDbCluster**

The *AwsRdsDbCluster* object provides details about an Amazon RDS database cluster.

**Example**

```json
"AwsRdsDbCluster": {
    "AllocatedStorage": 1,
    "AvailabilityZones": [
        "us-east-1c",
        "us-east-1e",
        "us-east-1a"
    ],
    "BackupRetentionPeriod": 1,
    "DatabaseName": "",
    "Status": "modifying",
    "Endpoint": "database-3.cluster-example.us-east-1.rds.amazonaws.com",
    "ReaderEndpoint": "database-3.cluster-ro-example.us-east-1.rds.amazonaws.com",
    "CustomEndpoints": [],
    "MultiAz": false,
    "Engine": "aurora-mysql",
    "EngineVersion": "5.7.mysql_aurora.2.03.4",
    "Port": 3306,
    "MasterUsername": "admin",
    "PreferredBackupWindow": "04:52-05:22",
    "PreferredMaintenanceWindow": "sun:09:32-sun:10:02",
    "ReadReplicaIdentifiers": [],
    "VpcSecurityGroups": [
        {
            "VpcSecurityGroupId": "sg-example-1",
            "Status": "active"
        }
    ],
    "HostedZoneId": "ZONE1",
    "StorageEncrypted": true,
    "KmsKeyId": "arn:aws:kms:us-east-1:77788889999:key/key1",
    "DbClusterResourceId": "cluster-example",
    "AssociatedRoles": [
        {
            "RoleArn": "arn:aws:iam::77788889999:role/aws-service-role/rds.amazonaws.com/AWSServiceRoleForRDS",
            "Status": "PENDING"
        }
    ],
    "ClusterCreateTime": "2020-06-22T17:40:12.322Z",
}
"EnabledCloudwatchLogsExports": [
    "audit",
    "error",
    "general",
    "slowquery"
],
"EngineMode": "provisioned",
"DeletionProtection": false,
"HttpEndpointEnabled": false,
"ActivityStreamStatus": "stopped",
"CopyTagsToSnapshot": true,
"CrossAccountClone": false,
"DomainMemberships": [],
"DbClusterParameterGroup": "cluster-parameter-group",
"DbSubnetGroup": "subnet-group",
"DbClusterOptionGroupMemberships": [],
"DbClusterIdentifier": "database-3",
"DbClusterMembers": [
  {
    "IsClusterWriter": true,
    "PromotionTier": 1,
    "DbInstanceIdentifier": "database-3-instance-1",
    "DbClusterParameterGroupStatus": "in-sync"
  }
],
"IamDatabaseAuthenticationEnabled": false
}

The `AwsRdsDbCluster` object can contain the following attributes.

**ActivityStreamStatus**

Optional

The status of the database activity stream.

**Type:** String

**Valid values:** `stopped` | `starting` | `started` | `stopping`

**AllocatedStorage**

Optional

For all database engines except Amazon Aurora, specifies the allocated storage size in gibibytes (GiB).

For Aurora, `AllocatedStorage` is always 1. The Aurora database cluster storage size is not fixed. Instead, it automatically adjusts as needed.

**Type:** Number

**AssociatedRoles (p. 379)**

Optional

A list of the IAM roles that are associated with the DB cluster.

**Type:** Array of objects

**AvailabilityZones**

Optional

A list of Availability Zones (AZs) where instances in the DB cluster can be created.
**ASFF attributes**

**Type:** Array of strings

**Example**

```
"AvailabilityZones": [
    "us-east-1c",
    "us-east-1e",
    "us-east-1a"
]
```

**BackupRetentionPeriod**

Optional

The number of days for which automated backups are retained.

**Type:** Number

**Minimum value:** 1

**Maximum value:** 35

**ClusterCreateTime**

Optional

Indicates when the DB cluster was created, in Universal Coordinated Time (UTC).

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"ClusterCreateTime": "2020-06-22T17:40:12.322Z"
```

**CopyTagsToSnapshot**

Optional

Whether tags are copied from the DB cluster to snapshots of the DB cluster.

**Type:** Boolean

**CrossAccountClone**

Optional

Whether the DB cluster is a clone of a DB cluster owned by a different AWS account.

**Type:** Boolean

**CustomEndpoints**

Optional

A list of custom endpoints for the DB cluster.

**Type:** Array of strings

**DatabaseName**

Optional
The name of the database.

**Type:** String

**DbClusterIdentifier**

Optional

The DB cluster identifier that the user assigned to the cluster. This identifier is the unique key that identifies a DB cluster.

**Type:** String

**DbClusterMembers (p. 380)**

Optional

The list of instances that make up the DB cluster.

**Type:** Array of objects

**DbClusterOptionGroupMemberships (p. 380)**

Optional

The list of option group memberships for this DB cluster.

**Type:** Array of objects

**DbClusterParameterGroup**

Optional

The name of the DB cluster parameter group for the DB cluster.

**Type:** String

**DbClusterResourceId**

Optional

The identifier of the DB cluster. The identifier must be unique within each AWS Region and is immutable.

**Type:** String

**DbSubnetGroup**

Optional

The subnet group that is associated with the DB cluster, including the name, description, and subnets in the subnet group.

**Type:** String

**DeletionProtection**

Optional

Whether the DB cluster has deletion protection enabled.

**Type:** Boolean

**DomainMemberships (p. 381)**

Optional
The Active Directory domain membership records that are associated with the DB cluster.

**Type:** Array of objects

**EnabledCloudwatchLogsExports**

Optional

A list of log types that this DB cluster is configured to export to CloudWatch Logs.

**Type:** Array of strings

**Example**

```
"EnabledCloudwatchLogsExports": [
  "audit",
  "error",
  "general",
  "slowquery"
]
```

**Endpoint**

Optional

The connection endpoint for the primary instance of the DB cluster.

**Type:** String

**Engine**

Optional

The name of the database engine to use for this DB cluster.

**Type:** String

**Valid values:** aurora | aurora-mysql | aurora-postgresql

**EngineMode**

Optional

The database engine mode of the DB cluster.

**Type:** String

**Valid values:** provisioned | serverless | parallelquery | global | multimaster

**EngineVersion**

Optional

The version number of the database engine to use.

**Type:** String

**Example**

```
"EngineVersion": "5.7.mysql_aurora.2.03.4",
```

**HostedZoneId**

Optional
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
<th>Type</th>
<th>Default</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASFF attributes</td>
<td>Specifies the identifier that Amazon Route 53 assigns when you create a hosted zone.</td>
<td>Type: String</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HttpEndpointEnabled</strong></td>
<td>Optional</td>
<td>Whether the HTTP endpoint for an Aurora Serverless DB cluster is enabled.</td>
<td>Type: Boolean</td>
<td></td>
</tr>
<tr>
<td><strong>IamDatabaseAuthenticationEnabled</strong></td>
<td>Optional</td>
<td>Whether the mapping of IAM accounts to database accounts is enabled.</td>
<td>Type: Boolean</td>
<td></td>
</tr>
<tr>
<td><strong>KmsKeyId</strong></td>
<td>Optional</td>
<td>The ARN of the AWS KMS master key that is used to encrypt the database instances in the DB cluster.</td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td><strong>MasterUsername</strong></td>
<td>Optional</td>
<td>The name of the master user for the DB cluster.</td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td><strong>MultiAz</strong></td>
<td>Optional</td>
<td>Whether the DB cluster has instances in multiple Availability Zones.</td>
<td>Type: Boolean</td>
<td></td>
</tr>
<tr>
<td><strong>Port</strong></td>
<td>Optional</td>
<td>The port number on which the DB instances in the DB cluster accept connections.</td>
<td>Type: Number</td>
<td></td>
</tr>
<tr>
<td><strong>PreferredBackupWindow</strong></td>
<td>Optional</td>
<td>The range of time each day when automated backups are created, if automated backups are enabled.</td>
<td>Type: string, Format: HH:MM–HH:MM</td>
<td></td>
</tr>
</tbody>
</table>
"PreferredBackupWindow": "04:52-05:22"

**PreferredMaintenanceWindow**

Optional

The weekly time range during which system maintenance can occur, in Universal Coordinated Time (UTC).

**Type:** String

**Format:** `<day>:HH:MM-<day>:HH:MM`

For the day values, use mon | tue | wed | thu | fri | sat | sun

**Example**

"PreferredMaintenanceWindow": "sun:09:32-sun:10:02"

**ReaderEndpoint**

Optional

The reader endpoint for the DB cluster.

**Type:** String

**ReadReplicaIdentifiers**

Optional

The identifiers of the read replicas that are associated with this DB cluster.

**Type:** Array of strings

**Status**

Optional

The current status of this DB cluster.

**Type:** String

**StorageEncrypted**

Optional

Whether the DB cluster is encrypted.

**Type:** Boolean

**VpcSecurityGroups (p. 381)**

Optional

A list of VPC security groups that the DB cluster belongs to.

**Type:** Array of objects

**AssociatedRoles**

The AssociatedRoles object specifies the list of IAM roles that are associated with the Amazon RDS DB cluster.
Each role can have the following attributes.

**RoleArn**

Optional

The ARN of an IAM role that is associated with the Amazon RDS DB cluster.

**Status**

Optional

The status of the association between the IAM role and the DB cluster.

**Valid values:** ACTIVE | PENDING | INVALID

**DbClusterMembers**

The `DbClusterMembers` object contains the list of instances in the cluster. For each instance, the object can have the following attributes.

**DbClusterParameterGroupStatus**

Optional

The status of the DB cluster parameter group for this member of the DB cluster.

**Type:** String

**DbInstanceIdentifier**

Optional

The instance identifier for this member of the DB cluster.

**Type:** String

**IsClusterWriter**

Optional

Whether the cluster member is the primary instance for the DB cluster.

**Type:** Boolean

**PromotionTier**

Optional

Specifies the order in which an Aurora replica is promoted to the primary instance when the existing primary instance fails.

**Type:** Number

**DbClusterOptionGroupMemberships**

The `DbClusterOptionGroupMemberships` object contains a list of option group members for this DB cluster.
Each option group membership can have the following attributes.

**DbClusterOptionGroupName**

Optional

The name of the DB cluster option group.

*Type: String*

**Status**

Optional

The status of the DB cluster option group.

*Type: String*

**DomainMemberships**

The `DomainMemberships` object contains the list of Active Directory domain memberships for the DB cluster.

Each membership can have the following attributes.

**Domain**

Optional

The identifier of the Active Directory domain.

*Type: String*

**Fqdn**

Optional

The fully qualified domain name of the Active Directory domain.

*Type: String*

**IamRoleName**

Optional

The name of the IAM role to use when making API calls to the Directory Service.

*Type: String*

**Status**

Optional

The status of the Active Directory domain membership for the DB cluster.

*Type: String*

**VpcSecurityGroups**

The `VpcSecurityGroups` object contains the list of VPC security groups that the DB cluster belongs to.

Each security group can have the following attributes.
**Status**

Optional

The status of the VPC security group.

Type: string

**VpcSecurityGroupId**

Optional

The name of the VPC security group.

Type: string

**AwsRdsDbClusterSnapshot**

The `AwsRdsDbClusterSnapshot` object contains information about an Amazon RDS DB cluster snapshot.

**Example**

```json
"AwsRdsDbClusterSnapshot": {  
  "AvailabilityZones": [  
    "us-east-1a",  
    "us-east-1d",  
    "us-east-1e"  
  ],  
  "SnapshotCreateTime": "2020-06-22T17:40:12.322Z",  
  "Engine": "aurora",  
  "AllocatedStorage": 0,  
  "Status": "available",  
  "Port": 0,  
  "VpcId": "vpc-faf7e380",  
  "ClusterCreateTime": "2020-06-12T13:23:15.577Z",  
  "MasterUsername": "admin",  
  "EngineVersion": "5.6.10a",  
  "LicenseModel": "aurora",  
  "SnapshotType": "automated",  
  "PercentProgress": 100,  
  "StorageEncrypted": true,  
  "KmsKeyId": "arn:aws:kms:us-east-1:777788889999:key/key1",  
  "DbClusterIdentifier": "database-2",  
  "DbClusterSnapshotIdentifier": "rds:database-2-2020-06-23-03-52",  
  "IamDatabaseAuthenticationEnabled": false
}
```

`AwsRdsDbClusterSnapshot` can have the following attributes.

**AllocatedStorage**

Optional

Specifies the allocated storage size in gibibytes (GiB).

Type: Number

**AvailabilityZones**

Optional

A list of Availability Zones where instances in the DB cluster can be created.
Type: Array of strings

ClusterCreateTime

Optional

Indicates when the DB cluster was created, in Universal Coordinated Time (UTC).

Type: String

Format: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

Example

"ClusterCreateTime": "2020-06-22T17:40:12.322Z"

DbClusterIdentifier

Optional

The DB cluster identifier.

Type: String

Format: Must be lowercase

DbClusterSnapshotIdentifier

Optional

The identifier of the DB cluster snapshot.

Type: String

Engine

Optional

The name of the database engine to be used for this DB cluster.

Type: String

EngineVersion

Optional

The version of the database engine to use.

Type: String

IamDatabaseAuthenticationEnabled

Optional

Whether mapping of IAM accounts to database accounts is enabled.

Type: Boolean

KmsKeyId

Optional

The ARN of the AWS KMS master key that is used to encrypt the database instances in the DB cluster.
**ASFF attributes**

**LicenseModel**
- **Type:** String
- **Optional**
- The license model information for this DB cluster snapshot.

**MasterUsername**
- **Type:** String
- **Optional**
- The name of the master user for the DB cluster.

**PercentProgress**
- **Type:** Number
- **Optional**
- Specifies the percentage of the estimated data that has been transferred.

**Example**

```
"PercentProgress": 100
```

**Port**
- **Type:** Number
- **Optional**
- The port number on which the DB instances in the DB cluster accept connections.

**SnapshotCreateTime**
- **Type:** String
- **Optional**
- Indicates when the snapshot was taken.

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"SnapshotCreateTime": "2020-06-22T17:40:12.322Z"
```

**SnapshotType**
- **Type:** String
- **Optional**
- The type of DB cluster snapshot.

**Status**
- **Type:** String
- **Optional**
The status of this DB cluster snapshot.

**Type:** String

**StorageEncrypted**

Optional

Whether the DB cluster is encrypted.

**Type:** Boolean

**VpcId**

Optional

The VPC ID that is associated with the DB cluster snapshot.

**Type:** String

**AwsRdsDbInstance**

The *AwsRdsDbInstance* object provides details about an Amazon RDS DB instance.

**Example**

```json
"AwsRdsDbInstance": {
  "AllocatedStorage": 20,
  "AssociatedRoles": [],
  "AutoMinorVersionUpgrade": true,
  "AvailabilityZone": "us-east-1d",
  "BackupRetentionPeriod": 7,
  "CaCertificateIdentifier": "certificate1",
  "CharacterSetName": "",
  "CopyTagsToSnapshot": true,
  "DbClusterIdentifier": "",
  "DbInstanceClass": "db.t2.micro",
  "DbInstanceIdentifier": "database-1",
  "DbInstancePort": 0,
  "DbInstanceStatus": "available",
  "DbiResourceId": "db-EXAMPLE123",
  "DbName": "",
  "DbParameterGroups": [
    {
      "DbParameterGroupName": "default.mysql5.7",
      "ParameterApplyStatus": "in-sync"
    }
  ],
  "DbSecurityGroups": [],

  "DbSubnetGroup": {
    "DbSubnetGroupName": "my-group-123abc",
    "DbSubnetGroupDescription": "My subnet group",
    "VpcId": "vpc-example1",
    "SubnetGroupStatus": "Complete",
    "Subnets": [
      {
        "SubnetIdentifier": "subnet-123abc",
        "SubnetAvailabilityZone": {
          "Name": "us-east-1d"
        },
        "SubnetStatus": "Active"
      }
    ]
  }
}
```
"ReadReplicaDBClusterIdentifiers": [],
"ReadReplicaDBInstanceIdentifiers": [],
"ReadReplicaSourceDBInstanceIdentifier": "",
"SecondaryAvailabilityZone": "",
"StatusInfos": [],
"StorageEncrypted": false,
"StorageType": "gp2",
"TdeCredentialArn": "",
"Timezone": "",
"VpcSecurityGroups": [
  {
    "VpcSecurityGroupId": "sg-example1",
    "Status": "active"
  }
]

The `AwsRdsDbInstance` object can have the following attributes.

**AllocatedStorage**

Optional

The amount of storage (in gigabytes) to initially allocate for the DB instance.

**Type**: Number

**AssociatedRoles (p. 395)**

Optional

The IAM roles that are associated with the DB instance.

**Type**: Array of role objects

**AutoMinorVersionUpgrade**

Optional

Indicates whether minor version patches are applied automatically.

**Type**: Boolean

**AvailabilityZone**

Optional

The Availability Zone where the DB instance will be created.

**Type**: String

**BackupRetentionPeriod**

Optional

The number of days for which to retain automated backups.

**Type**: Number

**Minimum value**: 0

**Maximum value**: 35

**CACertificateIdentifier**

Optional
The identifier of the CA certificate for this DB instance.

**Type:** String

**CharacterSetName**

Optional

The name of the character set that this DB instance is associated with.

**Type:** String

**CopyTagsToSnapshot**

Optional

Whether to copy resource tags to snapshots of the DB instance.

**Type:** Boolean

**DBClusterIdentifier**

Optional

If the DB instance is a member of a DB cluster, contains the name of the DB cluster that the DB instance is a member of.

**Type:** String

**DBInstanceClass**

Optional

Contains the name of the compute and memory capacity class of the DB instance.

**Type:** String

**DBInstanceIdentifier**

Optional

Contains a user-supplied database identifier. This identifier is the unique key that identifies a DB instance.

**Type:** String

**DbInstancePort**

Optional

Specifies the port that the DB instance listens on. If the DB instance is part of a DB cluster, this can be a different port than the DB cluster port.

**Type:** Integer

**DbInstanceStatus**

Optional

The current status of the DB instance.

**Type:** String

**DbiResourceId**

Optional
The AWS Region-unique, immutable identifier for the DB instance.

This identifier is found in CloudTrail log entries whenever the AWS KMS key for the DB instance is accessed.

**Type:** String

**DBName**

Optional

The meaning of this parameter differs according to the database that engine you use.

**MySQL, MariaDB, SQL Server, PostgreSQL**

Contains the name of the initial database of this instance that was provided at create time, if one was specified when the DB instance was created. This same name is returned for the life of the DB instance.

**Type:** String

**Oracle**

Contains the Oracle System Identifier (SID) of the created DB instance. Not shown when the returned parameters do not apply to an Oracle DB instance.

**Type:** String

**DbParameterGroups** *(p. 395)*

Optional

A list of the DB parameter groups to assign to the DB instance.

**Type:** Array of objects

**DbSecurityGroups**

Optional

A list of the DB security groups to assign to the DB instance.

**Type:** Array of strings

**DbSubnetGroup** *(p. 396)*

Optional

Information about the subnet group that is associated with the DB instance.

**Type:** Object

**DeletionProtection**

Optional

Indicates whether the DB instance has deletion protection enabled. The database can't be deleted when deletion protection is enabled.

**Type:** Boolean

**DomainMemberships** *(p. 397)*

Optional
The Active Directory domain membership records associated with the DB instance.

**Type:** Array of objects

**EnabledCloudWatchLogsExports**

Optional

A list of log types that this DB instance is configured to export to CloudWatch Logs.

**Type:** Array of strings

**Endpoint (p. 398)**

Optional

Specifies the connection endpoint.

**Type:** Object

**Engine**

Optional

Provides the name of the database engine to be used for this DB instance.

**Type:** String

**EngineVersion**

Optional

Indicates the database engine version.

**Type:** String

**EnhancedMonitoringResourceArn**

Optional

The ARN of the CloudWatch Logs log stream that receives the enhanced monitoring metrics data for the DB instance.

**Type:** String

**IamDatabaseAuthenticationEnabled**

Optional

True if mapping of IAM accounts to database accounts is enabled, and otherwise false.

IAM database authentication can be enabled for the following database engines:

- For MySQL 5.6, minor version 5.6.34 or higher
- For MySQL 5.7, minor version 5.7.16 or higher
- Aurora 5.6 or higher

**Type:** Boolean

**InstanceCreateTime**

Optional

Indicates when the DB instance was created.

**Type:** String
**Format**: Uses the date-time format specified in [RFC 3339 section 5.6, Internet Date/Time Format](https://tools.ietf.org/html/rfc3339). The value cannot contain spaces.

**Iops**

Optional

Specifies the Provisioned IOPS (I/O operations per second) for this DB instance.

**Type**: Number

**KmsKeyId**

Optional

If `StorageEncrypted` is true, the AWS KMS key identifier for the encrypted DB instance.

**Type**: String

**LatestRestorableTime**

Optional

Specifies the latest time to which a database can be restored with point-in-time restore.

**Type**: String

**Format**: Uses the date-time format specified in [RFC 3339 section 5.6, Internet Date/Time Format](https://tools.ietf.org/html/rfc3339). The value cannot contain spaces.

**Example**

```
"LatestRestorableTime": "2020-06-22T17:40:12.322Z"
```

**LicenseModel**

Optional

License model information for this DB instance.

**Type**: String

**ListenerEndpoint (p. 398)**

Optional

Information about the listener connection endpoint for SQL Server Always On.

**Type**: Object

**MasterUsername**

Optional

The master user name of the DB instance.

**Type**: String

**MaxAllocatedStorage**

Optional

The upper limit to which Amazon RDS can automatically scale the storage of the DB instance.

**Type**: Number
MonitoringInterval

Optional

The interval, in seconds, between points when enhanced monitoring metrics are collected for the DB instance.

**Type:** Number

MonitoringRoleArn

Optional

The ARN for the IAM role that permits Amazon RDS to send enhanced monitoring metrics to CloudWatch Logs.

**Type:** String

MultiAz

Optional

Whether the DB instance is a multiple Availability Zone deployment.

**Type:** Boolean

OptionGroupMemberships (p. 399)

Optional

The list of option group memberships for this DB instance.

**Type:** Array of objects

PendingModifiedValues (p. 399)

Optional

Changes to the DB instance that are currently pending.

**Type:** Object

PerformanceInsightsEnabled

Optional

Indicates whether Performance Insights is enabled for the DB instance.

**Type:** Boolean

PerformanceInsightsKmsKeyId

Optional

The identifier of the AWS KMS key used to encrypt the Performance Insights data.

**Type:** String

PerformanceInsightsRetentionPeriod

Optional

The number of days to retain Performance Insights data.

**Type:** Number
**PreferredBackupWindow**

Optional

The range of time each day during which automated backups are created, if automated backups are enabled.

**Type:** string

**Format:** HH:MM–HH:MM

**Example**

"PreferredBackupWindow": "04:52-05:22"

**PreferredMaintenanceWindow**

Optional

The weekly time range during which system maintenance can occur, in Universal Coordinated Time (UTC).

**Type:** String

**Format:** <day>:HH:MM<day>:HH:MM

For the day values, use mon | tue | wed | thu | fri | sat | sun

**Example:**

"PreferredMaintenanceWindow": "sun:09:32-sun:10:02"

**ProcessorFeatures (p. 401)**

Optional

The number of CPU cores and the number of threads per core for the DB instance class of the DB instance.

**Type:** Array of objects

**PromotionTier**

Optional

The order in which to promote an Aurora replica to the primary instance after a failure of the existing primary instance.

**Type:** Number

**PubliclyAccessible**

Optional

Specifies the accessibility options for the DB instance.

A value of true specifies an internet-facing instance with a publicly resolvable DNS name, which resolves to a public IP address.

A value of false specifies an internal instance with a DNS name that resolves to a private IP address.

**Type:** Boolean
ReadReplicaDBClusterIdentifiers
  Optional
  List of identifiers of Aurora DB clusters to which the RDS DB instance is replicated as a read replica.
  Type: Array of strings

ReadReplicaDBInstanceIdentifiers
  Optional
  List of identifiers of the read replicas that are associated with this DB instance.
  Type: Array of strings

ReadReplicaSourceDBInstanceIdentifier
  Optional
  If this DB instance is a read replica, contains the identifier of the source DB instance.
  Type: String

SecondaryAvailabilityZone
  Optional
  For a DB instance with multi-Availability Zone support, the name of the secondary Availability Zone.
  Type: String

StatusInfos
  Optional
  The status of a read replica. If the instance isn't a read replica, this is empty.
  Type: Array of objects

StorageEncrypted
  Optional
  Specifies whether the DB instance is encrypted.
  Type: Boolean

StorageType
  Optional
  The storage type for the DB instance.
  Type: String

TdeCredentialArn
  Optional
  The ARN from the key store with which the instance is associated for TDE encryption.
  Type: String

Timezone
  Optional
The time zone of the DB instance.

**Type:** String

**VpcSecurityGroups (p. 402)**

Optional

List of VPC security groups that the DB instance belongs to.

**Type:** Array of objects

**AssociatedRoles**

The `AssociatedRoles` array lists the IAM roles that are associated with the DB instance.

Each role object in the `AssociatedRoles` array can have the following attributes.

**FeatureName**

Optional

The name of the feature that is associated with the IAM role.

**Type:** String

**RoleArn**

Optional

The ARN of the IAM role that is associated with the DB instance.

**Type:** String

**Status**

Optional

Describes the state of association between the IAM role and the DB instance.

**Type:** String

**Valid values:**

- `ACTIVE` - The IAM role ARN is associated with the DB instance and can be used to access other AWS services on your behalf.
- `PENDING` - The IAM role ARN is being associated with the DB instance.
- `INVALID` - The IAM role ARN is associated with the DB instance. But the DB instance is unable to assume the IAM role in order to access other AWS services on your behalf.

**DbParameterGroups**

The `DbParameterGroups` object contains the list of parameter groups to assign to the database instance.

Each parameter group can have the following attributes.

**DbParameterGroupName**

Optional

The name of the parameter group.
**Type:** String

**ParameterApplyStatus**

Optional

The status of parameter updates.

**Type:** String

**DbSubnetGroup**

The `DbSubnetGroup` object contains information about the subnet group for the database instance. It can have the following attributes.

**DbSubnetGroupArn**

Optional

The ARN of the subnet group.

**Type:** String

**DbSubnetGroupDescription**

Optional

The description of the subnet group.

**Type:** String

**DbSubnetGroupName**

Optional

The name of the subnet group.

**Type:** String

**SubnetGroupStatus**

Optional

The status of the subnet group.

**Type:** String

**Subnets**

Optional

A list of subnets in the subnet group.

**Type:** Array of objects

**VpcId**

Optional

The VPC ID of the subnet group.

**Type:** String

The `Subnets` object contains the list of subnets in the subnet group.
Each subnet can have the following attributes.

**SubnetAvailabilityZone**

Optional

Information about the Availability Zone for a subnet in the subnet group.

*Type: Object*

**SubnetAvailabilityZone.Name**

Optional

The name of the Availability Zone for a subnet in the subnet group.

*Type: String*

**SubnetIdentifier**

Optional

The identifier of a subnet in the subnet group.

*Type: String*

**SubnetStatus**

Optional

The status of a subnet in the subnet group.

*Type: String*

**DomainMemberships**

The **DomainMemberships** object contains the Active Directory domain membership records associated with the DB instance.

It can have the following attributes.

**Domain**

Optional

The identifier of the Active Directory domain.

*Type: String*

**Fqdn**

Optional

The fully qualified domain name of the Active Directory domain.

*Type: String*

**IamRoleName**

Optional

The name of the IAM role to use when making API calls to the Directory Service.

*Type: String*
Status
Optional
The status of the Active Directory domain membership for the DB instance.
Type: String

Endpoint
The Endpoint object provides details about the connection endpoint for the DB instance.
It can have the following attributes.

Address
Optional
Specifies the DNS address of the DB instance.
Type: String

HostedZoneId
Optional
Specifies the ID that Amazon Route 53 assigns when you create a hosted zone.
Type: String

Port
Optional
Specifies the port that the database engine is listening on.
Type: Integer

ListenerEndpoint
The ListenerEndpoint object contains information about the listener connection endpoint for SQL Server Always On.
It can have the following attributes.

Address
Optional
Specifies the DNS address of the DB instance.
Type: String

HostedZoneId
Optional
The ID that Amazon Route 53 assigns when you create a hosted zone.
Type: String

Port
Optional
The port that the database engine is listening on.

**Type:** Number

**OptionGroupMemberships**

The `OptionGroupMemberships` object contains the list of option group memberships for the DB instance.

Each option group membership can have the following attributes.

**OptionGroupName**

Optional

The name of the option group.

**Type:** String

**Status**

Optional

The status of the DB instance membership in the option group.

**Type:** String

**PendingModifiedValues**

The `PendingModifiedValues` object lists changes to the DB instance that are currently pending.

It can have the following attributes.

**AllocatedStorage**

Optional

The new value of the allocated storage for the DB instance.

**Type:** Number

**BackupRetentionPeriod**

Optional

The new backup retention period for the DB instance.

**Type:** Number

**CaCertificateIdentifier**

Optional

The new CA certificate identifier for the DB instance.

**Type:** String

**DbInstanceClass**

Optional

The new DB instance class for the DB instance.

**Type:** String
DbInstanceIdentifier
Optional
The new DB instance identifier for the DB instance.
Type: String

DbSubnetGroupName
Optional
The name of the new subnet group for the DB instance.
Type: String

EngineVersion
Optional
The new engine version for the DB instance.
Type: String

Iops
Optional
The new Provisioned IOPS value for the DB instance.
Type: Number

LicenseModel
Optional
The new license model value for the DB instance.
Type: String

MasterUserPassword
Optional
The new master user password for the DB instance.
Type: String

MultiAZ
Optional
Indicates that a single Availability Zone DB instance is changing to a multiple Availability Zone deployment.
Type: Boolean

PendingCloudWatchLogsExports
Optional
A list of log types that are being enabled or disabled.
Type: Object

Port
Optional
The new port for the DB instance.

**Type:** Number

**ProcessorFeatures** *(p. 401)*

Optional

Processor features that are being updated.

**Type:** Array of objects

**StorageType**

Optional

The new storage type for the DB instance.

**Type:** String

The `PendingCloudWatchLogsExport` object identifies the log types to enable and disable. It can have the following attributes.

**LogTypesToDisable**

Optional

A list of log types that are being disabled.

**Type:** Array of strings

**LogTypesToEnable**

Optional

A list of log types that are being enabled.

**Type:** Array of strings

**ProcessorFeatures**

The `ProcessorFeatures` object contains a list of processor features. In the context of `PendingModifiedValues`, it identifies the features to be updated.

It can have the following attributes.

**Name**

Optional

The name of the processor feature.

**Type:** String

**Value**

Optional

The value of the processor feature.

**Type:** String
**StatusInfos**

The `StatusInfos` object contains information about the status of a read replica. If the instance isn't a read replica, the object is empty.

It can have the following attributes.

**Message**

Optional

If the read replica is currently in an error state, provides the error details.

*Type: String*

**Normal**

Optional

Whether the read replica instance is operating normally.

*Type: Boolean*

**Status**

Optional

The status of the read replica instance.

*Type: String*

**StatusType**

Optional

The type of status. For a read replica, the status type is read replication.

*Type: String*

**VpcSecurityGroups**

The `VpcSecurityGroups` array provides the list of VPC security groups that the DB instance belongs to. Each object in the `VpcSecurityGroups` array can have the following attributes.

**VpcSecurityGroupId**

Optional

The name of the VPC security group.

*Type: String*

**Status**

Optional

The status of the VPC security group.

*Type: String*

**AwsRdsDbSnapshot**

The `AwsRdsDbSnapshot` object contains details about an Amazon RDS DB cluster snapshot.
### Example

```json
"AwsRdsDbSnapshot": {
    "DbSnapshotIdentifier": "rds:database-1-2020-06-22-17-41",
    "DbInstanceIdentifier": "database-1",
    "SnapshotCreateTime": "2020-06-22T17:41:29.967Z",
    "Engine": "mysql",
    "AllocatedStorage": 20,
    "Status": "available",
    "Port": 3306,
    "AvailabilityZone": "us-east-1d",
    "VpcId": "vpc-example1",
    "InstanceCreateTime": "2020-06-22T17:40:12.322Z",
    "MasterUsername": "admin",
    "EngineVersion": "5.7.22",
    "LicenseModel": "general-public-license",
    "SnapshotType": "automated",
    "Iops": null,
    "OptionGroupName": "default:mysql-5-7",
    "PercentProgress": 100,
    "SourceRegion": null,
    "SourceDbSnapshotIdentifier": "",
    "StorageType": "gp2",
    "TdeCredentialArn": "",
    "Encrypted": false,
    "KmsKeyId": "",
    "Timezone": "",
    "IamDatabaseAuthenticationEnabled": false,
    "ProcessorFeatures": [],
    "DbiResourceId": "db-resourceexample1"
}
```

`AwsRdsDbSnapshot` can have the following attributes.

**AllocatedStorage**

Optional

The amount of storage (in gigabytes) to be initially allocated for the database instance.

**Type:** Number

**AvailabilityZone**

Optional

Specifies the name of the Availability Zone in which the DB instance was located at the time of the DB snapshot.

**Type:** String

**DbInstanceIdentifier**

Optional

A name for the DB instance.

**Type:** String

**DbiResourceId**

Optional

The identifier for the source DB instance.
**ASFF attributes**

**DbSnapshotIdentifier**

Optional

The name or ARN of the DB snapshot that is used to restore the DB instance.

**Type**: String

**Encrypted**

Optional

Whether the DB snapshot is encrypted.

**Type**: Boolean

**Engine**

Optional

The name of the database engine that you want to use for this DB instance.

**Type**: String

**Valid values**: aurora | aurora-mysql | aurora-postgresql | mariadb | mysql | oracle-ee | oracle-se2 | oracle-se1 | oracle-se | c | sqlserver-ee | sqlserver-se | sqlserver-ex | sqlserver-web

**EngineVersion**

Optional

The version of the database engine.

**Type**: String

**IamDatabaseAuthenticationEnabled**

Optional

Whether mapping of IAM accounts to database accounts is enabled.

**Type**: Boolean

**InstanceCreateTime**

Optional

Specifies the time in Coordinated Universal Time (UTC) when the DB instance, from which the snapshot was taken, was created.

**Type**: String

**Format**: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
"InstanceCreateTime": "2020-06-22T17:40:12.322Z"
```

**Iops**

Optional
The Provisioned IOPS (I/O operations per second) value of the DB instance at the time of the snapshot.

**Type:** Number

**KmsKeyId**

Optional

If `Encrypted` is true, the AWS KMS key identifier for the encrypted DB snapshot.

**Type:** String

**LicenseModel**

Optional

License model information for the restored DB instance.

**Type:** String

**Example**

```
"LicenseModel": "general-public-license"
```

**MasterUsername**

Optional

The master user name for the DB snapshot.

**Type:** String

**OptionGroupName**

Optional

The option group name for the DB snapshot.

**Type:** String

**PercentProgress**

Optional

The percentage of the estimated data that has been transferred.

**Type:** Number

**Example**

```
"PercentProgress": 100
```

**Port**

Optional

The port that the database engine was listening on at the time of the snapshot.

**Type:** Number

**ProcessorFeatures**

Optional
The number of CPU cores and the number of threads per core for the DB instance class of the DB instance.

**Type**: Array of objects

**Example**

```json
"ProcessorFeatures": [
  {
    "Name": "coreCount",
    "Value": "3"
  }
]
```

**ProcessorFeatures.Name**

Optional

The name of the processor feature.

**Type**: String

**Valid values**: coreCount | threadsPerCore

**ProcessorFeatures.Value**

Optional

The value of the specified processor feature.

**Type**: String

**SnapshotCreateTime**

Optional

When the snapshot was taken in Coordinated Universal Time (UTC).

**Type**: String

**Format**: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```json
"SnapshotCreateTime": "2020-06-22T17:41:29.967Z"
```

**SnapshotType**

Optional

The type of the DB snapshot.

**Type**: String

**SourceDbSnapshotIdentifier**

Optional

The DB snapshot ARN that the DB snapshot was copied from.

**Type**: String
SourceRegion

Optional

The AWS Region that the DB snapshot was created in or copied from.

Type: String

Status

Optional

The status of this DB snapshot.

Type: String

StorageType

Optional

The storage type that is associated with DB snapshot.

Type: String

Valid values: standard | gp2 | io1

TdeCredentialArn

Optional

The ARN from the key store with which to associate the instance for TDE encryption.

Type: String

Timezone

Optional

The time zone of the DB snapshot.

Type: String

VpcId

Optional

The VPC ID associated with the DB snapshot.

Type: String

AwsRdsEventSubscription

The AwsRdsEventSubscription contains details about an RDS event notification subscription. The subscription allows RDS to post events to an SNS topic.

Example

```
"AwsRdsEventSubscription": {
    "CustSubscriptionId": "myawsuser-secgpr",
    "CustomerAwsId": "111111111111",
    "Enabled": true,
    "EventCategoriesList": [
        "configuration change",
```
"failure"
],
"SnsTopicArn": "arn:aws:sns:us-east-1:1111111111:myawsuser-RDS",
"SourceIdsList": [
  "si-sample",
  "mysqldb-rr"
],
"SourceType": "db-security-group",
"Status": "creating",
"SubscriptionCreationTime": "2021-06-27T01:38:01.090Z"
}

AwsRdsEventSubscription can have the following attributes.

CustomerAwsId

Optional

The identifier of the account that is associated with the event notification subscription.

**Type:** String

CustSubscriptionId

Optional

The identifier of the event notification subscription.

**Type:** String

Enabled

Optional

Whether the event notification subscription is enabled.

**Type:** Boolean

EventCategoriesList

Optional

The list of event categories for the event notification subscription.

**Type:** Array of strings

EventSubscriptionArn

Optional

The ARN of the event notification subscription.

**Type:** String

SnsTopicArn

Optional

The ARN of the SNS topic to post the event notifications to.

**Type:** String

SourceIdsList

Optional
A list of source identifiers for the event notification subscription.

**Type:** Array of strings

**SourceType**

Optional

The source type for the event notification subscription.

**Type:** String

**Status**

Optional

The status of the event notification subscription.

**Type:** String

**Valid values:** creating | modifying | deleting | active | no-permission | topic-not-exist

**SubscriptionCreationTime**

Optional

The date and time when the event notification subscription was created.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**AwsRedshiftCluster**

The `AwsRedshiftCluster` object contains details about an Amazon Redshift cluster.

**Example**

```json
"AwsRedshiftCluster": {
   "AllowVersionUpgrade": true,
   "AutomatedSnapshotRetentionPeriod": 1,
   "AvailabilityZone": "us-west-2d",
   "ClusterAvailabilityStatus": "Unavailable",
   "ClusterCreateTime": "2020-08-03T19:22:44.637Z",
   "ClusterIdentifier": "redshift-cluster-1",
   "ClusterNodes": [
      {
         "NodeRole": "LEADER",
         "PrivateIPAddress": "192.0.2.108",
         "PublicIPAddress": "198.51.100.29"
      },
      {
         "NodeRole": "COMPUTE-0",
         "PrivateIPAddress": "192.0.2.22",
         "PublicIPAddress": "198.51.100.63"
      },
      {
         "NodeRole": "COMPUTE-1",
         "PrivateIPAddress": "192.0.2.224",
         "PublicIPAddress": "198.51.100.226"
      }
   ],
   "ClusterParameterGroups": []
}
```
{ "ClusterParameterStatusList": [ {
   "ParameterName": "max_concurrency_scaling_clusters",
   "ParameterApplyStatus": "in-sync",
   "ParameterApplyErrorDescription": "parameterApplyErrorDescription"
 }, {
   "ParameterName": "enable_user_activity_logging",
   "ParameterApplyStatus": "in-sync",
   "ParameterApplyErrorDescription": "parameterApplyErrorDescription"
 }, {
   "ParameterName": "auto_analyze",
   "ParameterApplyStatus": "in-sync",
   "ParameterApplyErrorDescription": "parameterApplyErrorDescription"
 }, {
   "ParameterName": "query_group",
   "ParameterApplyStatus": "in-sync",
   "ParameterApplyErrorDescription": "parameterApplyErrorDescription"
 }, {
   "ParameterName": "datestyle",
   "ParameterApplyStatus": "in-sync",
   "ParameterApplyErrorDescription": "parameterApplyErrorDescription"
 }, {
   "ParameterName": "extra_float_digits",
   "ParameterApplyStatus": "in-sync",
   "ParameterApplyErrorDescription": "parameterApplyErrorDescription"
 }, {
   "ParameterName": "search_path",
   "ParameterApplyStatus": "in-sync",
   "ParameterApplyErrorDescription": "parameterApplyErrorDescription"
 }, {
   "ParameterName": "statement_timeout",
   "ParameterApplyStatus": "in-sync",
   "ParameterApplyErrorDescription": "parameterApplyErrorDescription"
 }, {
   "ParameterName": "wlm_json_configuration",
   "ParameterApplyStatus": "in-sync",
   "ParameterApplyErrorDescription": "parameterApplyErrorDescription"
 }, {
   "ParameterName": "require_ssl",
   "ParameterApplyStatus": "in-sync",
   "ParameterApplyErrorDescription": "parameterApplyErrorDescription"
 }, {
   "ParameterName": "use_fips_ssl",
   "ParameterApplyStatus": "in-sync",
   "ParameterApplyErrorDescription": "parameterApplyErrorDescription"
 } ],
   "ParameterApplyStatus": "in-sync",
   "ParameterGroupName": "temp"
 },
   "ClusterPublicKey": "JalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY Amazon-Redshift",
   "ClusterRevisionNumber": 17498,
   "ClusterSecurityGroups": [ ]}
"ClusterSecurityGroupName": "default",
"Status": "active"
]
,"ClusterSnapshotCopyStatus": {
"DestinationRegion": "us-west-2",
"ManualSnapshotRetentionPeriod": -1,
"RetentionPeriod": 1,
"SnapshotCopyGrantName": "snapshotCopyGrantName"
},
"ClusterStatus": "available",
"ClusterSubnetGroupName": "default",
"ClusterVersion": "1.0",
"DBName": "dev",
"DeferredMaintenanceWindows": [
{
"DeferMaintenanceEndTime": "2020-10-07T20:34:01.000Z",
"DeferMaintenanceIdentifier": "deferMaintenanceIdentifier",
"DeferMaintenanceStartTime": "2020-09-07T20:34:01.000Z"
}
],
"ElasticIpStatus": {
"ElasticIp": "203.0.113.29",
"Status": "active"
},
"ElasticResizeNumberOfNodeOptions": "4",
"Encrypted": false,
"Endpoint": {
"Address": "redshift-cluster-1.example.us-west-2.redshift.amazonaws.com",
"Port": 5439
},
"EnhancedVpcRouting": false,
"ExpectedNextSnapshotScheduleTime": "2020-10-13T20:34:01.000Z",
"ExpectedNextSnapshotScheduleTimeStatus": "OnTrack",
"HsmStatus": {
"HsmClientCertificateIdentifier": "hsmClientCertificateIdentifier",
"HsmConfigurationIdentifier": "hsmConfigurationIdentifier",
"Status": "applying"
},
"IamRoles": [
{
"ApplyStatus": "in-sync",
"IamRoleArn": "arn:aws:iam::111122223333:role/RedshiftCopyUnload"
}
],
"KmsKeyId": "kmsKeyId",
"MaintenanceTrackName": "current",
"ManualSnapshotRetentionPeriod": -1,
"MasterUsername": "awsuser",
"NextMaintenanceWindowStartTime": "2020-08-09T13:00:00.000Z",
"NodeType": "dc2.large",
"NumberOfNodes": 2,
"PendingActions": [],
"PendingModifiedValues": {
"AutomatedSnapshotRetentionPeriod": 0,
"ClusterIdentifier": "clusterIdentifier",
"ClusterType": "clusterType",
"ClusterVersion": "clusterVersion",
"EncryptionType": "None",
"EnhancedVpcRouting": false,
"MaintenanceTrackName": "maintenanceTrackName",
"MasterUserPassword": "masterUserPassword",
"NodeType": "dc2.large",
"NumberOfNodes": 1,
"PubliclyAccessible": true
},
"PreferredMaintenanceWindow": "sun:13:00–sun:13:30",
"PubliclyAccessible": true,
"ResizeInfo": {
    "AllowCancelResize": true,
    "ResizeType": "ClassicResize"
},
"RestoreStatus": {
    "CurrentRestoreRateInMegaBytesPerSecond": 15,
    "ElapsedTimeInSeconds": 120,
    "EstimatedTimeToCompletionInSeconds": 100,
    "ProgressInMegaBytes": 10,
    "SnapshotSizeInMegaBytes": 1500,
    "Status": "restoring"
},
"SnapshotScheduleIdentifier": "snapshotScheduleIdentifier",
"SnapshotScheduleState": "ACTIVE",
"VpcId": "vpc-example",
"VpcSecurityGroups": [
    {
        "Status": "active",
        "VpcSecurityGroupId": "sg-example"
    }
]

**AwsRedshiftCluster** can have the following attributes.

### AllowVersionUpgrade

Optional

Indicates whether major version upgrades are applied automatically to the cluster during the maintenance window.

**Type**: Boolean

### AutomatedSnapshotRetentionPeriod

Optional

The number of days that automatic cluster snapshots are retained.

**Type**: Number

**Format**: Must be an integer

### AvailabilityZone

Optional

The name of the Availability Zone in which the cluster is located.

**Type**: String

### ClusterAvailabilityStatus

Optional

The availability status of the cluster for queries. Possible values are the following:

- **Available** – The cluster is available for queries.
- **Unavailable** – The cluster is not available for queries.
- **Maintenance** – The cluster is intermittently available for queries due to maintenance activities.
- **Modifying** – The cluster is intermittently available for queries due to changes that modify the cluster.
• Failed – The cluster failed and is not available for queries.

**Type:** String

**Valid values:** Available | Unavailable | Maintenance | Modifying | Failed

**ClusterCreateTime**

Optional

Indicates when the cluster was created.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**


**ClusterIdentifier**

Optional

The unique identifier of the cluster.

**Type:** String

**ClusterNodes (p. 418)**

Optional

The nodes in the cluster.

**Type:** Array of objects

**ClusterParameterGroups (p. 419)**

Optional

The list of cluster parameter groups that are associated with this cluster.

**Type:** Array of objects

**ClusterPublicKey**

Optional

The public key for the cluster.

**Type:** String

**ClusterRevisionNumber**

Optional

The specific revision number of the database in the cluster.

**Type:** String

**ClusterSecurityGroups (p. 420)**

Optional
A list of cluster security groups that are associated with the cluster.

**Type:** Array of objects

**ClusterSnapshotCopyStatus (p. 420)**

Optional

Information about the destination Region and retention period for the cross-Region snapshot copy.

**Type:** Object

**ClusterStatus**

Optional

The current status of the cluster.

**Type:** String

**Valid values:** available | available, prep-for-resize | available, resize-cleanup | cancelling-resize | creating | deleting | final-snapshot | hardware-failure | incompatible-hsm | incompatible-network | incompatible-parameters | incompatible-restore | modifying | paused | rebooting | renaming | resizing | rotating-keys | storage-full | updating-hsm

**ClusterSubnetGroupName**

Optional

The name of the subnet group that is associated with the cluster. This parameter is valid only when the cluster is in a VPC.

**Type:** String

**ClusterVersion**

Optional

The version ID of the Amazon Redshift engine that runs on the cluster.

**Type:** String

**DBName**

Optional

The name of the initial database that was created when the cluster was created.

The same name is returned for the life of the cluster.

If an initial database is not specified, a database named devdev is created by default.

**Type:** String

**DeferredMaintenanceWindows (p. 421)**

Optional

List of time spans, or time windows, during which maintenance was deferred.

**Type:** Array of objects

**ElasticIpStatus (p. 421)**

Optional
Information about the status of the Elastic IP (EIP) address.

**Type:** Object

### ElasticResizeNumberOfNodeOptions

**Optional**

The number of nodes that you can resize the cluster to with the elastic resize method.

**Type:** String

### Encrypted

**Optional**

Indicates whether the data in the cluster is encrypted at rest.

**Type:** Boolean

### Endpoint (p. 422)

**Optional**

The connection endpoint.

**Type:** Object

### EnhancedVpcRouting

**Optional**

Indicates whether to create the cluster with enhanced VPC routing enabled.

**Type:** Boolean

### ExpectedNextSnapshotScheduleTime

**Optional**

Indicates when the next snapshot is expected to be taken. The cluster must have a valid snapshot schedule and have backups enabled.

**Type:** String

**Format:** Uses the date–time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
```

### ExpectedNextSnapshotScheduleTimeStatus

**Optional**

The status of the next expected snapshot.

**Type:** String

**Valid values:** OnTrack | Pending

### HsmStatus (p. 422)

**Optional**
Information about whether the Amazon Redshift cluster finished applying any changes to hardware security module (HSM) settings that were specified in a modify cluster command.

**Type:** Object

**IamRoles** *(p. 423)*

Optional

A list of IAM roles that the cluster can use to access other AWS services.

**Type:** Array of objects

**KmsKeyId**

Optional

The identifier of the AWS KMS encryption key that is used to encrypt data in the cluster.

**Type:** String

**MaintenanceTrackName**

Optional

The name of the maintenance track for the cluster.

**Type:** String

**ManualSnapshotRetentionPeriod**

Optional

The default number of days to retain a manual snapshot.

If the value is -1, the snapshot is retained indefinitely.

This setting doesn't change the retention period of existing snapshots.

**Type:** Number

**Valid values:** Either -1 or an integer between 1 and 3,653

**MasterUsername**

Optional

The master user name for the cluster. This name is used to connect to the database that is specified in as the value of **DBName**.

**Type:** String

**NextMaintenanceWindowStartTime**

Optional

Indicates the start of the next maintenance window.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
```
**NodeType**

Optional

The node type for the nodes in the cluster.

**Type:** String

**NumberOfNodes**

Optional

The number of compute nodes in the cluster.

**Type:** Number

**PendingActions**

Optional

A list of cluster operations that are waiting to start.

**Type:** Array of strings

**PendingModifiedValues (p. 423)**

Optional

List of changes to the cluster that are currently pending.

**Type:** Object

**PreferredMaintenanceWindow**

Optional

The weekly time range, in Universal Coordinated Time (UTC), during which system maintenance can occur.

**Type:** String

**Format:** <day>:HH:MM--<day>:HH:MM

For the day values, use mon | tue | wed | thu | fri | sat | sun

**Example**

"PreferredMaintenanceWindow": "sun:09:32-sun:10:02"

**PubliclyAccessible**

Optional

Whether the cluster can be accessed from a public network.

**Type:** Boolean

**ResizeInfo (p. 425)**

Optional

Information about the resize operation for the cluster.

**Type:** Object
**RestoreStatus (p. 425)**

Optional

Information about the status of a cluster restore action. Only applies to a cluster that was created by restoring a snapshot.

**Type:** Object

**SnapshotScheduleIdentifier**

Optional

A unique identifier for the cluster snapshot schedule.

**Type:** String

**SnapshotScheduleState**

Optional

The current state of the cluster snapshot schedule.

**Type:** String

**Valid values:** MODIFYING | ACTIVE | FAILED

**VpcId**

Optional

The identifier of the VPC that the cluster is in, if the cluster is in a VPC.

**Type:** String

**VpcSecurityGroups (p. 426)**

Optional

The list of VPC security groups that the cluster belongs to, if the cluster is in a VPC.

**Type:** Array of objects

**ClusterNodes**

The `ClusterNodes` object contains the list of nodes in the cluster.

Each node can have the following attributes.

**NodeRole**

Optional

The role of the node. A node might be a leader node or a compute node.

**Type:** String

**PrivateIPAddress**

Optional

The private IP address of the node.

**Type:** String
PublicIPAddress

Optional

The public IP address of the node.

Type: String

ClusterParameterGroups

The ClusterParameterGroups object contains the list of cluster parameter groups that are associated with this cluster.

Each parameter group can have the following attributes.

ClusterParameterStatusList

Optional

The list of parameter statuses.

Type: Array of objects

ParameterApplyStatus

Optional

The status of updates to the parameters.

Type: String

ParameterGroupName

Optional

The name of the parameter group.

Type: String

For each parameter status, ClusterParameterStatusList can have the following attributes.

ParameterApplyErrorDescription

Optional

The error that prevented the parameter from being applied to the database.

Type: String

ParameterApplyStatus

Optional

The status of the parameter. Indicates whether the parameter is in sync with the database, waiting for a cluster reboot, or encountered an error when it was applied.

Type: String

Valid values: in-sync | pending-reboot | applying | invalid-parameter | apply-deferred | apply-error | unknown-error

ParameterName

Optional
The name of the parameter.

**Type:** String

**ClusterSecurityGroups**

The `ClusterSecurityGroups` object contains the list of security groups that are associated with the cluster.

Each security group can have the following attributes.

**ClusterSecurityGroupName**

Optional

The name of the cluster security group.

**Type:** String

**Status**

Optional

The status of the cluster security group.

**Type:** String

**ClusterSnapshotCopyStatus**

The `ClusterSnapshotCopyStatus` object provides information about the destination Region and retention period for the cross-Region snapshot copy.

`ClusterSnapshotCopyStatus` can have the following attributes.

**DestinationRegion**

Optional

The destination Region that snapshots are automatically copied to when cross-Region snapshot copy is enabled.

**Type:** String

**ManualSnapshotRetentionPeriod**

Optional

The number of days that manual snapshots are retained in the destination Region after they are copied from a source Region.

If the value is -1, then the manual snapshot is retained indefinitely.

**Type:** Number

**Valid values:** Either -1 or an integer between 1 and 3,653

**RetentionPeriod**

Optional

The number of days to retain automated snapshots in the destination Region after they are copied from a source Region.
**Type**: Number

**SnapshotCopyGrantName**

Optional

The name of the snapshot copy grant.

**Type**: String

**DeferredMaintenanceWindows**

The `DeferredMaintenanceWindows` object contains a list of time windows during which maintenance was deferred.

Each time window can have the following attributes.

**DeferMaintenanceEndTime**

Optional

The end of the time window for which maintenance was deferred.

**Type**: String

**Format**: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
```

**DeferMaintenanceIdentifier**

Optional

The identifier of the maintenance window.

**Type**: String

**DeferMaintenanceStartTime**

Optional

The start of the time window for which maintenance was deferred.

**Type**: String

**Format**: Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Example**

```
```

**ElasticIpStatus**

The `ElasticIpStatus` object contains information about the status of the Elastic IP (EIP) address.

**ElasticIpStatus** can have the following attributes.
**ElasticIp**

Optional

The Elastic IP address for the cluster.

**Type:** String

**Status**

Optional

The status of the Elastic IP address.

**Type:** String

**Endpoint**

The `Endpoint` object describes the connection endpoint for the cluster.

`Endpoint` can have the following attributes.

**Address**

Optional

The DNS address of the cluster.

**Type:** String

**Port**

Optional

The port that the database engine listens on.

**Type:** Number

**HsmStatus**

The `HsmStatus` object provides information about whether the Amazon Redshift cluster finished applying any hardware changes to security module (HSM) settings that were specified in a modify cluster command.

`HsmStatus` can have the following attributes.

**HsmClientCertificateIdentifier**

Optional

The name of the HSM client certificate that the Amazon Redshift cluster uses to retrieve the data encryption keys that are stored in an HSM.

**Type:** String

**HsmConfigurationIdentifier**

Optional

The name of the HSM configuration that contains the information that the Amazon Redshift cluster can use to retrieve and store keys in an HSM.
Type: String

Status
Optional
Indicates whether the Amazon Redshift cluster has finished applying any HSM settings changes specified in a modify cluster command.

Type: String

Valid values: active | applying

IamRoles
The IamRoles object contains a list of IAM roles that the cluster can use to access other AWS services. Each role can have the following attributes.

ApplyStatus
Optional
The status of the IAM role's association with the cluster.

Type: String

Valid values: in-sync | adding | removing

IamRoleArn
Optional
The ARN of the IAM role.

Type: String

PendingModifiedValues
The PendingModifiedValues object contains a list of changes to the cluster that are currently pending.

PendingModifiedValues can have the following attributes.

AutomatedSnapshotRetentionPeriod
Optional
The pending or in-progress change to the automated snapshot retention period.

Type: String

ClusterIdentifier
Optional
The pending or in-progress change to the identifier for the cluster.

Type: String

ClusterType
Optional
The pending or in-progress change to the cluster type.

**Type**: String

**ClusterVersion**
Optional
The pending or in-progress change to the service version.

**Type**: String

**EncryptionType**
Optional
The encryption type for a cluster.

**Type**: String

**EnhancedVpcRouting**
Optional
Indicates whether to create the cluster with enhanced VPC routing enabled.

**Type**: Boolean

**MaintenanceTrackName**
Optional
The name of the maintenance track that the cluster changes to during the next maintenance window.

**Type**: String

**MasterUserPassword**
Optional
The pending or in-progress change to the master user password for the cluster.

**Type**: String

**NodeType**
Optional
The pending or in-progress change to the cluster's node type.

**Type**: String

**NumberOfNodes**
Optional
The pending or in-progress change to the number of nodes in the cluster.

**Type**: Number

**PubliclyAccessible**
Optional
The pending or in-progress change to whether the cluster can be connected to from the public network.
ResizeInfo

The ResizeInfo object contains information about the resize operation for the cluster. 

ResizeInfo can have the following attributes.

AllowCancelResize

Optional

Indicates whether the resize operation can be canceled.

Type: Boolean

ResizeType

Optional

The type of resize operation.

Type: String

Valid values: ClassicResize

RestoreStatus

The RestoreStatus object contains information about the status of a cluster restore action. It only applies if the cluster was created by restoring a snapshot.

RestoreStatus can have the following attributes.

CurrentRestoreRateInMegaBytesPerSecond

Optional

The number of megabytes per second being transferred from the backup storage. Returns the average rate for a completed backup.

This field is only updated when you restore to DC2 and DS2 node types.

Type: Number

ElapsedTimeInSeconds

Optional

The amount of time an in-progress restore has been running or the amount of time it took a completed restore to finish.

This field is only updated when you restore to DC2 and DS2 node types.

Type: Number

EstimatedTimeToCompletionInSeconds

Optional

The estimate of the time remaining before the restore is complete. Returns 0 for a completed restore.
This field is only updated when you restore to DC2 and DS2 node types.

**Type:** Number  
**ProgressInMegaBytes**  
Optional  
The number of megabytes that were transferred from snapshot storage.  
This field is only updated when you restore to DC2 and DS2 node types.  
**Type:** Number  
**SnapshotSizeInMegaBytes**  
Optional  
The size of the set of snapshot data that was used to restore the cluster.  
This field is only updated when you restore to DC2 and DS2 node types.  
**Type:** Number  
**Status**  
Optional  
The status of the restore action.  
**Type:** String  
**Valid values:** starting | restoring | completed | failed  

**VpcSecurityGroups**  
The `VpcSecurityGroups` object contains the list of VPC security groups that the cluster belongs to, if the cluster is in a VPC.  
Each security group can have the following attributes.

**Status**  
Optional  
The status of the VPC security group.  
**Type:** String  
**VpcSecurityGroupId**  
Optional  
The identifier of the VPC security group.  
**Type:** String  

**AwsS3AccountPublicAccessBlock**  
`AwsS3AccountPublicAccessBlock` provides information about the Amazon S3 Public Access Block configuration for accounts.
Example

```json
"AwsS3AccountPublicAccessBlock": { 
   "BlockPublicAcls": true, 
   "BlockPublicPolicy": true, 
   "IgnorePublicAcls": false, 
   "RestrictPublicBuckets": true 
}
```

**AwsS3AccountPublicAccessBlock** can have the following attributes.

**BlockPublicAcls**

Optional

Indicates whether to reject calls to update an S3 bucket if the calls include a public access control list (ACL).

**Type:** Boolean

**BlockPublicPolicy**

Optional

Indicates whether to reject calls to update the access policy for an S3 bucket or access point if the policy allows public access.

**Type:** Boolean

**IgnorePublicAcls**

Optional

Indicates whether Amazon S3 ignores public ACLs that are associated with an S3 bucket.

**Type:** Boolean

**RestrictPublicBuckets**

Optional

Indicates whether to restrict access to an access point or S3 bucket that has a public policy to only AWS service principals and authorized users within the S3 bucket owner's account.

**Type:** Boolean

**AwsS3Bucket**

The **AwsS3Bucket** object provides details about an Amazon S3 bucket.

Example

```json
"AwsS3Bucket": { 
   "OwnerId": "AIDACKCEVSQ6C2EXAMPLE", 
   "OwnerName": "s3bucketowner", 
   "CreatedAt": "2007-11-30T01:46:56.000Z", 
   "ServerSideEncryptionConfiguration": { 
      "Rules": [ 
      { 
         "ApplyServerSideEncryptionByDefault": { 
            "SSEAlgorithm": "AES256", 
```
"KMSMasterKeyId": "12345678-abcd-abcd-abcd-123456789012"
}

}
)
"BucketLifecycleConfiguration": {
"Rules": [
{
"AbortIncompleteMultipartUpload": {
"DaysAfterInitiation": 5
},
"ExpirationDate": "2021-11-10T00:00:00.000Z",
"ExpirationInDays": 365,
"ExpiredObjectDeleteMarker": false,
"Filter": {
"Predicate": {
"Operands": [
{
"Prefix": "tmp/",
"Type": "LifecyclePrefixPredicate"
},
{
"Tag": {
"Key": "ArchiveAge",
"Value": "9m"
},
"Type": "LifecycleTagPredicate"
}
],
"Type": "LifecycleAndOperator"
},
"ID": "Move rotated logs to Glacier",
"NoncurrentVersionExpirationInDays": -1,
"NoncurrentVersionTransitions": [
{
"Days": 2,
"StorageClass": "GLACIER"
}
],
"Prefix": "rotated/",
"Status": "Enabled",
"Transitions": [
{
"Date": "2020-11-10T00:00:00.000Z",
"Days": 100,
"StorageClass": "GLACIER"
}
]
}
}
"PublicAccessBlockConfiguration": {
"BlockPublicAcls": true,
"BlockPublicPolicy": true,
"IgnorePublicAcls": true,
"RestrictPublicBuckets": true,
}

AwsS3Bucket can have the following attributes.

**AccessControlList**

Optional
The access control list for the S3 bucket.

**Type:** String

**BucketLifecycleConfiguration** *(p. 430)*

Optional

The lifecycle configuration for objects in the S3 bucket.

**Type:** Object

**BucketLoggingConfiguration** *(p. 434)*

Optional

The logging configuration for the S3 bucket.

**Type:** Object

**BucketNotificationConfiguration** *(p. 434)*

Optional

The notification configuration for the S3 bucket.

**Type:** Object

**BucketWebsiteConfiguration** *(p. 435)*

Optional

The website configuration parameters for the S3 bucket.

**Type:** Object

**CreatedAt**

Optional

Indicates when the S3 bucket was created.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**OwnerId**

Optional

The canonical user ID of the owner of the S3 bucket.

**Type:** String

**Maximum length:** 64

**OwnerName**

Optional

The display name of the owner of the S3 bucket.

**Type:** String

**Maximum length:** 128
PublicAccessBlockConfiguration (p. 438)
Information about the Amazon S3 public access block configuration for the S3 bucket.

**Type:** Object

ServerSideEncryptionConfiguration (p. 438)
Optional
The encryption rules that are applied to the S3 bucket.

**Type:** Object

BucketLifecycleConfiguration
The BucketLifecycleConfiguration object contains the lifecycle configuration for the objects in the S3 bucket.

BucketLifecycleConfiguration consists of a Rules object. The Rules object is an array of objects. Each object defines a lifecycle rule.

Each rule in the Rules object can have the following attributes.

AbortIncompleteMultipartUpload (p. 431)
Optional
How Amazon S3 responds when a multipart upload is incomplete. Specifically, provides a number of days before Amazon S3 cancels the entire upload.

**Type:** Object

ExpirationDate
Optional
The date when objects are moved or deleted.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

ExpirationInDays
Optional
The length in days of the lifetime for objects that are subject to the rule.

**Type:** Integer

**Valid values:** Must be a non-zero positive integer.

ExpiredObjectDeleteMarker
Optional
Whether Amazon S3 removes a delete marker that has no noncurrent versions. If set to true, the delete marker is expired. If set to false, the policy takes no action.

If you provide ExpiredObjectDeleteMarker, you cannot provide ExpirationInDays or ExpirationDate.
**Filter (p. 432)**

Optional

Identifies the objects that a rule applies to.

**Id**

Optional

The unique identifier of the rule.

**Type:** String

**Maximum length:** 255 characters

**NoncurrentVersionExpirationInDays**

Optional

The number of days that an object is noncurrent before Amazon S3 can perform the associated action.

**Type:** Number

**NoncurrentVersionTransitions (p. 433)**

Optional

Transition rules that describe when noncurrent objects transition to a specified storage class.

**Type:** Array of objects

**Prefix**

Optional

A prefix that identifies one or more objects that the rule applies to.

**Type:** String

**Status**

Optional

The current status of the rule. Indicates whether the rule is currently being applied.

**Type:** String

**Valid values:** Enabled | Disabled

**Transitions (p. 433)**

Optional

Transition rules that indicate when objects transition to a specified storage class.

**Type:** Array of objects

**AbortIncompleteMultipartUpload**

The `AbortIncompleteMultipartUpload` object provides information about what Amazon S3 does when a multipart upload is incomplete.
AbortIncompleteMultipartUpload can have the following attributes.

**DaysAfterInitiation**
Optional
The number of days after which Amazon S3 cancels an incomplete multipart upload.

**Type**: Number

**Filter**
The Filter object identifies the objects that a rule applies to.
The Filter object contains a Predicate object.
The Predicate object has the following attributes.

**Operands**
Optional
The values to use for the filter.

**Type**: Array of objects.

**Type**
Optional
Indicates whether to use AND or OR to join the operands.

**Type**: String

**Valid values**: LifecycleAndOperator | LifecycleOrOperator

In the Operands object, an operand can be either a prefix operand or a tag operand. A prefix operand filters the objects based on the first characters of the object identifier. A tag operand filters the objects based on assigned tag values.

All operands have a **Type** attribute.

**Type**
Optional
The type of filter value.

**Type**: String

**Valid values**: LifecyclePrefixPredicate | LifecycleTagPredicate

A prefix operand also has the following attributes.

**Prefix**
Optional
Prefix text for matching objects.

**Type**: String
A tag operand also contains a `Tag` object. The `Tag` object identifies a tag key and value that is assigned to a matching object.

**Key**
- Optional
- The tag key.
  - **Type**: String

**Value**
- Optional
- The tag value.
  - **Type**: String

**NoncurrentVersionTransitions**

The `NoncurrentVersionTransitions` object contains a list of transition rules that describe when noncurrent objects transition to a specified storage class.

Each rule can have the following attributes.

**Days**
- Optional
- The number of days that an object is noncurrent before Amazon S3 can perform the associated action.
  - **Type**: Number

**StorageClass**
- Optional
- The class of storage to change the object to after the object is noncurrent for the specified number of days.
  - **Type**: String
  - **Valid values**: GLACIER | STANDARD_IA | ONEZONE_IA | INTELLIGENT_TIERING | DEEP_ARCHIVE

**Transitions**

The `Transitions` object provides a set of rules for when objects transition to specific storage classes.

Each rule can be based either on an exact date or a number of days.

Each rule can have the following attributes.

**Date**
- Optional
- Provides a date on which to transition objects to the specified storage class. If you provide `Date`, you cannot provide `Days`.
  - **Type**: String
**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Days**

Optional

The number of days after which to transition the object to the specified storage class. If you provide **Days**, you cannot provide **Date**.

**Type:** Number

**StorageClass**

Optional

The storage class to transition the object to.

**Type:** String

**Valid values:** GLACIER | STANDARD_IA | ONEZONE_IA | INTELLIGENT_TIERING | DEEP_ARCHIVE

**BucketLoggingConfiguration**

The **BucketLoggingConfiguration** object provides information about logging for the S3 bucket. **BucketLoggingConfiguration** can have the following attributes.

**DestinationBucketName**

Optional

The name of the S3 bucket where log files for the S3 bucket are stored.

**Type:** String

**LogFilePrefix**

Optional

The prefix added to log files for the S3 bucket.

**Type:** String

**BucketNotificationConfiguration**

The **BucketNotificationConfiguration** object contains the notification configuration for the S3 bucket.

**BucketNotificationConfiguration** contains a **Configurations** array of objects.

Each object in **Configurations** can have the following attributes.

**Destination**

Optional

The ARN of the Lambda function, Amazon SQS queue, or Amazon SNS topic that generates the notification.

**Type:** String
Events

Optional

The list of events that trigger a notification.

**Type:** Array of strings

Filter (p. 435)

Optional

The filters that determine which S3 buckets generate notifications.

**Type:** Object

**Type**

Optional

Indicates the type of notification. Notifications can be generated using Lambda functions, Amazon SQS queues or Amazon SNS topics.

**Type:** String

**Valid values:** LambdaConfiguration | QueueConfiguration | TopicConfiguration

Filter

The Filter object contains filtering information for the notifications. The filtering is based on Amazon S3 key names.

Filter contains an S3KeyFilter object. S3KeyFilter contains a FilterRules array of objects.

Each filter rule in FilterRules can have the following attributes.

Name

Optional

Indicates whether the filter is based on the prefix or suffix of the Amazon S3 key.

**Type:** String

**Valid values:** prefix | suffix

Value

Optional

The filter value.

**Type:** String

BucketWebsiteConfiguration

The BucketWebsiteConfiguration object contains website parameters for the S3 bucket.

BucketWebsiteConfiguration can have the following attributes.

ErrorDocument

Optional
The name of the error document for the website.

**Type:** String

**IndexDocumentSuffix**

Optional

The name of the index document for the website.

**Type:** String

**RedirectAllRequestsTo (p. 436)**

Optional

The redirect behavior for requests to the website.

**Type:** Object

**RoutingRules (p. 436)**

Optional

The rules for applying redirects for requests to the website.

**Type:** Array of objects

**RedirectAllRequestsTo**

The RedirectAllRequestsTo object specifies the redirect behavior for requests to the website.

RedirectAllRequestsTo can have the following attributes.

**Hostname**

Optional

The name of the host to redirect requests to.

**Type:** String

**Protocol**

Optional

The protocol to use when redirecting requests. By default, uses the same protocol as the original request.

**Type:** String

**Valid values:** http | https

**RoutingRules**

The RoutingRules array of objects contains the rules for redirecting requests to the website.

Each routing rule can have the following attributes:

**Condition**

Optional
Provides the condition that must be met in order to apply the routing rule.

**Type:** Object

**Redirect**

Optional

Provides the rules to redirect the request if the condition in `Condition` is met.

**Type:** Object

`Condition` can specify an HTTP error code, a key prefix value, or both. If both are specified, then the request is redirected only if it matches both conditions. `Condition` can have the following attributes.

**HttpErrorCodeReturnedEquals**

Optional

Indicates to redirect the request if the HTTP error code matches this value.

**Type:** String

**KeyPrefixEquals**

Optional

Indicates to redirect the request if the key prefix matches this value.

**Type:** String

**Redirect** can have the following attributes

**Hostname**

Optional

The host name to use in the redirect request.

**Type:** String

**HttpRedirectCode**

Optional

The HTTP redirect code to use in the response.

**Type:** String

**Protocol**

Optional

The protocol to use to redirect the request. By default, uses the protocol from the original request.

**Type:** String

**Valid values:** `http` | `https`

**ReplaceKeyPrefixWith**

Optional

The object key prefix to use in the redirect request.
Cannot be provided if ReplaceKeyWith is present.

**Type:** String

**ReplaceKeyWith**

Optional

The specific object key to use in the redirect request.

Cannot be provided if ReplaceKeyPrefixWith is present.

**Type:** String

**PublicAccessBlockConfiguration**

PublicAccessBlockConfiguration provides information about the Amazon S3 public access block configuration for the S3 bucket.

PublicAccessBlockConfiguration can have the following attributes.

**BlockPublicAcls**

Optional

Indicates whether to reject calls to update an S3 bucket if the calls include a public access control list (ACL).

**Type:** Boolean

**BlockPublicPolicy**

Optional

Indicates whether to reject calls to update the access policy for an S3 bucket or access point if the policy allows public access.

**Type:** Boolean

**IgnorePublicAcls**

Optional

Indicates whether Amazon S3 ignores public ACLs that are associated with an S3 bucket.

**Type:** Boolean

**RestrictPublicBuckets**

Optional

Indicates whether to restrict access to an access point or S3 bucket that has a public policy to only AWS service principals and authorized users within the S3 bucket owner's account.

**Type:** Boolean

**ServerSideEncryptionConfiguration**

The encryption rules that are applied to the S3 bucket.

Consists of a Rules object, which contains the ApplyServerSideEncryptionByDefault object. The ApplyServerSideEncryptionByDefault object specifies the default server-side encryption to apply to new objects in the bucket.
ApplyServerSideEncryptionByDefault can have the following attributes.

**KMSMasterKeyID**

Optional

AWS KMS customer master key (CMK) ID to use for the default encryption.

Can be either the key ID or the CMK ARN.

*Type: String*

**SSEAlgorithm**

Required

Server-side encryption algorithm to use for the default encryption.

*Type: String*

*Valid values: AES256 | aws:kms*

**AwsS3Object**

The **AwsS3Object** object provides information about an Amazon S3 object.

*Example*

```json
"AwsS3Object": {
  "ContentType": "text/html",
  "ETag": "\"30a6ec7ea9a9ad79c203d5a589c8b400\"",
  "LastModified": "2012-04-23T18:25:43.511Z",
  "ServerSideEncryption": "aws:kms",
  "SSEKMSEntityId": "arn:aws:kms:us-west-2:123456789012:key/4dff8393-e225-4793-a9a0-608ec069e5a7",
  "VersionId": "ws310urg0ojH_HH1l1xPE35P.MELYaYh"
}
```

**AWSS3Object** can have the following attributes.

**ContentType**

Optional

A standard MIME type describing the format of the object data.

*Type: String*

**ETag**

Optional

The opaque identifier assigned by a web server to a specific version of a resource found at a URL.

*Type: String*

**LastModified**

Optional

Indicates when the object was last modified.

*Type: String*
**Format**: Uses the date-time format specified in [RFC 3339 section 5.6, Internet Date/Time Format](https://tools.ietf.org/html/rfc3339). The value cannot contain spaces.

**ServerSideEncryption**

Optional

If the object is stored using server-side encryption, the value of the server-side encryption algorithm used when storing this object in Amazon S3.

**Type**: String

**SSEKMSKeyId**

Optional

The identifier of the symmetric customer managed key that was used for the object.

**Type**: String

**VersionId**

Optional

The version of the object.

**Type**: String

**AwsSecretsManagerSecret**

The `AwsSecretsManagerSecret` object provides details about a Secrets Manager secret.

**Example**

```json
"AwsSecretsManagerSecret": {
   "RotationRules": {
      "AutomaticallyAfterDays": 30
   },
   "RotationOccurredWithinFrequency": true,
   "KmsKeyId": "kmsKeyId",
   "RotationEnabled": true,
   "Deleted": false,
   "Name": "MyTestDatabaseSecret",
   "Description": "My test database secret"
}
```

`AwsSecretsManagerSecret` can have the following attributes.

**Deleted**

Optional

Whether the secret is deleted.

**Type**: Boolean

**Description**

Optional

The user-provided description of the secret.
**Type:** String

**Maximum length:** 2,048

**KmsKeyId**

Optional

The ARN, key ID, or alias of the AWS KMS key that is used to encrypt the SecretString or SecretBinary values for versions of this secret.

**Type:** String

**Name**

Optional

The name of the secret.

**Type:** String

**Minimum length:** 1

**Maximum length:** 256

**RotationEnabled**

Optional

Whether rotation is enabled.

**Type:** Boolean

**RotationLambdaArn**

Optional

The ARN of the Lambda function that rotates the secret.

**Type:** String

**RotationOccurredWithinFrequency**

Optional

Whether the rotation occurred within the specified rotation frequency.

**Type:** Boolean

**RotationRules**

Optional

Defines the rotation schedule for the secret.

**Type:** Object

**RotationRules.AutomaticallyAfterDays**

Optional

The number of days after the previous rotation to rotate the secret.

**Type:** Integer

**Minimum value:** 1
Maximum value: 1,000

**AwsSnsTopic**

The `AwsSnsTopic` object contains details about an Amazon SNS topic.

`AwsSnsTopic` can have the following attributes.

- **KmsKeyId**
  
  Optional
  
  The ID of an AWS managed key for Amazon SNS or a customer managed key.

  **Type:** String

- **Subscription**
  
  Optional
  
  List of subscription endpoints of an Amazon SNS topic.

  **Type:** Array of objects

- **TopicName**
  
  Optional
  
  The name of the topic.

  **Type:** String

- **Owner**
  
  Optional
  
  The subscription’s owner.

  **Type:** String

**Subscription**

The `Subscription` object in an `AwsSnsTopic` object describes the subscription endpoints of an Amazon SNS topic.

For each subscription endpoint, `Subscription` can have the following attributes.

- **Endpoint**
  
  Optional
  
  The subscription’s endpoint (format depends on the protocol).

  **Type:** String

- **Protocol**
  
  Optional
  
  The subscription’s protocol.

  **Type:** String
**AwsSqsQueue**

The **AwsSqsQueue** object contains information about an Amazon SQS queue.

**AwsSqsQueue** can have the following attributes.

- **KmsDataKeyReusePeriodSeconds**
  - Optional
  - The length of time, in seconds, for which Amazon SQS can reuse a data key to encrypt or decrypt messages before calling AWS KMS again.
  - **Type**: Integer

- **KmsMasterKeyId**
  - Optional
  - The ID of an AWS managed key for Amazon SQS or a custom KMS key.
  - **Type**: String

- **QueueName**
  - Optional
  - The name of the new queue.
  - **Type**: String

- **DeadLetterTargetArn**
  - Optional
  - The ARN of the dead-letter queue to which Amazon SQS moves messages after the value of `maxReceiveCount` is exceeded.
  - **Type**: String

**AwsSsmPatchCompliance**

The **AwsSsmPatchCompliance** object provides information about the state of a patch on an instance based on the patch baseline that was used to patch the instance.

**Example**

```json
AwsSsmPatchCompliance: {
  "Patch": {
    "ComplianceSummary": {
      "ComplianceType": "Patch",
      "CompliantCriticalCount": 0,
      "CompliantHighCount": 0,
      "CompliantInformationalCount": 0,
      "CompliantLowCount": 0,
      "CompliantMediumCount": 0,
      "CompliantUnspecifiedCount": 461,
      "ExecutionType": "Command",
      "NonCompliantCriticalCount": 0,
      "NonCompliantHighCount": 0,
      "NonCompliantInformationalCount": 0,
      "NonCompliantLowCount": 0,
    }
  }
```
The `AwsSsmPatchCompliance` contains a `Patch` object. The `Patch` object contains the `ComplianceSummary` object, which contains the compliance status information.

`ComplianceSummary` can have the following attributes:

**ComplianceType**
- **Optional**
- The type of resource for which the compliance was determined.
- For `AwsSsmPatchCompliance`, `ComplianceType` is `Patch`.

  **Type:** String

**CompliantCriticalCount**
- **Optional**
- For the patches that are compliant, the number that have a severity of `CRITICAL`.

  **Type:** Integer

**CompliantHighCount**
- **Optional**
- For the patches that are compliant, the number that have a severity of `HIGH`.

  **Type:** Integer

**CompliantInformationalCount**
- **Optional**
- For the patches that are compliant, the number that have a severity of `INFORMATIONAL`.

  **Type:** Integer

**CompliantLowCount**
- **Optional**
- For the patches that are compliant, the number that have a severity of `LOW`.

  **Type:** Integer

**CompliantMediumCount**
- **Optional**
- For the patches that are compliant, the number that have a severity of `MEDIUM`.

  **Type:** Integer
CompliantUnspecifiedCount
  Optional
  For the patches that are compliant, the number that have a severity of UNSPECIFIED.
  Type: Integer

ExecutionType
  Optional
  The type of execution that was used determine compliance.
  Type: String
  Maximum length: 50
  Valid values: Command

NonCompliantCriticalCount
  Optional
  For the patch items that are noncompliant, the number of items that have a severity of CRITICAL.
  Type: Integer

NonCompliantHighCount
  Optional
  For the patches that are noncompliant, the number that have a severity of HIGH.
  Type: Integer

NonCompliantInformationalCount
  Optional
  For the patches that are noncompliant, the number that have a severity of INFORMATIONAL.
  Type: Integer

NonCompliantLowCount
  Optional
  For the patches that are noncompliant, the number that have a severity of LOW.
  Type: Integer

NonCompliantMediumCount
  Optional
  For the patches that are noncompliant, the number that have a severity of MEDIUM.
  Type: Integer

NonCompliantUnspecifiedCount
  Optional
  For the patches that are noncompliant, the number that have a severity of UNSPECIFIED.
  Type: Integer
OverallSeverity

Optional

The highest severity for the patches.

**Type:** String

**Valid values:** CRITICAL | HIGH | MEDIUM | LOW | INFORMATIONAL | UNSPECIFIED

PatchBaselineId

Optional

The identifier of the patch baseline. The patch baseline lists the patches that are approved for installation.

**Type:** String

PatchGroup

Optional

The identifier of the patch group for which compliance was determined. A patch group uses tags to group EC2 instances that should have the same patch compliance.

**Type:** String

Status

Optional

The current patch compliance status.

**Type:** String

**Valid values:** COMPLIANT | NON_COMPLIANT | UNSPECIFIED_DATA

**AwsWafWebAcl**

The **AwsWafWebAcl** object provides details about an AWS WAF web ACL.

**Example**

```json
"AwsWafWebAcl": {
  "DefaultAction": "ALLOW",
  "Name": "MyWafAcl",
  "Rules": [
    {
      "Action": {
        "Type": "ALLOW"
      },
      "ExcludedRules": [
        {
          "RuleId": "5432a230-0113-5b83-bbb2-89375c5bfa98"
        }
      ],
      "OverrideAction": {
        "Type": "NONE"
      },
      "Priority": 1,
      "RuleId": "5432a230-0113-5b83-bbb2-89375c5bfa98",
      "Type": "REGULAR"
    }
  ]
}```
An `AwsWafWebAcl` object can have the following attributes.

**DefaultAction**

*Required*

The action to perform if none of the rules contained in the web ACL match. The action is specified by the `WafAction` object.

*Type:* `WafAction` object

**Name**

*Optional*

A friendly name or description of the web ACL. You can't change the name of a web ACL after you create it.

*Type:* `String`

*Minimum length:* 1

*Maximum length:* 128

**Rules (p. 447)**

*Required*

A list of rules for the web ACL.

*Type:* Array of objects

**WebAclId**

*Required*

A unique identifier for a web ACL.

*Type:* `String`

*Minimum length:* 1

*Maximum length:* 128

**Rule object**

The `Rules` array provides the list of rules for the web ACL.

Each rule object in the array can have the following attributes.

**Action**

*Optional*

Specifies the action that CloudFront or AWS WAF takes when a web request matches the conditions in the rule.

*Type:* `Object`
ExcludedRules

Optional

An array of rules to exclude from a rule group. This is applicable only when the ActivatedRule refers to a rule group.

Type: Array of objects

OverrideAction

Optional

Use the OverrideAction to test your RuleGroup.

Any rule in a rule group can potentially block a request. If you set the OverrideAction to None, the rule group blocks a request if any individual rule in the rule group matches the request and is configured to block that request.

However, if you first want to test the rule group, set the OverrideAction to Count. The rule group then overrides any block action specified by individual rules contained within the group. Instead of blocking matching requests, those requests are counted.

ActivatedRule|OverrideAction applies only when updating or adding a rule group to a web ACL. In this case, you do not use ActivatedRule|Action. For all other update requests, ActivatedRule|Action is used instead of ActivatedRule|OverrideAction.

Type: Object

Priority

Required

Specifies the order in which to evaluate the rules in a web ACL. Rules with a lower value for Priority are evaluated before rules with a higher value.

The value must be a unique integer.

If you add multiple rules to a web ACL, the values don't need to be consecutive.

Type: Integer

RuleId

Required

The identifier for a rule.

Type: String

Minimum length: 1

Maximum length: 128

Type

Optional

The rule type, either REGULAR, RATE_BASED, or GROUP.

The default is REGULAR.

Type: String
Valid values: REGULAR | RATE_BASED | GROUP

Each action can have the following attributes.

Type

Optional

Specifies how you want AWS WAF to respond to requests that match the settings in a rule.

- **ALLOW** - AWS WAF allows requests.
- **BLOCK** - AWS WAF blocks requests.
- **COUNT** - AWS WAF increments a counter of the requests that match all of the conditions in the rule. AWS WAF then continues to inspect the web request based on the remaining rules in the web ACL. You cannot specify **COUNT** for the default action for a web ACL.

Type: String

Valid values: BLOCK | ALLOW | COUNT

Each excluded rule can have the following attributes.

RuleId

Required

The unique identifier for the rule to exclude from the rule group.

Type: String

Minimum length: 1

Maximum length: 128.

Each override action for a rule can have the following attributes.

Type

Required

**COUNT** overrides the action specified by the individual rule within a rule group.

If set to **NONE**, the rule's action takes place.

Type: String

Valid values: NONE | COUNT

Container

Container details that are related to a finding.

Type: Object

Example:

```
"Container": {
```
The `Container` object can have the following attributes.

**ImageId**

Optional

The identifier of the image that is related to a finding.

**Type:** String

**Maximum length:** 128

**ImageName**

Optional

The name of the image that is related to a finding.

**Type:** String

**Maximum length:** 128

**LaunchedAt**

Optional

Indicates when the container was started.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Name**

Optional

The name of the container that is related to a finding.

**Type:** String

**Maximum length:** 128

**Other**

The `Other` subfield allows you to provide custom fields and values. You use the `Other` subfield in the following cases.

- The resource type does not have a corresponding subfield. To provide details for the resource, you use the `Other` subfield.
- The subfield for the resource type does not include all of the fields that you want to populate. In this case, use the subfield for the resource type to populate the available fields. Use the `Other` subfield to populate the fields that are not in the type-specific subfield.
- The resource type is not one of the provided types. In this case, you set `Resource.Type` to `Other`, and use the `Other` subfield to populate the details.
Type: Map of up to 50 key-value pairs

Each key-value pair must meet the following requirements.

- The key must contain fewer than 128 characters.
- The value must contain fewer than 1,024 characters.

Severity

Details about the severity of the finding.

For BatchImportFindings requests, finding providers should use the Severity object under FindingProviderFields (p. 174).

The finding severity does not consider the criticality of the involved assets or the underlying resource. Criticality is defined as the level of importance of the resources that are associated with the finding. For example, a resource that is associated with a mission critical application versus one that is associated with nonproduction testing. To capture information about resource criticality, use the Criticality field.

The finding must have either Label or Normalized populated. Label is the preferred attribute. Security Hub populates Normalized, but does not otherwise use it. If neither attribute is populated, then the finding is invalid.

The Severity object can have the following attributes.

Label

Optional

The severity value for the finding.

Type: Enum

Valid values: INFORMATIONAL | LOW | MEDIUM | HIGH | CRITICAL

At a high level, the Label values can be interpreted as follows.

- INFORMATIONAL – No issue was found.
- LOW – The issue does not require action on its own.
- MEDIUM – The issue must be addressed but not urgently.
- HIGH – The issue must be addressed as a priority.
- CRITICAL – The issue must be remediated immediately to prevent it from escalating.

For guidance on how to set the value of Label, see the section called “Guidance for assigning severity (AWS services and partners)” (p. 452).

Normalized (To be deprecated)

Optional

This attribute is no longer relevant. Security Hub populates the Normalized attribute, but does not otherwise use it. Instead of Normalized, use Label.

The normalized severity of a finding.

Type: Integer

The value of Normalized must be an integer between 0 and 100. Zero means that no severity applies, and 100 means that the finding has the maximum possible severity.
Original

Optional

The native severity from the finding product that generated the finding.

Type: String

Maximum length: 64

Product (Deprecated)

Optional

The native severity as defined by the finding product that generated the finding.

This is deprecated in favor of Original.

Type: Number

Format: Single-precision 32-bit IEEE 754 floating point number, restricted to finite values

Guidance for assigning severity (AWS services and partners)

For findings generated by AWS services and third-party partner products, the severity is based on the following.

• **Most severe** – Findings that are associated with actual data loss or denial of service

• **Second-most severe** – Findings that are associated with an active compromise but that do not indicate that data loss or other negative effects have occurred

• **Third-most severe** – Findings that are associated with issues that indicate potential for a future compromise

We recommend that you use the following guidance when translating findings' native severity scores to the value of `Severity.Label` for the ASFF.

• Informational findings. For example, a finding for a passed check or a sensitive data identification.

  Suggested severity: INFORMATIONAL

• Findings that are associated with issues that could result in future compromises. For example, vulnerabilities, configuration weaknesses, exposed passwords.

  This generally aligns to the Software and Configuration Checks namespace under a finding's type.

  Suggested severity: LOW

• Findings that are associated with issues that indicate an active compromise, but no indication that an adversary completed their objectives. For example, malware activity, hacking activity, or unusual behavior detection.

  This generally aligns to the Threat Detections and Unusual Behavior namespaces under a finding's type.

  Suggested severity: MEDIUM

• Findings that indicate that an adversary completed their objectives, such as active data loss or compromise or a denial of service.

  This generally aligns to the Effects namespace under a finding's type.
Suggested severity: HIGH or CRITICAL

How Security Hub maps Label and Normalized values

If a BatchImportFindings request for a new finding only provides Label or only provides Normalized, then Security Hub automatically populates the value of the other field.

Label is the preferred attribute. Security Hub populates Normalized, but does not otherwise use it.

Security Hub does not make any automatic updates based on changes from BatchUpdateFindings.

If BatchImportFindings provides Normalized and does not provide Label, Label is set automatically as follows.

<table>
<thead>
<tr>
<th>Normalized</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>INFORMATIONAL</td>
</tr>
<tr>
<td>1–39</td>
<td>LOW</td>
</tr>
<tr>
<td>40–69</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>70–89</td>
<td>HIGH</td>
</tr>
<tr>
<td>90–100</td>
<td>CRITICAL</td>
</tr>
</tbody>
</table>

If BatchImportFindings only provides Label and does not provide Normalized, Normalized is set automatically as follows.

<table>
<thead>
<tr>
<th>Label</th>
<th>Normalized</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFORMATIONAL</td>
<td>0</td>
</tr>
<tr>
<td>LOW</td>
<td>1</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>40</td>
</tr>
<tr>
<td>HIGH</td>
<td>70</td>
</tr>
<tr>
<td>CRITICAL</td>
<td>90</td>
</tr>
</tbody>
</table>

ThreatIntelIndicators

Threat intelligence details that are related to a finding.

Type: Array of up to five threat intelligence indicator objects

Example

"ThreatIntelIndicators": [
  {
    "Type": "IPV4_ADDRESS",
    "Value": "8.8.8.8",
    "Category": "BACKDOOR",
    "LastObservedAt": "2018-09-27T23:37:31Z",
    "Source": "Threat Intel Weekly",
  },
  ...
]
Each threat intelligence indicator object can have the following attributes.

**Category**

*Optional*

The category of a threat intel indicator.

*Type:* Enum

**Valid values:** BACKDOOR | CARD_STEALER | COMMAND_AND_CONTROL | DROP_SITE | EXPLOIT_SITE | KEYLOGGER

**LastObservedAt**

*Optional*

Indicates when the threat intelligence indicator was last observed.

*Type:* String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**Source**

*Optional*

The source of the threat intelligence.

*Type:* String

**Maximum length:** 64

**SourceUrl**

*Optional*

The URL for more details from the source of the threat intelligence.

*Type:* URL

**Type**

*Optional*

The type of a threat intelligence indicator.

*Type:* Enum

**Valid values:** DOMAIN | EMAIL_ADDRESS | HASH_MD5 | HASH_SHA1 | HASH_SHA256 | HASH_SHA512 | IPV4_ADDRESS | IPV6_ADDRESS | MUTEX | PROCESS | URL

**Value**

*Optional*

The value of a threat intelligence indicator.

*Type:* String

**Maximum length:** 512
Vulnerabilities

The **Vulnerabilities** object provides a list of vulnerabilities that are associated with the findings.

**Example**

```json
"Vulnerabilities" : [ 
  
  { "Cvss": [ 
    
    { "BaseScore": 4.7, 
      "BaseVector": "AV:N/AC:L/PR:N/UI:N/S:U/C:L/I:N/A:N", 
      "Version": "V3" 
    }, 
    
    { "BaseScore": 4.7, 
      "BaseVector": "AV:L/AC:M/Au:N/C:C/I:N/A:N", 
      "Version": "V2" 
    } 
  ], 
  "Id": "CVE-2020-12345", 
  "ReferenceUrls": [ 
    "http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2019-12418", 
    "http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2019-17563" 
  ], 
  "RelatedVulnerabilities": ["CVE-2020-12345"], 
  "Vendor": { 
    "Name": "Alas", 
    "Url": "https://alas.aws.amazon.com/ALAS-2020-1337.html", 
    "VendorCreatedAt": "2020-01-16T00:01:43Z", 
    "VendorSeverity": "Medium", 
    "VendorUpdatedAt": "2020-01-16T00:01:43Z" 
  }, 
  "VulnerablePackages": [ 
    
    { "Architecture": "x86_64", 
      "Epoch": "1", 
      "Name": "openssl", 
      "Release": "16.amzn2.0.3", 
      "Version": "1.0.2k" 
    } 
  ] 
] 
```

Each vulnerability can have the following attributes.

**Cvss (p. 456)**

Optional

Common Vulnerability Scoring System (CVSS) scores from the advisory that are related to the vulnerability.

**Type:** Array of objects

**Id**

Required

The identifier of the vulnerability.

**Type:** String

---

455
Maximum length: 32

**ReferenceUrls**

Optional

A list of URLs that provide additional information about the vulnerability.

**Type:** Array of strings

**RelatedVulnerabilities**

Optional

List of vulnerabilities that are related to this vulnerability. For each vulnerability, provide the vulnerability ID.

**Type:** Array of strings

**Vendor (p. 457)**

Optional

Information about the vendor that generates the vulnerability report.

**Type:** Object

**VulnerablePackages (p. 458)**

Optional

List of packages that have the vulnerability.

**Type:** Array of objects

**Cvss**

The `Cvss` object provides a list of CVSS scores for the vulnerability.

Each `CVSS` score can have the following attributes.

**Adjustments (p. 457)**

Optional

**Type:** Array of objects

**BaseScore**

Optional

The base CVSS score.

**Type:** Number

**BaseVector**

Optional

The base scoring vector for the CVSS score.

**Type:** String

**Source**

Optional
The origin of the original CVSS score and vector.

**Type:** String

**Version**

Optional

The version of CVSS for the CVSS score.

**Type:** String

**Adjustments**

Adjustments can have the following attributes.

**Metric**

Optional

The metric to adjust.

**Type:** String

**Reason**

Optional

The reason for the adjustment.

**Type:** String

**Minimum length:** 1

**Maximum length:** 512

**Vendor**

The Vendor object provides information about the vendor that generated the vulnerability advisory for the vulnerability.

The Vendor object can have the following attributes.

**Name**

Required

The name of the vendor.

**Type:** String

**Maximum length:** 32

**Url**

Optional

The URL of the vulnerability advisory.

**Type:** String

**VendorCreatedAt**

Optional
Indicates when the vulnerability advisory was created.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**VendorSeverity**

Optional

The severity that the vendor assigned to the vulnerability.

**Type:** String

**Maximum length:** 32

**VendorUpdatedAt**

Optional

Indicates when the vulnerability advisory was last updated.

**Type:** String

**Format:** Uses the date-time format specified in RFC 3339 section 5.6, Internet Date/Time Format. The value cannot contain spaces.

**VulnerablePackages**

The `VulnerablePackages` object provides the list of packages that have the vulnerability.

Each package can have the following attributes.

**Architecture**

Optional

The architecture used for the vulnerable package.

**Type:** String

**Epoch**

Optional

The epoch for the vulnerable package.

**Type:** String

**FilePath**

Optional

The file system path to the package manager inventory file.

**Type:** String

**Name**

Optional

The name of the vulnerable package.

**Type:** String
**PackageManager**

Optional

The source of the package.

**Type:** String

**Release**

Optional

The release for the vulnerable package.

**Type:** String

**Version**

Optional

The version of the vulnerable package.

**Type:** String

### Workflow

The **Workflow** object provides information about the status of the investigation into a finding.

It is not intended for finding providers. It is only to be used by customers and by remediation, orchestration, and ticketing tools used by customers.

The workflow status can only be updated using `BatchUpdateFindings`. Customers can also update it from the console. See the section called “Setting the workflow status for findings” (p. 103).

**Workflow** can have the following attributes.

#### Status

Optional

The status of your investigation into the finding. The workflow status is specific to an individual finding. It does not affect the generation of new findings. For example, setting the workflow status to **SUPPRESSED** or **RESOLVED** does not prevent a new finding for the same issue.

**Type:** Enum

**Valid values:** NEW | NOTIFIED | RESOLVED | SUPPRESSED

- **NEW** – The initial state of a finding, before it is reviewed.

  Security Hub also resets `Workflow.Status` from NOTIFIED or RESOLVED to NEW in the following cases:

  - `RecordState` changes from ARCHIVED to ACTIVE.
  - `Compliance.Status` changes from PASSED to either WARNING, FAILED, or NOT_AVAILABLE.
  - **NOTIFIED** – Indicates that you notified the resource owner about the security issue. Used when the initial reviewer is not the resource owner and needs intervention from the resource owner.
  - **RESOLVED** – The finding was reviewed and remediated and is now considered resolved. For findings from controls, if `Compliance.Status` is passed, then Security Hub automatically sets `Workflow.Status` to RESOLVED.
  - **SUPPRESSED** – Indicates that you reviewed the finding and do not believe that any action is needed. The finding is no longer updated.
Types taxonomy for ASFF

The following information describes the first three levels of the Types path. In the list, the top-level bullets are namespaces, the second-level bullets are categories, and the third-level bullets are classifiers. Only the Software and Configuration Checks namespace has defined classifiers.

- Namespaces
  - Categories
    - Classifiers

Finding providers must use the defined namespaces. The defined categories and classifiers are recommended for use, but are not required.

A finding provider might define a partial path for namespace/category/classifier. For example, the following finding types are all valid.

- TTPs
- TTPs/Defense Evasion
- TTPs/Defense Evasion/CloudTrailStopped

TTPs stands for tactics, techniques, and procedures. The TTP categories in the following list align to the MITRE ATT&CK Matrix™. Unusual Behaviors reflect general unusual behavior, such as general statistical anomalies, and are not aligned with a specific TTP. However, you could classify a finding with both Unusual Behaviors and TTPs finding types.

- Software and Configuration Checks
  - Vulnerabilities
    - CVE
  - AWS Security Best Practices
    - Network Reachability
    - Runtime Behavior Analysis
  - Industry and Regulatory Standards
    - CIS Host Hardening Benchmarks
    - CIS AWS Foundations Benchmark
    - PCI-DSS Controls
    - Cloud Security Alliance Controls
    - ISO 90001 Controls
    - ISO 27001 Controls
    - ISO 27017 Controls
    - ISO 27018 Controls
    - SOC 1
    - SOC 2
    - HIPAA Controls (USA)
    - NIST 800-53 Controls (USA)
    - NIST CSF Controls (USA)
    - IRAP Controls (Australia)
    - K-ISMS Controls (Korea)
    - MTCS Controls (Singapore)
    - FISC Controls (Japan)
- My Number Act Controls (Japan)
- ENS Controls (Spain)
- Cyber Essentials Plus Controls (UK)
- G-Cloud Controls (UK)
- C5 Controls (Germany)
- IT-Grundschutz Controls (Germany)
- GDPR Controls (Europe)
- TISAX Controls (Europe)
- Patch Management
- TTPs
  - Initial Access
  - Execution
  - Persistence
  - Privilege Escalation
  - Defense Evasion
  - Credential Access
  - Discovery
  - Lateral Movement
  - Collection
  - Command and Control
- Effects
  - Data Exposure
  - Data Exfiltration
  - Data Destruction
  - Denial of Service
  - Resource Consumption
- Unusual Behaviors
  - Application
  - Network Flow
  - IP address
  - User
  - VM
  - Container
  - Serverless
  - Process
  - Database
  - Data
- Sensitive Data Identifications
  - PII
  - Passwords
  - Legal
  - Financial
  - Security
  - Business
Product integrations in AWS Security Hub

AWS Security Hub can aggregate security finding data from several AWS services and from supported AWS Partner Network (APN) security solutions. This aggregation provides a comprehensive view of security and compliance across your AWS environment.

You can also send findings that are generated from your own custom security products.

**Important**
From the supported AWS and partner product integrations, Security Hub receives and consolidates only findings that are generated after you enable Security Hub in your AWS accounts. The service does not retroactively receive and consolidate security findings that were generated before you enabled Security Hub.

For details on how Security Hub charges for ingested findings, see Security Hub pricing.

**Topics**
- Managing product integrations (p. 462)
- Available AWS service integrations (p. 465)
- Available third-party partner product integrations (p. 468)
- Using custom product integrations to send findings to AWS Security Hub (p. 479)

Managing product integrations

The *Integrations* page in the AWS Management Console provides access to all of the available AWS and third-party product integrations. The AWS Security Hub API also provides operations to allow you to manage integrations.

**Note**
Some integrations are not available in all Regions. If an integration is not supported, it is not listed on the *Integrations* page. See also the section called "Integrations that are supported in China (Beijing) and China (Ningxia)" (p. 11) and the section called “Integrations that are supported in AWS GovCloud (US-East) and AWS GovCloud (US-West)” (p. 12).

Viewing and filtering the list of integrations (console)

From the *Integrations* page, you can view and filter the list of integrations.

**To view the list of integrations**

2. In the Security Hub navigation pane, choose *Integrations*.

On the *Integrations* page, the integrations with other AWS services are listed first, followed by the integrations with third-party products.

For each integration, the *Integrations* page provides the following information.

- The name of the company
• The name of the product
• A description of the integration
• The categories that the integration applies to
• How to enable the integration
• The current status of the integration

You can filter the list by entering text from the following fields.
• Company name
• Product name
• Integration description
• Categories

**Viewing information about product integrations (Security Hub API, AWS CLI)**

To view information about product integrations, you can use an API call or the AWS Command Line Interface. You can display information about all product integrations, or information about the product integrations that you have enabled.

**To view information about all available product integrations (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the `DescribeProducts` operation. To identify a specific product integration to return, use the `ProductArn` parameter to provide the integration ARN.
- **AWS CLI** – At the command line, run the `describe-products` command. To identify a specific product integration to return, provide the integration ARN.

```bash
aws securityhub describe-products --product-arn "<integrationARN>"
```

**Example**

```bash
aws securityhub describe-products --product-arn "arn:aws:securityhub:us-east-1::product/3coresec/3coresec"
```

**To view information about product integrations you have enabled (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the `ListEnabledProductsForImport` operation.
- **AWS CLI** – At the command line, run the `list-enabled-products-for-import` command.

```bash
aws securityhub list-enabled-products-for-import
```

**Enabling an integration**

On the **Integrations** page, each integration provides the required steps to enable the integration.

For most of the integrations with other AWS services, the only required step is to enable the other service. The integration information includes a link to the service home page. When you enable the other
service, a resource-level permission that allows Security Hub to receive findings from the service is then automatically created and applied.

For third-party product integrations, you may need to purchase the integration from the AWS Marketplace, and then configure the integration. The integration information provides links to perform those tasks.

If more than one version of a product is available in AWS Marketplace, select the version to subscribe to and then choose **Continue to Subscribe**. For example, some products offer a standard version and an AWS GovCloud (US) version.

When you enable a product integration, a resource policy is automatically attached to that product subscription. This resource policy defines the permissions that Security Hub needs to receive findings from that product.

**Disabling and enabling the flow of findings from an integration (console)**

On the **Integrations** page, for integrations that send findings, the **Status** information indicates whether you are currently accepting findings.

To stop accepting findings, choose **Stop accepting findings**.

To resume accepting findings, choose **Accept findings**.

**Disabling the flow of findings from an integration (Security Hub API, AWS CLI)**

To disable the flow of findings from an integration, you can use an API call or the AWS Command Line Interface.

To disable the flow of findings from an integration (Security Hub API, AWS CLI)

- **Security Hub API** – Use the `DisableImportFindingsForProduct` operation. To identify the integration to disable, you need the ARN of your subscription. To obtain the subscription ARNs for your enabled integrations, use the `ListEnabledProductsForImport` operation.
- **AWS CLI** – At the command line, run the `disable-import-findings-for-product` command.

```
aws securityhub disable-import-findings-for-product --product-subscription-arn <subscription ARN>
```

**Example**

```
aws securityhub disable-import-findings-for-product --product-subscription-arn
```

**Enabling the flow of findings from an integration (Security Hub API, AWS CLI)**

To enable the flow of findings from an integration, you can use an API call or the AWS Command Line Interface.
To enable the flow of findings from an integration (Security Hub API, AWS CLI)

- **Security Hub API** – Use the `EnableImportFindingsForProduct` operation. To enable Security Hub to receive findings from an integration, you need the product ARN. To obtain the ARNs for the available integrations, use the `DescribeProducts` operation.

- **AWS CLI**: At the command line, run the `enable-import-findings-for-product` command.

```
aws securityhub enable-import-findings-for-product --product-arn <integration ARN>
```

**Example**

```
```

### Viewing the findings from an integration

For integrations that you accept findings for (Status is Accepting findings), to view a list of findings, choose **See findings**.

The findings list shows the active findings for the selected integration that have a workflow status of NEW or NOTIFIED.

From the findings list, you can perform the following actions.

- Change the filters and grouping for the list (p. 99)
- View details for individual findings (p. 102)
- Update the workflow status of findings (p. 103)
- Send findings to custom actions (p. 104)

### Available AWS service integrations

Security Hub supports integrations with several AWS services.

**Note**

Some integrations are not available in Africa (Cape Town), Asia Pacific (Hong Kong), China (Beijing), China (Ningxia), Europe (Milan), AWS GovCloud (US-East), or AWS GovCloud (US-West). If an integration is not supported, it is not listed on the **Integrations** page.

See also the section called “Integrations that are supported in China (Beijing) and China (Ningxia)” (p. 11) and the section called “Integrations that are supported in AWS GovCloud (US-East) and AWS GovCloud (US-West)” (p. 12).

For these services, the integration allows the service to send findings to Security Hub:

- AWS Firewall Manager (p. 466)
- Amazon GuardDuty (p. 466)
- IAM Access Analyzer (p. 467)
- Amazon Inspector (p. 467)
- Amazon Macie (p. 467)
- AWS Systems Manager Patch Manager (p. 467)

The following integrations allow Security Hub to send findings to those services:
Available AWS service integrations

- Audit Manager (p. 466)
- AWS Chatbot (p. 466)
- Systems Manager Explorer and OpsCenter (p. 467)

Explorer and OpsCenter also update findings in Security Hub.

The Detective integration (p. 466) allows you to pivot from Security Hub to Detective to investigate a GuardDuty finding.

Here are the details about each AWS service integration.

**AWS Audit Manager**

Security Hub sends control findings to Audit Manager. These findings help Audit Manager users to prepare for audits.

To learn more about Audit Manager, see the [AWS Audit Manager User Guide](#). AWS Security Hub checks supported by AWS Audit Manager lists the controls for which Security Hub sends findings to Audit Manager.

**AWS Chatbot**

AWS Chatbot is an interactive agent that helps you to monitor and interact with your AWS resources in your Slack channels and Amazon Chime chat rooms.

Security Hub sends findings to AWS Chatbot.

To learn more about the AWS Chatbot integration with Security Hub, see the Security Hub integration overview in the [AWS Chatbot Administrator Guide](#).

**Amazon Detective**

Detective automatically collects log data from your AWS resources and uses machine learning, statistical analysis, and graph theory to help you visualize and conduct faster and more efficient security investigations.

The Security Hub integration with Detective allows you to pivot from Amazon GuardDuty findings in Security Hub into Detective. You can then use the Detective tools and visualizations to investigate them. The integration does not require any additional configuration in Security Hub or Detective.

For GuardDuty finding types, the finding details include an **Investigate in Detective** subsection. That subsection contains the link to Detective. See Pivoting to an entity profile or finding overview from Amazon GuardDuty or AWS Security Hub in the [Amazon Detective User Guide](#).

If a link does not work, then for troubleshooting advice, see Troubleshooting the pivot.

**AWS Firewall Manager**

Firewall Manager sends findings to Security Hub when a WAF policy for resources or a web ACL rule is not in compliance. Firewall Manager also sends findings when AWS Shield Advanced is not protecting resources, or when an attack is identified.

If you are already using Firewall Manager, Security Hub automatically enables this integration. You do not need to take any additional action to begin to receive findings from Firewall Manager.

To learn more about the integration, view the **Integrations** page in the Security Hub console.

To learn more about Firewall Manager, see the [AWS WAF Developer Guide](#).

**Amazon GuardDuty**

GuardDuty sends findings to Security Hub for all of the supported finding types.
New findings from GuardDuty are sent to Security Hub within 5 minutes. Updates to findings are sent based on the **Updated findings** setting for Amazon EventBridge in GuardDuty settings.

When you generate GuardDuty sample findings using the GuardDuty **Settings** page, Security Hub receives the sample findings and omits the prefix '[Sample]' in the finding type. For example, the sample finding type in GuardDuty "[SAMPLE] Recon:IAMUser/ResourcePermissions" is displayed as "Recon:IAMUser/ResourcePermissions" in Security Hub.

For more information about the GuardDuty integration, see **Integration with AWS Security Hub** in the *Amazon GuardDuty User Guide*.

**IAM Access Analyzer**

With IAM Access Analyzer, all findings are sent to Security Hub.

IAM Access Analyzer uses logic-based reasoning to analyze resource-based policies that are applied to supported resources in your account. IAM Access Analyzer generates a finding when it detects a policy statement that allows an external principal access to a resource in your account.

To learn more, see **Integration with AWS Security Hub** in the *IAM User Guide*.

**Amazon Inspector**

Amazon Inspector sends Amazon Inspector findings to Security Hub that are generated through assessment runs for all supported rules packages.

For more information about the integration, see **Integration with AWS Security Hub** in the *Amazon Inspector User Guide*.

**Amazon Macie**

A finding from Macie can indicate that there is a policy violation, or that sensitive data, such as personal identifying information (PII) and intellectual property, is present in the data that your organization stores in Amazon S3.

By default, Macie only sends policy violation findings to Security Hub. You can also configure the integration to send sensitive data findings to Security Hub. For more information, see **Amazon Macie integration with AWS Security Hub** in the *Amazon Macie User Guide*.

Security Hub can also receive findings from Macie Classic. Macie Classic sends basic and custom findings to Macie from the **S3 bucket properties** and **S3 objects** indices. Macie Classic does not send data classifications, or findings from the **CloudTrail data** index.

For more information, see **Locating and analyzing Macie Classic alerts** in the *Amazon Macie Classic User Guide*.

**AWS Systems Manager Explorer and OpsCenter**

AWS Systems Manager Explorer and OpsCenter receive findings from Security Hub, and update those findings in Security Hub.

Explorer provides you with a customizable dashboard, providing key insights and analysis into the operational health and performance of your AWS environment.

OpsCenter provides you with a central location to view, investigate, and resolve operational work items.

For more information about Explorer and OpsCenter, see **Operations management** in the *AWS Systems Manager User Guide*.

**AWS Systems Manager Patch Manager**

AWS Systems Manager Patch Manager sends findings to Security Hub when instances in a customer's fleet go out of compliance with their patch compliance standard.
Patch Manager automates the process of patching managed instances with both security related and other types of updates.

For more information about using Patch Manager, see AWS Systems Manager Patch Manager in the AWS Systems Manager User Guide.

Available third-party partner product integrations

AWS Security Hub is integrated with the following third-party products. For each provider, the list indicates how the integration interacts with findings. An integration can perform the following actions:

- Send findings that it generates to Security Hub.
- Receive findings from Security Hub.
- Update findings in Security Hub. Integrations that receive findings from Security Hub might also update those findings.

If applicable, the list also specifies the product ARN. Integrations that send findings to Security Hub always have an ARN.

Note
Some integrations are not available in Africa (Cape Town), China (Beijing), China (Ningxia), Europe (Milan), AWS GovCloud (US-East), or AWS GovCloud (US-West).
If an integration is not supported, it is not listed on the console Integrations page
See also the section called "Integrations that are supported in China (Beijing) and China (Ningxia)" (p. 11) and the section called "Integrations that are supported in AWS GovCloud (US-East) and AWS GovCloud (US-West)" (p. 12).

If you have a security solution and are interested in becoming a Security Hub partner, send an email to <securityhub-partners@amazon.com>. In the message, provide your company name, product name, AWS Partner Network (APN) tier level, and contact information.

To become a Security Hub partner, you must meet one of the following criteria:

- You are an AWS Select Tier Partner or above.
- You have joined the AWS ISV Partner Path, and the product that you use for Security Hub integration has completed an AWS Foundational Technical Review (FTR). The product is then granted a "Reviewed by AWS" badge.

To get started, read through the AWS Security Hub Partner Integration Guide. After you review the onboarding information, you can begin to work on your product manifest.

3CORESec – 3CORESec NTA

Integration type: Send

Product ARN: arn:aws:securityhub:<REGION>::product/3coresec/3coresec

3CORESec provides managed detection services for both on-premises and AWS systems. Their integration with Security Hub allows visibility into threats such as malware, privilege escalation, lateral movement, and improper network segmentation.

Partner documentation

Alcide – kAudit

Integration type: Send
Available third-party partner product integrations

**Product ARN:** `arn:aws:securityhub::<REGION>::product/alcide/alcide-kaudit`

Alcide is a Kubernetes security company that created a new kind of Kubernetes security solution. This new solution is designed specifically for complex multi-cluster Kubernetes environments. It works for all the stakeholders who operate and protect in this new era: DevOps, security teams and cloud architects.

**Partner documentation**

**Alert Logic – SIEMless Threat Management**

**Integration type:** Send

**Product ARN:** `arn:aws:securityhub::<REGION>::733251395267:product/alertlogic/althreatmanagement`

Get the right level of coverage: vulnerability and asset visibility, threat detection and incident management, AWS WAF, and assigned SOC analyst options.

**Partner documentation**

**Aqua Security – Aqua Cloud Native Security Platform**

**Integration type:** Send

**Product ARN:** `arn:aws:securityhub::<REGION>::product/aquasecurity/aquasecurity`

Aqua Cloud Native Security Platform (CSP) provides full lifecycle security for container-based and serverless applications, from your CI/CD pipeline to runtime production environments.

**Partner documentation**

**Aqua Security – Kube-bench**

**Integration type:** Send

**Product ARN:** `arn:aws:securityhub::<REGION>::product/aqua-security/kube-bench`

Kube-bench is an open-source tool that runs the Center for Internet Security (CIS) Kubernetes Benchmark against your environment.

**Partner documentation**

**Armor – Armor Anywhere**

**Integration type:** Send

**Product ARN:** `arn:aws:securityhub::<REGION>::679703615338:product/armordefense/armoranywhere`

Armor Anywhere delivers managed security and compliance for AWS.

**Atlassian - Jira Service Management**

**Integration type:** Receive and update

The AWS Service Management Connector for Jira sends findings from Security Hub to Jira. Jira issues are created based on the findings. When the Jira issues are updated, the corresponding findings are updated in Security Hub.

For an overview of the integration and how it works, watch the video AWS Security Hub – Bidirectional integration with Atlassian Jira Service Management.

**Partner documentation**
Atlassian – Opsgenie

Integration type: Receive

Opsgenie is a modern incident management solution for operating always-on services, empowering development and operations teams to plan for service disruptions and stay in control during incidents.

Integrating with Security Hub ensures that mission critical security-related incidents are routed to the appropriate teams for immediate resolution.

Partner documentation

AttackIQ – AttackIQ

Integration type: Send

Product ARN: arn:aws:securityhub:<REGION>::product/attackiq/attackiq-platform

AttackIQ Platform emulates real adversarial behavior aligned with the MITRE ATT&CK Framework to help validate and improve your overall security posture.

Partner documentation

Barracuda Networks – Cloud Security Guardian

Integration type: Send

Product ARN: arn:aws:securityhub:<REGION>::product/barracuda/cloudsecurityguardian

Barracuda Cloud Security Sentry helps organizations stay secure while building applications in, and moving workloads to, the public cloud.

BigID – BigID Enterprise

Integration type: Send

Product ARN: arn:aws:securityhub:<REGION>::product/bigid/bigid-enterprise

The BigID Enterprise Privacy Management Platform helps companies manage and protect sensitive data (PII) across all their systems.

Partner documentation

Blue Hexagon – Blue Hexagon for AWS

Integration type: Send

Product ARN: arn:aws:securityhub:<REGION>::product/blue-hexagon/blue-hexagon-for-aws

Blue Hexagon is a real time threat detection platform. It uses deep learning principles to detect known and unknown threats, including malware and network anomalies.

Partner documentation

Capitis Solutions – C2VS

Integration type: Send

Product ARN: arn:aws:securityhub:<REGION>::product/capitis/c2vs

C2VS is a customizable compliance solution designed to automatically identify your application-specific misconfigurations and their root cause.
Available third-party partner product integrations

**Partner documentation**

**Caveonix – Caveonix Cloud**

**Integration type:** Send and receive

**Product ARN:** arn:aws:securityhub:<REGION>::product/caveonix/caveonix-cloud

Caveonix Cloud is a SaaS risk mitigation platform that delivers automated compliance and hybrid-cloud security posture management for comprehensive workload protection.

**Partner documentation**

**Check Point – CloudGuard IaaS**

**Integration type:** Send

**Product ARN:** arn:aws:securityhub:<REGION>::product/checkpoint/cloudguard-iaas

Check Point CloudGuard easily extends comprehensive threat prevention security to AWS while protecting assets in the cloud.

**Partner documentation**

**Check Point – Dome9 Arc**

**Integration type:** Send

**Product ARN:** arn:aws:securityhub:<REGION>::product/checkpoint/dome9-arc

A SaaS platform that delivers verifiable cloud network security, advanced IAM protection, and comprehensive compliance and governance.

**Cloud Custodian – Cloud Custodian**

**Integration type:** Send and receive

**Product ARN:** arn:aws:securityhub:<REGION>::product/cloud-custodian/cloud-custodian

Cloud Custodian enables users to be well managed in the cloud. The simple YAML DSL allows easily defined rules to enable a well-managed cloud infrastructure that's both secure and cost optimized.

**Partner documentation**

**Cloud Storage Security – Antivirus for Amazon S3**

**Integration type:** Send

**Product ARN:** arn:aws:securityhub:<REGION>::product/cloud-storage-security/antivirus-for-amazon-s3

Cloud Storage Security provides cloud native anti-malware and antivirus scanning for Amazon S3 objects.

Antivirus for Amazon S3 offers real time and scheduled scans of objects and files in Amazon S3 for malware and threats. It provides visibility and remediation for problem and infected files.

**Partner documentation**

**cloudtamer.io – cloudtamer.io**

**Integration type:** Send and receive
Available third-party partner product integrations

**Product ARN:** arn:aws:securityhub:<REGION>::product/cloudtamerio/cloudtamerio

cloudtamer.io is a complete cloud governance solution for AWS. cloudtamer.io gives stakeholders visibility into cloud operations and helps cloud users manage accounts, control budget and cost, and ensure continuous compliance.

**CrowdStrike – CrowdStrike Falcon**

**Integration type:** Send

**Product ARN:** arn:aws:securityhub:<REGION>:517716713836:product/crowdstrike/crowdstrike-falcon

The CrowdStrike Falcon single, lightweight sensor unifies next-generation antivirus, endpoint detection and response, and 24/7 managed hunting through the cloud.

**CyberArk – Privileged Threat Analytics**

**Integration type:** Send

**Product ARN:** arn:aws:securityhub:<REGION>:749430749651:product/cyberark/cyberark-pta

Privileged Threat Analytics collect, detect, alert, and respond to high-risk activity and behavior of privileged accounts to contain in-progress attacks.

**DisruptOps, Inc. – DisruptOPS**

**Integration type:** Send and receive

**Product ARN:** arn:aws:securityhub:<REGION>::product/disruptops-inc/disruptops

The DisruptOps Security Operations Platform helps organizations maintain best security practices in your cloud through the use of automated guardrails.

**FireEye – FireEye Helix**

**Integration type:** Receive

FireEye Helix is a cloud-hosted security operations platform that allows organizations to take control of any incident from alert to fix.

**Forcepoint – Forcepoint CASB**

**Integration type:** Send

**Product ARN:** arn:aws:securityhub:<REGION>:365761988620:product/forcepoint/forcepoint-casb

Forcepoint CASB allows you to discover cloud application use, analyze risk, and enforce appropriate controls for SaaS and custom applications.

**Forcepoint – Forcepoint Cloud Security Gateway**

**Integration type:** Send

**Product ARN:** arn:aws:securityhub:<REGION>::product/forcepoint/forcepoint-cloud-security-gateway

Forcepoint Cloud Security Gateway is a converged cloud security service that provides visibility, control, and threat protection for users and data, wherever they are.
Available third-party partner product integrations

**Forcepoint – Forcepoint DLP**

Integration type: Send

**Product ARN:** `arn:aws:securityhub:<REGION>:365761988620:product/forcepoint/forcepoint-dlp`

Forcepoint DLP addresses human-centric risk with visibility and control everywhere your people work and everywhere your data resides.

**Forcepoint – Forcepoint NGFW**

Integration type: Send

**Product ARN:** `arn:aws:securityhub:<REGION>:365761988620:product/forcepoint/forcepoint-ngfw`

Forcepoint NGFW lets you connect your AWS environment into your enterprise network with the scalability, protection, and insights needed to manage your network and respond to threats.

**Guardicore – Centra 4.0**

Integration type: Send

**Product ARN:** `arn:aws:securityhub:<REGION>:324264561773:product/guardicore/guardicore`

Guardicore Centra provides flow visualization, micro-segmentation, and breach detection for workloads in modern data centers and clouds.

**Guardicore – Infection Monkey**

Integration type: Send

**Product ARN:** `arn:aws:securityhub:<REGION>:324264561773:product/guardicore/aws-infection-monkey`

Infection Monkey is an attack simulation tool designed to test networks against attackers.

**HackerOne – Vulnerability Intelligence**

Integration type: Send

**Product ARN:** `arn:aws:securityhub:<REGION>::product/hackerone/vulnerability-intelligence`

The HackerOne platform partners with the global hacker community to uncover the most relevant security issues. Vulnerability Intelligence enables your organization to go beyond automated scanning. It shares vulnerabilities that HackerOne ethical hackers have validated and provided steps to reproduce.

**Helecloud – Managed Security**

Integration type: Receive
HeleCloud is a Managed Services Provider, taking care of your AWS infrastructure so that you can focus on your core business.

**IBM – QRadar**

Integration type: Receive


IBM QRadar SIEM provides security teams with the ability to quickly and accurately detect, prioritize, investigate, and respond to threats.

Partner documentation

**McAfee – MVISION Cloud Native Application Protection Platform (CNAPP)**

Integration type: Send


McAfee MVISION Cloud Native Application Protection Platform (CNAPP) offers Cloud Security Posture Management (CSPM) and Cloud Workload Protection Platform (CWPP) for your AWS environment.

Partner documentation

**MicroFocus – MicroFocus Arcsight**

Integration type: Receive

ArcSight accelerates effective threat detection and response in real time, integrating event correlation and supervised and unsupervised analytics with response automation and orchestration.

Partner documentation

**NETSCOUT – NETSCOUT Cyber Investigator**

Integration type: Send

Product ARN: arn:aws:securityhub:us-east-1::product/netscout/netscout-cyber-investigator

NETSCOUT Cyber Investigator is an enterprise-wide network threat, risk investigation, and forensic analysis platform that helps to reduce the impact of cyber threats on businesses.

Partner documentation

**PagerDuty – PagerDuty**

Integration type: Receive

The PagerDuty digital operations management platform empowers teams to proactively mitigate customer-impacting issues by automatically turning any signal into the right insight and action.

AWS users can use the PagerDuty set of AWS integrations to scale their AWS and hybrid environments with confidence.

When coupled with Security Hub aggregated and organized security alerts, PagerDuty allows teams to automate their threat response process and quickly set up custom actions to prevent potential issues.

PagerDuty users who are Undertaking a cloud migration project can move quickly, while decreasing the impact of issues that occur throughout the migration lifecycle.
Available third-party partner product integrations

**Partner documentation**

**Palo Alto Networks – Cortex XSOAR**

**Integration type:** Receive

Cortex XSOAR is a Security Orchestration, Automation, and Response (SOAR) platform that integrates with your entire security product stack to accelerate incident response and security operations.

**Partner documentation**

**Palo Alto Networks – Prisma Cloud Compute**

**Integration type:** Send

**Product ARN:** `arn:aws:securityhub:<REGION>:496947949261:product/twistlock/twistlock-enterprise`

Prisma Cloud Compute is a cloud native cybersecurity platform that protects VMs, containers, and serverless platforms.

**Partner documentation**

**Palo Alto Networks – Prisma Cloud Enterprise**

**Integration type:** Send

**Product ARN:** `arn:aws:securityhub:<REGION>:188619942792:product/paloaltonetworks/redlock`

Protects your AWS deployment with cloud security analytics, advanced threat detection, and compliance monitoring.

**Partner documentation**

**Palo Alto Networks – VM-Series**

**Integration type:** Receive

Palo Alto VM-Series integration with Security Hub collects threat intelligence and sends it to the VM-Series next-generation firewall as an automatic security policy update that blocks malicious IP address activity.

**Partner documentation**

**Prowler**

**Integration type:** Send

**Product ARN:** `arn:aws:securityhub:<REGION>::product/prowler/prowler`

Prowler is an open source security tool to perform AWS checks related to security best practices, hardening, and continuous monitoring.

**Partner documentation**

**Qualys – Vulnerability Management**

**Integration type:** Send

**Product ARN:** `arn:aws:securityhub:<REGION>:805950163170:product/qualys/qualys-vm`

Qualys Vulnerability Management (VM) continuously scans and identifies vulnerabilities, protecting your assets.
Available third-party partner product integrations

**Partner documentation**

**Rackspace Technology – Cloud Native Security**

**Integration type:** Receive

Rackspace Technology provides managed security services on top of native AWS security products for 24x7x365 monitoring by Rackspace SOC, advanced analysis, and threat remediation.

**Rapid7 – InsightConnect**

**Integration type:** Receive

Rapid7 InsightConnect is a security orchestration and automation solution that enables your team to optimize SOC operations with little to no code.

**Rapid7 – InsightVM**

**Integration type:** Send

**Product ARN:** `arn:aws:securityhub:<REGION>:336818582268:product/rapid7/insightvm`

Rapid7 InsightVM provides vulnerability management for modern environments, allowing you to efficiently find, prioritize, and remediate vulnerabilities.

**RSA – RSA Archer**

**Integration type:** Receive

RSA Archer IT and Security Risk Management allows you to determine which assets are critical to your business, establish and communicate security policies and standards, detect and respond to attacks, identify and remediate security deficiencies, and establish clear IT risk management best practices.

**SecureCloudDB – SecureCloudDB**

**Integration type:** Send

**Product ARN:** `arn:aws:securityhub:<REGION>::product/secureclouddb/secureclouddb`

SecureCloudDB is a cloud native database security tool that provides comprehensive visibility of internal and external security postures and activity. It flags security violations and provides remediation on exploitable database vulnerabilities.

**ServiceNow – ITSM**

**Integration type:** Receive and update

The ServiceNow integration with Security Hub allows security findings from Security Hub to be viewed within ServiceNow ITSM. You can also configure ServiceNow to automatically create an incident or problem when it receives a finding from Security Hub.

Any updates to these incidents and problems result in updates to the findings in Security Hub.

For an overview of the integration and how it works, watch the video AWS Security Hub - Bidirectional integration with ServiceNow ITSM.
Slack – Slack

Integration type: Receive

Slack is a layer of the business technology stack that brings together people, data, and applications. It is a single place where people can effectively work together, find important information, and access hundreds of thousands of critical applications and services to do their best work.

Sophos – Server Protection

Integration type: Send


Sophos Server Protection defends the critical applications and data at the core of your organization, using comprehensive defense-in-depth techniques.

Splunk – Splunk Enterprise

Integration type: Receive


Splunk uses Amazon CloudWatch Events as a consumer of Security Hub findings. Send your data to Splunk for advanced security analytics and SIEM.

Splunk – Splunk Phantom

Integration type: Receive

With the Splunk Phantom application for AWS Security Hub, findings are sent to Phantom for automated context enrichment with additional threat intelligence information or to perform automated response actions.

StackRox – StackRox Kubernetes Security

Integration type: Send

Product ARN: arn:aws:securityhub:<REGION>::product/stackrox/kubernetes-security

StackRox helps enterprises secure their container and Kubernetes deployments at scale by enforcing their compliance and security policies across the entire container life cycle – build, deploy, and run.

Sumo Logic – Machine Data Analytics

Integration type: Send


Sumo Logic is a secure, machine data analytics platform that enables development and security operations teams to build, run, and secure their AWS applications.
Available third-party partner product integrations

**Partner documentation**

**Symantec – Cloud Workload Protection**

**Integration type:** Send

**Product ARN:** arn:aws:securityhub:<REGION>:754237914691:product/symantec-corp/symantec-cwp

Cloud Workload Protection provides complete protection for your Amazon EC2 instances with antimalware, intrusion prevention, and file integrity monitoring.

**Partner documentation**

**Sysdig – Sysdig Secure for cloud**

**Integration type:** Send

**Product ARN:** arn:aws:securityhub:<REGION>::product/sysdig/sysdig-secure-for-cloud

Sysdig Secure for cloud supports asset discovery, risk management, Cloud Security Posture Management (CSPM), compliance, automatic vulnerability scanning for Amazon Elastic Container Registry (ECR) and Fargate, and threat detection based on CloudTrail. You can deploy all of these as a single security platform.

**Partner documentation**

**Tenable – Tenable.io**

**Integration type:** Send

**Product ARN:** arn:aws:securityhub:<REGION>:422820575223:product/tenable/tenable-io

Accurately identify, investigate, and prioritize vulnerabilities. Managed in the cloud.

**Partner documentation**

**ThreatModeler**

**Integration type:** Receive

ThreatModeler is an automated threat modeling solution that secures and scales the enterprise software and cloud development life cycle.

**Partner documentation**

**Turbot – Turbot**

**Integration type:** Send and receive

**Product ARN:** arn:aws:securityhub:<REGION>:453761072151:product/turbot/turbot

Turbot ensures that your cloud infrastructure is secure, compliant, scalable, and cost optimized.

**Partner documentation**

**Vectra AI – Cognito Detect**

**Integration type:** Send

**Product ARN:** arn:aws:securityhub:<REGION>::product/vectra-ai/cognito-detect

Vectra is transforming cybersecurity by applying advanced AI to detect and respond to hidden cyberattackers before they can steal or cause damage.
Partner documentation

Using custom product integrations to send findings to AWS Security Hub

In addition to findings generated by the integrated AWS services and third-party products, Security Hub can also consume findings that are generated by other custom security products you may use.

You can send these findings into Security Hub manually using the `BatchImportFindings` API operation.

When setting up the custom integration, use the guidelines and checklists provided in the Security Hub Partner Integration Guide.

Requirements and recommendations for sending findings from custom security products

Before you can successfully invoke the `BatchImportFindings` API operation, you must enable Security Hub.

You must provide the finding details using the section called "Finding format" (p. 105). For the findings from your custom integration, use the following requirements and recommendations.

**Setting the product ARN**

When you enable Security Hub, a default product Amazon Resource Name (ARN) for Security Hub is generated in your current account.

This product ARN has the following format: `arn:aws:securityhub:<region>:<account-id>:product/<account-id>/default`. For example, `arn:aws:securityhub:us-west-2:123456789012:product/123456789012/default`.

Use this product ARN as the value for the `ProductArn` attribute when invoking the `BatchImportFindings` API operation.

**Defining the product name**

We recommend that you use the `ProductFields` attribute to define the name of the product that generates the findings that you send to Security Hub.

For example.

```
"ProductFields":
{
  "ProviderName": "<name of the product>",
  "ProviderVersion": "<product version>",
}
```

**Setting the finding IDs**

You must supply, manage, and increment your own finding IDs, using the `Id` attribute.

Each new finding must have a unique finding ID.

**Setting the account ID**

You must specify your own account ID, using the `AwsAccountId` attribute.
Setting the created at and updated at dates

You must supply your own timestamps for the `CreatedAt` and `UpdatedAt` attributes.

Updating findings from custom products

In addition to sending new findings from custom products, you can also use the `BatchImportFindings` API operation to update existing findings from custom products.

To update existing findings, use the existing finding ID (via the `Id` attribute). Resend the full finding with the appropriate information updated in the request, including a modified `UpdatedAt` timestamp.

Example custom integrations

You can use the following example custom product integrations as a guide to create your own custom solution.

Importing AWS Config rules

You can use an AWS CloudFormation template to import AWS Config rules into Security Hub.

To learn more, see How to import AWS Config rules evaluations as findings in Security Hub.

Sending findings from Chef InSpec scans to Security Hub

You can create an AWS CloudFormation template that runs a Chef InSpec compliance scan and then sends findings to Security Hub.

For more details, see Continuous compliance monitoring with Chef InSpec and AWS Security Hub.

Sending container vulnerabilities detected by Trivy to Security Hub

You can create an AWS CloudFormation template that uses AquaSecurity Trivy to scan containers for vulnerabilities, and then sends those vulnerability findings to Security Hub.

For more details, see How to build a CI/CD pipeline for container vulnerability scanning with Trivy and AWS Security Hub.
Security standards and controls in AWS Security Hub

AWS Security Hub consumes, aggregates, and analyzes security findings from various supported AWS and third-party products.

Security Hub also generates its own findings as the result of running automated and continuous checks against the rules in a set of supported security standards. These checks provide a readiness score and identify specific accounts and resources that require attention.

Security Hub provides controls for the following standards.

- CIS AWS Foundations (p. 502)
- Payment Card Industry Data Security Standard (PCI DSS) (p. 553)
- AWS Foundational Security Best Practices (p. 607)

For information on Security Hub pricing for security checks, see Security Hub pricing.

Topics
- How AWS Security Hub runs and uses security checks (p. 481)
- Viewing and managing security standards (p. 491)
- Viewing and managing controls (p. 495)
- Available security standards in AWS Security Hub (p. 502)

How AWS Security Hub runs and uses security checks

For each enabled control, AWS Security Hub runs security checks. A security check determines whether your resources are in compliance with the control requirements.

Some checks run on a regular schedule. Other checks only run when there is a change to the resource state. See the section called “Schedule for running security checks” (p. 483).

Many security checks use AWS Config managed or custom rules to establish the compliance requirements. To run these checks, you must have AWS Config enabled. See the section called “How Security Hub uses AWS Config rules to run security checks” (p. 482). Others use custom Lambda functions, which are managed by Security Hub and are not visible to customers.

For each check, Security Hub creates or updates a finding. See the section called “Generating and updating control findings” (p. 483).

Security Hub uses the findings to assess your security posture for each control and across an entire standard. See the section called “Determining the control status” (p. 489) and the section called “Determining the standard security score” (p. 490).
AWS Security Hub User Guide
How Security Hub uses AWS Config rules to run security checks

Topics
- How Security Hub uses AWS Config rules to run security checks (p. 482)
- Schedule for running security checks (p. 483)
- Generating and updating control findings (p. 483)
- Determining the overall status of a control from its findings (p. 489)
- Determining the security score for a security standard (p. 490)

How Security Hub uses AWS Config rules to run security checks

To run security checks on your environment’s resources, AWS Security Hub either uses steps specified by the standard, or uses specific AWS Config rules. Some rules are managed rules, which are managed by AWS Config. Other rules are custom rules that Security Hub develops.

AWS Config rules that Security Hub uses for controls are referred to as service-linked rules, because they are enabled and controlled by the Security Hub service.

To enable checks against these AWS Config rules, every account that has Security Hub enabled must first enable AWS Config, and enable resource recording for all resources. See the section called “Enabling AWS Config” (p. 7).

How Security Hub generates the service-linked rules

For every control that uses an AWS Config service-linked rule, Security Hub creates instances of the required rules in your AWS environment.

These service-linked rules are specific to Security Hub. It creates these service-linked rules even if other instances of the same rules already exist.

For AWS Config managed rules, the quota is 250 rules per account per Region. The service-linked AWS Config rules that Security Hub creates do not count towards that quota. You can enable a security standard even if you already have 250 AWS Config managed rules in your account.

For service-linked rules, the quota is 250 rules per account per Region. This is in addition to the 250-rule quota on AWS Config managed rules.

Viewing details about the AWS Config rules for controls

For controls that use AWS Config managed rules, the control description includes a link to the AWS Config rule details for the associated AWS Config rule. See CIS AWS Foundations Benchmark controls (p. 503), the section called “PCI DSS controls” (p. 554), and the section called “Required AWS Config resources” (p. 608). Custom rules are not linked from the control description.

For findings generated from those controls, the finding details include a link to the associated AWS Config rule. Note that to navigate to the AWS Config rule from finding details, you must also have an IAM permission in the selected account to navigate to AWS Config.

The finding details on the Findings page, Insights page, and Integrations page include a Rules link to the AWS Config rule details. See the section called “Viewing finding details (console)” (p. 102).

On the control details page, the Investigate column of the finding list contains a link to the AWS Config rule details. See the section called “Viewing the AWS Config rule for a finding resource” (p. 501).
Schedule for running security checks

After you enable a security standard, AWS Security Hub begins to run all checks within two hours. Most checks begin to run within 25 minutes. Until a control completes its first run of checks, its status is No data.

After the initial check, the schedule for each control can be either periodic or change triggered.

- Periodic checks run automatically within 12 hours after the most recent run. You cannot change the periodicity.
- Change-triggered checks run when the associated resource changes state. Even if the resource does not change state, the updated at time for change-triggered checks is refreshed every 18 hours. This helps to indicate that the control is still enabled.

In general, Security Hub uses change-triggered rules whenever possible. For a resource to use a change-triggered rule, it must support AWS Config configuration items.

For a control that is based on a managed AWS Config rule, the control description includes a link to the rule description in the AWS Config Developer Guide. That description includes whether the rule is change triggered or periodic.

Checks that use Security Hub custom Lambda functions are always periodic.

Generating and updating control findings

When it runs checks against the enabled controls for the enabled security standards, AWS Security Hub generates findings. These findings use the AWS Security Finding Format (ASFF). Note that if the finding size exceeds the maximum of 240 KB, then the Resource.Details object is removed. For findings for controls that use AWS Config rules, you can view the resource details on the AWS Config console.

Security Hub normally charges for each security check for a control. However, if multiple controls use the same AWS Config rule, then Security Hub only charges once for each check against the AWS Config rule. It generates separate findings for each control based on the check.

For example, the AWS Config rule iam-password-policy is used by multiple controls in the CIS AWS Foundations Benchmark standard and by IAM.7 in the Foundational Security Best Practices standard. Each time Security Hub runs a check against that AWS Config rule, it generates a separate finding for each related control, but only charges once for the check.

Compliance

For findings generated by security checks, the Compliance (p. 172) field in the ASFF contains the control-related findings details. The Compliance (p. 172) field includes the following information.

RelatedRequirements

The list of related requirements for the control. The requirements are from the third-party security framework for the control, such as the Payment Card Industry Data Security Standard.

Status

The result of the most recent check that Security Hub ran for a given control. The results of the previous checks are kept in an archived state for 90 days.

StatusReasons

Contains a list of reasons for the value of Compliance.Status. For each reason, StatusReasons includes the reason code and a description.
The following table lists the available status reason codes and descriptions.

<table>
<thead>
<tr>
<th>Reason code</th>
<th>Compliance.Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLOUDTRAIL_METRIC_FILTER_NOT_VALEUILED</td>
<td>FAILED</td>
<td>The multi-Region CloudTrail trail does not have a valid metric filter.</td>
</tr>
<tr>
<td>CLOUDTRAIL_METRIC_FILTERS_NOT_PRESENED</td>
<td>FAILED</td>
<td>Metric filters are not present for the multi-Region CloudTrail trail.</td>
</tr>
<tr>
<td>CLOUDTRAIL_MULTI_REGION_NOT_PRESENTED</td>
<td>FAILED</td>
<td>The account does not have a multi-Region CloudTrail trail with the required configuration.</td>
</tr>
<tr>
<td>CLOUDTRAIL_REGION_INVAILDE</td>
<td>WARNING</td>
<td>Multi-Region CloudTrail trails are not in the current Region.</td>
</tr>
<tr>
<td>CLOUDWATCH_ALARM_ACTIONS_NOT_VALEUILED</td>
<td>FAILED</td>
<td>No valid alarm actions are present.</td>
</tr>
<tr>
<td>CLOUDWATCH_ALARMS_NOT_PRESENT</td>
<td>FAILED</td>
<td>CloudWatch alarms do not exist in the account.</td>
</tr>
<tr>
<td>CONFIG_ACCESS_DENIED</td>
<td>NOT_AVAILABLE</td>
<td>AWS Config access denied.</td>
</tr>
<tr>
<td></td>
<td>AWS Config status is ConfigError</td>
<td>Verify that AWS Config is enabled and has been granted sufficient permissions.</td>
</tr>
<tr>
<td>CONFIG_EVALUATIONS_EMPTY</td>
<td>PASSED</td>
<td>AWS Config evaluated your resources based on the rule.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The rule did not apply to the AWS resources in its scope, the specified resources were deleted, or the evaluation results were deleted.</td>
</tr>
<tr>
<td>CONFIG_RETURNS_NOT_APPLICABLE</td>
<td>NOT_AVAILABLE</td>
<td>The compliance status is NOT_AVAILABLE because AWS Config returned a status of Not Applicable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AWS Config does not provide the reason for the status. Here are some possible reasons for the Not Applicable status:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The resource was removed from the scope of the AWS Config rule.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The AWS Config rule was deleted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The resource was deleted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The AWS Config rule logic can produce a Not Applicable status.</td>
</tr>
<tr>
<td>CONFIG_RULE_EVALUATION_ERROR</td>
<td>NOT_AVAILABLE</td>
<td>This reason code is used for several different types of evaluation errors.</td>
</tr>
<tr>
<td></td>
<td>AWS Config status is ConfigError</td>
<td>The description provides the specific reason information.</td>
</tr>
<tr>
<td>Reason code</td>
<td>Compliance.Status</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>CONFIG_RULE_NOT_FOUND</td>
<td>NOT_AVAILABLE</td>
<td>The AWS Config rule is in the process of being created.</td>
</tr>
<tr>
<td>INTERNAL_SERVICE_ERROR</td>
<td>NOT_AVAILABLE</td>
<td>An unknown error occurred.</td>
</tr>
<tr>
<td>LAMBDA_CUSTOM_RUNTIME_DETAILS_NOT_AVAILABLE</td>
<td>FAILED</td>
<td>Security Hub is unable to perform a check against a custom Lambda runtime.</td>
</tr>
<tr>
<td>S3_BUCKET_CROSS_ACCOUNT_CROSS_REGION</td>
<td>WARNING</td>
<td>The finding is in a WARNING state, because the S3 bucket that is associated with this rule is in a different Region or account. This rule does not support cross-Region or cross-account checks. It is recommended that you disable this control in this Region or account. Only run it in the Region or account where the resource is located.</td>
</tr>
<tr>
<td>SNS_SUBSCRIPTION_NOT_PRESENT</td>
<td>FAILED</td>
<td>The CloudWatch Logs metric filters do not have a valid Amazon SNS subscription.</td>
</tr>
</tbody>
</table>
### Reason code

<table>
<thead>
<tr>
<th>Reason code</th>
<th>Compliance.Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNS_TOPIC_CROSS_ACCOUNT</td>
<td>WARNING</td>
<td>The finding is in a WARNING state. The SNS topic associated with this rule is owned by a different account. The current account cannot obtain the subscription information. The account that owns the SNS topic must grant the current account the sns:ListSubscriptionsByTopic permission for the SNS topic.</td>
</tr>
<tr>
<td>SNS_TOPIC_CROSS_ACCOUNT_CROSS_REGION</td>
<td>WARNING</td>
<td>The finding is in a WARNING state because the SNS topic that is associated with this rule is in a different Region or account. This rule does not support cross-Region or cross-account checks. It is recommended that you disable this control in this Region or account. Only run it in the Region or account where the resource is located.</td>
</tr>
<tr>
<td>SNS_TOPIC_INVALID</td>
<td>FAILED</td>
<td>The SNS topic associated with this rule is invalid.</td>
</tr>
<tr>
<td>THROTTLING_ERROR</td>
<td>NOT_AVAILABLE</td>
<td>The relevant API operation exceeded the allowed rate.</td>
</tr>
</tbody>
</table>

### ProductFields

For findings generated by security checks, **ProductFields** includes the following fields:

**StandardsGuideArn or StandardsArn**

The ARN of the standard associated with the control.

For the CIS AWS Foundations Benchmark standard, the field is **StandardsGuideArn**.

For PCI DSS and AWS Foundational Security Best Practices standards, the field is **StandardsArn**.

**StandardsGuideSubscriptionArn or StandardsSubscriptionArn**

The ARN of the account's subscription to the standard.

For the CIS AWS Foundations Benchmark standard, the field is **StandardsGuideSubscriptionArn**.

For the PCI DSS and AWS Foundational Security Best Practices standards, the field is **StandardsSubscriptionArn**.

**RuleId or ControlId**

The identifier of the control.

For the CIS AWS Foundations Benchmark standard, the field is **RuleId**.
For the PCI DSS and AWS Foundational Security Best Practices standards, the field is `ControlId`.

- **RecommendationUrl**
  The URL to the remediation information for the control.

- **RelatedAWSResources:0/name**
  The name of the resource associated with the finding.

- **RelatedAWSResource:0/type**
  The type of resource associated with the control.

- **StandardsControlArn**
  The ARN of the control.

- **aws/securityhub/ProductName**
  For control-based findings, the product name is Security Hub.

- **aws/securityhub/CompanyName**
  For control-based findings, the company name is AWS.

- **aws/securityhub/annotation**
  A description of the issue uncovered by the control.

- **aws/securityhub/FindingId**
  The identifier of the finding.

### Severity

The severity assigned to a Security Hub control identifies the importance of the control. It determines the severity label assigned to the control findings.

### Severity criteria

The severity of a control is determined based on an assessment of the following criteria:

- **How difficult is it for a threat actor to take advantage of the configuration weakness associated with the control?**
  The difficulty is determined by the amount of sophistication or complexity that is required to use the weakness to carry out a threat scenario.

- **How likely is it that the weakness will lead to a compromise of your AWS accounts or resources?**
  A compromise of your AWS accounts or resources means that confidentiality, integrity, or availability of your data or AWS infrastructure is damaged in some way.

  The likelihood of compromise indicates how likely it is that the threat scenario will result in a disruption or breach of your AWS services or resources.

As an example, consider the following configuration weaknesses:

- IAM user access keys are not rotated every 90 days.
- IAM root access key exists.

Both weaknesses are equally difficult for an adversary to take advantage of. In both cases, the adversary can use credential theft or some other method to acquire a user key. They can then use it to access your resources in an unauthorized way.
However, the likelihood of a compromise is much higher if the threat actor acquires the root user access key, because the root key gives them greater access. As a result, the root user key weakness has a higher severity.

The severity does not take into account the criticality of the underlying resource. Criticality is the level of importance of the resources that are associated with the finding. For example, a resource that is associated with a mission critical application is more critical than one that is associated with nonproduction testing. To capture resource criticality information, use the `Criticality` field of the AWS Security Finding Format (ASFF).

The following table maps the difficulty to exploit and the likelihood of compromise to the security labels.

<table>
<thead>
<tr>
<th>Compromise highly likely</th>
<th>Compromise likely</th>
<th>Compromise unlikely</th>
<th>Compromise highly unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very easy to exploit</strong></td>
<td>Critical</td>
<td>Critical</td>
<td>High</td>
</tr>
<tr>
<td><strong>Somewhat easy to exploit</strong></td>
<td>Critical</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Somewhat difficult to exploit</strong></td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Very difficult to exploit</strong></td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Severity definitions**

The severity labels are defined as follows.

**Critical – The issue should be remediated immediately to avoid it escalating.**

For example, an open S3 bucket is considered a critical severity finding. Because so many actors scan for open S3 buckets, data in exposed S3 buckets is likely to be discovered and accessed by others.

In general, resources that are publicly accessible are considered critical security issues. You should treat critical findings with the utmost urgency. You also should consider the criticality of the resource.

**High – The issue must be addressed as a near-term priority.**

For example, if a default VPC security group is open to inbound and outbound traffic, it is considered high severity. It is somewhat easy for a threat actor to compromise a VPC using this method. It is also likely that the threat actor will be able to disrupt or exfiltrate resources once they are in the VPC.

Security Hub recommends that you treat a high severity finding as a near-term priority. You should take immediate remediation steps. You also should consider the criticality of the resource.

**Medium – The issue should be addressed as a mid-term priority.**

For example, lack of encryption for data in transit is considered a medium severity finding. It requires a sophisticated man-in-the-middle attack to take advantage of this weakness. In other words, it is somewhat difficult. It is likely that some data will be compromised if the threat scenario is successful.

Security Hub recommends that you investigate the implicated resource at your earliest convenience. You also should consider the criticality of the resource.
Low – The issue does not require action on its own.

For example, failure to collect forensics information is considered low severity. This control can help to prevent future compromises, but the absence of forensics does not lead directly to a compromise.

You do not need to take immediate action on low severity findings, but they can provide context when you correlate them with other issues.

Informational – No configuration weakness was found.

In other words, the status is PASSED.

There is no recommended action. Informational findings help customers to demonstrate that they are in a compliant state.

Rules for updating control findings

A subsequent check against a given rule might generate a new result. For example, the status of "Avoid the use of the root account" could change from FAILED to PASSED. In that case, a new finding is generated that contains the most recent result.

If a subsequent check against a given rule generates a result that is identical to the current result, the existing finding is updated. No new finding is generated.

Security Hub automatically archives findings from controls if the associated resource is deleted, the resource does not exist, or the control is disabled. A resource might no longer exist because the associated service is not currently used. The findings are archived automatically based on one of the following criteria:

- The finding was not updated in three days.
- The associated AWS Config evaluation returned NOT_APPLICABLE.

Determining the overall status of a control from its findings

Security Hub uses the Compliance.Status value from each control's findings to determine the overall status of the control. The overall status is displayed in the control list for a standard and on the control details page.

For administrator accounts, the status for each control is the aggregated status across both the administrator account and all of the member accounts.

Security Hub calculates the control status every 24 hours. The calculation uses the findings from the previous 24 hours. On the standard details page and the control details page, Security Hub displays a timestamp to indicate when the status was last updated.

Values for Compliance.Status

Compliance.Status is assigned one of the following values.

- PASSED – Automatically sets the Security Hub Workflow.Status to RESOLVED.

  If Compliance.Status for a finding changes from PASSED to FAILED, WARNING, or NOT_AVAILABLE; and Workflow.Status was either NOTIFIED or RESOLVED; then Security Hub automatically sets Workflow.Status to NEW.

- FAILED
• **WARNING** – Indicates that the check was completed, but Security Hub cannot determine whether the resource is in a PASSED or FAILED state.

• **NOT_AVAILABLE** – Indicates that the check cannot be completed because a server failed, the resource was deleted, or the result of the AWS Config evaluation was NOT_APPLICABLE.

If the AWS Config evaluation result was NOT_APPLICABLE, then Security Hub automatically archives the finding.

### Values for the control status

When it calculates the overall status, Security Hub ignores findings that have a Workflow.Status of SUPPORTED.

The available values for the overall status are as follows:

- **Passed** – Indicates that all findings have a Compliance.Status of PASSED.
- **Failed** – Indicates that at least one finding has a Compliance.Status of FAILED.
- **Unknown** – Indicates that at least one finding has a Compliance.Status of WARNING or NOT_AVAILABLE. No findings are FAILED.
- **No data** – Indicates that there are no findings for the control. For example, a new control has this status until it begins to generate findings. A control also has this status if all of the findings are SUPPORTED.

### Determining the security score for a security standard

On the **Security standards** page, each enabled standard displays a security score from 0–100%. The standard details page also displays the overall security score.

Security Hub updates the calculated security score every 24 hours. Security Hub displays a timestamp to indicate when the current security score was last updated.

When the standard is first enabled, Security Hub cannot calculate the initial security score until the standard status is READY. The initial security score is available within 24 hours after that. To see the current status of the standard, use the GetEnabledStandards API operation.

### How the security score is calculated

The security score represents the proportion of Passed controls to enabled controls. The score is displayed as a percentage. For example, if 10 controls are enabled for a standard, and seven of those controls are in a Passed state, then the security score is 70%.

The security score calculation omits enabled controls that do not have any findings (overall status is No data). For example, a standard has 12 controls enabled. Six of those controls are in a Passed state. Two controls have no data. Because the calculation omits the controls without data, the security score is 60%.

### Security score for administrator accounts

For the administrator account, the security score for a standard is an aggregated score across both the administrator account and all of the member accounts.

### Security scores on the Summary page

On the **Summary** page, the **Security standards** card displays the security scores for each enabled standard. It also displays a consolidated security score that represents the proportion of passed controls to enabled controls across all of the enabled standards.
Viewing and managing security standards

Security standards provide a set of related controls to determine compliance with regulatory frameworks, industry best practices, or company policies.

For a standard in Security Hub, you can view the list of controls and determine whether to enable or disable a standard for your account. You can also see the overall security score for the standard.

Administrator accounts see aggregated scores and statuses across their member accounts.

For the list of available standards and their controls, see the section called “Available standards” (p. 502).

For information about how to manage individual controls in a standard, see the section called “Viewing and managing controls” (p. 495).

Topics

- Disabling or enabling a security standard (p. 491)
- Viewing details for a standard (p. 493)

Disabling or enabling a security standard

You can disable or enable each security standard.

Remember that Security Hub is Regional. When you enable or disable a security standard, it is enabled or disabled only in the current Region or in the Region that you specify in an API request.

When you disable a security standard, the following occurs:

- The checks for its controls are no longer performed.
- No additional findings are generated for its controls.
- Existing findings are archived automatically after three days.
- The related AWS Config rules that Security Hub created are removed.

This normally occurs within a few minutes after you disable the standard, but might take longer.

If the first request to delete the AWS Config rules fails, then Security Hub retries every 12 hours. However, if you disabled Security Hub or you do not have any other standards enabled, then Security Hub cannot retry the request, meaning that it cannot delete the AWS Config rules. If this occurs, and you need to have AWS Config rules removed, contact AWS Support.

Before you enable any security standards, make sure that you have enabled AWS Config and configured resource recording. See the section called “Enabling AWS Config” (p. 7).

When you enable a security standard, all of the controls for that standard are enabled by default. You can then disable individual controls. See the section called “Disabling and enabling individual controls” (p. 497).

When a standard is first enabled, Security Hub cannot calculate the initial aggregated security score until the standard status is READY. After that, the initial security score is available within 24 hours. To see the current status of the standard, use the GetEnabledStandards API operation.

Disabling a security standard (console)

On the Security standards page, each enabled standard includes an option to disable the standard.
To disable a standard

2. Confirm that you are using Security Hub in the Region in which you want to disable the standard.
4. For the standard you want to disable, choose Disable.

Disabling a security standard (Security Hub API, AWS CLI)

To disable a security standard, you can use an API call or the AWS Command Line Interface.

To disable a security standard (Security Hub API, AWS CLI)

- **Security Hub API** – Use the BatchDisableStandards operation. For each standard to disable, you provide the ARN of your subscription to the standard. To get the subscription ARNs for your enabled standards, use the GetEnabledStandards operation.
- **AWS CLI** – At the command line, run the batch-disable-standards command.

```bash
aws securityhub batch-disable-standards --standards-subscription-arns <subscription ARN>
```

Example

```bash
aws securityhub batch-disable-standards --standards-subscription-arns "arn:aws:securityhub:us-west-1:123456789012:subscription/aws-foundational-security-best-practices/v/1.0.0"
```

Enabling a security standard (console)

On the Security standards page, each disabled standard includes an option to enable the standard.

To enable a security standard (console)

2. Confirm that you are using Security Hub in the Region in which you want to enable the standard.
4. For the standard you want to enable, choose Enable.

Enabling a security standard (Security Hub API, AWS CLI)

To enable a security standard, you can use an API call or the AWS Command Line Interface.

To enable a security standard (Security Hub API, AWS CLI)

- **Security Hub API** – Use the BatchEnableStandards operation. To identify a standard to enable, you must provide the standard ARN. To obtain the standard ARN, use the DescribeStandards operation.
- **AWS CLI** – At the command line, run the batch-enable-standards command.

```bash
aws securityhub batch-enable-standards --standards-subscription-requests '{"StandardsArn": "<standard ARN>"}'
```
Example

```
aws securityhub batch-enable-standards --standards-subscription-requests
  "{"StandardsArn": "arn:aws:securityhub:us-east-1::standards/aws-foundational-security-
  beat-practices/v/1.0.0"}"
```

Viewing details for a standard

The details page for a standard contains the list of controls in the standard. It also shows the overall score for the standard.

You can view and filter the list of controls, and perform the following actions:

- **Enable or disable a control** (p. 497)
- **View the details for a control** (p. 496). The control details page includes the list of findings for the control. See the section called “Viewing and taking action on control findings” (p. 499).

Displaying the details page for an enabled standard (console)

From the [Security standards](#) page, you can display a details page for the standard. You can only display details for an enabled standard. You cannot display details for a disabled standard.

This also applies to administrator accounts. Administrator accounts that do not have a standard enabled for their individual account cannot view the details for that standard. They cannot see the aggregated security score and status information across the member accounts that do have the standard enabled.

To display the list of controls for an enabled standard (console)

2. In the Security Hub navigation pane, choose **Security standards**.
3. For the standard that you want to display the details for, choose **View results**.

Information on the standard details page

At the top of the details page is the overall score for the standard. The overall score is the percentage of passed controls relative to the number of enabled controls that have data. Security Hub updates the overall score every 24 hours. A timestamp indicates when the score was most recently updated. See the section called “Determining the standard security score” (p. 490).

Next to the overall score is a chart that summarizes the control statuses. The chart shows the percentage of failed and passed controls. When you pause on the chart, the pop-up displays the following:

- The number of failed controls for each severity
- The number of controls with a status of **Unknown**
- The number of passed controls

At the bottom of the details page is the list of controls for the standard. The control list is organized and sorted based on the current overall status of the control and the severity assigned to each control. Security Hub updates the control statuses every 24 hours. A timestamp on each tab indicates when the control statuses were most recently updated. See the section called “Determining the control status” (p. 489).
For administrator accounts, the score and statuses are aggregated across both their account and their member accounts.

**Filtering and sorting the controls**

The control list for a standard uses tabs to provide built-in filtering for the list based on the control status. You can also filter the list based on the ID, title, and severity.

The **All enabled** tab lists all of the enabled controls for the standard. By default, the list is sorted so that failed controls are at the top of the list. This sort order calls attention to controls that need to be addressed.

The lists on the **Failed**, **Unknown**, **No data**, and **Passed** tabs are filtered to only include enabled controls with that status.

The **Disabled** tab contains the list of disabled controls.

The list of enabled and disabled controls for an individual account is updated in real time to reflect which controls are enabled and disabled. The overall status and the number of passed and failed checks for each control is updated every 24 hours.

For each control, the control list contains the following information:

- The overall status of the control (see the section called “Determining the control status” (p. 489))
- The severity assigned to the control
- The control identifier and title
- The number of failed active findings and the total number of active findings. If applicable, the **Failed checks** column also lists the number of findings with a status of **Unknown**.

In addition to the built-in filters on each tab, you can filter the lists using values from the following fields:

- Status
- Severity
- ID
- Title

You can sort each list using any of the columns. By default, the **All enabled** tab is sorted so that failed controls are at the top of the list. This helps you to immediately focus on issues that require remediation.

Within each status, and on the remaining tabs, the controls are sorted by default in descending order by severity. In other words, critical controls are first, followed by high, then medium, then low severity controls.

**Additional tabs for administrator accounts**

For an administrator account, the lists on the first six tabs contain aggregated information across both the administrator account and their member accounts. For example, a control is listed on the **All enabled** tab if at least one of the accounts has the control enabled.

All of the information on these tabs is updated every 24 hours.

Administrator accounts also see the following additional tabs:

- **Enabled controls for this account** lists the controls that are enabled for the administrator account.
• **Disabled controls for this account** lists the controls that are disabled for the administrator account.

These lists are updated in real time to reflect the controls that the administrator account has enabled or disabled.

**Downloading the control list**

You can download the current page of the control list to a `.csv` file.

If you filtered the control list, then the downloaded file only includes the controls that match the filter.

If you chose a specific control from the list, then the downloaded file only includes that control.

To download the current page of the control list or the currently selected control, choose **Download**.

**Viewing the controls for an enabled standard (Security Hub API, AWS CLI)**

To display information about the controls for an enabled standard, you can use an API call or the AWS Command Line Interface.

**To display the controls for an enabled standard (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the `DescribeStandardsControls` operation. To identify the standard to display the controls for, you provide the ARN of your subscription to the control. To get the subscription ARNs for your enabled standards, use the `GetEnabledStandards` operation.

- **AWS CLI** – At the command line, run the `describe-standards-controls` command.

```bash
aws securityhub describe-standards-controls --standards-subscription-arn <subscription ARN>
```

**Example**

```bash
aws securityhub describe-standards-controls --standards-subscription-arn "arn:aws:securityhub:us-east-1:123456789012:subscription/aws-foundational-security-best-practices/v/1.0.0"
```

**Viewing and managing controls**

A control is a security check against a specific resource. From Security Hub, you can view the control details. The control details include the control status and the findings generated for each control.

You can enable or disable a control for your account. You can also view details for and take action on the findings generated by the control.

For administrator accounts, the control details show the status and findings across all of the member accounts.

**Topics**

- Viewing details for a control (p. 496)
- Enabling new controls automatically (p. 496)
• Disabling and enabling individual controls (p. 497)
• Viewing and taking action on control findings (p. 499)

Viewing details for a control

For each control, you can display a page of useful details.

To display details for a control

2. Display the controls for an enabled standard. (p. 493)
3. From the controls list, choose the control name.

The top of the details page provides an overview of the control and its current status. The overall control status is calculated every 24 hours. Administrator accounts see an aggregated status across the administrator account and the member accounts.

For controls in the Payment Card Industry Data Security Standard (PCI DSS) and the CIS AWS Foundations standard, the Related requirements tab lists the related requirements from within the framework.

From the details page, you can disable or enable the control. See the section called “Disabling and enabling individual controls” (p. 497).

The bottom of the details page contains information about the active findings for the control. Control findings are generated by security checks against the control. The control finding list does not include archived findings.

The finding list uses tabs that display different subsets of the list. On most of the tabs, the finding list shows findings that have a workflow status of NEW, NOTIFIED, or RESOLVED. A separate tab displays SUPPRESSED findings.

For each finding, the list provides access to details about the finding and the associated resource. You can also set the workflow status of each finding and send findings to custom actions.

See the section called “Viewing and taking action on control findings” (p. 499).

Enabling new controls automatically

AWS Security Hub regularly adds new controls to standards. When you first enable Security Hub, it automatically enables new controls as they are added. This only applies to enabled standards. Security Hub does not enable new controls when they are added to a standard that you disabled.

You can choose whether to automatically enable new controls. If you do not automatically enable new controls, then you must enable them manually. See the section called “Disabling and enabling individual controls” (p. 497).

Choosing whether to automatically enable new controls (console)

The General tab of the Settings page includes a setting to control whether to automatically enable new controls.
To choose whether to enable new controls for enabled standards

2. In the navigation pane, choose Settings, and then choose the General tab.
4. Toggle Auto-enable new controls in standards I have enabled.
5. Choose Save.

Choosing whether to automatically enable new controls (Security Hub API, AWS CLI)

To configure whether to automatically enable new controls, you can use an API call or the AWS Command Line Interface.

To configure whether to automatically enable new controls (Security Hub API, AWS CLI)

- Security Hub – Use the UpdateSecurityHubConfiguration operation. To automatically enable controls, set AutoEnableControls to true. To not automatically enable controls, set AutoEnableControls to false.
- AWS CLI – At the command line, run the update-security-hub-configuration command. To automatically enable new controls, specify --auto-enable-controls. To not enable new controls, specify --no-auto-enable-controls.

```
aws securityhub update-security-hub-configuration --auto-enable-controls | --no-auto-enable-controls
```

Example

```
aws securityhub update-security-hub-configuration --auto-enable-controls
```

Disabling and enabling individual controls

When you enable a standard, all of the controls for that standard are enabled by default. You can then disable and enable specific controls within an enabled standard.

When you disable a control, the following occurs:

- The check for the control is no longer performed.
- No additional findings are generated for that control.
- Existing findings are archived automatically after three days.
- The related AWS Config rules that Security Hub created are removed.

It can be useful to turn off security checks for controls that are not relevant to your environment. For example, you might use a single Amazon S3 bucket to log your CloudTrail logs. If so, you can turn off controls related to CloudTrail logging in all accounts and Regions except for the account and Region where the centralized S3 bucket is located. Disabling irrelevant controls reduces the number of irrelevant findings. It also removes the failed check from the readiness score for the associated standard.

Remember that Security Hub is Regional. When you disable or enable a control, it is disabled only in the current Region or in the Region that you specify in an API request.
Also, when you disable an entire standard, Security Hub does not track which controls were disabled. If you subsequently enable the standard again, all of the controls are enabled. For more information, see the section called “Disabling or enabling a security standard” (p. 491).

Disabling a control (console)

From the Security Hub console, you can disable controls from the control list on the standard details page or from the control details page.

To disable a control (console)

2. Confirm that you are using Security Hub in the Region in which you want to disable the control.
4. For the standard that you want to disable a control for, choose View results.
5. If you are an administrator account, choose Enabled for this account.

Other accounts can enable controls from any tab other than the Disabled tab.
6. Do one of the following:
   • In the control list, choose the control to disable. Then choose Disable.
   • Choose the control title. Then on the control details page, choose Disable.
7. Enter a reason why you are disabling the control. This can help others in your organization understand why the control is disabled.
8. Choose Disable.

Disabling a control (Security Hub API, AWS CLI)

To disable a control, you can use an API call or the AWS Command Line Interface.

To disable a control (Security Hub API, AWS CLI)

• Security Hub API – Use the UpdateStandardsControl operation. To identify the control to disable, you provide the control ARN. To retrieve the ARNs for the controls in a standard, use the DescribeStandardsControls operation.
• AWS CLI – At the command line, run the update-standards-control command.

```bash
aws securityhub update-standards-control --standards-control-arn <control ARN> --control-status "DISABLED" --disabled-reason "<description of reason to disable>
```

Example

```bash
aws securityhub update-standards-control --standards-control-arn "arn:aws:securityhub:us-east-1:123456789012:control/aws-foundational-security-best-practices/v/1.0.0/ACM.1" --control-status "DISABLED" --disabled-reason "Not applicable for my service"
```

Enabling a control (console)

On the standard details page, the disabled controls are displayed on the Disabled tab.

For administrator accounts, the Disabled tab contains an aggregated list across accounts. The disabled controls for the individual administrator account are displayed on the Disabled for this account tab.
You can enable a control from the controls list on the **Disabled** tab, or from the control details page.

**To enable a disabled control (console)**

2. Confirm that you are using Security Hub in the Region in which you want to disable the control.
3. In the Security Hub navigation pane, choose **Security standards**.
4. For the standard that you want to enable the control for, choose **View results**.
5. Display the list of disabled controls.
   - For a member account or a standalone account, choose **Disabled**.
   - For an administrator account, choose **Disabled for this account**.
6. Do one of the following:
   - In the control list on the **Disabled** or **Disabled for this account** tab, choose the control to enable. Then choose **Enable**.
   - Choose a control title. Then on the control details page, choose **Enable**.

**Enabling a control (Security Hub API, AWS CLI)**

To enable a control, you can use an API call or the AWS Command Line Interface.

**To enable a control (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the `UpdateStandardsControl` operation. To identify the control to enable, you provide the control ARN. To retrieve the ARNs for the controls in a standard, use the `DescribeStandardsControls` operation.
- **AWS CLI** – At the command line, run the `update-standards-control` command.

```
aws securityhub update-standards-control --standards-control-arn <control ARN> --control-status "ENABLED"
```

**Example**

```
aws securityhub update-standards-control --standards-control-arn "arn:aws:securityhub:us-east-1:123456789012:control/aws-foundational-security-best-practices/v/1.0.0/ACM.1" --control-status "ENABLED"
```

**Viewing and taking action on control findings**

The control details page contains a list of active findings for the control. The list does not include archived findings.

The list provides tools to filter and sort the findings, so that you can focus on more urgent findings first. Each finding can include links to resource details in the related service console. For controls that are based on AWS Config rules, you can view details about the rule and the configuration timeline.

You can also use the AWS Security Hub API to retrieve a list of findings. See the section called “Retrieving finding details (Security Hub API, AWS CLI)” (p. 102).
Filtering, sorting, and downloading the control finding list

The control finding list uses tabs to provide built-in filtering for the list based on the finding status. You can also filter the list based on other finding values, and download findings from the list.

Filtering and sorting the control finding list

The **All checks** tab lists all active findings that have a workflow status of **NEW**, **NOTIFIED**, or **RESOLVED**. By default, the list is sorted so that failed findings are at the top of the list. This sort order calls attention to findings that need to be addressed.

The lists on the **Failed**, **Unknown**, and **Passed** tabs are filtered based on the value of **Compliance.Status**. The lists also only include active findings that have a workflow status of **NEW**, **NOTIFIED**, or **RESOLVED**.

The **Suppressed** tab contains a list of active findings that have a workflow status of **SUPPRESSED**.

In addition to the built-in filters on each tab, you can filter the lists using values from the following fields:

- Account ID
- Workflow status
- Compliance status
- Resource ID
- Resource type

You can sort each list using any of the columns.

Downloading the control finding list

You can download the current page of the control finding list to a .csv file.

If you filtered the finding list, then the download only includes the controls that match the filter.

If you selected specific findings from the list, then the download only includes the selected findings.

To download the current page of the list or the selected findings, choose **Download**.

Viewing details about a control finding and finding resource

For each finding, AWS Security Hub provides access to details to help you investigate the finding.

You can display details about the finding resource and the related configuration rule.

You can also view any notes added to the finding.

Viewing the complete .json for a finding

You can display and download the full .json of a finding.
To display the .json, in the Finding .json column, choose the icon.

On the Finding JSON panel, to download the .json, choose Download.

Viewing information about a finding resource

The Resource column contains the resource type and resource identifier.

To display information about the resource, choose the resource identifier. For AWS accounts, if the account is an organization member account, then the information includes both the account ID and the account name. For accounts that were invited manually, the information only includes the account ID.

If you have permission to view the resource in its original service, then the resource identifier displays a link to the service. For example, for an AWS user, the resource details provide a link to the view the user details in IAM.

Security Hub displays a message to notify you if the resource is in a different account.

Viewing the configuration timeline for a finding resource

One avenue of investigation is the configuration timeline for the resource in AWS Config.

If you have permission to view the configuration timeline for the finding resource, then the finding list provides a link to the timeline.

Security Hub displays a message to notify you if the resource is in a different account.

To navigate to the configuration timeline in AWS Config

1. In the Investigate column, choose the icon.
2. On the menu, choose Configuration timeline. If you do not have access to the configuration timeline, then the link does not appear.

Viewing the AWS Config rule for a finding resource

If the control is based on an AWS Config rule, then you might also want to view the details for the AWS Config rule. The AWS Config rule information can help you to get a better understanding why a check passed or failed.

If you have permission to view the AWS Config rule for the control, then the finding list provides a link to the AWS Config rule in AWS Config.

Security Hub displays a message to notify you if the resource is in a different account.

To navigate to the AWS Config rule

1. In the Investigate column, choose the icon.
2. On the menu, choose Config rule. If you do not have access to the AWS Config rule, then Config rule is not linked.

Viewing notes for findings

If a finding has an associated note, then the Updated column displays a note icon.

To display the note that is associated with a finding
In the **Updated** column, choose the note icon.

**Taking action on control findings**

To reflect the current status of your investigation, you set the workflow status. See the section called "Setting the workflow status for findings" (p. 103).

AWS Security Hub also allows you to send selected findings to a custom action in Amazon EventBridge. See the section called “Sending findings to a custom action” (p. 104).

**Available security standards in AWS Security Hub**

Security standards provide a set of related controls to determine compliance with regulatory frameworks, industry best practices, or company policies.

The information for each standard includes the list of controls in the standard. Each control includes the following information:

- The security category that the control belongs to
- The resource that the control applies to
- If applicable, the AWS Config rule that is used for the control
- Any parameters used by the control
- A description of the control and what it checks
- For standards that are associated with a regulatory framework, the applicable requirements in that framework
- Information on how to remediate a failed check. For example, you might need to change the configuration of a resource.

AWS Security Hub supports the following security standards.

**Topics**

- CIS AWS Foundations Benchmark standard (p. 502)
- Payment Card Industry Data Security Standard (PCI DSS) (p. 553)
- AWS Foundational Security Best Practices standard (p. 607)

**CIS AWS Foundations Benchmark standard**

Security Hub supports the CIS AWS Foundations Benchmark standard. For more information, see [Securing Amazon Web Services](https://cisecurity.org) on the CIS website.

AWS Security Hub has satisfied the requirements of CIS Security Software Certification and is hereby awarded CIS Security Software Certification for the following CIS Benchmarks:

- CIS Benchmark for CIS Amazon Web Services Foundations Benchmark, v1.2.0, Level 1
- CIS Benchmark for CIS Amazon Web Services Foundations Benchmark, v1.2.0, Level 2

**Topics**

- AWS Config resources required for CIS controls (p. 503)
- CIS AWS Foundations Benchmark controls (p. 503)
• CIS AWS Foundations Benchmark controls that you might want to disable (p. 552)
• CIS AWS Foundations Benchmark security checks that are not supported in Security Hub (p. 552)

AWS Config resources required for CIS controls

To run security checks for the enabled controls on your environment’s resources, Security Hub either runs through the exact audit steps prescribed for the checks in Securing Amazon Web Services or uses specific AWS Config managed rules.

If you don’t enable all resources in AWS Config, a finding is generated for the control 2.5 – Ensure AWS Config is enabled (p. 518). For other CIS controls, for Security Hub to accurately report findings, you must enable the following resources in AWS Config.

• AWS CloudTrail trail
• Amazon EC2 security group
• Amazon EC2 VPC
• IAM policy
• IAM user
• AWS KMS key
• S3 bucket

If a finding is generated by a security check that is based on an AWS Config rule, the finding details include a Rules link to open the associated AWS Config rule. To navigate to the AWS Config rule, you must also have an IAM permission in the selected account to navigate to AWS Config.

CIS AWS Foundations Benchmark controls

For the CIS AWS Foundations standard, Security Hub supports the following controls. For each control, the information includes the required AWS Config rule and the remediation steps.

1.1 – Avoid the use of the "root" account

Severity: Low

AWS Config rule: None

The root account has unrestricted access to all resources in the AWS account. We highly recommend that you avoid using this account. The root account is the most privileged account. Minimizing the use of this account and adopting the principle of least privilege for access management reduces the risk of accidental changes and unintended disclosure of highly privileged credentials.

As a best practice, use your root credentials only when required to perform account and service management tasks. Apply IAM policies directly to groups and roles but not users. For a tutorial on how to set up an administrator for daily use, see Creating your first IAM admin user and group in the IAM User Guide

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.3 in the CIS AWS Foundations Benchmark v1.2. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

Note
When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.
The check results in **FAILED** findings in the following cases:

- No trail is configured.
- The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of **NO_DATA** in the following cases:

- The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
- The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have `listSubscription` access to the Amazon SNS topic. Otherwise Security Hub generates **WARNING** findings for the control.

**Remediation**

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

**To create an Amazon SNS topic**

2. Create an Amazon SNS topic that receives all CIS alarms.
   
   Create at least one subscriber to the topic. For more information, see [Getting started with Amazon SNS](https://docs.aws.amazon.com/sns/latest/dg/sns-quickstart.html) in the *Amazon Simple Notification Service Developer Guide*.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.

Finally, create the metric filter and alarm.

**To create a metric filter and alarm**

2. In the navigation pane, choose **Log groups**.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From **Actions**, choose **Create Metric Filter**.
5. Under **Define pattern**, do the following:
   
   a. Copy the following pattern and then paste it into the **Filter Pattern** field:

   ```
   {$userIdentity.type="Root" && $userIdentity.invokedBy NOT EXISTS && $.eventType != "AwsServiceEvent"}
   ```

   b. Choose **Next**.
6. Under **Assign Metric**, do the following:
a. In **Filter name**, enter a name for your metric filter.
b. For **Metric Namespace**, enter *LogMetrics*.
   
   If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
c. For **Metric Name**, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
d. For **Metric value**, enter 1.
e. Choose **Next**.

7. Under **Review and create**, verify the information that you provided for the new metric filter. Then choose **Create metric filter**.

8. In the navigation pane, choose **Alarms**.

9. Choose **Create Alarm**.

10. Under **Specify metric and conditions**, do the following:

    a. Choose **Select metric**.
    b. On the **Select metric** panel, on the **All metrics** tab, choose the **LogMetrics** namespace. You can use the search bar to search for it.
    c. Choose **Metrics with no dimensions**.
    d. Select the check box for the metric that you created. Then choose **Select metric**.
    e. Under **Metric**, leave the default values.
    f. Under **Conditions**, for **Threshold**, choose **Static**.
    g. For **Define the alarm condition**, choose **Greater/Equal**.
    h. For **Define the threshold value**, enter 1.
    i. Choose **Next**.

11. Under **Configure actions**, do the following:

    a. Under **Alarm state trigger**, choose **In alarm**.
    b. Under **Select an SNS topic**, choose **Select an existing SNS topic**.
    c. For **Send a notification to**, enter the name of the SNS topic that you created in the previous procedure.
    d. Choose **Next**.

12. Under **Add name and description**, enter a **Name** and **Description** for the alarm, such as **CIS-1.1-RootAccountUsage**. Then choose **Next**.

13. Under **Preview and create**, review the alarm configuration. Then choose **Create alarm**.

### 1.2 – Ensure multi-factor authentication (MFA) is enabled for all IAM users that have a console password

**Severity:** Medium

**AWS Config rule:** *mfa-enabled-for-iam-console-access*

Multi-factor authentication (MFA) adds an extra layer of protection on top of a user name and password. With MFA enabled, when a user signs in to an AWS website, they're prompted for their user name and password as well as for an authentication code from their AWS MFA device.

Security Hub recommends enabling MFA for all accounts that have a console password. Enabling MFA provides increased security for console access because it requires the authenticating principal to possess a device that emits a time-sensitive key and have knowledge of a credential.
Important
The AWS Config rule used for this check may take up to 4 hours to accurately report results for MFA. Any findings that are generated within the first 4 hours after enabling the CIS security checks may not be accurate. It may also take up to 4 hours after remediating this issue for the check to pass.

Remediation

To configure MFA for a user
1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Users.
3. Choose the User name of the user to configure MFA for.
4. Choose Security credentials and then choose Manage next to Assigned MFA device.
5. Follow the Manage MFA Device wizard to assign the type of device appropriate for your environment.

To learn how to delegate MFA setup to users, see How to Delegate Management of Multi-Factor Authentication to AWS IAM Users on the AWS Security Blog.

1.3 – Ensure credentials unused for 90 days or greater are disabled

Severity: Medium

AWS Config rule: iam-user-unused-credentials-check

IAM users can access AWS resources using different types of credentials, such as passwords or access keys.

Security Hub recommends that you remove or deactivate all credentials that have been unused in 90 days or more. Disabling or removing unnecessary credentials reduces the window of opportunity for credentials associated with a compromised or abandoned account to be used.

The AWS Config rule for this control uses the GetCredentialReport and GenerateCredentialReport API operations, which are only updated every four hours. Changes to IAM users can take up to four hours to be visible to this control.

Remediation

To get some of the information that you need to monitor accounts for dated credentials, use the IAM console. For example, when you view users in your account, there is a column for Access key age, Password age, and Last activity. If the value in any of these columns is greater than 90 days, make the credentials for those users inactive.

You can also use credential reports to monitor user accounts and identify those with no activity for 90 or more days. You can download credential reports in .csv format from the IAM console. For more information about credential reports, see Getting credential reports for your AWS Account.

After you identify the inactive accounts or unused credentials, use the following steps to disable them.
1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Users.
3. Choose the name of the user with credentials over 90 days old.
4. Choose Security credentials and then choose Make inactive for all sign-in credentials and access keys that haven't been used in 90 days or more.
1.4 – Ensure access keys are rotated every 90 days or less

**Severity:** Medium

**AWS Config rule:** access-keys-rotated

Access keys consist of an access key ID and secret access key, which are used to sign programmatic requests that you make to AWS. AWS users need their own access keys to make programmatic calls to AWS from the AWS Command Line Interface (AWS CLI), Tools for Windows PowerShell, the AWS SDKs, or direct HTTP calls using the APIs for individual AWS services.

Security Hub recommends that you regularly rotate all access keys. Rotating access keys reduces the chance for an access key that is associated with a compromised or terminated account to be used. Rotate access keys to ensure that data can't be accessed with an old key that might have been lost, cracked, or stolen.

**Note**
This control is not supported in Africa (Cape Town) or Europe (Milan).

**Remediation**

**To ensure that access keys aren't more than 90 days old**

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Users.
3. For each user that shows an Access key age that is greater than 90 days, choose the User name to open the settings for that user.
5. To create a new key for the user:
   a. Choose Create access key.
   b. To save the key content, either download the secret access key, or choose Show and then copy it from the page.
   c. Store the key in a secure location to provide to the user.
   d. Choose Close.
6. Update all applications that were using the previous key to use the new key.
7. For the previous key, choose Make inactive to make the access key inactive. Now the user can't make requests using that key.
8. Confirm that all applications work as expected with the new key.
9. After confirming that all applications work with the new key, delete the previous key. After you delete the access key, you can't recover it.

   To delete the previous key, choose the X at the end of the row and then choose Delete.

1.5 – Ensure IAM password policy requires at least one uppercase letter

**Severity:** Medium

**AWS Config rule:** iam-password-policy

Password policies, in part, enforce password complexity requirements. Use IAM password policies to ensure that passwords use different character sets.

Security Hub recommends that the password policy require at least one uppercase letter. Setting a password complexity policy increases account resiliency against brute force login attempts.
Remediation

To modify the password policy
1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Account settings.
3. Select Requires at least one uppercase letter and then choose Apply password policy.

1.6 – Ensure IAM password policy requires at least one lowercase letter

Severity: Medium

AWS Config rule: iam-password-policy

Password policies, in part, enforce password complexity requirements. Use IAM password policies to ensure that passwords use different character sets. Security Hub recommends that the password policy require at least one lowercase letter. Setting a password complexity policy increases account resiliency against brute force login attempts.

Remediation

To modify the password policy
1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Account settings.
3. Select Requires at least one lowercase letter and then choose Apply password policy.

1.7 – Ensure IAM password policy requires at least one symbol

Severity: Medium

AWS Config rule: iam-password-policy

Password policies, in part, enforce password complexity requirements. Use IAM password policies to ensure that passwords use different character sets.

Security Hub recommends that the password policy require at least one symbol. Setting a password complexity policy increases account resiliency against brute force login attempts.

Remediation

To modify the password policy
1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Account settings.
3. Select Require at least one non-alphanumeric character and then choose Apply password policy.

1.8 – Ensure IAM password policy requires at least one number

Severity: Medium

AWS Config rule: iam-password-policy

Password policies, in part, enforce password complexity requirements. Use IAM password policies to ensure that passwords use different character sets.
Security Hub recommends that the password policy require at least one number. Setting a password complexity policy increases account resiliency against brute force login attempts.

Remediation

To modify the password policy
1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Account settings.
3. Select Requires at least one number and then choose Apply password policy.

1.9 – Ensure IAM password policy requires a minimum length of 14 or greater

Severity: Medium

AWS Config rule: iam-password-policy

Password policies, in part, enforce password complexity requirements. Use IAM password policies to ensure that passwords are at least a given length.

Security Hub recommends that the password policy require a minimum password length of 14 characters. Setting a password complexity policy increases account resiliency against brute force login attempts.

Remediation

To modify the password policy
1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Account settings.
3. In the Minimum password length field, enter 14, then choose Apply password policy.

1.10 – Ensure IAM password policy prevents password reuse

Severity: Low

AWS Config rule: iam-password-policy

This control checks whether the number of passwords to remember is set to 24. The control fails if the value is not 24.

IAM password policies can prevent the reuse of a given password by the same user.

Security Hub recommends that the password policy prevent the reuse of passwords. Preventing password reuse increases account resiliency against brute force login attempts.

Remediation

To modify the password policy
1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Account settings.
3. Select Prevent password reuse and then enter 24 for Number of passwords to remember.
4. Choose Apply password policy.
1.11 – Ensure IAM password policy expires passwords within 90 days or less

Severity: Low

AWS Config rule: iam-password-policy

IAM password policies can require passwords to be rotated or expired after a given number of days. Security Hub recommends that the password policy expire passwords after 90 days or less. Reducing the password lifetime increases account resiliency against brute force login attempts. Requiring regular password changes also helps in the following scenarios:

- Passwords can be stolen or compromised without your knowledge. This can happen via a system compromise, software vulnerability, or internal threat.
- Certain corporate and government web filters or proxy servers can intercept and record traffic even if it’s encrypted.
- Many people use the same password for many systems such as work, email, and personal.
- Compromised end-user workstations might have a keystroke logger.

Remediation

To modify the password policy

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Account settings.
3. Select Enable password expiration and then enter 90 for Password expiration period (in days).
4. Choose Apply password policy.

1.12 – Ensure no root account access key exists

Severity: Critical

AWS Config rule: iam-root-access-key-check

The root account is the most privileged user in an AWS account. AWS Access Keys provide programmatic access to a given account. Security Hub recommends that all access keys be associated with the root account be removed. Removing access keys associated with the root account limits vectors that the account can be compromised by. Removing the root access keys also encourages the creation and use of role-based accounts that are least privileged.

Note
This control is not supported in Africa (Cape Town) or Asia Pacific (Osaka).

Remediation

To delete access keys

1. Log in to your account using the root credentials.
2. Choose the account name near the top-right corner of the page and then choose My Security Credentials.
3. In the pop-up warning, choose Continue to Security Credentials.
4. Choose Access keys (access key ID and secret access key).
5. To permanently delete the key, choose Delete and then choose Yes. You cannot recover deleted keys.
6. If there is more than one root user access key, then repeat steps 4 and 5 for each key.

1.13 – Ensure MFA is enabled for the "root" account

**Severity:** Critical

**AWS Config rule:** `root-account-mfa-enabled`

The root account is the most privileged user in an account. MFA adds an extra layer of protection on top of a user name and password. With MFA enabled, when a user signs in to an AWS website, they're prompted for their user name and password and for an authentication code from their AWS MFA device.

When you use virtual MFA for root accounts, Security Hub recommends that the device used is not a personal device. Instead, use a dedicated mobile device (tablet or phone) that you manage to keep charged and secured independent of any individual personal devices. This lessens the risks of losing access to the MFA due to device loss, device trade-in, or if the individual owning the device is no longer employed at the company.

**Note**

This control is not supported in the following Regions:

- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West).

**Remediation**

**To enable MFA for the root account**

1. Log in to your account using the root credentials.
2. Choose the account name near the top-right corner of the page and then choose **My Security Credentials**.
3. In the pop-up warning, choose **Continue to Security Credentials**.
4. Choose **Multi-factor authentication (MFA)**.
5. Choose **Activate MFA**.
6. Choose the type of device to use for MFA and then choose **Continue**.
7. Complete the steps to configure the device type appropriate to your selection.

Choose a hardware-based authentication mechanism for best results in passing the check 1.14 – Ensure hardware MFA is enabled for the "root" account (p. 511).

1.14 – Ensure hardware MFA is enabled for the "root" account

**Severity:** Critical

**AWS Config rule:** `root-account-hardware-mfa-enabled`

The root account is the most privileged user in an account. MFA adds an extra layer of protection on top of a user name and password. With MFA enabled, when a user signs in to an AWS website, they're prompted for their user name and password and for an authentication code from their AWS MFA device.

For Level 2, Security Hub recommends that you protect the root account with a hardware MFA. A hardware MFA has a smaller attack surface than a virtual MFA. For example, a hardware MFA doesn't suffer the attack surface introduced by the mobile smartphone that a virtual MFA resides on.
Using hardware MFA for many, many accounts might create a logistical device management issue. If this occurs, consider implementing this Level 2 recommendation selectively to the highest security accounts. You can then apply the Level 1 recommendation to the remaining accounts.

**Note**
This control is not supported in the following Regions.

- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West).

**Remediation**

**To enable hardware-based MFA for the root account**

1. Log in to your account using the root credentials.
2. Choose the account name near the top-right corner of the page and then choose **My Security Credentials**.
3. In the pop-up warning, choose **Continue to Security Credentials**.
4. Choose **Multi-factor authentication (MFA)**.
5. Choose **Activate MFA**.
6. Choose a hardware-based (not virtual) device to use for MFA and then choose **Continue**.
7. Complete the steps to configure the device type appropriate to your selection.

**1.16 – Ensure IAM policies are attached only to groups or roles**

**Severity:** Low

**AWS Config rule:** iam-user-no-policies-check

By default, IAM users, groups, and roles have no access to AWS resources. IAM policies are how privileges are granted to users, groups, or roles.

Security Hub recommends that you apply IAM policies directly to groups and roles but not users. Assigning privileges at the group or role level reduces the complexity of access management as the number of users grow. Reducing access management complexity might in turn reduce opportunity for a principal to inadvertently receive or retain excessive privileges.

**Remediation**

To resolve this issue, create an IAM group, assign the policy to the group, and then add the users to the group. The policy is applied to each user in the group.

**To create an IAM group**

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose **Groups** and then choose **Create New Group**.
3. Enter a name for the group to create and then choose **Next Step**.
4. Select each policy to assign to the group and then choose **Next Step**.

The policies that you choose should include any policies currently attached directly to a user account. The next step to resolve a failed check is to add users to a group and then assign the policies to that group. Each user in the group gets assigned the policies assigned to the group.
5. Confirm the details on the Review page and then choose Create Group.

For more information about creating groups, see Creating IAM groups in the IAM User Guide.

**To add users to an IAM group**

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Groups.
3. Choose Group Actions and then choose Add Users to Group.
4. Select the users to add to the group and then choose Add Users.

For more information about adding users to groups, see Adding and removing users in an IAM group.

**To remove a policy attached directly to a user**

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Users.
3. For the user to detach a policy from, choose the name in the User name column.
4. For each policy listed under Attached directly, choose the X on the right side of the page to remove the policy from the user and then choose Remove.
5. Confirm that the user can still use AWS services as expected.

1.20 - Ensure a support role has been created to manage incidents with AWS Support

**Severity:** Low

**AWS Config rule:** iam-policy-in-use

AWS provides a support center that can be used for incident notification and response, as well as technical support and customer services.

Create an IAM role to allow authorized users to manage incidents with AWS Support. By implementing least privilege for access control, an IAM role will require an appropriate IAM policy to allow support center access in order to manage incidents with AWS Support.

**Note**

This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)

**Remediation**

To remediate this issue, create a role to allow authorized users to manage AWS Support incidents.

**To create the role to use for AWS Support access**

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. In the IAM navigation pane, choose Roles, then choose Create role.
3. For Role type, choose the Another AWS account.
4. For **Account ID**, enter the AWS account ID of the AWS account to which you want to grant access to your resources.

   If the users or groups that will assume this role are in the same account, then enter the local account number.

   **Note**
   The administrator of the specified account can grant permission to assume this role to any IAM user in that account. To do this, the administrator attaches a policy to the user or a group that grants permission for the `sts:AssumeRole` action. In that policy, the resource must be the role ARN.

5. Choose **Next: Permissions**.
7. Select the check box for the `AWSSupportAccess` managed policy.
8. Choose **Next: Tags**.
9. (Optional) To add metadata to the role, attach tags as key-value pairs.

   For more information about using tags in IAM, see Tagging IAM users and roles in the **IAM User Guide**.

10. Choose **Next: Review**.
11. For **Role name**, enter a name for your role.

   Role names must be unique within your AWS account. They are not case sensitive.

12. (Optional) For **Role description**, enter a description for the new role.

13. Review the role, then choose **Create role**.

1.22 – Ensure IAM policies that allow full "*:*" administrative privileges are not created

**Severity:** High

**AWS Config rule:** `iam-policy-no-statements-with-admin-access`

IAM policies define a set of privileges granted to users, groups, or roles. It's recommended and considered a standard security advice to grant least privilege—that is, granting only the permissions required to perform a task. Determine what users need to do and then craft policies that let the users perform only those tasks, instead of allowing full administrative privileges.

It's more secure to start with a minimum set of permissions and grant additional permissions as necessary, rather than starting with permissions that are too lenient and then trying to tighten them later. Providing full administrative privileges instead of restricting to the minimum set of permissions that the user is required to do exposes the resources to potentially unwanted actions.

You should remove IAM policies that have a statement with "Effect": "Allow" with "Action": "*" over "Resource": "*".

**Remediation**

**To modify an IAM policy**

2. Choose **Policies**.
3. Select the radio button next to the policy to remove.
4. From the **Policy actions** drop-down menu, choose **Detach**.
5. On the Detach policy page, select the radio button next to each user to detach the policy from and then choose Detach policy.

Confirm that the user that you detached the policy from can still access AWS services and resources as expected.

2.1 – Ensure CloudTrail is enabled in all Regions

Severity: Critical

AWS Config rule: multi-region-cloudtrail-enabled

CloudTrail is a service that records AWS API calls for your account and delivers log files to you. The recorded information includes the identity of the API caller, the time of the API call, the source IP address of the API caller, the request parameters, and the response elements returned by the AWS service. CloudTrail provides a history of AWS API calls for an account, including API calls made via the AWS Management Console, AWS SDKs, command-line tools, and higher-level AWS services (such as AWS CloudFormation).

The AWS API call history produced by CloudTrail enables security analysis, resource change tracking, and compliance auditing. Additionally:

- Ensuring that a multi-Region trail exists ensures that unexpected activity occurring in otherwise unused Regions is detected
- Ensuring that a multi-Region trail exists ensures that Global Service Logging is enabled for a trail by default to capture recording of events generated on AWS global services
- For a multi-Region trail, ensuring that management events configured for all type of Read/Writes ensures recording of management operations that are performed on all resources in an AWS account

By default, CloudTrail trails that are created using the AWS Management Console are multi-Region trails.

Remediation

To create a new trail in CloudTrail

1. Sign in to the AWS Management Console and open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.
2. If you haven't used CloudTrail before, choose Get Started Now.
3. Choose Trails and then choose Create trail.
4. Enter a name for the trail.
5. Under Storage location, do one of the following:
   - To create a new S3 bucket for CloudTrail logs, choose Create new S3 bucket and then enter a name for the bucket.
   - Choose Use existing S3 bucket and then select the bucket to use.
6. Choose Additional settings and, for Log file validation, choose Enabled to pass 2.2. – Ensure CloudTrail log file validation is enabled (p. 516).
7. To pass the section called “2.4 – Ensure CloudTrail trails are integrated with Amazon CloudWatch Logs” (p. 517), you must enable CloudWatch Logs.
   a. Under CloudWatch Logs, select the Enabled check box.
   b. For Log group, do one of the following:
      - To use an existing log group, choose Existing and then enter the name of the log group to use.
• To create a new log group, choose New and then enter a name for the log group to create.

c. For IAM role, do one of the following:
   • To use an existing role, choose Existing and then choose the role from the drop-down list.
   • To create a new role, choose New and then enter a name for the role to create. The new role is assigned a policy that grants the necessary permissions.
   
   To view the permissions granted to the role, expand the Policy document.

8. Choose Create.

To update an existing trail in CloudTrail

1. Sign in to the AWS Management Console and open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.

2. Choose Trails.

3. Choose the name of the trail in the Name column.

4. Update the trail configuration as needed.

   To update the configuration in a particular section, do the following:

   a. Choose Edit for that section.
   b. Make the required updates to the configuration.
   c. Choose Save changes.

2.2. – Ensure CloudTrail log file validation is enabled

Severity: Medium

AWS Config rule: cloud-trail-log-file-validation-enabled

CloudTrail log file validation creates a digitally signed digest file containing a hash of each log that CloudTrail writes to S3. You can use these digest files to determine whether a log file was changed, deleted, or unchanged after CloudTrail delivered the log.

Security Hub recommends that you enable file validation on all trails. Enabling log file validation provides additional integrity checking of CloudTrail logs.

Remediation

To enable CloudTrail log file validation

1. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.

2. Choose Trails.

3. Choose the name of a trail to edit in the Name column.


5. Under Additional settings, for Log file validation, select Enabled.

6. Choose Save.

2.3 – Ensure the S3 bucket CloudTrail logs to is not publicly accessible

Severity: Critical

AWS Config rules: s3-bucket-public-read-prohibited, s3-bucket-public-write-prohibited
CloudTrail logs a record of every API call made in your account. These log files are stored in an S3 bucket. Security Hub recommends that the S3 bucket policy, or access control list (ACL), applied to the S3 bucket that CloudTrail logs to prevents public access to the CloudTrail logs. Allowing public access to CloudTrail log content might aid an adversary in identifying weaknesses in the affected account's use or configuration.

To run this check, Security Hub first uses custom logic to look for the S3 bucket where your CloudTrail logs are stored. It then uses the AWS Config managed rules to check that bucket is publicly accessible.

If you aggregate your logs into a single centralized S3 bucket, then Security Hub only runs the check against the account and Region where the centralized S3 bucket is located. For other accounts and Regions, the control status is No data.

If the bucket is publicly accessible, the check generates a failed finding.

Remediation

**To remove public access for an Amazon S3 bucket**

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Choose the name of the bucket where your CloudTrail are stored.
3. Choose Permissions and then choose Public access settings.
4. Choose Edit, select all four options, and then choose Save.
5. If prompted, enter confirm and then choose Confirm.

### 2.4 – Ensure CloudTrail trails are integrated with Amazon CloudWatch Logs

**Severity:** Low

**AWS Config rule:** cloud-trail-cloud-watch-logs-enabled

CloudTrail is a web service that records AWS API calls made in a given account. The recorded information includes the identity of the API caller, the time of the API call, the source IP address of the API caller, the request parameters, and the response elements returned by the AWS service.

CloudTrail uses Amazon S3 for log file storage and delivery, so log files are stored durably. In addition to capturing CloudTrail logs in a specified Amazon S3 bucket for long-term analysis, you can perform real-time analysis by configuring CloudTrail to send logs to CloudWatch Logs.

For a trail that is enabled in all Regions in an account, CloudTrail sends log files from all those Regions to a CloudWatch Logs log group.

Security Hub recommends that you send CloudTrail logs to CloudWatch Logs.

**Note**

The intent of this recommendation is to ensure that account activity is being captured, monitored, and appropriately alarmed on. CloudWatch Logs is a native way to accomplish this using AWS services but doesn't preclude the use of an alternate solution.

Sending CloudTrail logs to CloudWatch Logs facilitates real-time and historic activity logging based on user, API, resource, and IP address. It provides the opportunity to establish alarms and notifications for anomalous or sensitivity account activity.

Remediation

**To ensure that CloudTrail trails are integrated with CloudWatch Logs**

1. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.

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2. Choose Trails.
3. Choose a trail that there is no value for in the CloudWatch Logs Log group column.
4. Scroll down to the CloudWatch Logs section and then choose Edit.
5. Select the Enabled check box.
6. For Log group, do one of the following:
   • To use an existing log group, choose Existing and then enter the name of the log group to use.
   • To create a new log group, choose New and then enter a name for the log group to create.
7. For IAM role, do one of the following:
   • To use an existing role, choose Existing and then choose the role from the drop-down list.
   • To create a new role, choose New and then enter a name for the role to create. The new role is assigned a policy that grants the necessary permissions.
   To view the permissions granted to the role, expand the Policy document.
8. Choose Save changes.

For more information, see Configuring CloudWatch Logs monitoring with the console in the AWS CloudTrail User Guide.

2.5 – Ensure AWS Config is enabled

Severity: Medium

AWS Config rule: None

AWS Config is a web service that performs configuration management of supported AWS resources in your account and delivers log files to you. The recorded information includes the configuration item (AWS resource), relationships between configuration items (AWS resources), and any configuration changes between resources.

Security Hub recommends that you enable AWS Config in all Regions. The AWS configuration item history that AWS Config captures enables security analysis, resource change tracking, and compliance auditing.

Note
CIS 2.5 requires that AWS Config is enabled in all Regions in which you use Security Hub. Because Security Hub is a regional service, the check performed for this control checks only the current Region for the account. It does not check all Regions. You also must record global resources so that security checks against global resources can be checked in each Region. If you only record global resources in a single Region, then you can disable this control in all Regions except the Region where you record global resources.

To run this check, Security Hub performs custom logic to perform the audit steps prescribed for it in the CIS AWS Foundations Benchmark v1.2. Security Hub also requires that global resources are recorded in each Region, because Security Hub is a regional service and performs its security checks on a Region-by-Region basis.

Remediation

To configure AWS Config settings
1. Open the AWS Config console at https://console.aws.amazon.com/config/.
2. Select the Region to configure AWS Config in.
3. If you haven’t used AWS Config before, choose Get started.
4. On the Settings page, do the following:

   • Under **Resource types to record**, select **Record all resources supported in this region** and **Include global resources (e.g., AWS IAM resources)**.
   • Under **Amazon S3 bucket**, specify the bucket to use or create a bucket and optionally include a prefix.
   • Under **Amazon SNS topic**, select an Amazon SNS topic from your account or create one. For more information about Amazon SNS, see the Amazon Simple Notification Service Getting Started Guide.
   • Under **AWS Config role**, either choose **Create AWS Config service-linked role** or choose **Choose a role from your account** and then select the role to use.

5. Choose **Next**.

6. On the **AWS Config** rules page, choose **Skip**.

7. Choose **Confirm**.

For more information about using AWS Config from the AWS Command Line Interface, see Turning on AWS Config in the AWS Config Developer Guide.

You can also use an AWS CloudFormation template to automate this process. For more information, see the AWS CloudFormation StackSets sample template in the AWS CloudFormation User Guide.

### 2.6 – Ensure S3 bucket access logging is enabled on the CloudTrail S3 bucket

**Severity:** Low

**AWS Config rule:** a3-bucket-logging-enabled

Amazon S3 bucket access logging generates a log that contains access records for each request made to your S3 bucket. An access log record contains details about the request, such as the request type, the resources specified in the request worked, and the time and date the request was processed.

Security Hub recommends that you enable bucket access logging on the CloudTrail S3 bucket.

By enabling S3 bucket logging on target S3 buckets, you can capture all events that might affect objects in a target bucket. Configuring logs to be placed in a separate bucket enables access to log information, which can be useful in security and incident response workflows.

To run this check, Security Hub first uses custom logic to look for the bucket where your CloudTrail logs are stored and then uses the AWS Config managed rule to check if logging is enabled.

If you aggregate your logs into a single centralized S3 bucket, then Security Hub only runs the check against the account and Region where the centralized S3 bucket is located. For other accounts and Regions, the control status is **No data**.

If the bucket is publicly accessible, the check generates a failed finding.

**Remediation**

**To enable S3 bucket access logging**

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Choose the bucket used for CloudTrail.
3. Choose **Properties**.
4. Choose **Server access logging**, then choose **Enable logging**.
5. Select a bucket from the **Target bucket** list, and optionally enter a prefix.
6. Choose Save.

2.7 – Ensure CloudTrail logs are encrypted at rest using AWS KMS keys

**Severity:** Medium

**AWS Config rule:** cloud-trail-encryption-enabled

CloudTrail is a web service that records AWS API calls for an account and makes those logs available to users and resources in accordance with IAM policies. AWS Key Management Service (AWS KMS) is a managed service that helps create and control the encryption keys used to encrypt account data, and uses hardware security modules (HSMs) to protect the security of encryption keys.

You can configure CloudTrail logs to leverage server-side encryption (SSE) and KMS keys to further protect CloudTrail logs.

Security Hub recommends that you configure CloudTrail to use SSE-KMS.

Configuring CloudTrail to use SSE-KMS provides additional confidentiality controls on log data because a given user must have S3 read permission on the corresponding log bucket and must be granted decrypt permission by the KMS key policy.

**Remediation**

**To enable encryption for CloudTrail logs**

1. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.
2. Choose Trails.
3. Choose the trail to update.
4. Under **Storage location**, choose the pencil icon to edit the settings.
5. For **Encrypt log files with SSE-KMS**, choose Yes.
6. For **Create a new KMS key**, do one of the following:
   - To create a key, choose Yes and then enter an alias for the key in the KMS key field. The key is created in the same Region as the bucket.
   - To use an existing key, choose No and then select the key from the KMS key list.
   **Note**
   The AWS KMS key and S3 bucket must be in the same Region.
7. Choose Save.

You might need to modify the policy for CloudTrail to successfully interact with your KMS key. For more information, see Encrypting CloudTrail log files with AWS KMS–Managed Keys (SSE-KMS) in the AWS CloudTrail User Guide.

2.8 – Ensure rotation for customer-created KMS keys is enabled

**Severity:** Medium

**AWS Config rule:** cmk-backing-key-rotation-enabled

AWS KMS enables customers to rotate the backing key, which is key material stored in AWS KMS and is tied to the key ID of the KMS key. It's the backing key that is used to perform cryptographic operations such as encryption and decryption. Automated key rotation currently retains all previous backing keys so that decryption of encrypted data can take place transparently.
Security Hub recommends that you enable KMS key key rotation. Rotating encryption keys helps reduce the potential impact of a compromised key because data encrypted with a new key can't be accessed with a previous key that might have been exposed.

**Remediation**

**To enable KMS key rotation**

2. To change the AWS Region, use the Region selector in the upper-right corner of the page.
3. Choose **Customer managed keys**.
4. Choose the alias of the key to update in the **Alias** column.
5. Choose **Key rotation**.
6. Select **Automatically rotate this KMS key every year** and then choose **Save**.

---

**2.9 – Ensure VPC flow logging is enabled in all VPCs**

**Severity:** Medium

**AWS Config rule:** vpc-flow-logs-enabled

VPC flow logs is a feature that enables you to capture information about the IP traffic going to and from network interfaces in your VPC. After you have created a flow log, you can view and retrieve its data in CloudWatch Logs.

Security Hub recommends that you enable flow logging for packet rejects for VPCs. Flow logs provide visibility into network traffic that traverses the VPC and can detect anomalous traffic or insight during security workflows.

**Remediation**

**To enable VPC flow logging**

1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. Choose **Your VPCs**.
3. Select a VPC to update.
4. Choose the **Flow Logs** tab in the bottom section of the page.
5. Choose **Create flow log**.
6. For **Filter**, choose **Reject**.
7. For **Destination log group**, select the log group to use.
8. For **IAM role**, select the IAM role to use.
9. Choose **Create**.

---

**3.1 – Ensure a log metric filter and alarm exist for unauthorized API calls**

**Severity:** Low

**AWS Config rule:** None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms.
Security Hub recommends that you create a metric filter and alarm unauthorized API calls. Monitoring unauthorized API calls helps reveal application errors and might reduce time to detect malicious activity.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.1 in the CIS AWS Foundations Benchmark v1.2. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

**Note**

When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.

The check results in **FAILED** findings in the following cases:

- No trail is configured.
- The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of **NO_DATA** in the following cases:

- The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
- The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have `listSubscription` access to the Amazon SNS topic. Otherwise Security Hub generates **WARNING** findings for the control.

**Remediation**

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

**To create an Amazon SNS topic**

2. Create an Amazon SNS topic that receives all CIS alarms.
   
   Create at least one subscriber to the topic. For more information, see Getting started with Amazon SNS in the Amazon Simple Notification Service Developer Guide.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.

Finally, create the metric filter and alarm.

**To create a metric filter and alarm**

2. In the navigation pane, choose Log groups.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From Actions, choose Create Metric Filter.
5. Under **Define pattern**, do the following:
   a. Copy the following pattern and then paste it into the **Filter Pattern** field.
   
   ```
   \{($.errorCode="UnauthorizedOperation") || ($.errorCode="AccessDenied")\}
   ```
   
   b. Choose **Next**.

6. Under **Assign metric**, do the following:
   a. In **Filter name**, enter a name for your metric filter.
   b. For **Metric namespace**, enter **LogMetrics**.
      
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
   c. For **Metric name**, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
   d. For **Metric value**, enter **1**.
   e. Choose **Next**.

7. Under **Review and create**, verify the information that you provided for the new metric filter. Then choose **Create metric filter**.

8. Choose the **Metric filters** tab, then choose the metric filter that you just created.

   To choose the metric filter, select the check box at the upper right.

9. Choose **Create Alarm**.

10. Under **Specify metric and conditions**, do the following:
    a. Under **Metric**, for **Statistic**, choose **Average**. For more information about the available statistics, see **Statistics** in the *Amazon CloudWatch User Guide*.
    b. Under **Conditions**, for **Threshold**, choose **Static**.
    c. For **Define the alarm condition**, choose **Greater/Equal**.
    d. For **Define the threshold value**, enter **1**.
    e. Choose **Next**.

11. Under **Configure actions**, do the following:
    a. Under **Alarm state trigger**, choose **In alarm**.
    b. Under **Select an SNS topic**, choose **Select an existing SNS topic**.
    c. For **Send a notification to**, enter the name of the SNS topic that you created in the previous procedure.
    d. Choose **Next**.

12. Under **Add name and description**, enter a **Name** and **Description** for the alarm. For example, **CIS-3.1-UnAuthorizedAPICalls**. Then choose **Next**.

13. Under **Preview and create**, review the alarm configuration. Then choose **Create alarm**.

### 3.2 – Ensure a log metric filter and alarm exist for AWS Management Console sign-in without MFA

**Severity:** Low

**AWS Config rule:** None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms.
Security Hub recommends that you create a metric filter and alarm console logins that aren’t protected by MFA. Monitoring for single-factor console logins increases visibility into accounts that aren’t protected by MFA.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.2 in the CIS AWS Foundations Benchmark v1.2. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

**Note**

When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.

The check results in **FAILED** findings in the following cases:

- No trail is configured.
- The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of **NO_DATA** in the following cases:

- The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
- The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have **listSubscription** access to the Amazon SNS topic. Otherwise Security Hub generates **WARNING** findings for the control.

**Remediation**

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

**To create an Amazon SNS topic**

2. Create an Amazon SNS topic that receives all CIS alarms.

Create at least one subscriber to the topic. For more information, see Getting started with Amazon SNS in the Amazon Simple Notification Service Developer Guide.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.

Finally, create the metric filter and alarm.

**To create a metric filter and alarm**

2. In the navigation pane, choose **Log groups**.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From Actions, choose Create Metric Filter.
5. Under Define pattern, do the following:
   a. Copy the following pattern and then paste it into the Filter Pattern field.
      
      ```
      {($.eventName="ConsoleLogin") && ($.additionalEventData.MFAUsed !="Yes")}
      ```
   b. Choose Next.
6. Under Assign metric, do the following:
   a. In Filter name, enter a name for your metric filter.
   b. For Metric namespace, enter LogMetrics.
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark
      metrics are grouped together.
   c. For Metric name, enter a name for the metric. Remember the name of the metric. You will need
      to select the metric when you create the alarm.
   d. For Metric value, enter 1.
   e. Choose Next.
7. Under Review and create, verify the information that you provided for the new metric filter. Then
   choose Create metric filter.
8. Choose the Metric filters tab, then choose the metric filter that you just created.
   To choose the metric filter, select the check box at the upper right.
9. Choose Create Alarm.
10. Under Specify metric and conditions, do the following:
    a. Under Metric, leave the default values. For more information about the available statistics, see
       Statistics in the Amazon CloudWatch User Guide.
    b. Under Conditions, for Threshold, choose Static.
    c. For Define the alarm condition, choose Greater/Equal.
    d. For Define the threshold value, enter 1.
    e. Choose Next.
11. Under Configure actions, do the following:
    a. Under Alarm state trigger, choose In alarm.
    b. Under Select an SNS topic, choose Select an existing SNS topic.
    c. For Send a notification to, enter the name of the SNS topic that you created in the previous
       procedure.
    d. Choose Next.
12. Under Add name and description, enter a Name and Description for the alarm. For example,
    CIS-3.2-ConsoleSigninWithoutMFA. Then choose Next.
13. Under Preview and create, review the alarm configuration. Then choose Create alarm.

3.3 – Ensure a log metric filter and alarm exist for usage of "root" account

Severity: Low

AWS Config rule: None

You can do real-time monitoring of API calls directing CloudTrail logs to CloudWatch Logs and
establishing corresponding metric filters and alarms.

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Security Hub recommends that you create a metric filter and alarm for root login attempts. Monitoring for root account logins provides visibility into the use of a fully privileged account and an opportunity to reduce the use of it.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.3 in the CIS AWS Foundations Benchmark v1.2. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

**Note**

When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.

The check results in **FAILED** findings in the following cases:

- No trail is configured.
- The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of **NO_DATA** in the following cases:

- The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
- The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have `listSubscription` access to the Amazon SNS topic. Otherwise Security Hub generates **WARNING** findings for the control.

**Remediation**

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

**To create an Amazon SNS topic**

2. Create an Amazon SNS topic that receives all CIS alarms.

Create at least one subscriber to the topic. For more information, see Getting started with Amazon SNS in the *Amazon Simple Notification Service Developer Guide*.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.

Finally, create the metric filter and alarm.

**To create a metric filter and alarm**

2. In the navigation pane, choose **Log groups**.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From Actions, choose Create Metric Filter.
5. Under Define pattern, do the following:
   
a. Copy the following pattern and then paste it into the Filter Pattern field.
   
   ```
   $.userIdentity.type="Root" && $.userIdentity.invokedBy NOT EXISTS && $.eventType !="AwsServiceEvent"
   ```
   
b. Choose Next.
6. Under Assign metric, do the following:
   
a. In Filter name, enter a name for your metric filter.
   b. For Metric namespace, enter LogMetrics.
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
   c. For Metric name, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
   d. For Metric value, enter 1.
   e. Choose Next.
7. Under Review and create, verify the information that you provided for the new metric filter. Then choose Create metric filter.
8. Choose the Metric filters tab, then choose the metric filter that you just created.
   
   To choose the metric filter, select the check box at the upper right.
9. Choose Create Alarm.
10. Under Specify metric and conditions, do the following:
   
a. Under Metric, leave the default values. For more information about the available statistics, see Statistics in the Amazon CloudWatch User Guide.
   b. Under Conditions, for Threshold, choose Static.
   c. For Define the alarm condition, choose Greater/Equal.
   d. For Define the threshold value, enter 1.
   e. Choose Next.
11. Under Configure actions, do the following:
   
a. Under Alarm state trigger, choose In alarm.
   b. Under Select an SNS topic, choose Select an existing SNS topic.
   c. For Send a notification to, enter the name of the SNS topic that you created in the previous procedure.
   d. Choose Next.
12. Under Add name and description, enter a Name and Description for the alarm. For example, RootAccountUsage. Then choose Next.
13. Under Preview and create, review the alarm configuration. Then choose Create alarm.

### 3.4 – Ensure a log metric filter and alarm exist for IAM policy changes

**Severity:** Low

**AWS Config rule:** None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms.
Security Hub recommends that you create a metric filter and alarm for changes made to IAM policies. Monitoring these changes helps ensure that authentication and authorization controls remain intact.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.4 in the CIS AWS Foundations Benchmark v1.2. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

**Note**
When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.

The check results in FAILED findings in the following cases:

- No trail is configured.
- The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of NO_DATA in the following cases:

- The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
- The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have listSubscription access to the Amazon SNS topic. Otherwise Security Hub generates WARNING findings for the control.

**Remediation**

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

Note that the alarm checks for specific API operations by name. One of these operations is DeletePolicy. The alarm does not check that the call was issued from IAM. Because of this, the alarm also is triggered when Auto Scaling calls DeletePolicy.

**To create an Amazon SNS topic**
2. Create an Amazon SNS topic that receives all CIS alarms.

Create at least one subscriber to the topic. For more information, see Getting started with Amazon SNS in the Amazon Simple Notification Service Developer Guide.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.

Finally, create the metric filter and alarm.

**To create a metric filter and alarm**
2. In the navigation pane, choose Log groups.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From Actions, choose Create Metric Filter.
5. Under Define pattern, do the following:
   a. Copy the following pattern and then paste it into the Filter Pattern field.

```
{($.eventName=DeleteGroupPolicy) || ($.eventName=DeleteRolePolicy)
 || ($.eventName=DeleteUserPolicy) || ($.eventName=PutGroupPolicy)
 || ($.eventName=PutRolePolicy) || ($.eventName=PutUserPolicy)
 || ($.eventName=CreatePolicy) || ($.eventName=DeletePolicy)
 || ($.eventName=CreatePolicyVersion) || ($.eventName=DeletePolicyVersion)
 || ($.eventName=AttachRolePolicy) || ($.eventName=DetachRolePolicy)
 || ($.eventName=AttachUserPolicy) || ($.eventName=DetachUserPolicy) ||
 ($.eventName=AttachGroupPolicy) || ($.eventName=DetachGroupPolicy)}
```

b. Choose Next.
6. Under Assign metric, do the following:
   a. In Filter name, enter a name for your metric filter.
   b. For Metric namespace, enter LogMetrics.
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
   c. For Metric name, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
   d. For Metric value, enter 1.
   e. Choose Next.
7. Under Review and create, verify the information that you provided for the new metric filter. Then choose Create metric filter.
8. Choose the Metric filters tab, then choose the metric filter that you just created.
9. Choose Create Alarm.
10. Under Specify metric and conditions, do the following:
    a. Under Metric, for Statistic, choose Average. For more information about the available statistics, see Statistics in the Amazon CloudWatch User Guide.
    b. Under Conditions, for Threshold, choose Static.
    c. For Define the alarm condition, choose Greater/Equal.
    d. For Define the threshold value, enter 1.
    e. Choose Next.
11. Under Configure actions, do the following:
    a. Under Alarm state trigger, choose In alarm.
    b. Under Select an SNS topic, choose Select an existing SNS topic.
    c. For Send a notification to, enter the name of the SNS topic that you created in the previous procedure.
    d. Choose Next.
12. Under Add name and description, enter a Name and Description for the alarm. For example, CIS-3.4-IAMPolicyChanges. Then choose Next.
13. Under Preview and create, review the alarm configuration. Then choose Create alarm.
3.5 – Ensure a log metric filter and alarm exist for CloudTrail configuration changes

Severity: Low

AWS Config rule: None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms.

Security Hub recommends that you create a metric filter and alarm for changes to CloudTrail configuration settings. Monitoring these changes helps ensure sustained visibility to activities in the account.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.5 in the CIS AWS Foundations Benchmark v1.2. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

Note
When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.

The check results in FAILED findings in the following cases:

- No trail is configured.
- The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of NO_DATA in the following cases:

- The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
- The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have listSubscription access to the Amazon SNS topic. Otherwise Security Hub generates WARNING findings for the control.

Remediation

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

To create an Amazon SNS topic

2. Create an Amazon SNS topic that receives all CIS alarms.
   Create at least one subscriber to the topic. For more information, see Getting started with Amazon SNS in the Amazon Simple Notification Service Developer Guide.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.
Finally, create the metric filter and alarm.

**To create a metric filter and alarm**

2. In the navigation pane, choose Log groups.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From Actions, choose Create Metric Filter.
5. Under Define pattern, do the following:
   a. Copy the following pattern and then paste it into the Filter Pattern field.
      ```
      {($.eventName=CreateTrail) || ($.eventName=UpdateTrail) ||
      ($.eventName=DeleteTrail) || ($.eventName=StartLogging) ||
      ($.eventName=StopLogging)}
      ```
   b. Choose Next.
6. Under Assign metric, do the following:
   a. In Filter name, enter a name for your metric filter.
   b. For Metric namespace, enter LogMetrics.
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
   c. For Metric name, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
   d. For Metric value, enter 1.
   e. Choose Next.
7. Under Review and create, verify the information that you provided for the new metric filter. Then choose Create metric filter.
8. Choose the Metric filters tab, then choose the metric filter that you just created.
   To choose the metric filter, select the check box at the upper right.
9. Choose Create Alarm.
10. Under Specify metric and conditions, do the following:
    a. Under Metric, leave the default values. For more information about the available statistics, see Statistics in the Amazon CloudWatch User Guide.
    b. Under Conditions, for Threshold, choose Static.
    c. For Define the alarm condition, choose Greater/Equal.
    d. For Define the threshold value, enter 1.
    e. Choose Next.
11. Under Configure actions, do the following:
    a. Under Alarm state trigger, choose In alarm.
    b. Under Select an SNS topic, choose Select an existing SNS topic.
    c. For Send a notification to, enter the name of the SNS topic that you created in the previous procedure.
    d. Choose Next.
12. Under Add name and description, enter a Name and Description for the alarm. For example, CIS-3.5-CloudTrailChanges. Then choose Next.
13. Under Preview and create, review the alarm configuration. Then choose Create alarm.
3.6 – Ensure a log metric filter and alarm exist for AWS Management Console authentication failures

Severity: Low

AWS Config rule: None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms.

Security Hub recommends that you create a metric filter and alarm for failed console authentication attempts. Monitoring failed console logins might decrease lead time to detect an attempt to brute-force a credential, which might provide an indicator, such as source IP, that you can use in other event correlations.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.6 in the CIS AWS Foundations Benchmark v1.2. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

Note

When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region. The check results in FAILED findings in the following cases:

• No trail is configured.
• The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of NO_DATA in the following cases:

• The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
• The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have listSubscription access to the Amazon SNS topic. Otherwise Security Hub generates WARNING findings for the control.

Remediation

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

To create an Amazon SNS topic

2. Create an Amazon SNS topic that receives all CIS alarms.
   Create at least one subscriber to the topic. For more information, see Getting started with Amazon SNS in the Amazon Simple Notification Service Developer Guide.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.
Finally, create the metric filter and alarm.

**To create a metric filter and alarm**

2. In the navigation pane, choose **Log groups**.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From **Actions**, choose **Create Metric Filter**.
5. Under **Define pattern**, do the following:
   a. Copy the following pattern and then paste it into the **Filter Pattern** field.
   
   ```bash
   {{$.eventName=ConsoleLogin) && ($.errorMessage="Failed authentication")}
   ```
   b. Choose **Next**.
6. Under **Assign metric**, do the following:
   a. In **Filter name**, enter a name for your metric filter.
   b. For **Metric namespace**, enter **LogMetrics**.
      
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
   c. For **Metric name**, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
   d. For **Metric value**, enter **1**.
   e. Choose **Next**.
7. Under **Review and create**, verify the information that you provided for the new metric filter. Then choose **Create metric filter**.
8. Choose the **Metric filters** tab, then choose the metric filter that you just created.

To choose the metric filter, select the check box at the upper right.

9. Choose **Create Alarm**.
10. Under **Specify metric and conditions**, do the following:
    a. Under **Metric**, leave the default values. For more information about the available statistics, see **Statistics** in the *Amazon CloudWatch User Guide*.
    b. Under **Conditions**, for **Threshold**, choose **Static**.
    c. For **Define the alarm condition**, choose **Greater/Equal**.
    d. For **Define the threshold value**, enter **1**.
    e. Choose **Next**.
11. Under **Configure actions**, do the following:
    a. Under **Alarm state trigger**, choose **In alarm**.
    b. Under **Select an SNS topic**, choose **Select an existing SNS topic**.
    c. For **Send a notification to**, enter the name of the SNS topic that you created in the previous procedure.
    d. Choose **Next**.
12. Under **Add name and description**, enter a **Name** and **Description** for the alarm. For example, **CIS-3.6-ConsoleAuthenticationFailure**. Then choose **Next**.
13. Under **Preview and create**, review the alarm configuration. Then choose **Create alarm**.
3.7 – Ensure a log metric filter and alarm exist for disabling or scheduled deletion of customer managed keys

Severity: Low

AWS Config rule: None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms.

Security Hub recommends that you create a metric filter and alarm for customer managed keys that have changed state to disabled or scheduled deletion. Data encrypted with disabled or deleted keys is no longer accessible.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.7 in the CIS AWS Foundations Benchmark v1.2. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

Note
When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.

The check results in FAILED findings in the following cases:

• No trail is configured.
• The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of NO_DATA in the following cases:

• The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
• The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have listSubscription access to the Amazon SNS topic. Otherwise Security Hub generates WARNING findings for the control.

Remediation

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

To create an Amazon SNS topic

2. Create an Amazon SNS topic that receives all CIS alarms.

Create at least one subscriber to the topic. For more information, see Getting started with Amazon SNS in the Amazon Simple Notification Service Developer Guide.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.
Finally, create the metric filter and alarm.

**To create a metric filter and alarm**

2. In the navigation pane, choose **Log groups**.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From **Actions**, choose **Create Metric Filter**.
5. Under **Define pattern**, do the following:
   a. Copy the following pattern and then paste it into the **Filter Pattern** field.
   ```
   {($.eventSource=kms.amazonaws.com) && (($.eventName=DisableKey) || ($.eventName=ScheduleKeyDeletion))}
   ```
   b. Choose **Next**.
6. Under **Assign metric**, do the following:
   a. In **Filter name**, enter a name for your metric filter.
   b. For **Metric namespace**, enter **LogMetrics**.
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
   c. For **Metric name**, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
   d. For **Metric value**, enter 1.
   e. Choose **Next**.
7. Under **Review and create**, verify the information that you provided for the new metric filter. Then choose **Create metric filter**.
8. Choose the **Metric filters** tab, then choose the metric filter that you just created.
   To choose the metric filter, select the check box at the upper right.
9. Choose **Create Alarm**.
10. Under **Specify metric and conditions**, do the following:
    a. Under **Metric**, leave the default values. For more information about the available statistics, see **Statistics** in the Amazon CloudWatch User Guide.
    b. Under **Conditions**, for **Threshold**, choose **Static**.
    c. For **Define the alarm condition**, choose **Greater/Equal**.
    d. For **Define the threshold value**, enter 1.
    e. Choose **Next**.
11. Under **Configure actions**, do the following:
    a. Under **Alarm state trigger**, choose **In alarm**.
    b. Under **Select an SNS topic**, choose **Select an existing SNS topic**.
    c. For **Send a notification to**, enter the name of the SNS topic that you created in the previous procedure.
    d. Choose **Next**.
12. Under **Add name and description**, enter a **Name** and **Description** for the alarm. For example, **CIS-3.7-DisableOrDeleteCMK**. Then choose **Next**.
13. Under **Preview and create**, review the alarm configuration. Then choose **Create alarm**.
3.8 – Ensure a log metric filter and alarm exist for S3 bucket policy changes

**Severity:** Low

**AWS Config rule:** None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms.

Security Hub recommends that you create a metric filter and alarm for changes to S3 bucket policies. Monitoring these changes might reduce time to detect and correct permissive policies on sensitive S3 buckets.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.8 in the CIS AWS Foundations Benchmark v1.2. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

**Note**

When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.

The check results in **FAILED** findings in the following cases:

- No trail is configured.
- The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of **NO_DATA** in the following cases:

- The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
- The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have `listSubscription` access to the Amazon SNS topic. Otherwise Security Hub generates **WARNING** findings for the control.

**Remediation**

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

**To create an Amazon SNS topic**

2. Create an Amazon SNS topic that receives all CIS alarms.
   
   Create at least one subscriber to the topic. For more information, see [Getting started with Amazon SNS](https://docs.aws.amazon.com/AmazonSNS/latest/userguide/SNS-Getting-Started.html) in the Amazon Simple Notification Service Developer Guide.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.

Finally, create the metric filter and alarm.
To create a metric filter and alarm

2. In the navigation pane, choose Log groups.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From Actions, choose Create Metric Filter.
5. Under Define pattern, do the following:
   a. Copy the following pattern and then paste it into the Filter Pattern field.

```
{($.eventSource=s3.amazonaws.com) && (($.eventName=PutBucketAcl)
|| ($.eventName=PutBucketPolicy) || ($.eventName=PutBucketCors) ||
($.eventName=PutBucketLifecycle) || ($.eventName=PutBucketReplication)
|| ($.eventName=DeleteBucketPolicy) || ($.eventName=DeleteBucketCors) ||
($.eventName=DeleteBucketLifecycle) || ($.eventName=DeleteBucketReplication))
```
   b. Choose Next.
6. Under Assign metric, do the following:
   a. In Filter name, enter a name for your metric filter.
   b. For Metric namespace, enter LogMetrics.
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
   c. For Metric name, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
   d. For Metric value, enter 1.
   e. Choose Next.
7. Under Review and create, verify the information that you provided for the new metric filter. Then choose Create metric filter.
8. Choose the Metric filters tab, then choose the metric filter that you just created.
   To choose the metric filter, select the check box at the upper right.
9. Choose Create Alarm.
10. Under Specify metric and conditions, do the following:
    a. Under Metric, for Statistic, choose Average. For more information about the available statistics, see Statistics in the Amazon CloudWatch User Guide.
    b. Under Conditions, for Threshold, choose Static.
    c. For Define the alarm condition, choose Greater/Equal.
    d. For Define the threshold value, enter 1.
    e. Choose Next.
11. Under Configure actions, do the following:
    a. Under Alarm state trigger, choose In alarm.
    b. Under Select an SNS topic, choose Select an existing SNS topic.
    c. For Send a notification to, enter the name of the SNS topic that you created in the previous procedure.
    d. Choose Next.
12. Under Add name and description, enter a Name and Description for the alarm. For example, CIS-3.8-S3BucketPolicyChanges. Then choose Next.
13. Under Preview and create, review the alarm configuration. Then choose Create alarm.
3.9 – Ensure a log metric filter and alarm exist for AWS Config configuration changes

Severity: Low

AWS Config rule: None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms.

Security Hub recommends that you create a metric filter and alarm for changes to AWS Config configuration settings. Monitoring these changes helps ensure sustained visibility of configuration items in the account.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.9 in the CIS AWS Foundations Benchmark v1.2. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

Note
When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.

The check results in FAILED findings in the following cases:

• No trail is configured.
• The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of NO_DATA in the following cases:

• The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
• The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have listSubscription access to the Amazon SNS topic. Otherwise Security Hub generates WARNING findings for the control.

Remediation

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

To create an Amazon SNS topic

2. Create an Amazon SNS topic that receives all CIS alarms.

Create at least one subscriber to the topic. For more information, see Getting started with Amazon SNS in the Amazon Simple Notification Service Developer Guide.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.
Finally, create the metric filter and alarm.

**To create a metric filter and alarm**

2. In the navigation pane, choose **Log groups**.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From **Actions**, choose **Create Metric Filter**.
5. Under **Define pattern**, do the following:
   a. Copy the following pattern and then paste it into the **Filter Pattern** field.

   $$\{(\$.eventSource=config.amazonaws.com) \&\& ((\$.eventName=StopConfigurationRecorder) \| \| (\$.eventName=DeleteDeliveryChannel) \| \| (\$.eventName=PutDeliveryChannel) \| \| (\$.eventName=PutConfigurationRecorder))\}$$

   b. Choose **Next**.
6. Under **Assign metric**, do the following:
   a. In **Filter name**, enter a name for your metric filter.
   b. For **Metric namespace**, enter **LogMetrics**.
      
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
   c. For **Metric name**, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
   d. For **Metric value**, enter **1**.
   e. Choose **Next**.
7. Under **Review and create**, verify the information that you provided for the new metric filter. Then choose **Create metric filter**.
8. Choose the **Metric filters** tab, then choose the metric filter that you just created.
   
   To choose the metric filter, select the check box at the upper right.
9. Choose **Create Alarm**.
10. Under **Specify metric and conditions**, do the following:
    a. Under **Metric**, leave the default values. For more information about the available statistics, see **Statistics** in the *Amazon CloudWatch User Guide*.
    b. Under **Conditions**, for **Threshold**, choose **Static**.
    c. For **Define the alarm condition**, choose **Greater/Equal**.
    d. For **Define the threshold value**, enter **1**.
    e. Choose **Next**.
11. Under **Configure actions**, do the following:
    a. Under **Alarm state trigger**, choose **In alarm**.
    b. Under **Select an SNS topic**, choose **Select an existing SNS topic**.
    c. For **Send a notification to**, enter the name of the SNS topic that you created in the previous procedure.
    d. Choose **Next**.
12. Under **Add name and description**, enter a **Name** and **Description** for the alarm. For example, **CIS-3.9-AWSConfigChanges**. Then choose **Next**.
13. Under **Preview and create**, review the alarm configuration. Then choose **Create alarm**.

### 3.10 – Ensure a log metric filter and alarm exist for security group changes

**Severity:** Low

**AWS Config rule:** None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms. Security groups are a stateful packet filter that controls ingress and egress traffic in a VPC.

Security Hub recommends that you create a metric filter and alarm for changes to security groups. Monitoring these changes helps ensure that resources and services aren't unintentionally exposed.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.10 in the [CIS AWS Foundations Benchmark v1.2](https://docs.aws.amazon.com/cloudtrail/latest/userguide/cis-aws-foundations-benchmark.html). This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

**Note**

When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.

The check results in **FAILED** findings in the following cases:

- No trail is configured.
- The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of **NO_DATA** in the following cases:

- The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
- The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have `listSubscription` access to the Amazon SNS topic. Otherwise Security Hub generates **WARNING** findings for the control.

**Remediation**

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

**To create an Amazon SNS topic**

2. Create an Amazon SNS topic that receives all CIS alarms.

   Create at least one subscriber to the topic. For more information, see [Getting Started with Amazon SNS](https://docs.aws.amazon.com/sns/latest/dg/sns-getting-started.html) in the *Amazon Simple Notification Service Developer Guide*.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).
Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.

Finally, create the metric filter and alarm.

**To create a metric filter and alarm**

2. In the navigation pane, choose **Log groups**.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From **Actions**, choose **Create Metric Filter**.
5. Under **Define pattern**, do the following:
   a. Copy the following pattern and then paste it into the **Filter Pattern** field.
      ```
      {($.eventName=AuthorizeSecurityGroupIngress)
      || ($.eventName=AuthorizeSecurityGroupEgress)
      || ($.eventName=RevokeSecurityGroupIngress) ||
      ($.eventName=RevokeSecurityGroupEgress) ||
      ($.eventName=CreateSecurityGroup) ||
      ($.eventName=DeleteSecurityGroup)}
      ```
   b. Choose **Next**.
6. Under **Assign metric**, do the following:
   a. In **Filter name**, enter a name for your metric filter.
   b. For **Metric namespace**, enter **LogMetrics**.
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
   c. For **Metric name**, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
   d. For **Metric value**, enter **1**.
   e. Choose **Next**.
7. Under **Review and create**, verify the information that you provided for the new metric filter. Then choose **Create metric filter**.
8. Choose the **Metric filters** tab, then choose the metric filter that you just created.

To choose the metric filter, select the check box at the upper right.

9. Choose **Create Alarm**.
10. Under **Specify metric and conditions**, do the following:
    a. Under **Metric**, leave the default values. For more information about the available statistics, see **Statistics** in the [Amazon CloudWatch User Guide](https://docs.aws.amazon.com/AmazonCloudWatch/latest/monitoring/CloudWatch-Metrics.html).
    b. Under **Conditions**, for **Threshold**, choose **Static**.
    c. For **Define the alarm condition**, choose **Greater/Equal**.
    d. For **Define the threshold value**, enter **1**.
    e. Choose **Next**.
11. Under **Configure actions**, do the following:
    a. Under **Alarm state trigger**, choose **In alarm**.
    b. Under **Select an SNS topic**, choose **Select an existing SNS topic**.
    c. For **Send a notification to**, enter the name of the SNS topic that you created in the previous procedure.
d. Choose Next.

12. Under Add name and description, enter a Name and Description for the alarm. For example, CIS-3.10-SecurityGroupChanges. Then choose Next.

13. Under Preview and create, review the alarm configuration. Then choose Create alarm.

3.11 – Ensure a log metric filter and alarm exist for changes to Network Access Control Lists (NACL)

Severity: Low

AWS Config rule: None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms. NACLs are used as a stateless packet filter to control ingress and egress traffic for subnets in a VPC.

Security Hub recommends that you create a metric filter and alarm for changes to NACLs. Monitoring these changes helps ensure that AWS resources and services aren't unintentionally exposed.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.11 in the CIS AWS Foundations Benchmark v1.2. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

Note
When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region. The check results in FAILED findings in the following cases:

- No trail is configured.
- The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of NO_DATA in the following cases:

- The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
- The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have listSubscription access to the Amazon SNS topic. Otherwise Security Hub generates WARNING findings for the control.

Remediation

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

To create an Amazon SNS topic

2. Create an Amazon SNS topic that receives all CIS alarms.

Create at least one subscriber to the topic. For more information, see Getting started with Amazon SNS in the Amazon Simple Notification Service Developer Guide.
Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.

Finally, create the metric filter and alarm.

**To create a metric filter and alarm**

2. In the navigation pane, choose **Log groups**.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From **Actions**, choose **Create Metric Filter**.
5. Under **Define pattern**, do the following:
   a. Copy the following pattern and then paste it into the **Filter Pattern** field.

   ```
   {($.eventName=CreateNetworkAcl) || ($.eventName=CreateNetworkAclEntry) || ($.eventName=DeleteNetworkAcl) || ($.eventName=DeleteNetworkAclEntry) || ($.eventName=ReplaceNetworkAclEntry) || ($.eventName=ReplaceNetworkAclAssociation)}
   ```
   b. Choose **Next**.
6. Under **Assign metric**, do the following:
   a. In **Filter name**, enter a name for your metric filter.
   b. For **Metric namespace**, enter **LogMetrics**.
      
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
   c. For **Metric name**, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
   d. For **Metric value**, enter 1.
   e. Choose **Next**.
7. Under **Review and create**, verify the information that you provided for the new metric filter. Then choose **Create metric filter**.
8. Choose the **Metric filters** tab, then choose the metric filter that you just created.

   To choose the metric filter, select the check box at the upper right.
9. Choose **Create Alarm**.
10. Under **Specify metric and conditions**, do the following:
    a. Under **Metric**, leave the default values. For more information about the available statistics, see **Statistics** in the *Amazon CloudWatch User Guide*.
    b. Under **Conditions**, for **Threshold**, choose **Static**.
    c. For **Define the alarm condition**, choose **Greater/Equal**.
    d. For **Define the threshold value**, enter 1.
    e. Choose **Next**.
11. Under **Configure actions**, do the following:
    a. Under **Alarm state trigger**, choose **In alarm**.
    b. Under **Select an SNS topic**, choose **Select an existing SNS topic**.
c. For **Send a notification to**, enter the name of the SNS topic that you created in the previous procedure.

d. Choose **Next**.

12. Under **Add name and description**, enter a **Name** and **Description** for the alarm. For example, **CIS-3.11-NetworkACLChanges**. Then choose **Next**.

13. Under **Preview and create**, review the alarm configuration. Then choose **Create alarm**.

### 3.12 – Ensure a log metric filter and alarm exist for changes to network gateways

**Severity:** Low

**AWS Config rule:** None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms. Network gateways are required to send and receive traffic to a destination outside a VPC.

Security Hub recommends that you create a metric filter and alarm for changes to network gateways. Monitoring these changes helps ensure that all ingress and egress traffic traverses the VPC border via a controlled path.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.12 in the **CIS AWS Foundations Benchmark v1.2**. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

**Note**

When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.

The check results in **FAILED** findings in the following cases:

- No trail is configured.
- The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of **NO_DATA** in the following cases:

- The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
- The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have **listSubscription** access to the Amazon SNS topic. Otherwise Security Hub generates **WARNING** findings for the control.

**Remediation**

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

**To create an Amazon SNS topic**

2. Create an Amazon SNS topic that receives all CIS alarms.
Create at least one subscriber to the topic. For more information, see Getting started with Amazon SNS in the Amazon Simple Notification Service Developer Guide.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.

Finally, create the metric filter and alarm.

To create a metric filter and alarm

2. In the navigation pane, choose Log groups.  
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.  
4. From Actions, choose Create Metric Filter.  
5. Under Define pattern, do the following:  
   a. Copy the following pattern and then paste it into the Filter Pattern field.  

      ```
      {($.eventName=CreateCustomerGateway) || ($.eventName=DeleteCustomerGateway) ||  
      ($.eventName=AttachInternetGateway) || ($.eventName=CreateInternetGateway) ||  
      ($.eventName=DeleteInternetGateway) || ($.eventName=DetachInternetGateway)}
      ```  
   b. Choose Next.  
6. Under Assign metric, do the following:  
   a. In Filter name, enter a name for your metric filter.  
   b. For Metric namespace, enter LogMetrics.  
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.  
   c. For Metric name, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.  
   d. For Metric value, enter 1.  
   e. Choose Next.  
7. Under Review and create, verify the information that you provided for the new metric filter. Then choose Create metric filter.  
8. Choose the Metric filters tab, then choose the metric filter that you just created.  
   To choose the metric filter, select the check box at the upper right.  
9. Choose Create Alarm.  
10. Under Specify metric and conditions, do the following:  
   a. Under Metric, leave the default values. For more information about the available statistics, see Statistics in the Amazon CloudWatch User Guide.  
   b. Under Conditions, for Threshold, choose Static.  
   c. For Define the alarm condition, choose Greater/Equal.  
   d. For Define the threshold value, enter 1.  
   e. Choose Next.  
11. Under Configure actions, do the following:
a. Under **Alarm state trigger**, choose **In alarm**.
b. Under **Select an SNS topic**, choose **Select an existing SNS topic**.
c. For **Send a notification to**, enter the name of the SNS topic that you created in the previous procedure.
d. Choose **Next**.

12. Under **Add name and description**, enter a **Name** and **Description** for the alarm. For example, **CIS-3.12-NetworkGatewayChanges**. Then choose **Next**.

13. Under **Preview and create**, review the alarm configuration. Then choose **Create alarm**.

### 3.13 – Ensure a log metric filter and alarm exist for route table changes

**Severity:** Low

**AWS Config rule:** None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms. Routing tables route network traffic between subnets and to network gateways.

Security Hub recommends that you create a metric filter and alarm for changes to route tables. Monitoring these changes helps ensure that all VPC traffic flows through an expected path.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.13 in the [CIS AWS Foundations Benchmark v1.2](https://docs.aws.amazon.com/config/latest/wnp/configchecks-cis-aws-foundation.html). This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

**Note**

When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.

The check results in **FAILED** findings in the following cases:

- No trail is configured.
- The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of **NO_DATA** in the following cases:

- The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
- The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have `listSubscription` access to the Amazon SNS topic. Otherwise Security Hub generates **WARNING** findings for the control.

**Remediation**

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.

**To create an Amazon SNS topic**

2. Create an Amazon SNS topic that receives all CIS alarms.

Create at least one subscriber to the topic. For more information, see Getting started with Amazon SNS in the Amazon Simple Notification Service Developer Guide.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.

Finally, create the metric filter and alarm.

To create a metric filter and alarm

2. In the navigation pane, choose Log groups.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From Actions, choose Create Metric Filter.
5. Under Define pattern, do the following:
   a. Copy the following pattern and then paste it into the Filter Pattern field.
      
      ```
      {($.eventName=CreateRoute) || ($.eventName=CreateRouteTable) ||
      ($.eventName=ReplaceRoute) || ($.eventName=ReplaceRouteTableAssociation)
      || ($.eventName=DeleteRouteTable) || ($.eventName=DeleteRoute) ||
      ($.eventName=DisassociateRouteTable)}
      ```
   b. Choose Next.
6. Under Assign metric, do the following:
   a. In Filter name, enter a name for your metric filter.
   b. For Metric namespace, enter LogMetrics.
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
   c. For Metric name, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
   d. For Metric value, enter 1.
   e. Choose Next.
7. Under Review and create, verify the information that you provided for the new metric filter. Then choose Create metric filter.
8. Choose the Metric filters tab, then choose the metric filter that you just created.
    To choose the metric filter, select the check box at the upper right.
9. Choose Create Alarm.
10. Under Specify metric and conditions, do the following:
    a. Under Metric, for Statistic, choose Average. For more information about the available statistics, see Statistics in the Amazon CloudWatch User Guide.
    b. Under Conditions, for Threshold, choose Static.
    c. For Define the alarm condition, choose Greater/Equal.
    d. For Define the threshold value, enter 1.
e. Choose Next.

11. Under Configure actions, do the following:
   a. Under Alarm state trigger, choose In alarm.
   b. Under Select an SNS topic, choose Select an existing SNS topic.
   c. For Send a notification to, enter the name of the SNS topic that you created in the previous procedure.
   d. Choose Next.

12. Under Add name and description, enter a Name and Description for the alarm. For example, CIS-3.13-RouteTableChanges. Then choose Next.

13. Under Preview and create, review the alarm configuration. Then choose Create alarm.

3.14 – Ensure a log metric filter and alarm exist for VPC changes

Severity: Low

AWS Config rule: None

You can do real-time monitoring of API calls by directing CloudTrail logs to CloudWatch Logs and establishing corresponding metric filters and alarms. You can have more than one VPC in an account, and you can create a peer connection between two VPCs, enabling network traffic to route between VPCs.

Security Hub recommends that you create a metric filter and alarm for changes to VPCs. Monitoring these changes helps ensure that authentication and authorization controls remain intact.

To run this check, Security Hub uses custom logic to perform the exact audit steps prescribed for control 3.14 in the CIS AWS Foundations Benchmark v1.2. This control fails if the exact metric filters prescribed by CIS are not used. Additional fields or terms cannot be added to the metric filters.

Note
When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.

The check results in FAILED findings in the following cases:

- No trail is configured.
- The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of NO_DATA in the following cases:

- The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
- The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have listSubscription access to the Amazon SNS topic. Otherwise Security Hub generates WARNING findings for the control.

Remediation

The steps to remediate this issue include setting up an Amazon SNS topic, a CloudTrail trail, a metric filter, and an alarm for the metric filter.
Create an Amazon SNS topic

2. Create an Amazon SNS topic that receives all CIS alarms.

Create at least one subscriber to the topic. For more information, see Getting started with Amazon SNS in the Amazon Simple Notification Service Developer Guide.

Next, set up an active CloudTrail that applies to all Regions. To do so, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).

Make a note of the name of the CloudWatch Logs log group that you associate with the CloudTrail trail. You create the metric filter for that log group.

Finally, create the metric filter and alarm.

To create a metric filter and alarm

2. In the navigation pane, choose Log groups.
3. Select the check box for the CloudWatch Logs log group that is associated with the CloudTrail trail that you created.
4. From Actions, choose Create Metric Filter.
5. Under Define pattern, do the following:
   a. Copy the following pattern and then paste it into the Filter Pattern field.

   ```
   {($.eventName=CreateVpc) || ($.eventName=DeleteVpc) ||
   ($.eventName=ModifyVpcAttribute) || ($.eventName=AcceptVpcPeeringConnection)
   || ($.eventName=CreateVpcPeeringConnection) ||
   ($.eventName=DeleteVpcPeeringConnection) ||
   ($.eventName=RejectVpcPeeringConnection) || ($.eventName=AttachClassicLinkVpc)
   || ($.eventName=DetachClassicLinkVpc) || ($.eventName=DisableVpcClassicLink) ||
   ($.eventName=EnableVpcClassicLink)}
   ```
   b. Choose Next.
6. Under Assign metric, do the following:
   a. In Filter name, enter a name for your metric filter.
   b. For Metric namespace, enter LogMetrics.
      
      If you use the same namespace for all of your CIS log metric filters, then all CIS Benchmark metrics are grouped together.
   c. For Metric name, enter a name for the metric. Remember the name of the metric. You will need to select the metric when you create the alarm.
   d. For Metric value, enter 1.
   e. Choose Next.
7. Under Review and create, verify the information that you provided for the new metric filter. Then choose Create metric filter.
8. Choose the Metric filters tab, then choose the metric filter that you just created.

   To choose the metric filter, select the check box at the upper right.
9. Choose Create Alarm.
10. Under Specify metric and conditions, do the following:
a. Under Metric, for Statistic, choose Average. For more information about the available statistics, see Statistics in the Amazon CloudWatch User Guide.

b. Under Conditions, for Threshold, choose Static.

c. For Define the alarm condition, choose Greater/Equal.

d. For Define the threshold value, enter 1.

e. Choose Next.

11. Under Configure actions, do the following:

   a. Under Alarm state trigger, choose In alarm.

   b. Under Select an SNS topic, choose Select an existing SNS topic.

   c. For Send a notification to, enter the name of the SNS topic that you created in the previous procedure.

   d. Choose Next.

12. Under Add name and description, enter a Name and Description for the alarm. For example, CIS-3.14-VPCChanges. Then choose Next.

13. Under Preview and create, review the alarm configuration. Then choose Create alarm.

4.1 – Ensure no security groups allow ingress from 0.0.0.0/0 to port 22

Severity: High

AWS Config rule: restricted-ssh

Security groups provide stateful filtering of ingress and egress network traffic to AWS resources.

Security Hub recommends that no security group allow unrestricted ingress access to port 22. Removing unfettered connectivity to remote console services, such as SSH, reduces a server’s exposure to risk.

Note
This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)

Remediation

Perform the following steps for each security group associated with a VPC.

1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. In the left pane, choose Security groups.
3. Select a security group.
4. In the bottom section of the page, choose the Inbound Rules tab.
5. Choose Edit rules.
6. Identify the rule that allows access through port 22 and then choose the X to remove it.
7. Choose Save rules.

4.2 – Ensure no security groups allow ingress from 0.0.0.0/0 to port 3389

Severity: High
AWS Config rule: restricted-common-ports

The name of the associated AWS Config managed rule is restricted-common-ports. However, the rule that is created uses the name restricted-rdp.

Security groups provide stateful filtering of ingress and egress network traffic to AWS resources.

Security Hub recommends that no security group allow unrestricted ingress access to port 3389. Removing unfettered connectivity to remote console services, such as RDP, reduces a server’s exposure to risk.

Note
This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)

Remediation

Perform the following steps for each security group associated with a VPC.

1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. In the left pane, choose Security groups.
3. Select a security group.
4. In the bottom section of the page, choose the Inbound Rules tab.
5. Choose Edit rules.
6. Identify the rule that allows access through port 3389 and then choose the X to remove it.
7. Choose Save rules.

4.3 – Ensure the default security group of every VPC restricts all traffic

Severity: High

AWS Config rule: vpc-default-security-group-closed

A VPC comes with a default security group with initial settings that deny all inbound traffic, allow all outbound traffic, and allow all traffic between instances assigned to the security group. If you don’t specify a security group when you launch an instance, the instance is automatically assigned to this default security group. Security groups provide stateful filtering of ingress and egress network traffic to AWS resources.

Security Hub recommends that the default security group restrict all traffic.

Update the default security group for the default VPC in every Region to comply. Any new VPCs automatically contain a default security group that you need to remediate to comply with this recommendation.

Note
When implementing this recommendation, you can use VPC flow logging, enabled for the section called “2.9 – Ensure VPC flow logging is enabled in all VPCs” (p. 521), to determine the least-privilege port access that systems require to work properly. VPC flow logging can log all packet acceptances and rejections that occur under the current security groups.

Configuring all VPC default security groups to restrict all traffic encourages least-privilege security group development and mindful placement of AWS resources into security groups. This in turn reduces the exposure of those resources.
Remediation

To update the default security group to restrict all access

1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. View the default security groups details to see the resources that are assigned to them.
3. Create a set of least-privilege security groups for the resources.
4. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
5. On the Amazon EC2 console, change the security group for the resources that use the default security groups to the least-privilege security group you created.
6. For each default security group, choose the **Inbound** tab and delete all inbound rules.
7. For each default security group, choose the **Outbound** tab and delete all outbound rules.

For more information, see Working with Security Groups in the *Amazon VPC User Guide*.

CIS AWS Foundations Benchmark controls that you might want to disable

For the CIS AWS Foundations Benchmark standard, below are some specific controls that you might want to disable. You might want to disable them because they are related to resources that only exist in specific accounts or Regions. The controls would then produce WARNING statuses if the relevant resource cannot be found.

**CIS AWS Foundations Benchmark 2.7 control**

This control deals with using AWS KMS to encrypt CloudTrail trail logs. If you log these trails in a centralized logging account, you only need to run this control in the account and Region where centralized logging takes place.

**CIS AWS Foundations Benchmark 1.2-1.14, 1.16, 1.20, 1.22, and 2.5 controls**

To save on the cost of AWS Config, you can disable recording of global resources in all but one Region, and then disable these controls that deal with global resources in all Regions except for the Region that runs global recording.

If you disable these 1.x controls and disable recording of global resources in a particular Region, you should also disable 2.5. This is because 2.5 requires recording of global resources in order to pass.

CIS AWS Foundations Benchmark security checks that are not supported in Security Hub

The following rules are *not* supported in the CIS AWS Foundations Benchmark standard in Security Hub, because they cannot be evaluated in an automated way. Security Hub focuses on automated security checks.

- 1.15 – Ensure security questions are registered in the AWS account
- 1.17 – Maintain current contact details
- 1.18 – Ensure security contact information is registered
- 1.19 – Ensure IAM instance roles are used for AWS resource access from instances
- 1.21 – Do not set up access keys during initial user setup for all IAM users that have a console password
- 4.4 – Ensure routing tables for VPC peering are "least access"
Payment Card Industry Data Security Standard (PCI DSS)

The Payment Card Industry Data Security Standard (PCI DSS) standard in Security Hub consists of a set of AWS security best practices controls. Each control applies to a specific AWS resource, and relates to one or more PCI DSS version 3.2.1 requirements. A PCI DSS requirement can be related to multiple controls. The details page for each PCI DSS control lists the specific PCI DSS requirements that are related to that control. See the section called “Viewing details for a standard” (p. 493).

The PCI DSS Compliance Standard in Security Hub is designed to help you with your ongoing PCI DSS security activities. The controls cannot verify whether your systems are compliant with the PCI DSS standard. They can neither replace internal efforts nor guarantee that you will pass a PCI DSS assessment. Security Hub does not check procedural controls that require manual evidence collection.

Security Hub currently scopes the controls at the account level. It is recommended that you enable these controls in all of your accounts that have resources that store, process, and/or transmit cardholder data.

This standard was validated by AWS Security Assurance Services LLC (AWS SAS), which is a team of Qualified Security Assessors (QSAs) certified to provide PCI DSS guidance and assessments by the PCI DSS Security Standards Council (PCI SSC). AWS SAS have confirmed that the automated checks can assist a customer in preparing for a PCI DSS assessment.

Contents

- AWS Config resources required for PCI DSS controls (p. 553)
- PCI DSS controls (p. 554)
- PCI DSS controls that you might want to disable (p. 607)

AWS Config resources required for PCI DSS controls

For AWS Security Hub to accurately report findings for all of the PCI DSS controls, you must enable the following resources in AWS Config.

- OpenSearch Service domain
- Auto Scaling group
- CloudTrail trail
- CodeBuild project
- Amazon EC2 Elastic IP address
- Amazon EC2 security group
- Amazon EC2 volume
- IAM user
- AWS KMS key
- IAM policy
- Lambda function
- Amazon RDS DB instance
- Amazon RDS snapshot
- Amazon Redshift cluster
- S3 bucket
- Systems Manager patch compliance
PCI DSS controls

The PCI DSS security standard in Security Hub supports the following controls. For each control, the information includes the severity, the resource type, the AWS Config rule, and the remediation steps.

[PCI.AutoScaling.1] Auto Scaling groups associated with a load balancer should use health checks

Severity: Low

Resource type: AWS::AutoScaling::AutoScalingGroup

AWS Config rule: autoscaling-group-elb-healthcheck-required

Parameters: None

This control checks whether your Auto Scaling groups that are associated with a load balancer are using Elastic Load Balancing health checks.

PCI DSS does not require load balancing or highly available configurations. However, this check aligns with AWS best practices.

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 2.2: Develop configuration standards for all system components. Assure that these standards address all known security vulnerabilities and are consistent with industry-accepted system hardening standards.

- Replicating systems using load balancing provides high availability and is a means to mitigate the effects of a DDoS event.
- This is one method used to implement system hardening configurations.

Remediation

To enable Elastic Load Balancing health checks

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the navigation pane, under Auto Scaling, choose Auto Scaling Groups.
3. To select the group from the list, choose the right box.
4. From Actions, choose Edit
5. For Health Check Type, choose ELB.
6. For Health Check Grace Period, enter 300.
7. Choose Save.

For more information on using a load balancer with an Auto Scaling group, see the Amazon EC2 Auto Scaling User Guide.

[PCI.CloudTrail.1] CloudTrail logs should be encrypted at rest using AWS KMS keys

Severity: Medium

Resource type: AWS::CloudTrail::Trail
**AWS Config rule:** cloud-trail-encryption-enabled

**Parameters:** None

This control checks whether AWS CloudTrail is configured to use the server-side encryption (SSE) AWS KMS key encryption.

If you are only using the default encryption option, you can choose to disable this check.

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements:

**PCI DSS 3.4: Render Primary Account Numbers (PAN) unreadable anywhere it is stored (including on portable digital media, backup media, and in logs).**

If you are using AWS services to process and store PAN, your CloudTrail logs should be encrypted at rest. Encrypting logs ensures that if logs capture PAN(s), the PAN(s) are protected.

By default, the log files delivered by CloudTrail to your S3 bucket are encrypted using Amazon server-side encryption with Amazon S3-managed encryption keys (SSE-S3). See the Amazon Simple Storage Service Developer Guide.

You can configure CloudTrail logs to leverage customer managed keys to further protect CloudTrail logs.

These are methods used to render PAN unreadable.

**Remediation**

To remediate this issue, you enable encryption for your CloudTrail log files.

For details on how to encrypt CloudTrail log files with AWS KMS managed keys (SSE-KMS), see Encrypting CloudTrail log files with AWS KMS–managed keys (SSE-KMS) in the AWS CloudTrail User Guide.

**[PCI.CloudTrail.2] CloudTrail should be enabled**

**Severity:** High

**Resource type:** AWS account

**AWS Config rule:** cloudtrail-enabled

**Parameters:** None

This control checks whether CloudTrail is enabled in your AWS account.

However, some AWS services do not enable logging of all APIs and events. You should implement any additional audit trails other than CloudTrail and review the documentation for each service in CloudTrail Supported Services and Integrations.

**Related PCI DSS requirements**

This control is associated with the following PCI DSS requirements:

**PCI DSS 10.1: Implement audit trails to link all access to system components to each individual user.**

By enabling CloudTrail, Event History provides you with 90 days of readily available events and audit trails for access to system components by each individual user.
You can find the identity of the users in the `eventSource` section of the CloudTrail log.

**PCI DSS 10.2.1:** Implement automated audit trails for all system components to reconstruct the following events: All individual user accesses to cardholder data

Depending on where cardholder data is stored, individual user accesses to cardholder data could be found in the `userIdentity`, `eventSource`, `eventName`, or `responseElements` sections of the CloudTrail log.

**PCI DSS 10.2.2:** Implement automated audit trails for all system components to reconstruct the following events: All actions taken by any individual with root or administrative privileges

Root user identification is found in the `userIdentity` section of the log.

**PCI DSS 10.2.3:** Implement automated audit trails for all system components to reconstruct the following events: Access to all audit trails

Access to audit trails might be found in the `eventSource`, `eventName`, or `responseElements` sections of the log.

**PCI DSS 10.2.4:** Implement automated audit trails for all system components to reconstruct the following events: Invalid logical access attempts

You can find invalid logical access attempts in CloudTrail logs. For example: `responseElements: "ConsoleLogin"` and `responseElements: "Failure"`.

**PCI DSS 10.2.5:** Implement automated audit trails for all system components to reconstruct the following events: Use of and changes to identification and authentication mechanisms—including but not limited to creation of new accounts and elevation of privileges—and all changes, additions, or deletions to accounts with root or administrative privileges

Use of and changes to identification and authentication mechanisms might be found in the `userAgent`, `eventName`, or `responseElements` sections of the log.

**PCI DSS 10.2.6:** Implement automated audit trails for all system components to reconstruct the following events: Initialization, stopping, or pausing of the audit logs

Starting and stopping logging is captured in the CloudTrail logs.

An example of audit log starting and stopping would look as follows within a CloudTrail Log: `eventName: "StopLogging"` and `eventName: "StartLogging"`

**PCI DSS 10.2.7:** Implement automated audit trails for all system components to reconstruct the following events: Creation and deletion of system-level objects

Creation and deletion of system-level objects are captured in the CloudTrail logs. An example of a system-level object would be an AWS Lambda function.

CloudTrail captures the `createFunction` and `deleteFunction` API calls, as described in the [AWS Lambda Developer Guide](https://docs.aws.amazon.com/lambda/latest/dg/api-reference.html).

**PCI DSS 10.3.1:** Record at least the following audit trail entries for all system components for each event: User identification

You can find user identification in the `userIdentity` section of the CloudTrail logs.

**PCI DSS 10.3.2:** Record at least the following audit trail entries for all system components for each event: Type of event

You can find the type of event in the `eventName` section of the CloudTrail log.

**PCI DSS 10.3.3:** Record at least the following audit trail entries for all system components for each event: Date and time

You can find the date and time of an event in the `eventTime` section of the CloudTrail log.
PCI DSS 10.3.4: Record at least the following audit trail entries for all system components for each event: Success or failure indication

You can find the success or failure indication in the responseElements section of the CloudTrail log.

PCI DSS 10.3.5: Record at least the following audit trail entries for all system components for each event: Origination of event

You can find the origination of an event in the userAgent or sourceIPAddress section of the CloudTrail log.

PCI DSS 10.3.6: Record at least the following audit trail entries for all system components for each event: Identity or name of affected data, system component, or resource.

You can find the identity of the resource in the eventSource section of the CloudTrail log.

Remediation

To create a new trail in CloudTrail

1. Sign in to the AWS Management Console using the IAM user you configured for CloudTrail administration.
2. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.
3. In the Region selector, choose the AWS Region where you want your trail to be created. This is the Home Region for the trail.
   
   The Home Region is the only AWS Region where you can view and update the trail after it is created, even if the trail logs events in all AWS Regions.
4. In the navigation pane, choose Trails.
5. On the Trails page, choose Get Started Now. If you do not see that option, choose Create Trail.
6. In Trail name, give your trail a name, such as My-Management-Events-Trail.
   
   As a best practice, use a name that quickly identifies the purpose of the trail. In this case, you're creating a trail that logs management events.
7. In Management Events, make sure Read/Write events is set to All.
8. In Data Events, do not make any changes. This trail will not log any data events.
9. Create a new S3 bucket for the logs:
   
   a. In Storage Location, in Create a new S3 bucket, choose Yes.
   b. In S3 bucket, give your bucket a name, such as my-bucket-for-storing-cloudtrail-logs.

   The name of your S3 bucket must be globally unique. For more information about S3 bucket naming requirements, see the AWS CloudTrail User Guide.
   c. Under Advanced, choose Yes for both Encrypt log files with SSE-KMS and Enable log file validation.
10. Choose Create.

   For more details, see the tutorial in the AWS CloudTrail User Guide.

   [PCI CloudTrail.3] CloudTrail log file validation should be enabled

   Severity: Low

   Resource type: AWS::CloudTrail::Trail
**AWS Config rule:** cloud-trail-log-file-validation-enabled

**Parameters:** None

This control checks whether CloudTrail log file validation is enabled. It does not check when configurations are altered. To monitor and alert on log file changes, you can use Amazon EventBridge or CloudWatch metric filters.

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements:

**PCI DSS 10.5.2: Protect audit trail files from unauthorized modifications.**

CloudTrail log file validation creates a digitally signed digest file containing a hash of each log that CloudTrail writes to Amazon S3.

You can use these digest files to determine whether a log file was changed, deleted, or unchanged after CloudTrail delivered the log.

This is a method that helps to protect audit trail files from unauthorized modifications.

**PCI DSS 10.5.5: Use file-integrity monitoring or change-detection software on logs to ensure that existing log data cannot be changed without generating alerts.**

CloudTrail log file validation creates a digitally signed digest file containing a hash of each log that CloudTrail writes to Amazon S3.

You can use these digest files to determine whether a log file was changed, deleted, or unchanged after CloudTrail delivered the log.

This is a method that helps to ensure file-integrity monitoring or change-detection software is used on logs.

**Remediation**

**To enable CloudTrail log file validation**

1. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.
2. Choose Trails.
3. In the Name column, choose the name of a trail to edit.
5. Under Additional settings, for Log file validation, select Enabled.
6. Choose Save.

**[PCI.CloudTrail.4] CloudTrail trails should be integrated with CloudWatch Logs**

**Severity:** Low

**Resource type:** AWS::CloudTrail::Trail

**AWS Config rule:** cloud-trail-cloud-watch-logs-enabled

**Parameters:** None
This control checks whether CloudTrail trails are configured to send logs to CloudWatch Logs.

It does not check for user permissions to alter logs or log groups. You should create specific CloudWatch rules to alert when CloudTrail logs are altered.

This control also does not check for any additional audit log sources other than CloudTrail being sent to a CloudWatch Logs group.

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 10.5.3: Promptly back up audit trail files to a centralized log server or media that is difficult to alter.

CloudTrail uses Amazon S3 for log file storage and delivery, so log files are stored permanently.

CloudWatch Logs is a native way to promptly back up audit trail files.

Remediation

To ensure that CloudTrail trails are integrated with CloudWatch Logs

1. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.
2. Choose Trails.
3. Choose a trail that there is no value for in the CloudWatch Logs Log group column.
4. Scroll down to the CloudWatch Logs section and then choose Edit.
5. For Log group field, do one of the following:
   - To use the default log group, keep the name as is.
   - To use an existing log group, choose Existing and then enter the name of the log group to use.
   - To create a new log group, choose New and then enter a name for the log group to create.
6. Choose Continue.
7. For IAM role, do one of the following:
   - To use an existing role, choose Existing and then choose the role from the drop-down list.
   - To create a new role, choose New and then enter a name for the role to create.

   The new role is assigned a policy that grants the necessary permissions.

    To view the permissions granted to the role, expand the Policy document.
8. Choose Save changes.

For more information about configuring CloudWatch Logs monitoring with the console, see the AWS CloudTrail User Guide.

[PCI.CodeBuild.1] CodeBuild GitHub or Bitbucket source repository URLs should use OAuth

Severity: Critical

Resource type: AWS::CodeBuild::Project

AWS Config rule: codebuild-project-source-repo-url-check
Parameters: None

This control checks whether the GitHub or Bitbucket source repository URL contains either personal access tokens or a user name and password.

**Note**
This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements:

**PCI DSS 8.2.1: Using strong cryptography, render all authentication credentials (such as passwords/phrases) unreadable during transmission and storage on all system components.**

You can use CodeBuild in your PCI DSS environment to compile your source code, run unit tests, or produce artifacts that are ready to deploy. If you do, your authentication credentials should never be stored or transmitted in clear text or appear in the repository URL.

You should use OAuth instead of personal access tokens or a user name and password to grant authorization for accessing GitHub or Bitbucket repositories. This is a method to use strong cryptography to render authentication credentials unreadable.

**Remediation**

**To remove basic authentication / (GitHub) Personal Access Token from CodeBuild Project Source**

2. Select your Build project that contains personal access tokens or a user name and password.
3. From **Edit**, choose **Source**.
4. Choose **Disconnect from GitHub / Bitbucket**.
5. Choose **Connect using OAuth** and then choose **Connect to GitHub / Bitbucket**.
6. In the message displayed by your source provider, authorize as appropriate.
7. Reconfigure your **Repository URL** and **additional configuration** settings, as needed.
8. Choose **Update source**.

To see CodeBuild use case-based samples, see the [AWS CodeBuild User Guide](https://docs.aws.amazon.com/codebuild/latest/userguide/).

**[PCI.CodeBuild.2] CodeBuild project environment variables should not contain clear text credentials**

**Severity:** Critical

**Resource type:** AWS::CodeBuild::Project

**AWS Config rule:** codebuild-project-envvar-awscred-check
Parameters: None

This control checks whether the project contains environment variables `AWS_ACCESS_KEY_ID` and `AWS_SECRET_ACCESS_KEY`.

Note
This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 8.2.1: Using strong cryptography, render all authentication credentials (such as passwords/phrases) unreadable during transmission and storage on all system components.

You can use CodeBuild in your PCI DSS environment to compile your source code, run unit tests, or produce artifacts that are ready to deploy. If you do, never store the authentication credentials `AWS_ACCESS_KEY_ID` and `AWS_SECRET_ACCESS_KEY` in clear text.

Using environmental variables to store credentials in your CodeBuild project may violate the requirement to use strong cryptography to render authentication credentials unreadable.

Remediation

To reference sensitive data in CodeBuild runtime using Environment variables, use the following procedures.

To remove an Environmental Variable

2. Expand Build, choose Build project, and then choose the build project that contains plaintext credentials.
3. From Edit, choose Environment.
4. Expand Additional configuration and then scroll to Environment variables.
5. Choose Remove next to the environment variable.
6. Choose Update environment.

To store sensitive values in the Amazon EC2 Systems Manager Parameter Store and then retrieve them from your build spec

2. Expand Build, choose Build project, and then choose your build project that contains plaintext credentials.
3. From Edit, choose Environment.
4. Expand Additional configuration and then scroll to Environment variables.
5. In AWS Systems Manager, create a Systems Manager parameter that contains your sensitive data. For instructions on how to do this, refer to the tutorial in the AWS Systems Manager User Guide.
6. After you create the parameter, copy the parameter name.
7. Back in the CodeBuild console, choose Create environmental variable.
8. For name, enter the name of your variable as it appears in your build spec.
9. For value, paste in the name of your parameter.
10. From type, choose Parameter.
11. Choose Remove next to your noncompliant environmental variable that contains plaintext credentials.
12. Choose Update environment.

See the information on environment variables in build environments in the AWS CodeBuild User Guide.

[PCI.Config.1] AWS Config should be enabled

Severity: Medium

Resource type: AWS account

AWS Config rule: None. To run this check, Security Hub runs through audit steps prescribed for it in Securing Amazon Web Services. No AWS Config managed rules are created in your AWS environment for this check.

Parameters: None

This control checks whether AWS Config is enabled in the account for the local Region and is recording all resources.

It does not check for change detection for all critical system files and content files, as AWS Config supports only a subset of resource types.

The AWS Config service performs configuration management of supported AWS resources in your account and delivers log files to you. The recorded information includes the configuration item (AWS resource), relationships between configuration items, and any configuration changes between resources.

Security Hub recommends that you enable AWS Config in all Regions. The AWS configuration item history that AWS Config captures enables security analysis, resource change tracking, and compliance auditing.

Note

Because Security Hub is a Regional service, the check performed for this control checks only the current Region for the account. It does not check all Regions.

To allow security checks against global resources in each Region, you also must record global resources. If you only record global resources in a single Region, then you can disable this control in all Regions except the Region where you record global resources.

For more information, see the AWS Config Developer Guide.

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 10.5.2: Protect audit trail files from unauthorized modifications.

AWS Config continuously monitors, tracks, and evaluates your AWS resource configurations for desired settings and generates configuration change history files every six hours.

You should enable AWS Config to protect audit trail files from unauthorized modifications.
PCI DSS 11.5: Deploy a change-detection mechanism to alert personnel to unauthorized modification of critical system files, configuration files, or content files; and configure the software to perform critical file comparisons at least weekly.

AWS Config continuously monitors, tracks, and evaluates your AWS resource configurations for desired settings and generates configuration change history files every six hours.

You should enable AWS Config to ensure a change-detection mechanism is deployed and is configured to perform critical file comparisons at least weekly.

Remediation

To configure AWS Config settings

1. Open the AWS Config console at https://console.aws.amazon.com/config/.
2. Choose the Region to configure AWS Config in.
3. If you have not used AWS Config before, choose Get started.
4. On the Settings page, do the following:
   a. Under Resource types to record, choose Record all resources supported in this region and Include global resources (e.g., AWS IAM resources).
   b. Under Amazon S3 bucket, either specify the bucket to use or create a bucket and optionally include a prefix.
   c. Under Amazon SNS topic, either select an Amazon SNS topic from your account or create one. For more information about Amazon SNS, see the Amazon Simple Notification Service Getting Started Guide.
   d. Under AWS Config role, either choose Create AWS Config service-linked role or choose Choose a role from your account and then choose the role to use.
5. Choose Next.
6. On the AWS Config rules page, choose Skip.
7. Choose Confirm.

For more information about using AWS Config from the AWS CLI, see the AWS Config Developer Guide.

You can also use an AWS CloudFormation template to automate this process. For more information, see the AWS CloudFormation User Guide.

[PCI.CW.1] A log metric filter and alarm should exist for usage of the "root" user

Severity: Critical

Resource type: AWS account

AWS Config rule: Security Hub runs through audit steps without creating an AWS Config managed rules in your AWS account for this check.

Parameters: None

This control checks for the CloudWatch metric filters using the following pattern:

```javascript
{ $.userIdentity.type = "Root" && $.userIdentity.invokedBy NOT EXISTS && $.eventType != "AwsServiceEvent" }
```

It checks the following:
• The log group name is configured for use with active multi-Region CloudTrail.
• There is at least one Event Selector for a Trail with IncludeManagementEvents set to true and ReadWriteType set to All.
• There is at least one active subscriber to an Amazon SNS topic associated with the alarm.

Note
When Security Hub performs the check for this control, it looks for CloudTrail trails that the current account uses. These trails might be organization trails that belong to another account. Multi-Region trails also might be based in a different Region.
The check results in FAILED findings in the following cases:
• No trail is configured.
• The available trails that are in the current Region and that are owned by current account do not meet the control requirements.

The check results in a control status of NO_DATA in the following cases:
• The multi-Region trail is based in a different Region. Security Hub can only generate findings in the Region where the trail is based.
• The multi-Region trail belongs to a different account. Security Hub can only generate findings for the account that owns the trail.

For the alarm, the current account must either own the referenced Amazon SNS topic, or must have listSubscription access to the Amazon SNS topic. Otherwise Security Hub generates WARNING findings for the control.

Related PCI DSS requirements
This control is related to the following PCI DSS requirements:

PCI DSS 7.2.1: Establish an access control system(s) for systems components that restricts access based on a user’s need to know, and is set to "deny all" unless specifically allowed. This access control system(s) must include the following: Coverage of all system components.

The root user is the most privileged user in an AWS account and has unrestricted access to all resources in the AWS account.

You should set up log metric filters and alarms in the event that AWS account root user credentials are used.

You should also ensure that CloudTrail is enabled to keep an audit trail of actions taken by any individual with root or administrative privileges (see the section called “[PCI.CloudTrail.2] CloudTrail should be enabled” (p. 555)). Root user identification would be found in the userIdentity section of the CloudTrail log.

Remediation
The steps to remediate this issue include setting up an Amazon SNS topic, a metric filter, and an alarm for the metric filter.

These are the same steps to remediate findings for the section called “3.3 – Ensure a log metric filter and alarm exist for usage of “root” account ” (p. 525).

To create an Amazon SNS topic
2. Create an Amazon SNS topic that receives all CIS alarms.
   Create at least one subscriber to the topic.
   For more information about creating Amazon SNS topics, see the Amazon Simple Notification Service Developer Guide.
3. Set up an active CloudTrail trail that applies to all Regions.
   To do this, follow the remediation steps in the section called “2.1 – Ensure CloudTrail is enabled in all Regions” (p. 515).
   Make a note of the associated log group name.

To create a metric filter and alarm
2. Choose Logs, then choose Log groups.
3. Choose the log group where CloudTrail is logging.
4. On the log group details page, choose Metric filters.
5. Choose Create metric filter.
6. Copy the following pattern and then paste it into Filter pattern.

   ```
   {{$userIdentity.type="Root" && $.userIdentity.invokedBy NOT EXISTS && $.eventType != "AwsServiceEvent"}}
   ```

7. Choose Next.
8. Enter the name of the new filter. For example, RootAccountUsage.
9. Confirm that the value for Metric namespace is LogMetrics.
   This ensures that all CIS Benchmark metrics are grouped together.
10. In Metric name, enter the name of the metric.
11. In Metric value, enter 1, and then choose Next.
12. Choose Create metric filter.
13. Next, set up the notification. Select the the metric filter you just created, then choose Create alarm.
14. Enter the threshold for the alarm (for example, 1), then choose Next.
15. Under Select an SNS topic, for Send notification to, choose an email list, then choose Next.
16. Enter a Name and Description for the alarm, such as RootAccountUsageAlarm, then choose Next.
17. Choose Create Alarm.

[PCI.DMS.1] AWS Database Migration Service replication instances should not be public

Severity: Critical

Resource type: AWS::DMS::ReplicationInstance

AWS Config rule: dms-replication-not-public

Parameters: None

This control checks whether AWS DMS replication instances are public. To do this, it examines the value of the PubliclyAccessible field.
A private replication instance has a private IP address that you cannot access outside of the replication network. A replication instance should have a private IP address when the source and target databases are in the same network, and the network is connected to the replication instance's VPC using a VPN, AWS Direct Connect, or VPC peering. To learn more about public and private replication instances, see [Public and private replication instances](#) in the AWS Database Migration Service User Guide.

You should also ensure that access to your AWS DMS instance configuration is limited to only authorized users. To do this, restrict users' IAM permissions to modify AWS DMS settings and resources.

**Note**
This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements.

**PCI DSS 1.2.1 - Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.**

If you use AWS DMS in your defined CDE, set the replication instance's `PubliclyAccessible` field to `'false'`. Allowing public access to your replication instance might violate the requirement to allow only necessary traffic to and from the CDE.

**PCI DSS 1.3.1 - Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.**

If you use AWS DMS in your defined CDE, set the replication instance's `PubliclyAccessible` field to `'false'`. Allowing public access to your replication instance might violate the requirement to limit inbound traffic to only system components that provide authorized, publicly accessible services, protocols, and ports.

**PCI DSS 1.3.2 - Limit inbound internet traffic to IP addresses within the DMZ.**

If you use AWS DMS in your defined CDE, set the replication instance's `PubliclyAccessible` field to `'false'`. Allowing public access to your replication instance might violate the requirement to limit inbound traffic to IP addresses within the DMZ.

**PCI DSS 1.3.4 - Do not allow unauthorized outbound traffic from the cardholder data environment to the internet.**

If you use AWS DMS in your defined CDE, set the replication instance's `PubliclyAccessible` field to `'false'`. Allowing public access to your replication instance might violate the requirement to block unauthorized outbound traffic from the cardholder data environment to the internet.

**PCI DSS 1.3.6 - Place system components that store cardholder data (such as a database) in an internal network zone, segregated from the DMZ and other untrusted networks.**

If you use AWS DMS in your defined CDE, to migrate a database storing cardholder data, set the replication instance's `PubliclyAccessible` field to `'false'`. Allowing public access to your replication instance might violate the requirement to place system components that store cardholder data in an internal network zone, segregated from the DMZ and other untrusted networks.

**Remediation**

Note that you cannot change the public access setting once a replication instance is created. It must be deleted and recreated.
To configure the AWS DMS replication instances setting to be not publicly accessible

2. In the left navigation pane, under Resource management, navigate to Replication instances.
3. To delete the public instance, select the check box for the instance, choose Actions, then choose delete.
4. Choose Create replication instance. Provide the configuration details.
5. To disable public access, make sure that Publicly accessible is not selected.
6. Choose Create.

For more information, see the section on Creating a replication instance in the AWS Database Migration Service User Guide.

[PCI.EC2.1] Amazon EBS snapshots should not be publicly restorable

Severity: Critical

Resource type: AWS::EC2::Volume

AWS Config rule: ebs-snapshot-public-restorable-check

Parameters: None

This control checks whether Amazon Elastic Block Store snapshots are not publicly restorable by everyone, which makes them public. Amazon EBS snapshots should not be publicly restorable by everyone unless you explicitly allow it, to avoid accidental exposure of your company's sensitive data.

You should also ensure that permission to change Amazon EBS configurations are restricted to authorized AWS accounts only. Learn more about managing Amazon EBS snapshot permissions in the Amazon EC2 User Guide for Linux Instances.

Note
This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

**PCI DSS 1.2.1: Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.**

Amazon EBS snapshots are used to back up the data on your Amazon EBS volumes to Amazon S3 at a specific point in time. They can be used to restore previous states of EBS volumes.

If an Amazon EBS snapshot stores cardholder data, it should not be publicly restorable by everyone. This would violate the requirement to allow only necessary traffic to and from the CDE.

**PCI DSS 1.3.1: Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.**

Amazon EBS snapshots are used to back up the data on your Amazon EBS volumes to Amazon S3 at a specific point in time. They can be used to restore previous states of Amazon EBS volumes.
If an Amazon EBS snapshot stores cardholder data, it should not be publicly restorable by everyone. This would violate the requirement to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

**PCI DSS 1.3.4: Do not allow unauthorized outbound traffic from the cardholder data environment to the internet.**

Amazon EBS snapshots are used to back up the data on your Amazon EBS volumes to Amazon S3 at a specific point in time, and can be used to restore previous states of EBS volumes.

If an Amazon EBS snapshot stores cardholder data, it should not be publicly restorable by everyone. This would violate the requirement to block unauthorized outbound traffic from the cardholder data environment to the internet.

**PCI DSS 7.2.1: Establish an access control system(s) for systems components that restrict access based on a user’s need to know, and is set to "deny all" unless specifically allowed. This access control system(s) must include the following: Coverage of all system components.**

Amazon EBS snapshots are used to back up the data on your Amazon EBS volumes to Amazon S3 at a specific point in time. They can be used to restore previous states of Amazon EBS volumes.

If an Amazon EBS snapshot stores cardholder data, it should not be publicly restorable by everyone. This may violate the requirement to ensure access to systems components is restricted to least privilege necessary, or a user’s need to know.

**Remediation**

**To make a public Amazon EBS snapshot private**

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. In the navigation pane, under **Elastic Block Store**, choose **Snapshots** and then select your public snapshot.
3. Choose **Actions**, then choose **Modify permissions**
4. Choose **Private**
5. (Optional) Add AWS account numbers for authorized accounts to share your snapshot with.
6. Choose **Save**

For more information about sharing an Amazon EBS snapshot, see the Amazon EC2 User Guide for Linux Instances.

**[PCI.EC2.2] VPC default security group should prohibit inbound and outbound traffic**

**Severity:** Medium

**Resource type:** AWS::EC2::SecurityGroup

**AWS Config rule:** vpc-default-security-group-closed

**Parameters:** None

This control checks that the default security group of a VPC does not allow inbound or outbound traffic. It does not check for access restrictions for other security groups that are not default, and other VPC configurations.

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements:
PCI DSS 1.2.1: Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.

If a service that is in scope for PCI DSS is associated with the default security group, the default rules for the security group will allow all outbound traffic. The rules also allow all inbound traffic from network interfaces (and their associated instances) that are assigned to the same security group.

You should change the default security group rules setting to restrict inbound and outbound traffic. Using the default might violate the requirement to allow only necessary traffic to and from the CDE.

PCI DSS 1.3.4: Do not allow unauthorized outbound traffic from the cardholder data environment to the internet.

If a service that is in scope for PCI DSS is associated with the default security group, the default rules for the security group will allow all outbound traffic. The rules also allow all inbound traffic from network interfaces (and their associated instances) that are assigned to the same security group.

You should change the default security group rules setting to restrict unauthorized inbound and outbound traffic. Using the default may violate the requirement to block unauthorized outbound traffic from the cardholder data environment to the internet.

PCI DSS 2.1: Always change vendor-supplied defaults and remove or disable unnecessary default accounts before installing a system on the network.

If a service that is in scope for PCI DSS is associated with the default security group, the default rules for the security group will allow all outbound traffic. The rules also allow all inbound traffic from network interfaces (and their associated instances) that are assigned to the same security group.

You should change the default security group rules setting to restrict inbound and outbound traffic. Using the default may violate the requirement to remove or disable unnecessary default accounts.

Remediation

To remediate this issue, create new security groups and assign those security groups to your resources. To prevent the default security groups from being used, remove their inbound and outbound rules.

To create new security groups and assign them to your resources

1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. In the navigation pane, choose Security groups. View the default security groups details to see the resources that are assigned to them.
3. Create a set of least-privilege security groups for the resources. For details on how to create security groups, see Creating a security group in the Amazon VPC User Guide.
4. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
5. On the Amazon EC2 console, change the security group for the resources that use the default security groups to the least-privilege security group you created. See Changing an instance's security groups in the Amazon VPC User Guide.

After you assign the new security groups to the resources, remove the inbound and outbound rules from the default security groups. This ensures that the default security groups are not used.

To remove the rules from the default security group

1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. In the navigation pane, choose Security groups.
4. Repeat the previous step for each default security group.
5. Select a default security group and choose the **Outbound rules** tab. Choose **Edit outbound rules**. Then delete all of the outbound rules. Choose **Save rules**.
6. Repeat the previous step for each default security group.

For more information about working with security groups in Amazon VPC, see the *Amazon VPC User Guide*.

**[PCI.EC2.3] Unused EC2 security groups should be removed (Retired)**

This control is retired.

**[PCI.EC2.4] Unused EC2 EIPs should be removed**

**Severity:** Low

**Resource type:** AWS::EC2::EIP

**AWS Config rule:** eip-attached

**Parameters:** None

This control checks whether Elastic IP addresses that are allocated to a VPC are attached to Amazon EC2 instances or in-use elastic network interfaces (ENIs).

A failed finding indicates you may have unused Amazon EC2 EIPs.

This will help you maintain an accurate asset inventory of EIPs in your cardholder data environment (CDE).

**Note**

This control is not supported in Africa (Cape Town) or Europe (Milan).

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements:

PCI DSS 2.4: Maintain an inventory of system components that are in scope for PCI DSS.

If an EIP is not attached to an Amazon EC2 instance, this is an indication that it is no longer in use.

Unless there is a business need to retain them, you should remove unused resources to maintain an accurate inventory of system components.

**Remediation**

If you no longer need an Elastic IP address, Security Hub recommends that you release it (the address must not be associated with an instance).

**To release an Elastic IP address using the console**

1. Open the Amazon EC2 console at [https://console.aws.amazon.com/ec2/](https://console.aws.amazon.com/ec2/).
2. In the navigation pane, under **Network & Security**, choose **Elastic IPs**.
3. Choose the Elastic IP address, choose **Actions**, and then choose **Release Elastic IP address**.
4. When prompted, choose **Release**.

For more information, see the information on releasing Elastic IP addresses in the *[Amazon EC2 User Guide for Linux Instances]*.
[PCI.EC2.5] Security groups should not allow ingress from 0.0.0.0/0 to port 22

Severity: High

Resource type: AWS::EC2::SecurityGroup

AWS Config rule: restricted-ssh

Parameters: None

This control checks whether security groups in use disallow unrestricted incoming SSH traffic.

It does not evaluate outbound traffic.

Note that security groups are stateful. If you send a request from your instance, the response traffic for that request is allowed to flow in regardless of inbound security group rules. Responses to allowed inbound traffic are allowed to flow out regardless of outbound rules. To learn more about security groups, see Security groups for your VPC in the Amazon VPC User Guide.

Note
This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

**PCI DSS 1.2.1 - Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.**

You might allow SSH traffic to your instances that are in your defined CDE. If so, restrict the inbound SSH source from 0.0.0.0/0 (anywhere) to a specific IP address or range. Leaving unrestricted access to SSH might violate the requirement to allow only necessary traffic to and from the CDE.

**PCI DSS 1.3.1 - Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.**

You might allow SSH traffic to your instances that are in your defined CDE. If so, restrict the inbound SSH source from 0.0.0.0/0 (anywhere) to a specific IP address or range. Leaving unrestricted access to SSH might violate the requirement to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

**PCI DSS 2.2.2 Enable only necessary services, protocols, daemons, etc., as required for the function of the system.**

You might allow SSH traffic to your instances that are in your defined CDE. If so, restrict the inbound SSH source from 0.0.0.0/0 (anywhere) to a specific IP address or range as required for the function of the security group. Within a CDE, a security group could be considered a system component, which should be hardened appropriately. Leaving unrestricted access to SSH might violate the requirement to enable only the necessary services, protocols, daemons, etc., that are required for the function of the system.

Remediation

Perform the following steps for each security group associated with a VPC.
To remove access to port 22 from a security group

1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. In the navigation pane, under Security, choose Security groups.
3. Select a security group.
4. In the bottom section of the page, choose Inbound rules.
5. Choose Edit inbound rules.
6. Identify the rule that allows access through port 22 and then choose the X to remove it.
7. Choose Save rules.

[PCI.1.3] VPC flow logging should be enabled in all VPCs

Severity: Medium

Resource type: AWS::EC2::VPC

AWS Config rule: vpc-flow-logs-enabled

Parameters:

- trafficType – REJECT

This control checks whether VPC flow logs are found and enabled for VPCs. The traffic type is set to REJECT.

With VPC Flow Logs, you can capture information about the IP address traffic to and from network interfaces in your VPC. After you create a flow log, you can use CloudWatch Logs to view and retrieve the log data.

Security Hub recommends that you enable flow logging for packet rejects for VPCs. Flow logs provide visibility into network traffic that traverses the VPC. They can detect anomalous traffic and provide insight into security workflows.

By default, the record includes values for the different components of the IP address flow, including the source, destination, and protocol. For more information and descriptions of the log fields, see VPC Flow Logs in the Amazon VPC User Guide.

Related PCI DSS requirements

This control is related to the following PCI DSS requirements.

PCI DSS 10.3.3 Verify date and time stamp is included in log entries.

By enabling VPC flow logging for your VPC, you can identify the date and time of a log entry. The event date and time are recorded in the start and end fields. The values are displayed in Unix seconds.

PCI DSS 10.3.4 Verify success or failure indication is included in log entries.

By enabling VPC flow logging for your VPC, you can identify the type of event that occurred. The type of event is recorded in the action field, and can be either ACCEPT or REJECT.

PCI DSS 10.3.5 Verify origination of event is included in log entries.

By enabling VPC flow logging for your VPC, you can verify the origin of an event. The event origin is recorded in the pkt-srcaddr, srcaddr, and srcport fields. These fields show the source IP address and source port of the traffic.
PCI DSS 10.3.6 Verify identity or name of affected data, system component, or resources is included in log entries.

By enabling VPC flow logging for your VPC, you can verify the identity or name of affected data, system components, or resources. The \texttt{pkt-dstaddr}, \texttt{dstaddr}, and \texttt{dstport} fields show the destination IP address and destination port of the traffic.

Remediation

To remediate this issue, enable VPC flow logging.

To enable VPC flow logging

1. Open the Amazon VPC console at \url{https://console.aws.amazon.com/vpc/}.
2. In the navigation pane, under \textit{Virtual Private Cloud}, choose \textit{Your VPCs}.
3. Select a VPC to update.
4. At the bottom of the page, choose \textit{Flow Logs}.
5. Choose \textit{Create flow log}.
6. For \textit{Filter}, choose \textit{Reject}.
7. For \textit{Destination log group}, choose the log group to use.
8. If you chose \textit{CloudWatch Logs} for your destination log group, for \textit{IAM role}, choose the IAM role to use.
9. Choose \textit{Create}.

[PCI.ELBV2.1] Application Load Balancer should be configured to redirect all HTTP requests to HTTPS

\textbf{Severity:} Medium

\textbf{Resource type:} AWS::ElasticLoadBalancingV2::LoadBalancer

\textbf{AWS Config rule:} alb-http-to-https-redirection-check

\textbf{Parameters:} None

This control checks whether HTTP to HTTPS redirection is configured on all HTTP listeners of Application Load Balancers. The control fails if any of the HTTP listeners of Application Load Balancers do not have HTTP to HTTPS redirection configured.

Before you start to use your Application Load Balancer, you must add one or more listeners. A listener is a process that uses the configured protocol and port to check for connection requests. Listeners support both the HTTP and HTTPS protocols. You can use an HTTPS listener to offload the work of encryption and decryption to your load balancer. To enforce encryption in transit, you should use redirect actions with Application Load Balancers to redirect client HTTP requests to an HTTPS request on port 443.

To learn more, see \textit{Listeners for your Application Load Balancers} in \textit{User Guide for Application Load Balancers}.

\textbf{Note}

This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)
Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

**PCI DSS 2.3 Encrypt all nonconsole administrative access using strong cryptography.**

If you use Application Load Balancers with an HTTP listener, ensure that the listener is redirected to HTTPS for any nonconsole administrative access. Allowing unencrypted authentication over HTTP for administrators of the cardholder data environment might violate the requirement to encrypt all nonconsole administrative access using strong cryptography.

**PCI DSS 4.1 Use strong cryptography and security protocols to safeguard sensitive cardholder data during transmission over open, public networks.**

If you use Application Load Balancers with an HTTP listener, ensure that the listener is redirected to HTTPS for any transmissions of cardholder data. Allowing unencrypted transmissions of cardholder data might violate the requirement to use strong cryptography and security protocols to safeguard sensitive cardholder data during transmission over open, public networks.

Remediation

To remediate this issue, you redirect HTTP request to HTTPS.

**To redirect HTTP requests to HTTPS on an Application Load Balancer**

1. Open the Amazon EC2 console at [https://console.aws.amazon.com/ec2/](https://console.aws.amazon.com/ec2/).
2. In the navigation pane, under Load Balancing, choose Load balancers.
3. Choose an Application Load Balancer.
4. Choose Listeners.
5. Select the check box for an HTTP listener (port 80 TCP) and then choose Edit.
6. If there is an existing rule, you must delete it. Otherwise, choose Add action and then choose Redirect to....
7. Choose HTTPS and then enter 443.
8. Choose the check mark in a circle symbol and then choose Update.

**[PCI.ES.1] Elasticsearch domains should be in a VPC**

**Severity:** Critical

**Resource type:** AWS::Elasticsearch::Domain

**AWS Config rule:** elasticsearch-in-vpc-only

**Parameters:** None

This control checks whether Elasticsearch domains are in a VPC.

It does not evaluate the VPC subnet routing configuration to determine public reachability.

This AWS control also does not check whether the OpenSearch Service resource-based policy permits public access by other accounts or external entities. You should ensure that Elasticsearch domains are not attached to public subnets. See Resource-based policies in the Amazon OpenSearch Service Developer Guide.

You should also ensure that your VPC is configured according to the recommended best practices. See Security best practices for your VPC in the Amazon VPC User Guide.
Note
This control is not supported in Asia Pacific (Osaka).

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

**PCI DSS 1.2.1: Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.**

If your OpenSearch Service clusters contain cardholder data, the OpenSearch Service domains should be placed in a VPC. Doing so enables secure communication between OpenSearch Service and other services within the VPC without the need for an internet gateway, NAT device, or VPN connection port.

This method is used to allow only necessary traffic to and from the CDE.

**PCI DSS 1.3.1: Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.**

If your OpenSearch Service clusters contain cardholder data, the OpenSearch Service domains should be placed in a VPC. Doing so enables secure communication between OpenSearch Service and other services within the VPC without the need for an internet gateway, NAT device, or VPN connection port.

This method is used to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

**PCI DSS 1.3.2: Limit inbound internet traffic to IP addresses within the DMZ.**

If your OpenSearch Service clusters contain cardholder data, the OpenSearch Service domains should be placed in a VPC. Doing so enables secure communication between OpenSearch Service and other services within the VPC without the need for an internet gateway, NAT device, or VPN connection port.

This method is used to limit inbound internet traffic to IP addresses within the DMZ.

You can also use a resource-based policy and specify an IP condition for restricting access based on source IP addresses. See the blog post [How to control access to your Amazon OpenSearch Service domain](#).

**PCI DSS 1.3.4: Do not allow unauthorized outbound traffic from the cardholder data environment to the internet.**

If your OpenSearch Service clusters contain cardholder data, the OpenSearch Service domains should be placed in a VPC, which enables secure communication between OpenSearch Service and other services within the VPC without the need for an internet gateway, NAT device, or VPN connection port.

This method is used to block unauthorized outbound traffic from the cardholder data environment to the internet.

**PCI DSS 1.3.6: Place system components that store cardholder data (such as a database) in an internal network zone, segregated from the DMZ and other untrusted networks.**

If your OpenSearch Service clusters contain cardholder data, the OpenSearch Service domains should be placed in a VPC. Doing so enables secure communication between OpenSearch Service and other services within the VPC without the need for an internet gateway, NAT device, or VPN connection port.

This method is used to place system components that store cardholder data in an internal network zone, segregated from the DMZ and other untrusted networks.
Remediation

If you create a domain with a public endpoint, you cannot later place it within a VPC. Instead, you must create a new domain and migrate your data.

The reverse is also true. If you create a domain within a VPC, it cannot have a public endpoint. Instead, you must either create another domain or disable this control.

See Launching your Amazon OpenSearch Service domains within a VPC in the Amazon OpenSearch Service Developer Guide.

[PCI.ES.2] Elasticsearch domains should have encryption at rest enabled

Severity: Medium

Resource type: AWS::Elasticsearch::Domain

AWS Config rule: elasticsearch-encrypted-at-rest

Parameters: None

This control checks whether Elasticsearch domains have encryption at rest configuration enabled.

Note

This control is not supported in Asia Pacific (Osaka).

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 3.4: Render Primary Account Numbers (PAN) unreadable anywhere it is stored (including on portable digital media, backup media, and in logs).

If you use OpenSearch Service to store credit card Primary Account Numbers (PAN), the PAN should be protected by enabling OpenSearch Service domain encryption at rest.

If enabled, it encrypts the following aspects of a domain: Indices, automated snapshots, OpenSearch Service logs, swap files, all other data in the application directory.

This is a method used to render PAN unreadable.

Remediation

By default, domains do not encrypt data at rest, and you cannot configure existing domains to use the feature.

To enable the feature, you must create another domain and migrate your data. For information about creating domains, see the Amazon OpenSearch Service Developer Guide.

Encryption of data at rest requires OpenSearch Service 5.1 or later. For more information about encrypting data at rest for OpenSearch Service, see the Amazon OpenSearch Service Developer Guide.

[PCI.GuardDuty.1] GuardDuty should be enabled

Severity: High

Resource type: AWS account

AWS Config rule: guardduty-enabled-centralized
Parameters: None

This control checks whether Amazon GuardDuty is enabled in your AWS account and Region.

While GuardDuty can be effective against attacks that an intrusion detection system would typically protect, it might not be a complete solution for every environment. This rule also does not check for the generation of alerts to personnel. For more information about GuardDuty, see the Amazon GuardDuty User Guide.

Note
This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)
- Europe (Milan)
- Middle East (Bahrain)
- AWS GovCloud (US-East)

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 11.4 Use intrusion-detection and/or intrusion-prevention techniques to detect and/or prevent intrusions into the network.

GuardDuty can help to meet requirement 11.4 by monitoring traffic at the perimeter of the cardholder data environment and all critical points within it. It can also keep all intrusion-detection engines, baselines, and signatures up to date. Findings are generated from GuardDuty. You can send these alerts to personnel using Amazon CloudWatch. See Creating custom responses to GuardDuty findings with Amazon CloudWatch Events in the Amazon GuardDuty User Guide. Not enabling GuardDuty in your AWS account might violate the requirement to use intrusion-detection and/or prevention techniques to prevent intrusions into the network.

Remediation

To remediate this issue, you enable GuardDuty.

For details on how to enable GuardDuty, including how to use AWS Organizations to manage multiple accounts, see Getting started with GuardDuty in the Amazon GuardDuty User Guide.

[PCI.IAM.1] IAM root user access key should not exist

Severity: Critical

Resource type: AWS account

AWS Config rule: iam-root-access-key-check

Parameters: None

This control checks whether user access keys exist for the root user.

Note
This control is not supported in Africa (Cape Town) or Asia Pacific (Osaka).
Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

**PCI DSS 2.1: Always change vendor-supplied defaults and remove or disable unnecessary default accounts before installing a system on the network.**

   The AWS account root user is the most privileged AWS user. AWS access keys provide programmatic access to a given account.

   No access keys should be created for the root user, as this may violate the requirement to remove or disable unnecessary default accounts.

**PCI DSS 2.2: Develop configuration standards for all system components. Assure that these standards address all known security vulnerabilities and are consistent with industry-accepted system hardening standards.**

   The root user is the most privileged AWS user. AWS access keys provide programmatic access to a given account.

   No access keys should be created for the root user, as this may violate the requirement to implement system hardening configurations.

**PCI DSS 7.2.1: Establish an access control system(s) for systems components that restricts access based on a user's need to know, and is set to “deny all” unless specifically allowed. This access control system(s) must include the following: Coverage of all system components.**

   The root user is the most privileged AWS user. AWS access keys provide programmatic access to a given account.

   No access keys should be created for the root user. Doing so might violate the requirement to ensure access to systems components is restricted to least privilege necessary, or a user’s need to know.

Remediation

**To delete access keys**

1. Log in to your account using the root user credentials.
2. Choose the account name near the top-right corner of the page and then choose **My Security Credentials**.
3. In the pop-up warning, choose **Continue to Security Credentials**.
4. Choose **Access keys (access key ID and secret access key)**.
5. To permanently delete the key, choose **Delete** and then choose **Yes**. You cannot recover deleted keys.
6. If there is more than one root user access key, then repeat steps 4 and 5 for each key.

[PCI.IAM.2] IAM users should not have IAM policies attached

**Severity:** Low

**Resource type:** AWS::IAM::User

**AWS Config rule:** iam-user-no-policies-check

**Parameters:** None

This control checks that none of your IAM users have policies attached. IAM users must inherit permissions from IAM groups or roles.
It does not check whether least privileged policies are applied to IAM roles and groups.

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements:

**PCI DSS 7.2.1**: Establish an access control system(s) for systems components that restricts access based on a user’s need to know, and is set to "deny all" unless specifically allowed. This access control system(s) must include the following: Coverage of all system components.

IAM policies are how privileges are granted to users, groups, or roles in AWS.

By default, IAM users, groups, and roles have no access to AWS resources until IAM policies are attached to them.

To manage least privileged access and reduce the complexity of access management for PCI DSS in-scope resources, you should assign IAM policies at the group or role level and not at the user level.

Reducing access management complexity reduces opportunity for a principal to inadvertently receive or retain excessive privileges.

This is a method used to ensure access to systems components that contain cardholder data is restricted to least privilege necessary, or a user’s need to know.

**Remediation**

To resolve this issue, do the following:

1. Create an IAM group
2. Assign the policy to the group
3. Add the users to the group

The policy is applied to each user in the group.

**To create an IAM group**

2. Choose **Groups** and then choose **Create New Group**.
3. Enter a name for the group to create and then choose **Next Step**.
4. Select each policy to assign to the group and then choose **Next Step**.
   
   The policies that you choose should include any policies currently attached directly to a user account. The next step to resolve a failed check is to add users to a group and then assign the policies to that group.

   Each user in the group gets assigned the policies assigned to the group.
5. Confirm the details on the **Review** page and then choose **Create Group**.

For more information about creating IAM groups, see the IAM User Guide.

**To add users to an IAM group**

2. Choose **Groups**.
3. Choose **Group Actions** and then choose **Add Users to Group**.
4. Choose the users to add to the group and then choose Add Users.

For more information about adding users to groups, see the IAM User Guide.

To remove a policy attached directly to a user

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Users.
3. For the user to detach a policy from, in the User name column, choose the name.
4. For each policy listed under Attached directly, to remove the policy from the user, choose the X on the right side of the page and then choose Remove.
5. Confirm that the user can still use AWS services as expected.

[PCI.IAM.3] IAM policies should not allow full "*" administrative privileges

Severity: High

Resource type: AWS::IAM::Policy

AWS Config rule: iam-policy-no-statements-with-admin-access

Parameters: None

This control checks whether the default version of AWS Identity and Access Management policies (also known as customer managed policies) do not have administrator access with a statement that has "Effect": "Allow" with "Action": "*" over "Resource": "*".

It only checks for the customer managed policies that you created, but does not check for full access to individual services, such as "S3:*".

It does not check for inline and AWS managed policies.

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 7.2.1: Establish an access control system(s) for systems components that restrict access based on a user's need to know, and is set to "deny all" unless specifically allowed. This access control system(s) must include the following: Coverage of all system components.

Providing full administrative privileges instead of restricting to the minimum required may violate the requirement to ensure access to systems components is restricted to the least privilege necessary, or a user's need to know.

Remediation

To modify an IAM policy

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Policies.
3. Choose the radio button next to the policy to remove.
4. From Policy actions, choose Detach.
5. On the Detach policy page, choose the radio button next to each user to detach the policy from and then choose Detach policy.
6. Confirm that the user that you detached the policy from can still access AWS services and resources as expected.

[PCI.IAM.4] Hardware MFA should be enabled for the root user

Severity: Critical

Resource type: AWS account

AWS Config rule: root-account-hardware-mfa-enabled

Parameters: None

This control checks whether your AWS account is enabled to use multi-factor authentication (MFA) hardware device to sign in with root user credentials.

It does not check whether you are using virtual MFA.

To address PCI DSS requirement 8.3.1, you can choose between hardware MFA (this control) or virtual MFA (the section called “[PCI.IAM.5] Virtual MFA should be enabled for the root user” (p. 582)).

Note
This control is not supported in the following Regions.

- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 8.3.1: Incorporate multi-factor authentication for all non-console access into the cardholder data environment (CDE) for personnel with administrative access.

The root user is the most privileged user in an account.

MFA adds an extra layer of protection on top of a user name and password. If users with administrative privileges are accessing the cardholder data environment over a network interface rather than via a direct, physical connection to the system component, and are not physically in front of the machine they are administering, MFA is required.

Enabling hardware MFA is a method used to incorporate multi-factor authentication (MFA) for all nonconsole administrative access.

Remediation

To enable hardware-based MFA for the root account

1. Log in to your account using the root user credentials.
2. Choose the account name at the top right of the page and then choose My Security Credentials.
3. In the warning, choose Continue to Security Credentials.
5. Choose Activate MFA.
6. Choose a hardware-based (not virtual) device to use for MFA and then choose **Continue**.
7. Complete the steps to configure the device type appropriate to your selection.

**[PCI.IAM.5] Virtual MFA should be enabled for the root user**

**Severity:** Critical

**Resource type:** AWS account

**AWS Config rule:** root-account-mfa-enabled

**Parameters:** None

This control checks whether users of your AWS account require a multi-factor authentication (MFA) device to sign in with root user credentials.

It does not check whether you are using hardware MFA.

To address PCI DSS requirement 8.3.1, you can choose between virtual MFA (this control) or hardware MFA (the section called “[PCI.IAM.4] Hardware MFA should be enabled for the root user” (p. 581)).

**Note**

This control is not supported in the following Regions.

- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements:

**PCI DSS 8.3.1:** Incorporate multi-factor authentication for all non-console access into the cardholder data environment (CDE) for personnel with administrative access.

The root user is the most privileged user in an account.

MFA adds an extra layer of protection on top of a user name and password. If users with administrative privileges are accessing the cardholder data environment, and are not physically in front of the machine they are administering, MFA is required.

Enabling virtual MFA is a method used to incorporate multi-factor authentication (MFA) for all nonconsole administrative access.

**Remediation**

**To enable MFA for the root account**

1. Log in to your account using the root user credentials.
2. Choose the account name at the top-right of the page and then choose **My Security Credentials**.
3. In the warning, choose **Continue to Security Credentials**.
4. Choose **Multi-factor authentication (MFA)**.
5. Choose **Activate MFA**.
6. Choose the type of device to use for MFA and then choose **Continue**.
7. Complete the steps to configure the device type appropriate to your selection.

[PCI.IAM.6] MFA should be enabled for all IAM users

**Severity:** Medium

**Resource type:** AWS::IAM::User

**AWS Config rule:** iam-user-mfa-enabled

**Parameters:** None

This control checks whether the IAM users have multi-factor authentication (MFA) enabled.

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements:

**PCI DSS 8.3.1:** Incorporate multi-factor authentication for all non-console access into the cardholder data environment (CDE) for personnel with administrative access.

Enabling MFA for all IAM users is a method used to incorporate multi-factor authentication (MFA) for all non-console administrative access.

**Remediation**

**To configure MFA for a user**

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Users.
3. Choose the user name of the user to configure MFA for.
4. Choose Security credentials and then choose Manage next to Assigned MFA device.
5. Follow the Manage MFA Device wizard to assign the type of device appropriate for your environment.

To learn how to delegate MFA setup to users, the AWS Security Blog post [How to Delegate Management of Multi-Factor Authentication to AWS IAM Users](https://aws.amazon.com/blogs/security/how-to-delegate-management-of-multi-factor-authentication-to-aws-iam-users/).

[PCI.IAM.7] IAM user credentials should be disabled if not used within a predefined number of days

**Severity:** Medium

**Resource type:** AWS::IAM::User

**AWS Config rule:** iam-user-unused-credentials-check

**Parameters:**

- `maxCredentialUsageAge`: 90 (days)

This control checks whether your IAM users have passwords or active access keys that have not been used within a specified number of days. The default is 90 days.

Security Hub strongly recommends that you do not generate and remove all access keys in your account. Instead, the recommended best practice is to either create one or more IAM roles or to use federation.
These practices allow your users to use their existing corporate credentials to sign in to the AWS Management Console console and AWS CLI.

Each approach has its use cases. Federation is generally better for enterprises that have an existing central directory or who plan to need more than the current quota of IAM users. Applications running outside of an AWS environment need access keys for programmatic access to AWS resources.

However, if the resources that need programmatic access run inside AWS, the best practice is to use IAM roles. You can use roles to grant a resource access without hardcoding an access key ID and secret access key into the configuration.

To learn more about protecting your access keys and account, see Best practices for managing AWS access keys in the AWS General Reference. Also see the blog post Guidelines for protecting your AWS account while using-programmatic access.

If you already have an access key, we recommend that you remove or deactivate unused user credentials that are inactive for 90 days or longer.

This control only checks for inactive passwords or active access keys. It does not disable the account from use after 90 days. Customers are responsible for taking action and disabling the unused credentials.

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements.

**PCI DSS 8.1.4 Remove/disable inactive user accounts within 90 days.**

If you use IAM passwords or access keys, ensure that they are monitored for use, and disabled if not used for 90 days. Allowing IAM user accounts to remain active with unused credentials might violate the requirement to remove/disable inactive user accounts within 90 days.

**Remediation**

To get some of the information that you need to monitor accounts for dated credentials, use the IAM console. For example, when you view users in your account, there are columns for Access key age, Password age, and Last activity. If the value in any of these columns is greater than 90 days, make the credentials for those users inactive.

You can also use credential reports to monitor user accounts and identify those with no activity for 90 or more days. You can download credential reports in .csv format from the IAM console. For more information about credential reports, see Getting credential reports for your AWS account in the IAM User Guide.

After you identify the inactive accounts or unused credentials, use the following steps to disable them.

**To disable inactive accounts or unused IAM credentials**

1. Open the IAM console at https://console.aws.amazon.com/iam/.
3. Choose the name of the user that has credentials older than 90 days.
4. Choose Security credentials. Choose Make inactive for all sign-in credentials and access keys that were not used in 90 days or more.

**[PCI.IAM.8] Password policies for IAM users should have strong configurations**

Severity: Medium
Resource type: AWS account

AWS Config rule: `iam-password-policy`

Parameters: None

This control checks whether the account password policy for IAM users uses the following minimum PCI DSS configurations.

- **RequireUppercaseCharacters** – Require at least one uppercase character in password. (Default = true)
- **RequireLowercaseCharacters** – Require at least one lowercase character in password. (Default = true)
- **RequireNumbers** – Require at least one number in password. (Default = true)
- **MinimumPasswordLength** – Password minimum length. (Default = 7 or longer)
- **PasswordReusePrevention** – Number of passwords before allowing reuse. (Default = 4)
- **MaxPasswordAge** – Number of days before password expiration. (Default = 90)

Related PCI DSS requirements

This control is related to the following PCI DSS requirements.

**PCI DSS 8.1.4: Remove/disable inactive user accounts within 90 days.**

If you have IAM users in your AWS account, you should configure the IAM password policy appropriately. Not securing IAM users' passwords might violate the requirement to remove or disable inactive user accounts within 90 days. By default, the `MaxPasswordAge` parameter is set to 90 days. After their password expires, IAM users cannot access their account until the password is changed, which disables the user.

**PCI DSS 8.2.3: Passwords/passphrases must meet the following: Require a minimum length of at least seven characters and Contain both numeric and alphabetic characters.**

If you have IAM users in your AWS account, the IAM password policy should be configured appropriately. Not securing IAM users' passwords might violate the requirement for a password to have a minimum length of at least seven characters. It might also violate the requirements to contain both numeric and alphabetic characters. By default, `MinimumPasswordLength` is 7, `RequireUppercaseCharacters` is true, and `RequireLowercaseCharacters` is true.

**PCI DSS 8.2.4: Change user passwords/passphrases at least once every 90 days.**

If you have IAM users in your AWS account, the IAM password policy should be configured appropriately. Not securing IAM users' passwords might violate the requirement to change user passwords or passphrases at least once every 90 days. By default, the `MaxPasswordAge` parameter is set to 90 days. After the password expires, the IAM user cannot access the account until the password is changed.

**PCI DSS 8.2.5: Do not allow an individual to submit a new password/passphrase that is the same as any of the last four passwords/passphrases he or she has used.**

If you have IAM users in your AWS account, the IAM password policy should be configured appropriately. Not securing IAM users' passwords might violate the requirement to not allow individuals to submit a new password or passphrase that is the same as any of their previous four passwords or passphrases. By default, `PasswordReusePrevention` is set to 4, which prevents users from reusing their last four passwords.

Remediation

You can use the IAM console to modify the password policy.
To modify the password policy

1. Open the IAM console at https://console.aws.amazon.com/iam/.
3. Select Prevent password reuse. For Number of passwords to remember, enter 24.
4. Choose Change password policy.
5. Select Require at least one uppercase letter from Latin alphabet (A-Z).
6. Select Require at least one lowercase letter from Latin alphabet (a-z).
7. Select Require at least one non-alphanumeric character (!@#$%^&*()_+-=\[]{}|').
8. Select Require at least one number.
9. For Enforce minimum password length, enter 14.
10. Select Enable password expiration. For Expire passwords in day(s), enter 90.
11. Choose Save changes.

[PCI.KMS.1] KMS key rotation should be enabled

Severity: Medium

Resource type: AWS::KMS::Key

AWS Config rule: cmk-backing-key-rotation-enabled

Parameters: None

This control checks that key rotation is enabled for each KMS key. It does not check KMS keys that have imported key material.

You should ensure keys that have imported material and those that are not stored in AWS KMS are rotated. AWS managed keys are rotated once every 3 years.

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 3.6.4: Cryptographic keys should be changed once they have reached the end of their cryptoperiod.

While PCI DSS does not specify the time frame for cryptoperiods, if key rotation is enabled, rotation occurs annually by default.

If you use a KMS key to encrypt cardholder data, you should enable key rotation.

This is a method used to change cryptographic keys once they have reached the end of their cryptoperiod.

Remediation

To enable KMS key rotation

2. To change the AWS Region, use the Region selector in the upper-right corner of the page.
3. Choose Customer managed keys.
4. In the Alias column, choose the alias of the key to update.
5. Choose Key rotation.
6. Select Automatically rotate this KMS key every year and then choose Save.
[PCI.Lambda.1] Lambda functions should prohibit public access

Severity: Critical

Resource type: AWS::Lambda::Function

AWS Config rule: lambda-function-public-access-prohibited

Parameters: None

This control checks whether the Lambda function resource-based policy prohibits public access.

It does not check for access to the Lambda function by internal principals, such as IAM roles. You should ensure that access to the Lambda function is restricted to authorized principals only by using least privilege Lambda resource-based policies.

For more information about using resource-based policies for AWS Lambda, see the AWS Lambda Developer Guide.

Note
This control is not supported in the following Regions.

- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 1.2.1: Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.

If you use a Lambda function that is in scope for PCI DSS, the function should not be publicly accessible. A publicly accessible function might violate the requirement to allow only necessary traffic to and from the CDE.

PCI DSS 1.3.1: Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

If you use a Lambda function that is in scope for PCI DSS, the function should not be publicly accessible. A publicly accessible function might violate the requirement to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

PCI DSS 1.3.2: Limit inbound internet traffic to IP addresses within the DMZ.

If you use a Lambda function that is in scope for PCI DSS, the function should not be publicly accessible. A publicly accessible function might violate the requirement to limit inbound internet traffic to IP addresses within the DMZ.

PCI DSS 1.3.4: Do not allow unauthorized outbound traffic from the cardholder data environment to the internet.

If you use a Lambda function that is in scope for PCI DSS, the function must not be publicly accessible. A publicly accessible function might violate the requirement to block unauthorized outbound traffic from the cardholder data environment to the internet.

PCI DSS 7.2.1: Establish an access control system(s) for systems components that restricts access based on a user's need to know, and is set to "deny all" unless specifically allowed. This access control system(s) must include the following: Coverage of all system components.

If you use a Lambda function that is in scope for PCI DSS, the function should not be publicly accessible. A publicly accessible function might violate the requirement to ensure access to systems
components that contain cardholder data is restricted to the least privilege necessary, or a user’s need to know.

Remediation

To remediate this issue, you update the resource-based policy to change the publicly accessible Lambda function to a private Lambda function.

You can only update resource-based policies for Lambda resources within the scope of the AddPermission and AddLayerVersionPermission API actions.

You cannot author policies for your Lambda resources in JSON, or use conditions that don't map to parameters for those actions using the CLI or the SDK.

To use the AWS CLI to revoke function-use permission from an AWS service or another account

1. To get the ID of the statement from the output of GetPolicy, from the AWS CLI, run the following:

   ```bash
   aws lambda get-policy --function-name yourfunctionname
   ```

   This command returns the Lambda resource-based policy string associated with the publicly accessible Lambda function.

2. From the policy statement returned by the get-policy command, copy the string value of the Sid field.

3. From the AWS CLI, run

   ```bash
   aws lambda remove-permission --function-name yourfunctionname --statement-id youridvalue
   ```

To use the Lambda console to restrict access to the Lambda function

1. Open the AWS Lambda console at https://console.aws.amazon.com/lambda/.

2. Navigate to Functions and then select your publicly accessible Lambda function.

3. Under Designer, choose the key icon at the top left. It has the tool-tip View permissions.

4. Under Function policy, if the policy allows actions for the principal element “*” or (“AWS”: “*”), it is publicly accessible.

   Consider adding the following IAM condition to scope access to your account only.

   ```json
   "Condition": {
       "StringEquals": {
           "AWS:SourceAccount": "<account_id>"
       }
   }
   ```

For other Lambda resource-based policies examples that allow you to grant usage permission to other accounts on a per-resource basis, see the information on using resource-based policies for AWS Lambda in the AWS Lambda Developer Guide.

[PCI.Lambda.2] Lambda functions should be in a VPC

Severity: Low
Resource type: AWS::Lambda::Function

AWS Config rule: lambda-inside-vpc

Parameters: None

This control checks whether a Lambda function is in a VPC. The control excludes Lambda@Edge resources.

It does not evaluate the VPC subnet routing configuration to determine public reachability.

Note
This control is not supported in the following Regions.

- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)

Related PCI DSS requirements
This control is related to the following PCI DSS requirements:

PCI DSS 1.2.1: Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.

By default, Lambda runs your functions in a secure default VPC with access to AWS services and the internet.

If you use a Lambda function that is in scope for PCI DSS, the function can be configured to use a VPC endpoint. This would allow you to connect to your Lambda function from within a VPC without internet access. This method is used to allow only necessary traffic to and from the CDE.

PCI DSS 1.3.1: Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

By default, Lambda runs your functions in a secure default VPC with access to AWS services and the internet.

If you use a Lambda function that is in scope for PCI DSS, the function can be configured to use a VPC endpoint. This allows you to connect to your Lambda function from within a VPC without internet access. This is a method used to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

PCI DSS 1.3.2: Limit inbound internet traffic to IP addresses within the DMZ.

By default, Lambda runs your functions in a secure default VPC with access to AWS services and the internet.

If you use a Lambda function that is in scope for PCI DSS, the function can be configured to use a VPC endpoint. This allows you to connect to your Lambda function from within a VPC without internet access. This is a method used to limit inbound internet traffic to IP addresses within the DMZ.

PCI DSS 1.3.4: Do not allow unauthorized outbound traffic from the cardholder data environment to the internet.

By default, Lambda runs your functions in a secure default VPC with access to AWS services and the internet.

If you use a Lambda function that is in scope for PCI DSS, the function can be configured to use a VPC endpoint. This allows you to connect to your Lambda function from within a VPC without...
internet access. This is a method used to block unauthorized outbound traffic from the cardholder data environment to the internet.

Remediation

To configure a function to connect to private subnets in a virtual private cloud (VPC) in your account

1. Open the AWS Lambda console at https://console.aws.amazon.com/lambda/.
2. Navigate to Functions and then select your Lambda function.
3. Scroll to Network and then select a VPC with the connectivity requirements of the function.
4. To run your functions in high availability mode, Security Hub recommends that you choose at least two subnets.
5. Choose at least one security group that has the connectivity requirements of the function.
6. Choose Save.

For more information see the section on configuring a Lambda function to access resources in a VPC in the AWS Lambda Developer Guide.

[PCI.RDS.1] RDS snapshots should prohibit public access

Severity: Critical

Resource type: Amazon RDS DB snapshot

AWS Config rule: rds-snapshots-public-prohibited

Parameters: None

This control checks whether Amazon RDS DB snapshots prohibit access by other accounts. You should also ensure that access to the snapshot and permission to change Amazon RDS configuration is restricted to authorized principals only.

To learn more about sharing DB snapshots in Amazon RDS, see the Amazon RDS User Guide.

Note that if the configuration is changed to allow public access, the AWS Config rule may not be able to detect the change for up to 12 hours. Until the AWS Config rule detects the change, the check passes even though the configuration violates the rule.

Note
This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 1.2.1: Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.

RDS snapshots are used to back up the data on your RDS instances at a specific point in time. They can be used to restore previous states of RDS instances.
If an RDS snapshot stores cardholder data, the RDS snapshot should not be shared by other accounts. Sharing the RDS snapshot would allow other accounts to restore an RDS instance from the snapshot. Allowing this might violate the requirement to allow only necessary traffic to and from the CDE.

**PCI DSS 1.3.1:** Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

RDS snapshots are used to back up the data on your RDS instances at a specific point in time. They can be used to restore previous states of RDS instances.

If an RDS snapshot stores cardholder data, the RDS snapshot should not be shared by other accounts. Sharing the RDS snapshot would allow other accounts to restore an RDS instance from the snapshot. Allowing this might violate the requirement to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

**PCI DSS 1.3.4:** Do not allow unauthorized outbound traffic from the cardholder data environment to the internet.

RDS snapshots are used to back up the data on your RDS instances at a specific point in time. They can be used to restore previous states of RDS instances.

If an RDS snapshot stores cardholder data, the RDS snapshot should not be shared by other accounts. Sharing the RDS snapshot would allow other accounts to restore an RDS instance from the snapshot. Allowing this might violate the requirement to block unauthorized outbound traffic from the cardholder data environment to the internet.

**PCI DSS 1.3.6:** Place system components that store cardholder data (such as a database) in an internal network zone, segregated from the DMZ and other untrusted networks.

RDS snapshots are used to back up the data on your RDS instances at a specific point in time. They can be used to restore previous states of RDS instances.

If an RDS snapshot stores cardholder data, the RDS snapshot should not be shared by other accounts. Sharing the RDS snapshot would allow other accounts to restore an RDS instance from the snapshot. Allowing this might violate the requirement to block unauthorized outbound traffic from the cardholder data environment to the internet.

**PCI DSS 7.2.1:** Establish an access control system(s) for systems components that restricts access based on a user’s need to know, and is set to "deny all" unless specifically allowed. This access control system(s) must include the following: Coverage of all system components.

RDS snapshots are used to back up the data on your RDS instances at a specific point in time. They can be used to restore previous states of RDS instances.

If an RDS snapshot stores cardholder data, the RDS snapshot should not be shared by other accounts. Sharing the RDS snapshot would allow other accounts to restore an RDS instance from the snapshot. Allowing this might violate the requirement to ensure access to systems components that contain cardholder data is restricted to least privilege necessary, or a user’s need to know.

**Remediation**

To remove public access for Amazon RDS Snapshots

1. Open the Amazon RDS console at [https://console.aws.amazon.com/rds/](https://console.aws.amazon.com/rds/).
2. Navigate to Snapshots and then select the public Snapshot you want to modify.
3. From the Actions list, choose Share Snapshots.
4. From DB snapshot visibility, choose Private.
5. Under **DB snapshot visibility**, select **for all**
6. Choose **Save**

**[PCI.RDS.2] RDS DB Instances should prohibit public access**

**Severity:** Critical

**Resource type:** AWS::RDS::DBInstance

**AWS Config rule:** rds-instance-public-access-check

**Parameters:** None

This control checks whether RDS instances are publicly accessible by evaluating the `publiclyAccessible` field in the instance configuration item. The value of `publiclyAccessible` indicates whether the DB instance is publicly accessible. When the DB instance is publicly accessible, it is an Internet-facing instance with a publicly resolvable DNS name, which resolves to a public IP address. When the DB instance isn't publicly accessible, it is an internal instance with a DNS name that resolves to a private IP address.

The control does not check VPC subnet routing settings or the Security Group rules. You should also ensure VPC subnet routing does not allow public access, and that the security group inbound rule associated with the RDS instance does not allow unrestricted access (0.0.0.0/0). You should also ensure that access to your RDS instance configuration is limited to only authorized users by restricting users' IAM permissions to modify RDS instances settings and resources.

For more information, see [Hiding a DB instance in a VPC from the Internet](https://docs.aws.amazon.com/rds/latest/userguide/Hiding-a-DB-instance-in-a-VPC-from-the-Internet.html) in the *Amazon RDS User Guide*.

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements:

**PCI DSS 1.2.1:** Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.

If you use an RDS instance that is in scope for PCI DSS, the RDS instance should not be publicly accessible. Allowing this might violate the requirement to allow only necessary traffic to and from the CDE.

**PCI DSS 1.3.1:** Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

If you use an RDS instance to store cardholder data, the RDS instance should not be publicly accessible. Allowing this might violate the requirement to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

**PCI DSS 1.3.2:** Limit inbound internet traffic to IP addresses within the DMZ.

If you use an RDS instance to store cardholder data, the RDS instance should not be publicly accessible as this might violate the requirement to limit inbound internet traffic to IP addresses within the DMZ.

**PCI DSS 1.3.4:** Do not allow unauthorized outbound traffic from the cardholder data environment to the internet.

If you use an RDS instance to store cardholder data, the RDS instance should not be publicly accessible. Allowing this might violate the requirement to block unauthorized outbound traffic from the cardholder data environment to the internet.
PCI DSS 1.3.6: Place system components that store cardholder data (such as a database) in an internal network zone, segregated from the DMZ and other untrusted networks.

If you use an RDS instance to store cardholder data, the RDS instance should not be publicly accessible. Allowing this may violate the requirement to place system components that store cardholder data in an internal network zone, segregated from the DMZ and other untrusted networks.

PCI DSS 7.2.1: Establish an access control system(s) for systems components that restricts access based on a user's need to know, and is set to "deny all" unless specifically allowed. This access control system(s) must include the following: Coverage of all system components.

If you use an RDS instance to store cardholder data, the RDS instance should not be publicly accessible, as this may violate the requirement to ensure access to systems components that contain cardholder data is restricted to least privilege necessary, or a user's need to know.

Remediation

To remove public access for Amazon RDS Databases

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. Navigate to Databases and then choose your public database.
3. Choose Modify.
5. For Public accessibility, choose No.
6. Scroll to the bottom and then choose Continue.
7. Under Scheduling of modifications, choose Apply immediately.
8. Choose Modify DB Instance.

For more information about working with a DB Instance in a VPC, see the Amazon RDS User Guide.

[PCI.Redshift.1] Amazon Redshift clusters should prohibit public access

Severity: Critical

Resource type: AWS::Redshift::Cluster

AWS Config rule: redshift-cluster-public-access-check

Parameters: None

This control checks whether Amazon Redshift clusters are publicly accessible by evaluating the publiclyAccessible field in the cluster configuration item.

Note
This control is not supported in Asia Pacific (Osaka).

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 1.2.1: Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.

If you use an Amazon Redshift cluster to store cardholder data, the cluster should not be publicly accessible. Allowing this might violate the requirement to allow only necessary traffic to and from the CDE.
PCI DSS 1.3.1: Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

If you use an Amazon Redshift cluster to store cardholder data, the cluster should not be publicly accessible. Allowing this might violate the requirement to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

**PCI DSS 1.3.2: Limit inbound internet traffic to IP addresses within the DMZ.**

If you use an Amazon Redshift cluster to store cardholder data, the cluster should not be publicly accessible, as this may violate the requirement to limit inbound internet traffic to IP addresses within the DMZ.

**PCI DSS 1.3.4: Do not allow unauthorized outbound traffic from the cardholder data environment to the internet.**

If you use an Amazon Redshift cluster to store cardholder data, the cluster should not be publicly accessible. Allowing this may violate the requirement to block unauthorized outbound traffic from the cardholder data environment to the internet.

**PCI DSS 1.3.6: Place system components that store cardholder data (such as a database) in an internal network zone, segregated from the DMZ and other untrusted networks.**

If you use an Amazon Redshift cluster to store cardholder data, the cluster should not be publicly accessible. Allowing this might violate the requirement to place system components that store cardholder data in an internal network zone, segregated from the DMZ and other untrusted networks.

### Remediation

**To disable public access for an Amazon Redshift cluster**

1. Open the Amazon Redshift console at [https://console.aws.amazon.com/redshift/](https://console.aws.amazon.com/redshift/).
2. On the navigation pane, choose **Clusters** and then select your public Amazon Redshift cluster.
3. From the **Cluster** drop-down menu, choose **Modify cluster**.
4. In **Publicly accessible**, choose **No**.
5. Choose **Modify**.

For more information about creating a cluster in a VPC, see the [Amazon Redshift Cluster Management Guide](https://docs.aws.amazon.com/redshift/latest/gsg/about-clusters.html).

**[PCI.S3.1] S3 buckets should prohibit public write access**

**Severity:** Critical

**Resource type:** AWS::S3::Bucket

**AWS Config rule:** `s3-bucket-public-write-prohibited`

**Parameters:** None

This control checks whether your S3 buckets allow public write access by evaluating the Block Public Access settings, the bucket policy, and the bucket access control list (ACL).

It does not check for write access to the bucket by internal principals, such as IAM roles. You should ensure that access to the bucket is restricted to authorized principals only.

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements:
PCI DSS 1.2.1: Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.

If you use an S3 bucket to store cardholder data, the bucket should prohibit public write access. Allowing public write access might violate the requirement to allow only necessary traffic to and from the CDE.

PCI DSS 1.3.1: Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

If you use an S3 bucket to store cardholder data, the bucket should prohibit public write access. Allowing public write access might violate the requirement to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

Unless you explicitly require everyone on the internet to be able to write to your S3 bucket, you should ensure that your S3 bucket is not publicly writable.

PCI DSS 1.3.2: Implement a DMZ to limit inbound internet traffic to IP addresses within the DMZ.

If you use an S3 bucket to store cardholder data, the bucket should prohibit public write access. Allowing public write access might violate the requirement to limit inbound internet traffic to IP addresses within the DMZ.

PCI DSS 1.3.4: Do not allow unauthorized outbound traffic from the cardholder data environment to the internet.

If you use an S3 bucket to store cardholder data, the bucket should prohibit public write access. Allowing public write access might violate the requirement to block unauthorized outbound traffic from the cardholder data environment to the internet.

PCI DSS 1.3.6: Place system components that store cardholder data (such as a database) in an internal network zone, segregated from the DMZ and other untrusted networks.

If you use an S3 bucket to store cardholder data, the bucket should prohibit public write access. Allowing public write access may violate the requirement to place system components that store cardholder data in an internal network zone, segregated from the DMZ and other untrusted networks.

PCI DSS 7.2.1: Establish an access control system(s) for systems components that restricts access based on a user’s need to know, and is set to “deny all” unless specifically allowed. This access control system(s) must include the following: Coverage of all system components.

If you use an S3 bucket to store cardholder data, the bucket should prohibit public write access. Allowing public write access might violate the requirement to ensure access to systems components is restricted to least privilege necessary, or a user’s need to know.

Remediation

To remove public access for an S3 bucket

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Choose the name of the bucket identified in the finding.
3. Choose Permissions and then choose Public access settings.
4. Choose Edit, select all four options, and then choose Save.
5. If prompted, enter confirm and then choose Confirm.

[PCI.S3.2] S3 buckets should prohibit public read access

Severity: Critical
Resource type: AWS::S3::Bucket

AWS Config rule: s3-bucket-public-read-prohibited

Parameters: None

This control checks whether your S3 buckets allow public read access by evaluating the Block Public Access settings, the bucket policy, and the bucket access control list (ACL).

Unless you explicitly require everyone on the internet to be able to write to your S3 bucket, you should ensure that your S3 bucket is not publicly writable.

It does not check for read access to the bucket by internal principals, such as IAM roles. You should ensure that access to the bucket is restricted to authorized principals only.

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 1.2.1: Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.

If you use an S3 bucket to store cardholder data, the bucket should prohibit public read access. Public read access might violate the requirement to allow only necessary traffic to and from the CDE.

PCI DSS 1.3.1: Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

If you use an S3 bucket to store cardholder data, the bucket should prohibit public read access. Public read access might violate the requirement to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

PCI DSS 1.3.2: Limit inbound internet traffic to IP addresses within the DMZ.

If you use an S3 bucket to store cardholder data, the bucket should prohibit public read access. Public read access might violate the requirement to limit inbound internet traffic to IP addresses within the DMZ.

PCI DSS 1.3.6: Place system components that store cardholder data (such as a database) in an internal network zone, segregated from the DMZ and other untrusted networks.

If you use an S3 bucket to store cardholder data, the bucket should prohibit public read access. Public read access might violate the requirement to place system components that store cardholder data in an internal network zone, segregated from the DMZ and other untrusted networks.

PCI DSS 7.2.1: Establish an access control system(s) for systems components that restricts access based on a user’s need to know, and is set to “deny all” unless specifically allowed. This access control system(s) must include the following: Coverage of all system components.

If you use an S3 bucket to store cardholder data, the bucket should prohibit public read access. Public read access might violate the requirement to ensure access to systems components is restricted to least privilege necessary, or a user’s need to know.

Remediation

To remove public access for an S3 bucket

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Choose the name of the bucket identified in the finding.
3. Choose Permissions and then choose Public access settings.
4. Choose Edit, select all four options, and then choose Save.
5. If prompted, enter confirm and then choose Confirm.

[PCI.S3.3] S3 buckets should have cross-region replication enabled

Severity: Low

Resource type: AWS::S3::Bucket

AWS Config rule: s3-bucket-replication-enabled

Parameters: None

This control checks whether S3 buckets have cross-region replication enabled.

PCI DSS does not require data replication or highly available configurations. However, this check aligns with AWS best practices for this control.

In addition to availability, you should consider other systems hardening settings.

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 2.2: Develop configuration standards for all system components. Assure that these standards address all known security vulnerabilities and are consistent with industry-accepted system hardening standards.

Enabling cross-Region replication on S3 buckets ensures that multiple versions of the data are available in different distinct Regions. This allows you to store data at even greater distances, minimize latency, increase operational efficiency, and protect against DDoS and data corruption events.

This is one method used to implement system hardening configuration.

Remediation

To enable S3 bucket replication

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Choose the S3 bucket that does not have cross-region replication enabled.
3. Choose Management, then choose Replication.
4. Choose Add rule. If versioning is not already enabled, you are prompted to enable it.
5. Choose your source bucket - Entire bucket.
6. Choose your destination bucket. If versioning is not already enabled on the destination bucket for your account, you are prompted to enable it.
7. Choose an IAM role. For more information on setting up permissions for replication, see the Amazon Simple Storage Service Developer Guide.
8. Enter a rule name, choose Enabled for the status, then choose Next.
9. Choose Save.

For more information about replication, see the Amazon Simple Storage Service Developer Guide.

[PCI.S3.4] S3 buckets should have server-side encryption enabled

Severity: Medium
Resource type: AWS::S3::Bucket

AWS Config rule: s3-bucket-server-side-encryption-enabled

Parameters: None

This control checks that your Amazon S3 bucket either has Amazon S3 default encryption enabled or that the S3 bucket policy explicitly denies put-object requests without server-side encryption.

When you set default encryption on a bucket, all new objects stored in the bucket are encrypted when they are stored, including clear text PAN data.

Server-side encryption for all of the objects stored in a bucket can also be enforced using a bucket policy. For more information about server-side encryption, see the Amazon Simple Storage Service Developer Guide.

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

**PCI DSS 3.4: Render Primary Account Numbers (PAN) unreadable anywhere it is stored (including on portable digital media, backup media, and in logs).**

If you use an S3 bucket to store credit card Primary Account Numbers (PAN), then to render the PAN unreadable, the bucket default encryption should be enabled and/or the S3 bucket policy should explicitly deny put-object requests without server-side encryption.

Remediation

To enable default encryption on an S3 bucket

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Choose the bucket from the list.
3. Choose Properties.
4. Choose Default encryption.
5. For the encryption, choose either **AES-256** or **AWS-KMS**.

   - To use keys that are managed by Amazon S3 for default encryption, choose **AES-256**. For more information about using Amazon S3 server-side encryption to encrypt your data, see the Amazon Simple Storage Service Developer Guide.
   - To use keys that are managed by AWS KMS for default encryption, choose **AWS-KMS**. Then choose a master key from the list of the AWS KMS master keys that you have created.

Type the Amazon Resource Name (ARN) of the AWS KMS key to use. You can find the ARN for your AWS KMS key in the IAM console, under Encryption keys. Or, you can choose a key name from the drop-down list.

**Important**

If you use the AWS KMS option for your default encryption configuration, you are subject to the RPS (requests per second) limits of AWS KMS. For more information about AWS KMS limits and how to request a limit increase, see the AWS Key Management Service Developer Guide.

For more information about creating an AWS KMS key, see the AWS Key Management Service Developer Guide.

For more information about using AWS KMS with Amazon S3, see the Amazon Simple Storage Service Developer Guide.
When enabling default encryption, you might need to update your bucket policy. For more information about moving from bucket policies to default encryption, see the Amazon Simple Storage Service Developer Guide.

6. Choose Save.

For more information about default S3 bucket encryption, see the Amazon Simple Storage Service Console User Guide.

[PCI.S3.5] S3 buckets should require requests to use Secure Socket Layer

Severity: Medium

Resource type: AWS::S3::Bucket

AWS Config rule: s3-bucket-ssl-requests-only

Parameters: None

This control checks whether Amazon S3 buckets have policies that require requests to use Secure Socket Layer (SSL).

S3 buckets should have policies that require all requests (Action: S3:*) to only accept transmission of data over HTTPS in the S3 resource policy, indicated by the condition key aws:SecureTransport.

This does not check the SSL or TLS version. You should not allow early versions of SSL or TLS (SSLv3, TLS1.0) per PCI DSS requirements.

Related PCI DSS requirements

This control is related to the following PCI DSS requirements.

PCI DSS 4.1 Use strong cryptography and security protocols to safeguard sensitive cardholder data during transmission over open, public networks.

If you use S3 buckets to store cardholder data, ensure that bucket policies require that requests to the bucket only accept transmission of data over HTTPS. For example, you could use the policy statement "aws:SecureTransport": "false" to deny any requests not accessed through HTTPS. Allowing unencrypted transmissions of cardholder data might violate the requirement to use strong cryptography and security protocols to safeguard sensitive cardholder data during transmission over open, public networks.

Remediation

To remediate this issue, update the permissions policy of the S3 bucket.

To configure an S3 bucket to deny nonsecure transport

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Navigate to the noncompliant bucket, and then choose the bucket name.
3. Choose Permissions, then choose Bucket Policy.
4. Add a similar policy statement to that in the policy below. Replace awsexamplebucket with the name of the bucket you are modifying.

```json
{
    "Id": "ExamplePolicy",
    "Version": "2012-10-17",
...}
```
"Statement": [  
  {  
    "Sid": "AllowSSLRequestsOnly",
    "Action": "s3:*",
    "Effect": "Deny",
    "Resource": [  
      "arn:aws:s3:::awsexamplebucket",
      "arn:aws:s3:::awsexamplebucket/*"
    ],
    "Condition": {  
      "Bool": {  
        "aws:SecureTransport": "false"
      }
    },
    "Principal": "*"
  }
]  

5. Choose Save.

For more information, see the knowledge center article What S3 bucket policy should I use to comply with the AWS Config rule s3-bucket-ssl-requests-only?

[PCI.S3.6] S3 Block Public Access setting should be enabled

Severity: Medium

Resource type: S3 AWS account

AWS Config rule: s3-account-level-public-access-blocks-periodic

Parameters:

• ignorePublicAcls: true
• blockPublicPolicy: true
• blockPublicAcls: true
• restrictPublicBuckets: true

This control checks whether the following public access block settings are configured at the account level.

• ignorePublicAcls: true,
• blockPublicPolicy: true
• blockPublicAcls: true
• restrictPublicBuckets: true

The control passes if all of the public access block settings are set to true.

The control fails if any of the settings are set to false, or if any of the settings are not configured.

As an AWS best practice, S3 buckets should block public access. Unless you explicitly require everyone on the internet to be able to access your S3 bucket, you should ensure that your S3 bucket is not publicly accessible.

Note
This control is not supported in the following Regions.

• Asia Pacific (Osaka)
- Europe (Milan)
- Middle East (Bahrain)

Related PCI DSS requirements

This control is related to the following PCI DSS requirements.

**PCI DSS 1.2.1 - Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.**

If you use S3 buckets to store cardholder data, ensure that the bucket does not allow public access. Public access to your S3 bucket might violate the requirement to allow only necessary traffic to and from the CDE.

**PCI DSS 1.3.1 - Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.**

If you use S3 buckets to store cardholder data, ensure that the bucket does not allow public access. Allowing public access to your S3 bucket might violate the requirement to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.

**PCI DSS 1.3.2 - Limit inbound internet traffic to IP addresses within the DMZ.**

If you use S3 buckets to store cardholder data, ensure that the bucket does not allow public access. Allowing public access to your S3 bucket might violate the requirement to limit inbound traffic to IP addresses within the DMZ.

**PCI DSS 1.3.4 Do not allow unauthorized outbound traffic from the cardholder data environment to the internet.**

If you use S3 buckets to store cardholder data, ensure that the bucket does not allow public access. Allowing public access to your S3 bucket might violate the requirement to block unauthorized outbound traffic from the cardholder data environment to the internet.

**PCI DSS 1.3.6 Place system components that store cardholder data (such as a database) in an internal network zone, segregated from the DMZ and other untrusted networks.**

If you use S3 buckets to store cardholder data, ensure that the bucket does not allow public access. Allowing public access to your S3 bucket might violate the requirement to place system components that store cardholder data in an internal network zone, segregated from the DMZ and other untrusted networks.

Remediation

**To enable Amazon S3 Block Public Access**

1. Open the Amazon S3 console at [https://console.aws.amazon.com/s3/](https://console.aws.amazon.com/s3/).
2. In the navigation pane, choose **Block public access (account settings)**.
3. Choose **Edit**. Then select **Block all public access**.
4. Choose **Save changes**.

For more information, see [Using Amazon S3 block public access](https://docs.aws.amazon.com/AmazonS3/latest/userguide/using-block-public-access.html) in the *Amazon Simple Storage Service Developer Guide*.

**[PCI.SageMaker.1] Amazon SageMaker notebook instances should not have direct internet access**

**Severity:** High
Resource type: AWS::SageMaker::NotebookInstance

AWS Config rule: sagemaker-notebook-no-direct-internet-access

Parameters: None

This control checks whether direct internet access is disabled for an SageMaker notebook instance. To do this, it checks whether the DirectInternetAccess field is disabled for the notebook instance.

If you configure your SageMaker instance without a VPC, then by default direct internet access is enabled on your instance. You should configure your instance with a VPC and change the default setting to Disable — Access the internet through a VPC.

To train or host models from a notebook, you need internet access. To enable internet access, make sure that your VPC has a NAT gateway and your security group allows outbound connections. To learn more about how to connect a notebook instance to resources in a VPC, see Connect a notebook instance to resources in a VPC in the Amazon SageMaker Developer Guide.

You should also ensure that access to your SageMaker configuration is limited to only authorized users. Restrict users' IAM permissions to modify SageMaker settings and resources.

**Note**
This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)
- Europe (Milan)
- AWS GovCloud (US-East)

**Related PCI DSS requirements**

This control is related to the following PCI DSS requirements:

**PCI DSS 1.2.1 - Restrict inbound and outbound traffic to that which is necessary for the cardholder data environment (CDE), and specifically deny all other traffic.**

If you use SageMaker notebook instances within your CDE, ensure that the notebook instance does not allow direct internet access. Allowing direct public access to your notebook instance might violate the requirement to allow only necessary traffic to and from the CDE.

**PCI DSS 1.3.1 - Implement a DMZ to limit inbound traffic to only system components that provide authorized publicly accessible services, protocols, and ports.**

If you use SageMaker notebook instances within your CDE, ensure that the notebook instance does not allow direct internet access. Allowing direct public access to your notebook instance might violate the requirement to limit inbound access to system components that provide authorized publicly accessible services, protocols, and ports.

**PCI DSS 1.3.2 - Limit inbound internet traffic to IP addresses within the DMZ.**

If you use SageMaker notebook instances within your CDE, ensure that the notebook instance does not allow direct internet access. Allowing direct public access to your notebook instance might violate the requirement to limit inbound traffic to IP addresses within the DMZ.

**PCI DSS 1.3.4 Do not allow unauthorized outbound traffic from the cardholder data environment to the internet.**

If you use SageMaker notebook instances within your CDE, ensure that the notebook instance does not allow direct internet access. Allowing direct public access to your notebook instance would violate the requirement to restrict outbound traffic.
might violate the requirement to block unauthorized outbound traffic from the cardholder data environment to the internet

PCI DSS 1.3.6 Place system components that store cardholder data (such as a database) in an internal network zone, segregated from the DMZ and other untrusted networks.

If you use SageMaker notebook instances, and the notebook instance contains cardholder data, restrict direct internet access. Allowing direct public access to your notebook instance might violate the requirement to place system components that store cardholder data in an internal network zone, segregated from the DMZ and other untrusted networks.

Remediation

Note that you cannot change the internet access setting after a notebook instance is created. It must be stopped, deleted, and recreated.

To configure an SageMaker notebook instance to deny direct internet access

1. Open the SageMaker console at https://console.aws.amazon.com/sagemaker/
2. Navigate to Notebook instances.
3. Delete the instance that has direct internet access enabled. Choose the instance, choose Actions, then choose stop.
   After the instance is stopped, choose Actions, then choose delete.
4. Choose Create notebook instance. Provide the configuration details.
5. Expand the Network section. Then choose a VPC, subnet, and security group. Under Direct internet access, choose Disable — Access the internet through a VPC.
6. Choose Create notebook instance.

For more information, see Connect a notebook instance to resources in a VPC in the Amazon SageMaker Developer Guide.

[PCI.SSM.1] Amazon EC2 instances managed by Systems Manager should have a patch compliance status of COMPLIANT after a patch installation

Severity: Medium

Resource type: SSM patch compliance and AWS::EC2::Instance

AWS Config rule: ec2-managedinstance-patch-compliance-status-check

Parameters: None

This control checks whether the compliance status of the Amazon EC2 Systems Manager patch compliance is COMPLIANT or NON_COMPLIANT after the patch installation on the instance.

It only checks instances that are managed by AWS Systems Manager Patch Manager.

It does not check whether the patch was applied within the 30-day limit prescribed by PCI DSS requirement 6.2.

It also does not validate whether the patches applied were classified as security patches.

You should create patching groups with the appropriate baseline settings and ensure in-scope systems are managed by those patch groups in Systems Manager. For more information about patch groups, see the AWS Systems Manager User Guide.
Note
This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)

Related PCI DSS requirements
This control is related to the following PCI DSS requirements:

PCI DSS 6.2: Ensure that all system components and software are protected from known vulnerabilities by installing applicable vendor-supplied security patches. Install critical security patches within one month of release.

Patches released by the vendor for systems that are in-scope for PCI DSS should be tested and validated before installation in production environment. Once deployed, security settings and controls should be validated to ensure that deployed patches have not impacted the security of the cardholder data environment (CDE).

If you use Amazon EC2 instances managed by AWS Systems Manager Patch Manager to patch managed instances in your CDE, ensure that the patches are successfully applied. To do this, check that the compliance status of the Amazon EC2 Systems Manager patch compliance is "COMPLIANT". Patch Manager can apply both operating systems and applications applicable patches.

This is a method used to protect system components and software from known vulnerabilities.

Remediation

To remediate noncompliant patches
This rule checks whether the compliance status of the Amazon EC2 Systems Manager patch compliance is COMPLIANT or NON_COMPLIANT. To find out more about patch compliance states, see the AWS Systems Manager User Guide.

2. In the navigation pane, under Node Management, choose Run Command.
3. Choose Run command.
4. Choose the radio button next to AWS-RunPatchBaseline and then change the Operation to Install.
5. Choose Choose instances manually and then choose the noncompliant instance(s).
6. Scroll to the bottom and then choose Run.
7. After the command has completed, to monitor the new compliance status of your patched instances, in the navigation pane, choose Compliance.

See the AWS Systems Manager User Guide for more information about the following

- Using Systems Manager documents to patch a managed instance
- Running commands using the Systems Manager Run command

[PCI.SSM.2] Instances managed by Systems Manager should have an association compliance status of COMPLIANT

Severity: Low
Resource type: SSM association compliance

AWS Config rule: `ec2-managedinstance-association-compliance-status-check`

Parameters: None

This control checks whether the status of the AWS Systems Manager association compliance is COMPLIANT or NON_COMPLIANT after the association is run on an instance. The control passes if the association compliance status is COMPLIANT.

A State Manager association is a configuration that is assigned to your managed instances. The configuration defines the state that you want to maintain on your instances. For example, an association can specify that antivirus software must be installed and running on your instances, or that certain ports must be closed.

After you create one or more State Manager associations, compliance status information is immediately available to you in the console or in response to AWS CLI commands or corresponding Systems Manager API operations. For associations, Configuration Compliance shows statuses of Compliant or Non-compliant and the severity level assigned to the association, such as Critical or Medium. To learn more about State Manager association compliance, see About State Manager association compliance in the AWS Systems Manager User Guide.

You must configure your in-scope EC2 instances for Systems Manager association. You must also configure the patch baseline for the security rating of the vendor of patches, and set the autoapproval date to meet PCI DSS 3.2.1 requirement 6.2. For additional guidance on how to create an association, see Create an association in the AWS Systems Manager User Guide. For additional information on working with patching in Systems Manager, see AWS Systems Manager Patch Manager in the AWS Systems Manager User Guide.

Note
This control is not supported in the following Regions.

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)

Related PCI DSS requirements
This control is related to the following PCI DSS requirements.

PCI DSS 2.4 Maintain an inventory of system components that are in scope for PCI DSS.

If you use EC2 instances managed by Systems Manager to collect inventory for your cardholder data environment (CDE), make sure that the instances are successfully associated. To do this, check whether the compliance status of the Systems Manager association compliance is COMPLIANT. Using Systems Manager can help to maintain an inventory of system components that are in scope for PCI DSS. For additional guidance on how to organize inventory, see Configuring Resource Data Sync for Inventory in the AWS Systems Manager User Guide.

Remediation
A failed association can be related to different things, including targets and SSM document names. To remediate this issue, you must first identify and investigate the association. You can then update the association to correct the specific issue.

You can edit an association to specify a new name, schedule, severity level, or targets. After you edit an association, Systems Manager creates a new version.
To investigate and update a failed association

2. In the navigation pane, under Node Management, choose Fleet Manager.
3. Choose the instance ID that has an Association status of Failed.
4. Choose View details.
5. Choose Associations.
6. Note the name of the association that has an Association status of Failed. This is the association that you need to investigate. You need to use the association name in the next step.
7. In the navigation pane, under Node Management, choose State Manager. Search for the association name, then select the association.

After you determine the issue, edit the failed association to correct the problem. For information on how to edit an association, see Edit an association.

For more information on creating and editing State Manager associations, see Working with associations in Systems Manager in the AWS Systems Manager User Guide.

[PCI.SSM.3] EC2 instances should be managed by AWS Systems Manager

Severity: Medium

Resource type: AWS::EC2::Instance

AWS Config rule: ec2-instance-managed-by-systems-manager

Parameters: None

This control checks whether the EC2 instances in your account are managed by Systems Manager.

AWS Systems Manager is an AWS service that you can use to view and control your AWS infrastructure. To help you to maintain security and compliance, Systems Manager scans your managed instances. A managed instance is a machine that is configured for use with Systems Manager. Systems Manager then reports or takes corrective action on any policy violations that it detects. Systems Manager also helps you to configure and maintain your managed instances. Additional configuration is needed in Systems Manager for patch deployment to managed EC2 instances.

To learn more, see the AWS Systems Manager User Guide.

Related PCI DSS requirements

This control is related to the following PCI DSS requirements:

PCI DSS 2.4 Maintain an inventory of system components that are in scope for PCI DSS.

If you use EC2 instances managed by Systems Manager to collect inventory for your cardholder data environment (CDE), make sure that the instances are managed by Systems Manager. Using Systems Manager can help to maintain an inventory of system components that are in scope for PCI DSS. For additional guidance on how to organize inventory, see Configuring resource data sync for inventory in the AWS Systems Manager User Guide.

PCI DSS 6.2 Ensure that all system components and software are protected from known vulnerabilities by installing applicable vendor supplied security patches. Install critical security patches within one month of release.

For systems that are in scope for PCI DSS, before you install vendor patches in a production environment, you should test and validate them. After you deploy patches, validate security settings and controls to ensure that deployed patches have not affected the security of the CDE. If you use
EC2 instances managed by Systems Manager to patch managed instances in your CDE, ensure that the instances are managed by Systems Manager. Systems Manager deploys system patches, which helps to protect system components and software from known vulnerabilities.

**Remediation**

You can use the Systems Manager quick setup to set up Systems Manager to manage your EC2 instances.

To determine whether your instances can support Systems Manager associations, see Systems Manager prerequisites in the *AWS Systems Manager User Guide*.

**To ensure EC2 instances are managed by Systems Manager**

2. In the navigation pane, choose **Quick setup**.
3. On the configuration screen, keep the default options.
4. Choose **Set up Systems Manager**.

**PCI DSS controls that you might want to disable**

To save on the cost of AWS Config, you can disable recording of global resources in all but one Region. Then disable these controls that deal with global resources in all Regions except for the Region that runs global recording.

- the section called “[PCI.IAM.1] IAM root user access key should not exist” (p. 577)
- the section called “[PCI.IAM.2] IAM users should not have IAM policies attached” (p. 578)
- the section called “[PCI.IAM.3] IAM policies should not allow full ‘*’ administrative privileges” (p. 580)
- the section called “[PCI.IAM.4] Hardware MFA should be enabled for the root user” (p. 581)
- the section called “[PCI.IAM.5] Virtual MFA should be enabled for the root user” (p. 582)
- the section called “[PCI.IAM.6] MFA should be enabled for all IAM users” (p. 583)

If you disable these controls and disable recording of global resources in a particular Region, you should also disable [PCI.Config.1] AWS Config should be enabled (p. 562). This is because [PCI.Config.1] AWS Config should be enabled (p. 562) requires recording of global resources in order to pass.

**AWS Foundational Security Best Practices standard**

The AWS Foundational Security Best Practices standard is a set of controls that detect when your deployed accounts and resources deviate from security best practices.

The standard allows you to continuously evaluate all of your AWS accounts and workloads to quickly identify areas of deviation from best practices. It provides actionable and prescriptive guidance on how to improve and maintain your organization's security posture.

The controls include best practices from across multiple AWS services. Each control is assigned a category that reflects the security function that it applies to. See the section called “Control categories” (p. 705).

**Topics**

- AWS Config resources required for AWS Foundational Security Best Practices controls (p. 608)
- AWS Foundational Security Best Practices controls (p. 608)
- Control categories (p. 705)
AWS Config resources required for AWS Foundational Security Best Practices controls

For AWS Security Hub to accurately report findings for all of the AWS Foundational Security Best Practices controls, you must enable the following resources in AWS Config.

**Note**

In Regions where a control is not available, the corresponding resource is not available in AWS Config.

- ACM certificate
- Application Load Balancer
- Amazon EFS file system
- CloudFront distribution
- CloudTrail trail
- CodeBuild project
- Amazon EC2 instance
- Amazon EC2 security group
- Amazon EC2 volume
- Elastic Load Balancing load balancer
- OpenSearch domain
- IAM group
- IAM policy
- IAM role
- IAM user
- AWS KMS key
- Lambda function
- Amazon RDS DB cluster snapshot
- Amazon RDS DB instance
- Amazon RDS snapshot
- Amazon S3 Block Public Access
- S3 bucket
- Systems Manager managed instance inventory
- Systems Manager patch compliance
- Subnet

AWS Foundational Security Best Practices controls

The AWS Foundational Security Best Practices standard contains the following controls. For each control, the information includes the following information.

- The category that the control applies to. For descriptions of the categories, see the section called “Control categories” (p. 705).
- The severity
- The applicable resource
- The required AWS Config rule, and any specific parameter values set by AWS Security Hub
• Remediation steps

Note that gaps in the control numbers indicate controls that are not yet released.

[ACM.1] Imported ACM certificates should be renewed after a specified time period

**Category:** Protect > Data protection > Encryption of data in transit

**Severity:** Medium

**Resource type:** ACM certificate

**AWS Config rule:** acm-certificate-expiration-check

**Parameters:**

- `daysToExpiration`: 30

This control checks whether ACM certificates in your account are marked for expiration within 30 days. It checks both imported certificates and certificates provided by AWS Certificate Manager.

ACM can automatically renew certificates that use DNS validation. For certificates that use email validation, you must respond to a domain validation email. ACM also does not automatically renew certificates that you import. You must renew imported certificates manually.

For more information about managed renewal for ACM certificates, see [Managed renewal for ACM certificates](https://docs.aws.amazon.com/acm/latest/userguide/managed-renewal.html) in the *AWS Certificate Manager User Guide*.

**Note**

This control is not supported in the following Regions:

- Africa (Cape Town)
- China (Beijing)
- China (Ningxia)
- Europe (Milan)

**Remediation**

ACM provides managed renewal for your Amazon-issued SSL/TLS certificates. This means that ACM either renews your certificates automatically (if you use DNS validation), or it sends you email notices when the certificate expiration approaches. These services are provided for both public and private ACM certificates.

**For domains validated by email**

When a certificate is 45 days from expiration, ACM sends to the domain owner an email for each domain name. To validate the domains and complete the renewal, you must respond to the email notifications.

For more information, see [Renewal for domains validated by email](https://docs.aws.amazon.com/acm/latest/userguide/managed-renewal-email.html) in the *AWS Certificate Manager User Guide*.

**For domains validated by DNS**

ACM automatically renews certificates that use DNS validation. 60 days before the expiration, ACM verifies that the certificate can be renewed.
If it cannot validate a domain name, then ACM sends a notification that manual validation is required. It sends these notifications 45 days, 30 days, 7 days, and 1 day before the expiration.

For more information, see Renewal for domains validated by DNS in the AWS Certificate Manager User Guide.

[APIGateway.1] API Gateway REST and WebSocket API logging should be enabled

**Category:** Identify > Logging

**Severity:** Medium

**Resource type:** AWS::ApiGateway::Stage, AWS::ApiGatewayV2::Stage

**AWS Config rule:** api-gw-execution-logging-enabled

**Parameters:** None

This control checks whether all stages of an Amazon API Gateway REST or WebSocket API have logging enabled. The control fails if logging is not enabled for all methods of a stage or if loggingLevel is neither ERROR nor INFO.

API Gateway REST or WebSocket API stages should have relevant logs enabled. API Gateway REST and WebSocket API execution logging provides detailed records of requests made to API Gateway REST and WebSocket API stages. The stages include API integration backend responses, Lambda authorizer responses, and the requestId for AWS integration endpoints.

**Note**
This control is not supported in the following Regions:

- Africa (Cape Town)
- Europe (Milan)

**Remediation**
To enable logging for REST and WebSocket API operations, see Set up CloudWatch API logging using the API Gateway console in the API Gateway Developer Guide.

[APIGateway.2] API Gateway REST API stages should be configured to use SSL certificates for backend authentication

**Category:** Protect > Data protection

**Severity:** Medium

**Resource type:** AWS::ApiGateway::Stage

**AWS Config rule:** api_gw_ssl_enabled

**Parameters:** None

This control checks whether Amazon API Gateway REST API stages have SSL certificates configured. Backend systems use these certificates to authenticate that incoming requests are from API Gateway.

API Gateway REST API stages should be configured with SSL certificates to allow backend systems to authenticate that requests originate from API Gateway.
**Note**  
This control is not supported in the following Regions:

- Asia Pacific (Osaka)  
- China (Beijing)  
- China (Ningxia)  
- AWS GovCloud (US-East)  
- AWS GovCloud (US-West)

**Remediation**

For detailed instructions on how to generate and configure API Gateway REST API SSL certificates, see [Generate and configure an SSL certificate for backend authentication](https://docs.aws.amazon.com/apigateway/latest/developerguide/howto-api-gateway-ssl.html) in the *API Gateway Developer Guide*.

**[APIGateway.3]** API Gateway REST API stages should have AWS X-Ray tracing enabled

**Category:** Detect > Detection services  
**Severity:** Low  
**Resource type:** AWS::ApiGateway::Stage  
**AWS Config rule:** api-gw-xray-enabled  
**Parameters:** None

This control checks whether AWS X-Ray active tracing is enabled for your Amazon API Gateway REST API stages.

X-Ray active tracing enables a more rapid response to performance changes in the underlying infrastructure. Changes in performance could result in a lack of availability of the API. X-Ray active tracing provides real-time metrics of user requests that flow through your API Gateway REST API operations and connected services.

**Note**  
This control is not supported in the following Regions:

- Asia Pacific (Osaka)  
- China (Beijing)  
- China (Ningxia)  
- AWS GovCloud (US-East)  
- AWS GovCloud (US-West)

**Remediation**

For detailed instructions on how to enable X-Ray active tracing for API Gateway REST API operations, see [Amazon API Gateway active tracing support for AWS X-Ray](https://docs.aws.amazon.com/xray/latest/dg/enable-api.html) in the *AWS X-Ray Developer Guide*.

**[APIGateway.4]** API Gateway should be associated with an AWS WAF web ACL

**Category:** Protect > Protective services  
**Severity:** Medium
Resource type: AWS::ApiGateway::Stage

AWS Configrule: api_gw_associated_with_waf

Parameters: None

This control checks whether an API Gateway stage uses an AWS WAF web access control list (ACL). This control fails if an AWS WAF web ACL is not attached to a REST API Gateway stage.

AWS WAF is a web application firewall that helps protect web applications and APIs from attacks. It enables you to configure an ACL, which is a set of rules that allow, block, or count web requests based on customizable web security rules and conditions that you define. Ensure that your API Gateway stage is associated with an AWS WAF web ACL to help protect it from malicious attacks.

Note

This control is not supported in the following Regions:

- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

Remediation

For information on how to use the API Gateway console to associate an AWS WAF Regional web ACL with an existing API Gateway API stage, see Using AWS WAF to protect your APIs in the API Gateway Developer Guide.

[APIGateway.5] API Gateway REST API cache data should be encrypted at rest

Category: Protect > Data protection > Encryption of data at rest

Severity: Medium

Resource type: AWS::ApiGateway::Stage

AWS Config rule: api-gw-cache-encrypted (Custom rule developed by Security Hub)

Parameters: None

This control checks whether all methods in API Gateway REST API stages that have cache enabled are encrypted. The control fails if any method in an API Gateway REST API stage is configured to cache and the cache is not encrypted.

Encrypting data at rest reduces the risk of data stored on disk being accessed by a user not authenticated to AWS. It adds another set of access controls to limit unauthorized users ability access the data. For example, API permissions are required to decrypt the data before it can be read.

API Gateway REST API caches should be encrypted at rest for an added layer of security.

Remediation

To remediate this control, configure the stage to encrypt the cache data.

To configure API caching for a given stage

1. Open the API Gateway console at https://console.aws.amazon.com/apigateway/.
2. Choose the API.
3. Choose **Stages**.
4. In the **Stages** list for the API, choose the stage to add caching to.
5. Choose **Settings**.
6. Choose **Enable API cache**.
7. Update the desired settings, then select **Encrypt cache data**.
8. Choose **Save Changes**.

**[AutoScaling.1] Auto Scaling groups associated with a load balancer should use load balancer health checks**

**Category:** Identify > Inventory  
**Severity:** Low  
**Resource type:** AWS::AutoScaling::AutoScalingGroup  
**AWS Config rule:** autoscaling-group-elb-healthcheck-required  
**Parameters:** None

This control checks whether your Auto Scaling groups that are associated with a load balancer are using Elastic Load Balancing health checks.

This ensures that the group can determine an instance's health based on additional tests provided by the load balancer. Using Elastic Load Balancing health checks can help support the availability of applications that use EC2 Auto Scaling groups.

**Remediation**

To remediate this issue, update your Auto Scaling groups to use Elastic Load Balancing health checks.

**To enable Elastic Load Balancing health checks**

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.  
2. In the navigation pane, under **Auto Scaling**, choose **Auto Scaling Groups**.  
3. Select the check box for your group.  
4. Choose **Edit**.  
5. Under **Health checks**, for **Health check type**, choose **ELB**.  
6. For **Health check grace period**, enter 300.  
7. At the bottom of the page, choose **Update**.

For more information on using a load balancer with an Auto Scaling group, see the **AWS Auto Scaling User Guide**.

**[CloudFront.1] CloudFront distributions should have a default root object configured**

**Category:** Protect > Secure access management > Resources not publicly accessible  
**Severity:** Critical  
**Resource type:** AWS::CloudFront::Distribution  
**AWS Config rule:** cloudfront-default-root-object-configured
Parameters: None

This control checks whether an Amazon CloudFront distribution is configured to return a specific object that is the default root object. The control fails if the CloudFront distribution does not have a default root object configured.

A user might sometimes request the distribution’s root URL instead of an object in the distribution. When this happens, specifying a default root object can help you to avoid exposing the contents of your web distribution.

Note
This control is only supported in US East (N. Virginia). It is not supported in the following Regions:

- US East (Ohio)
- US West (N. California)
- US West (Oregon)
- Africa (Cape Town)
- Asia Pacific (Hong Kong)
- Asia Pacific (Mumbai)
- Asia Pacific (Osaka)
- Asia Pacific (Seoul)
- Asia Pacific (Singapore)
- Asia Pacific (Sydney)
- Asia Pacific (Tokyo)
- Canada (Central)
- China (Beijing)
- China (Ningxia)
- Europe (Frankfurt)
- Europe (Ireland)
- Europe (London)
- Europe (Milan)
- Europe (Paris)
- Europe (Stockholm)
- Middle East (Bahrain)
- South America (São Paulo)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

Remediation

For detailed instructions on how to specify a default root object for your distribution, see How to specify a default root object in the Amazon CloudFront Developer Guide.

[CloudFront.2] CloudFront distributions should have origin access identity enabled

Category: Protect > Secure access management > Resource policy configuration

Severity: Medium

Resource type: AWS::CloudFront::Distribution
**AWS Config rule:** cloudfront-origin-access-identity-enabled

**Parameters:** None

This control checks whether an Amazon CloudFront distribution with Amazon S3 Origin type has Origin Access Identity (OAI) configured. The control fails if OAI is not configured.

CloudFront OAI prevents users from accessing S3 bucket content directly. When users access an S3 bucket directly, they effectively bypass the CloudFront distribution and any permissions that are applied to the underlying S3 bucket content.

**Note**
This control is only supported in US East (N. Virginia). It is not supported in the following Regions:

- US East (Ohio)
- US West (N. California)
- US West (Oregon)
- Africa (Cape Town)
- Asia Pacific (Hong Kong)
- Asia Pacific (Mumbai)
- Asia Pacific (Osaka)
- Asia Pacific (Seoul)
- Asia Pacific (Singapore)
- Asia Pacific (Sydney)
- Asia Pacific (Tokyo)
- Canada (Central)
- China (Beijing)
- China (Ningxia)
- Europe (Frankfurt)
- Europe (Ireland)
- Europe (London)
- Europe (Milan)
- Europe (Paris)
- Europe (Stockholm)
- Middle East (Bahrain)
- South America (São Paulo)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

**Remediation**

For detailed remediation instructions, see [Creating a CloudFront OAI and adding it to your distribution](#) in the *Amazon CloudFront Developer Guide*.

[CloudFront.3] CloudFront distributions should require encryption in transit

**Category:** Protect > Data protection > Encryption of data in transit

**Severity:** Medium

**Resource type:** AWS::CloudFront::Distribution
**AWS Config rule:** `cloudfront-viewer-policy-https`

**Parameters:** None

This control checks whether an Amazon CloudFront distribution requires viewers to use HTTPS directly or whether it uses redirection. The control fails if `ViewerProtocolPolicy` is set to `allow-all` for `defaultCacheBehavior` or for `cacheBehaviors`.

HTTPS (TLS) can be used to help prevent potential attackers from using person-in-the-middle or similar attacks to eavesdrop on or manipulate network traffic. Only encrypted connections over HTTPS (TLS) should be allowed. Encrypting data in transit can affect performance. You should test your application with this feature to understand the performance profile and the impact of TLS.

**Note**
This control is only supported in US East (N. Virginia). It is not supported in the following Regions:
- US East (Ohio)
- US West (N. California)
- US West (Oregon)
- Africa (Cape Town)
- Asia Pacific (Hong Kong)
- Asia Pacific (Mumbai)
- Asia Pacific (Osaka)
- Asia Pacific (Seoul)
- Asia Pacific (Singapore)
- Asia Pacific (Sydney)
- Asia Pacific (Tokyo)
- Canada (Central)
- China (Beijing)
- China (Ningxia)
- Europe (Frankfurt)
- Europe (Ireland)
- Europe (London)
- Europe (Milan)
- Europe (Paris)
- Europe (Stockholm)
- Middle East (Bahrain)
- South America (São Paulo)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

**Remediation**

For detailed remediation instructions, see Requiring HTTPS for communication between viewers and CloudFront in the *Amazon CloudFront Developer Guide*.

[CloudFront.4] CloudFront distributions should have origin failover configured

**Category:** Recover > Resilience > High availability

**Severity:** Low
Resource type: AWS::CloudFront::Distribution

AWS Config rule: cloudfront-origin-failover-enabled

Parameters: None

This control checks whether an Amazon CloudFront distribution is configured with an origin group that has two or more origins.

CloudFront origin failover can increase availability. Origin failover automatically redirects traffic to a secondary origin if the primary origin is unavailable or if it returns specific HTTP response status codes.

**Note**
This control is only supported in US East (N. Virginia). It is not supported in the following Regions:
- US East (Ohio)
- US West (N. California)
- US West (Oregon)
- Africa (Cape Town)
- Asia Pacific (Hong Kong)
- Asia Pacific (Mumbai)
- Asia Pacific (Osaka)
- Asia Pacific (Seoul)
- Asia Pacific (Singapore)
- Asia Pacific (Sydney)
- Asia Pacific (Tokyo)
- Canada (Central)
- China (Beijing)
- China (Ningxia)
- Europe (Frankfurt)
- Europe (Ireland)
- Europe (London)
- Europe (Milan)
- Europe (Paris)
- Europe (Stockholm)
- Middle East (Bahrain)
- South America (São Paulo)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

Remediation

For detailed remediation instructions, see Creating an origin group in the Amazon CloudFront Developer Guide.

[CloudFront.5] CloudFront distributions should have logging enabled

Category: Identify > Logging

Severity: Medium

Resource type: AWS::CloudFront::Distribution
AWS Config rule: cloudfront_accesslogs_enabled

Parameters:

• S3BucketName (Optional) – The S3 bucket to send the logs to

This control checks whether server access logging is enabled on CloudFront distributions. The control fails if access logging is not enabled for a distribution.

CloudFront access logs provide detailed information about every user request that CloudFront receives. Each log contains information such as the date and time the request was received, the IP address of the viewer that made the request, the source of the request, and the port number of the request from the viewer.

These logs are useful for applications such as security and access audits and forensics investigation. For additional guidance on how to analyze access logs, see Querying Amazon CloudFront logs in the Amazon Athena User Guide.

Note
This control is only supported in US East (N. Virginia). It is not supported in the following Regions:

• US East (Ohio)
• US West (N. California)
• US West (Oregon)
• Africa (Cape Town)
• Asia Pacific (Hong Kong)
• Asia Pacific (Mumbai)
• Asia Pacific (Osaka)
• Asia Pacific (Seoul)
• Asia Pacific (Singapore)
• Asia Pacific (Sydney)
• Asia Pacific (Tokyo)
• Canada (Central)
• China (Beijing)
• China (Ningxia)
• Europe (Frankfurt)
• Europe (Ireland)
• Europe (London)
• Europe (Milan)
• Europe (Paris)
• Europe (Stockholm)
• Middle East (Bahrain)
• South America (São Paulo)
• AWS GovCloud (US-East)
• AWS GovCloud (US-West)

Remediation

For information on how to configure access logging for a CloudFront distribution, see Configuring and using standard logs (access logs) in the Amazon CloudFront Developer Guide.
[CloudFront.6] CloudFront distributions should have AWS WAF enabled

**Category:** Protect > Protective services

**Severity:** Medium

**Resource type:** AWS::CloudFront::Distribution

**AWS Config rule:** cloudfront-associated-with-waf

**Parameters:**

- `wafWebAclIds` (Optional) - A comma-separated list of web ACL IDs (for AWS WAF) or web ACL ARNs (for AWS WAFv2).

This control checks whether CloudFront distributions are associated with either AWS WAF or AWS WAFv2 web ACLs. The control fails if the distribution is not associated with a web ACL.

AWS WAF is a web application firewall that helps protect web applications and APIs from attacks. It allows you to configure a set of rules, called a web access control list (web ACL), that allow, block, or count web requests based on customizable web security rules and conditions that you define. Ensure your CloudFront distribution is associated with an AWS WAF web ACL to help protect it from malicious attacks.

**Note**
This control is only supported in US East (N. Virginia). It is not supported in the following Regions:

- US East (Ohio)
- US West (N. California)
- US West (Oregon)
- Africa (Cape Town)
- Asia Pacific (Hong Kong)
- Asia Pacific (Mumbai)
- Asia Pacific (Osaka)
- Asia Pacific (Seoul)
- Asia Pacific (Singapore)
- Asia Pacific (Sydney)
- Asia Pacific (Tokyo)
- Canada (Central)
- China (Beijing)
- China (Ningxia)
- Europe (Frankfurt)
- Europe (Ireland)
- Europe (London)
- Europe (Milan)
- Europe (Paris)
- Europe (Stockholm)
- Middle East (Bahrain)
- South America (São Paulo)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)
Remediation

For information on how to associate a web ACL with a CloudFront distribution, see Using AWS WAF to control access to your content in the Amazon CloudFront Developer Guide.

[CloudTrail.1] CloudTrail should be enabled and configured with at least one multi-Region trail

**Category:** Identify > Logging

**Severity:** High

**Resource type:** AWS account

**AWS Config rule:** multi-region-cloudtrail-enabled

**Parameters:**

- `readWriteType`: ALL

This control checks that there is at least one multi-Region CloudTrail trail.

AWS CloudTrail records AWS API calls for your account and delivers log files to you. The recorded information includes the following information.

- Identity of the API caller
- Time of the API call
- Source IP address of the API caller
- Request parameters
- Response elements returned by the AWS service

CloudTrail provides a history of AWS API calls for an account, including API calls made from the AWS Management Console, AWS SDKs, command line tools. The history also includes API calls from higher-level AWS services such as AWS CloudFormation.

The AWS API call history produced by CloudTrail enables security analysis, resource change tracking, and compliance auditing. Multi-Region trails also provide the following benefits.

- A multi-Region trail helps to detect unexpected activity occurring in otherwise unused Regions.
- A multi-Region trail ensures that global service event logging is enabled for a trail by default. Global service event logging records events generated by AWS global services.
- For a multi-Region trail, management events for all read and write operations ensure that CloudTrail records management operations on all of an AWS account’s resources.

By default, CloudTrail trails that are created using the AWS Management Console are multi-Region trails.

**Remediation**

To remediate this issue, create a new multi-Region trail in CloudTrail.

**To create a new trail in CloudTrail**

1. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.
2. If you haven't used CloudTrail before, choose Get Started Now.
3. Choose Trails and then choose Create trail.
4. Enter a name for the trail.
5. Under **Storage location**, do one of the following:
   a. To create a new S3 bucket for CloudTrail logs, for **Create a new S3 bucket**, choose **Yes**, then enter a name for the new S3 bucket.
   b. To use an existing S3 bucket, for **Create a new S3 bucket**, choose **No**, then select the S3 bucket to use.
6. Under **Additional settings**, choose **Advanced**. For **Enable log file validation**, select **Enabled**.
7. Choose **Create**.

To update an existing trail in CloudTrail
1. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.
2. Choose **Trails**.
3. In the **Name** column, choose the name of the trail.
4. For **Management events**, choose **Edit**.
5. For **Read/Write events**, select **Management events**.
6. Under **API Activity**, select **Read** and **Write**.

[CloudTrail.2] CloudTrail should have encryption at rest enabled

**Category:** Protect > Data protection > Encryption of data at rest

**Severity:** Medium

**Resource type:** AWS::CloudTrail::Trail

**AWS Config rule:** cloud-trail-encryption-enabled

**Parameters:** None

This control checks whether CloudTrail is configured to use the server-side encryption (SSE) AWS KMS key encryption. The check passes if the **KmsKeyId** is defined.

For an added layer of security for your sensitive CloudTrail log files, you should use **server-side encryption with AWS KMS–managed keys (SSE-KMS)** for your CloudTrail log files for encryption at rest. Note that by default, the log files delivered by CloudTrail to your buckets are encrypted by **Amazon server-side encryption with Amazon S3-managed encryption keys (SSE-S3)**.

**Remediation**

To remediate this issue, update your trail to enable SSE-KMS encryption for the log files.

**To enable encryption for CloudTrail logs**
1. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.
2. Choose **Trails**.
3. Choose the trail to update.
4. Under **General details**, choose **Edit**.
5. For **Log file SSE-KMS encryption**, select **Enabled**.
6. For **Create a new KMS key**, do one of the following:
   - To create a key, choose **New**. Then in **AWS KMS alias**, enter an alias for the key. The key is created in the same Region as the S3 bucket.
To use an existing key, choose Existing, then from AWS KMS alias, choose the key.

The AWS KMS key and S3 bucket must be in the same Region.

7. Choose Save.

You might need to modify the policy for CloudTrail to successfully interact with your KMS key. For more information, see Encrypting CloudTrail log files with AWS KMS–managed keys (SSE-KMS) in the AWS CloudTrail User Guide.

[CloudTrail.4] Ensure CloudTrail log file validation is enabled

Category: Data protection > Data integrity

Severity: Low

Resource type: AWS::CloudTrail::Trail

AWS Config rule: cloud-trail-log-file-validation-enabled

Parameters: None

This control checks whether log file integrity validation is enabled on a CloudTrail trail.

CloudTrail log file validation creates a digitally signed digest file that contains a hash of each log that CloudTrail writes to Amazon S3. You can use these digest files to determine whether a log file was changed, deleted, or unchanged after CloudTrail delivered the log.

Security Hub recommends that you enable file validation on all trails. Log file validation provides additional integrity checks of CloudTrail logs.

For more information, see Enabling validation and validating files in the AWS CloudTrail User Guide.

Remediation

To remediate this issue, update your CloudTrail trail to enable log file validation.

To enable CloudTrail log file validation

1. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.
2. Choose Trails.
3. Under Name, choose the name of a trail to edit.
5. Under Additional settings, for Log file validation, choose Enabled.
6. Choose Save changes.

For more information, see Validating CloudTrail log file integrity in the AWS CloudTrail User Guide.

[CloudTrail.5] Ensure CloudTrail trails are integrated with Amazon CloudWatch Logs

Category: Identify > Logging

Severity: Low

Resource type: AWS::CloudTrail::Trail

AWS Config rule: cloud-trail-cloud-watch-logs-enabled
Parameters: None

This control checks whether CloudTrail trails are configured to send logs to CloudWatch Logs. The control fails if the CloudWatchLogsLogGroupArn property of the trail is empty.

CloudTrail records AWS API calls that are made in a given account. The recorded information includes the following:

- The identity of the API caller
- The time of the API call
- The source IP address of the API caller
- The request parameters
- The response elements returned by the AWS service

CloudTrail uses Amazon S3 for log file storage and delivery. You can capture CloudTrail logs in a specified S3 bucket for long-term analysis. To perform real-time analysis, you can configure CloudTrail to send logs to CloudWatch Logs.

For a trail that is enabled in all Regions in an account, CloudTrail sends log files from all of those Regions to a CloudWatch Logs log group.

Security Hub recommends that you send CloudTrail logs to CloudWatch Logs. Note that this recommendation is intended to ensure that account activity is captured, monitored, and has appropriately alarms. You can use CloudWatch Logs to set this up with your AWS services. This recommendation does not preclude the use of a different solution.

Sending CloudTrail logs to CloudWatch Logs facilitates real-time and historic activity logging based on user, API, resource, and IP address. You can use this approach to establish alarms and notifications for anomalous or sensitivity account activity.

Remediation

You can use the console to enable CloudTrail integration with CloudWatch Logs.

To enable CloudTrail integration with CloudWatch Logs

1. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.
2. Choose Trails.
3. Choose the trail that does not have a value for CloudWatch Logs Log group.
5. Select Enabled.
6. For Log group, do one of the following:
   - To use the default log group, keep the name as is.
   - To use an existing log group, choose Existing and then enter the name of the log group to use.
   - To create a new log group, choose New and then enter a name for the log group to create.
7. For IAM role, do one of the following:
   - To use an existing role, choose Existing and then choose the role from the drop-down list.
   - To create a new role, choose New and then enter a name for the role to create. The new role is assigned a policy that grants the necessary permissions.

To view the permissions granted to the role, expand Policy document.
8. Choose Save changes.
[CodeBuild.1] CodeBuild GitHub or Bitbucket source repository URLs should use OAuth

Category: Protect > Secure development

Severity: Critical

Resource type: AWS::CodeBuild::Project

AWS Config rule: codebuild-project-source-repo-url-check

Parameters: None

This control checks whether the GitHub or Bitbucket source repository URL contains either personal access tokens or a user name and password.

Note
This control is not supported in the following Regions.

- Africa (Cape Town)
- Europe (Milan)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

Authentication credentials should never be stored or transmitted in clear text or appear in the repository URL. Instead of personal access tokens or user name and password, you should use OAuth to grant authorization for accessing GitHub or Bitbucket repositories. Using personal access tokens or a user name and password could expose your credentials to unintended data exposure and unauthorized access.

Remediation

You can update your CodeBuild project to use OAuth.

To remove basic authentication / (GitHub) Personal Access Token from CodeBuild project source

2. Choose the build project that contains personal access tokens or a user name and password.
3. From Edit, choose Source.
4. Choose Disconnect from GitHub / Bitbucket.
5. Choose Connect using OAuth, then choose Connect to GitHub / Bitbucket.
6. When prompted, choose authorize as appropriate.
7. Reconfigure your repository URL and additional configuration settings, as needed.
8. Choose Update source.

For more information, refer to CodeBuild use case-based samples in the AWS CodeBuild User Guide.

[CodeBuild.2] CodeBuild project environment variables should not contain clear text credentials

Category: Protect > Secure development
**Severity:** Critical

**Resource type:** AWS::CodeBuild::Project

**AWS Config rule:** codebuild-project-envvar-awscrd-check

**Parameters:** None

This control checks whether the project contains the environment variables AWS_ACCESS_KEY_ID and AWS_SECRET_ACCESS_KEY.

Authentication credentials AWS_ACCESS_KEY_ID and AWS_SECRET_ACCESS_KEY should never be stored in clear text, as this could lead to unintended data exposure and unauthorized access.

**Note**

This control is not supported in the following Regions.

- Africa (Cape Town)
- Europe (Milan)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

**Remediation**

To remediate this issue, update your CodeBuild project to remove the environment variable.

**To remove environment variables from a CodeBuild project**

2. Expand **Build**.
3. Choose **Build project**, and then choose the build project that contains plaintext credentials.
4. From **Edit**, choose **Environment**.
5. Expand **Additional configuration**.
6. Choose **Remove** next to the environment variables.
7. Choose **Update environment**.

**To store sensitive values in the Amazon EC2 Systems Manager Parameter Store and then retrieve them from your build spec**

2. Expand **Build**.
3. Choose **Build project**, and then choose the build project that contains plaintext credentials.
4. From **Edit**, choose **Environment**.
5. Expand **Additional configuration** and scroll to **Environment variables**.
6. Follow this tutorial to create a Systems Manager parameter that contains your sensitive data.
7. After you create the parameter, copy the parameter name.
8. Back in the CodeBuild console, choose **Create environmental variable**.
9. Enter the name of your variable as it appears in your build spec.
10. For **Value**, paste the name of your parameter.
11. For **Type**, choose **Parameter**.
12. To remove your noncompliant environmental variable that contains plaintext credentials, choose **Remove**.
13. Choose **Update environment**.
For more information, see Environment variables in build environments in the AWS CodeBuild User Guide.

[Config.1] AWS Config should be enabled

Category: Identify > Inventory

Severity: Medium

Resource type: AWS account

AWS Config rule: None

Parameters: None

This control checks whether AWS Config is enabled in the account for the local Region and is recording all resources.

The AWS Config service performs configuration management of supported AWS resources in your account and delivers log files to you. The recorded information includes the configuration item (AWS resource), relationships between configuration items, and any configuration changes between resources.

Security Hub recommends that you enable AWS Config in all Regions. The AWS configuration item history that AWS Config captures enables security analysis, resource change tracking, and compliance auditing.

Note
Because Security Hub is a Regional service, the check performed for this control checks only the current Region for the account. It does not check all Regions.
To allow security checks against global resources in each Region, you also must record global resources. If you only record global resources in a single Region, then you can disable this control in all Regions except the Region where you record global resources.

To learn more, see Getting started with AWS Config in the AWS Config Developer Guide.

Remediation

After you enable AWS Config, configure it to record all resources.

To configure AWS Config settings

1. Open the AWS Config console at https://console.aws.amazon.com/config/.
2. Choose the Region to configure AWS Config in.
3. If you have not used AWS Config before, choose Get started.
4. On the Settings page, do the following:
   a. Under Resource types to record, choose Record all resources supported in this region and Include global resources (e.g. AWS IAM resources).
   b. Under AWS Config role, either choose Create AWS Config service-linked role or Choose a role from your account and then choose the role to use.
   c. Under Amazon S3 bucket, specify the bucket to use or create a bucket and optionally include a prefix.
   d. Under Amazon SNS topic, choose an Amazon SNS topic from your account or create one. For more information about Amazon SNS, see the Amazon Simple Notification Service Getting Started Guide.
5. Choose Next.
6. On the AWS Config rules page, choose Next.
7. Choose Confirm.
For more information about using AWS Config from the AWS CLI, see Turning on AWS Config in the AWS Config Developer Guide.

You can also use an AWS CloudFormation template to automate this process. For more information, see the AWS CloudFormation StackSets sample template in the AWS CloudFormation User Guide.

**[DMS.1] AWS Database Migration Service replication instances should not be public**

**Category:** Protect > Secure network configuration  
**Severity:** Critical  
**Resource type:** AWS::DMS::ReplicationInstance  
**AWS Config rule:** dms-replication-not-public  
**Parameters:** None

This control checks whether AWS DMS replication instances are public. To do this, it examines the value of the `PubliclyAccessible` field.

A private replication instance has a private IP address that you cannot access outside of the replication network. A replication instance should have a private IP address when the source and target databases are in the same network. The network must also be connected to the replication instance’s VPC using a VPN, AWS Direct Connect, or VPC peering. To learn more about public and private replication instances, see Public and private replication instances in the AWS Database Migration Service User Guide.

You should also ensure that access to your AWS DMS instance configuration is limited to only authorized users. To do this, restrict users’ IAM permissions to modify AWS DMS settings and resources.

**Note**  
This control is not supported in Africa (Cape Town) or Europe (Milan).

**Remediation**

Note that you cannot change the public access setting once a replication instance is created. It must be deleted and recreated.

**To configure the AWS DMS replication instances setting to block public access**

2. Navigate to Replication instances, then delete the public instance. Choose the instance, choose Actions, then choose delete.  
3. Choose Create replication instance. Provide the configuration details.  
4. To disable public access, make sure that Publicly accessible is not selected.  
5. Choose Create.

For more information, see the section on Creating a replication instance in the AWS Database Migration Service User Guide.

**[DynamoDB.1] DynamoDB tables should automatically scale capacity with demand**

**Category:** Recover > Resilience > High availability  
**Severity:** Medium  
**Resource type:** AWS::DynamoDB::Table
AWS Config rule: dynamodb-autoscaling-enabled

Parameters: None

This control checks whether an Amazon DynamoDB table can scale its read and write capacity as needed. This control passes if the table uses either on-demand capacity mode or provisioned mode with auto scaling configured. Scaling capacity with demand avoids throttling exceptions, which helps to maintain availability of your applications.

DynamoDB tables in on-demand capacity mode are only limited by the DynamoDB throughput default table quotas. To raise these quotas, you can file a support ticket through AWS Support.

DynamoDB tables in provisioned mode with auto scaling adjust the provisioned throughput capacity dynamically in response to traffic patterns. For additional information on DynamoDB request throttling, see Request throttling and burst capacity in the Amazon DynamoDB Developer Guide.

Note
This control is not supported in AWS GovCloud (US-East) or AWS GovCloud (US-West).

Remediation
For detailed instructions on enabling DynamoDB automatic scaling on existing tables in capacity mode, see Enabling DynamoDB auto scaling on existing tables in the Amazon DynamoDB Developer Guide.

[DynamoDB.2] DynamoDB tables should have point-in-time recovery enabled

Category: Recover > Resilience > Backups enabled

Severity: Medium

Resource type: AWS::DynamoDB::Table

AWS Config rule: dynamodb-pitr-enabled

Parameters: None

This control checks whether point-in-time recovery (PITR) is enabled for an Amazon DynamoDB table.

Backups help you to recover more quickly from a security incident. They also strengthen the resilience of your systems. DynamoDB point-in-time recovery automates backups for DynamoDB tables. It reduces the time to recover from accidental delete or write operations. DynamoDB tables that have PITR enabled can be restored to any point in time in the last 35 days.

Remediation
To remediate this issue, add point-in-time recovery to your DynamoDB table.

To enable DynamoDB point-in-time recovery for an existing table

2. Choose the table that you want to work with, and then choose Backups.
3. In the Point-in-time Recovery section, under Status, choose Enable.
4. Choose Enable again to confirm the change.

[DynamoDB.3] DynamoDB Accelerator (DAX) clusters should be encrypted at rest

Category: Protect > Data protection > Encryption of data at rest
Severity: Medium

Resource type: AWS::DAX::Cluster

AWS Config rule: dax_encryption_enabled

Parameters: None

This control checks whether a DAX cluster is encrypted at rest.

Encrypting data at rest reduces the risk of data stored on disk being accessed by a user not authenticated to AWS. The encryption adds another set of access controls to limit the ability of unauthorized users to access to the data. For example, API permissions are required to decrypt the data before it can be read.

Remediation

You cannot enable or disable encryption at rest after a cluster is created. You must recreate the cluster in order to enable encryption at rest. For detailed instructions on how to create a DAX cluster with encryption at rest enabled, see Enabling encryption at rest using the AWS Management Console in the Amazon DynamoDB Developer Guide.

[EC2.1] Amazon EBS snapshots should not be public, determined by the ability to be restorable by anyone

Category: Protect > Secure network configuration

Severity: Critical

Resource type: AWS account

AWS Config rule: ebs-snapshot-public-restorable-check

Parameters: None

This control checks that Amazon Elastic Block Store snapshots are not public, as determined by the ability to be restorable by anyone.

EBS snapshots are used to back up the data on your EBS volumes to Amazon S3 at a specific point in time. You can use the snapshots to restore previous states of EBS volumes. It is rarely acceptable to share a snapshot with the public. Typically the decision to share a snapshot publicly was made in error or without a complete understanding of the implications. This check helps ensure that all such sharing was fully planned and intentional.

Note
This control is not supported in Africa (Cape Town) or Europe (Milan).

Remediation

To remediate this issue, update your EBS snapshot to make it private instead of public.

To make a public EBS snapshot private

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. In the navigation pane, under Elastic Block Store, choose Snapshots menu and then choose your public snapshot.
3. From Actions, choose Modify permissions.
5. (Optional) Add the AWS account numbers of the authorized accounts to share your snapshot with and choose Add Permission.
6. Choose Save.

**[EC2.2] The VPC default security group should not allow inbound and outbound traffic**

**Category:** Protect > Secure network configuration

**Severity:** High

**Resource type:** AWS::EC2::SecurityGroup

**AWS Config rule:** vpc-default-security-group-closed

**Parameters:** None

This control checks that the default security group of a VPC does not allow inbound or outbound traffic.

The rules for the default security group allow all outbound and inbound traffic from network interfaces (and their associated instances) that are assigned to the same security group.

We do not recommend using the default security group. Because the default security group cannot be deleted, you should change the default security group rules setting to restrict inbound and outbound traffic. This prevents unintended traffic if the default security group is accidentally configured for resources such as EC2 instances.

**Remediation**

To remediate this issue, create new security groups and assign those security groups to your resources. To prevent the default security groups from being used, remove their inbound and outbound rules.

**To create new security groups and assign them to your resources**

1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. In the navigation pane, choose Security groups. View the default security groups details to see the resources that are assigned to them.
3. Create a set of least-privilege security groups for the resources. For details on how to create security groups, see Creating a security group in the Amazon VPC User Guide.
4. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
5. On the Amazon EC2 console, change the security group for the resources that use the default security groups to the least-privilege security group you created. See Changing an instance's security groups in the Amazon VPC User Guide.

After you assign the new security groups to the resources, remove the inbound and outbound rules from the default security groups. This ensures that the default security groups are not used.

**To remove the rules from the default security group**

1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. In the navigation pane, choose Security groups.
4. Repeat the previous step for each default security group.
5. Select a default security group and choose the Outbound rule tab. Choose Edit outbound rules. Then delete all outbound rules. Choose Save rules.
6. Repeat the previous step for each default security group.
For more information, see Working with security groups in the Amazon VPC User Guide.

[EC2.3] Attached EBS volumes should be encrypted at rest

Category: Protect > Data protection > Encryption of data at rest

Severity: Medium

Resource type: AWS::EC2::Volume

AWS Config rule: encrypted-volumes

Parameters: None

This control checks whether the EBS volumes that are in an attached state are encrypted. To pass this check, EBS volumes must be in use and encrypted. If the EBS volume is not attached, then it is not subject to this check.

For an added layer of security of your sensitive data in EBS volumes, you should enable EBS encryption at rest. Amazon EBS encryption offers a straightforward encryption solution for your EBS resources that doesn't require you to build, maintain, and secure your own key management infrastructure. It uses KMS keys when creating encrypted volumes and snapshots.

To learn more about Amazon EBS encryption, see Amazon EBS encryption in the Amazon EC2 User Guide for Linux Instances.

Note

This control is not supported in Africa (Cape Town) or Europe (Milan).

Remediation

There is no direct way to encrypt an existing unencrypted volume or snapshot. You can only encrypt a new volume or snapshot when you create it.

If you enabled encryption by default, Amazon EBS encrypts the resulting new volume or snapshot using your default key for Amazon EBS encryption. Even if you have not enabled encryption by default, you can enable encryption when you create an individual volume or snapshot. In both cases, you can override the default key for Amazon EBS encryption and choose a symmetric customer managed key.

For more information, see Creating an Amazon EBS volume and Copying an Amazon EBS snapshot in the Amazon EC2 User Guide for Linux Instances.

[EC2.4] Stopped EC2 instances should be removed after a specified time period

Category: Identify > Inventory

Severity: Medium

Resource type: AWS::EC2::Instance

AWS Config rule: ec2-stopped-instance

Parameters:

- allowedDays: 30

This control checks whether any EC2 instances have been stopped for more than the allowed number of days. An EC2 instance fails this check if it is stopped for longer than the maximum allowed time period, which by default is 30 days.
A failed finding indicates that an EC2 instance has not run for a significant period of time. This creates a security risk because the EC2 instance is not being actively maintained (analyzed, patched, updated). If it is later launched, the lack of proper maintenance could result in unexpected issues in your AWS environment. To safely maintain an EC2 instance over time in a nonrunning state, start it periodically for maintenance and then stop it after maintenance. Ideally this is an automated process.

**Note**
This control is not supported in Africa (Cape Town) or Europe (Milan).

**Remediation**

You can terminate an EC2 instance using either the console or the command line. Before you terminate the EC2 instance, verify that you won't lose any data:

- Check that your Amazon EBS volumes will not be deleted on termination.
- Copy any data that you need from your EC2 instance store volumes to Amazon EBS or Amazon S3.

**To terminate an EC2 instance (console)**

1. Open the Amazon EC2 console at [https://console.aws.amazon.com/ec2/](https://console.aws.amazon.com/ec2/).
2. In the navigation pane, under **Instances**, choose **Instances**.
3. Select the instance, and then choose **Actions, Instance State, Terminate**.
4. When prompted for confirmation, choose **Yes, Terminate**.

**To terminate an EC2 instance (AWS CLI, Tools for Windows PowerShell)**

Use one of the following commands. For more information about the command line interface, see Accessing Amazon EC2 in the Amazon EC2 User Guide for Linux Instances.

- From the AWS CLI, use `terminate-instances`
- From the Tools for Windows PowerShell, use `Stop-EC2Instance`.

To learn more about terminating instances, see Terminating an instance in the Amazon EC2 User Guide for Linux Instances.

**[EC2.6] VPC flow logging should be enabled in all VPCs**

**Category:** Identify > Logging

**Severity:** Medium

**Resource type:** AWS::EC2::VPC

**AWS Config rule:** vpc-flow-logs-enabled

**Parameters:**

- `trafficType`: REJECT

This control checks whether Amazon VPC Flow Logs are found and enabled for VPCs. The traffic type is set to Reject.

With the VPC Flow Logs feature, you can capture information about the IP address traffic going to and from network interfaces in your VPC. After you create a flow log, you can view and retrieve its data in CloudWatch Logs. To reduce cost, you can also send your flow logs to Amazon S3.
Security Hub recommends that you enable flow logging for packet rejects for VPCs. Flow logs provide visibility into network traffic that traverses the VPC and can detect anomalous traffic or provide insight during security workflows.

By default, the record includes values for the different components of the IP address flow, including the source, destination, and protocol. For more information and descriptions of the log fields, see VPC Flow Logs in the Amazon VPC User Guide.

Remediation

To remediate this issue, enable VPC flow logging.

To enable VPC flow logging
1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. Under Virtual Private Cloud, choose Your VPCs.
3. Select a VPC to update.
4. At the bottom of the page, choose Flow Logs.
5. Choose Create flow log.
6. For Filter, choose Reject.
7. For Destination log group, choose the log group to use.
8. For IAM role, choose the IAM role to use.
9. Choose Create.

[EC2.7] EBS default encryption should be enabled

Category: Protect > Data protection > Encryption of data at rest

Severity: Medium

Resource type: AWS account

AWS Config rule: ec2-ebs-encryption-by-default

Parameters: None

This control checks whether account-level encryption is enabled by default for Amazon Elastic Block Store (Amazon EBS). The control fails if the account level encryption is not enabled.

When encryption is enabled for your account, Amazon EBS volumes and snapshot copies are encrypted at rest. This adds an additional layer of protection for your data. For more information, see Encryption by default in the Amazon EC2 User Guide for Linux Instances.

Note that following instance types do not support encryption: R1, C1, and M1.

Remediation

You can use the Amazon EC2 console to enable default encryption for Amazon EBS volumes.

To configure the default encryption for Amazon EBS encryption for a Region
1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. From the navigation pane, select EC2 Dashboard.
3. In the upper-right corner of the page, choose Account Attributes, EBS encryption.
4. Choose Manage.
5. Select Enable. You can keep the AWS managed key with the alias alias/aws/ebs created on your behalf as the default encryption key, or choose a symmetric customer managed key.
6. Choose Update EBS encryption.

[EC2.8] EC2 instances should use IMDSv2

**Category:** Protect > Network security  
**Severity:** High  
**Resource type:** AWS::EC2::Instance  
**AWS Config rule:** ec2-imdsv2-check  
**Parameters:** None

This control checks whether your EC2 instance metadata version is configured with Instance Metadata Service Version 2 (IMDSv2). The control passes if HttpTokens is set to required for IMDSv2. The control fails if HttpTokens is set to optional.

You use instance metadata to configure or manage the running instance. The IMDS provides access to temporary, frequently rotated credentials. These credentials remove the need to hard code or distribute sensitive credentials to instances manually or programatically. The IMDS is attached locally to every EC2 instance. It runs on a special "link local" IP address of 169.254.169.254. This IP address is only accessible by software that runs on the instance.

Version 2 of the IMDS adds new protections for the following types of vulnerabilities. These vulnerabilities could be used to try to access the IMDS.

- Open website application firewalls
- Open reverse proxies
- Server-side request forgery (SSRF) vulnerabilities
- Open Layer 3 firewalls and network address translation (NAT)

Security Hub recommends that you configure your EC2 instances with IMDSv2.

**Note**  
This control is not supported in Africa (Cape Town) or Europe (Milan).

**Remediation**

To remediate an EC2 instance that is not configured with IMDSv2, you can require the use of IMDSv2.

To require IMDSv2 on an existing instance, when you request instance metadata, modify the Amazon EC2 metadata options. Follow the instructions in Configuring instance metadata options for existing instances in the Amazon EC2 User Guide for Linux Instances.

To require the use of IMDSv2 on a new instance when you launch it, follow the instructions in Configuring instance metadata options for new instances in the Amazon EC2 User Guide for Linux Instances.

**To configure your new EC2 instance with IMDSv2 from the console**

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. Choose Launch instance and then choose Launch instance.
3. In the Configure Instance Details step, under Advanced Details, for Metadata version, choose V2 (token required).
4. Choose **Review and Launch**.

If your software uses IMDSv1, you can reconfigure your software to use IMDSv2. For details, see Transitioning to using Instance Metadata Service Version 2 in the *Amazon EC2 User Guide for Linux Instances*.

**[EC2.9] EC2 instances should not have a public IP address**

**Category:** Protect > Secure network configuration > Public IP addresses  
**Severity:** High  
**Resource type:** AWS::EC2::Instance  
**AWS Config rule:** ec2-instance-no-public-ip  
**Parameters:** None

This control checks whether EC2 instances have a public IP address. The control fails if the `publicIp` field is present in the EC2 instance configuration item. This control applies to IPv4 addresses only.

A public IPv4 address is an IP address that is reachable from the internet. If you launch your instance with a public IP address, then your EC2 instance is reachable from the internet. A private IPv4 address is an IP address that is not reachable from the internet. You can use private IPv4 addresses for communication between EC2 instances in the same VPC or in your connected private network.

IPv6 addresses are globally unique, and therefore are reachable from the internet. However, by default all subnets have the IPv6 addressing attribute set to false. For more information about IPv6, see [IP addressing in your VPC](https://docs.aws.amazon.com/vpc/latest/userguide/ip-addressing.html) in the *Amazon VPC User Guide*.

If you have a legitimate use case to maintain EC2 instances with public IP addresses, then you can suppress the findings from this control. For more information about front-end architecture options, see the [AWS Architecture Blog](https://aws.amazon.com/blogs/architecture/) or the [This Is My Architecture series](https://aws.amazon.com/thisismyarchitecture/).

**Remediation**

Use a non-default VPC so that your instance is not assigned a public IP address by default.

When you launch an EC2 instance into a default VPC, it is assigned a public IP address. When you launch an EC2 instance into a non-default VPC, the subnet configuration determines whether it receives a public IP address. The subnet has an attribute to determine if new EC2 instances in the subnet receive a public IP address from the public IPv4 address pool.

You cannot manually associate or disassociate an automatically-assigned public IP address from your EC2 instance. To control whether your EC2 instance receives a public IP address, do one of the following:

- Modify the public IP addressing attribute of your subnet. For more information, see [Modifying the public IPv4 addressing attribute for your subnet](https://docs.aws.amazon.com/vpc/latest/userguide/ip-addressing.html) in the *Amazon VPC User Guide*.
- Enable or disable the public IP addressing feature during launch. This overrides the subnet's public IP addressing attribute. For more information, see [Assign a public IPv4 address during instance launch](https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/assign-public-ipv4.html) in the *Amazon EC2 User Guide for Linux Instances*.

For more information, see [Public IPv4 addresses and external DNS hostnames](https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/public-ipv4-ec2.html) in the *Amazon EC2 User Guide for Linux Instances*.

If your EC2 instance is associated with an Elastic IP address, then your EC2 instance is reachable from the internet. You can disassociate an Elastic IP address from an instance or network interface at any time.
To disassociate an Elastic IP address

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. In the navigation pane, choose Elastic IPs.
3. Select the Elastic IP address to disassociate.
4. From Actions, choose Disassociate Elastic IP address.
5. Choose Disassociate.

[EC2.10] Amazon EC2 should be configured to use VPC endpoints that are created for the Amazon EC2 service

Category: Protect - Secure network configuration > API private access

Severity: Medium

Resource type: AWS::EC2::VPC

AWS Config rule: service-vpc-endpoint-enabled

Parameters:

- serviceName: ec2

This control checks whether a service endpoint for Amazon EC2 is created for each VPC. The control fails if a VPC does not have a VPC endpoint created for the Amazon EC2 service.

To improve the security posture of your VPC, you can configure Amazon EC2 to use an interface VPC endpoint. Interface endpoints are powered by AWS PrivateLink, a technology that enables you to access Amazon EC2 API operations privately. It restricts all network traffic between your VPC and Amazon EC2 to the Amazon network. Because endpoints are supported within the same Region only, you cannot create an endpoint between a VPC and a service in a different Region. This prevents unintended Amazon EC2 API calls to other Regions.

To learn more about creating VPC endpoints for Amazon EC2, see Amazon EC2 and interface VPC endpoints in the Amazon EC2 User Guide for Linux Instances.

Remediation

To remediate this issue, you can create an interface VPC endpoint to Amazon EC2.

To create an interface endpoint to Amazon EC2 from the Amazon VPC console

1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. In the navigation pane, choose Endpoints.
3. Choose Create Endpoint.
4. For Service category, choose AWS services.
5. For Service Name, choose com.amazonaws.<region>.ec2.
6. For Type, choose Interface.
7. Complete the following information.
   a. For VPC, select a VPC in which to create the endpoint.
   b. For Subnets, select the subnets (Availability Zones) in which to create the endpoint network interfaces. Not all Availability Zones are supported for all AWS services.
   c. To enable private DNS for the interface endpoint, select the check box for Enable DNS Name. This option is enabled by default.
To use the private DNS option, the following attributes of your VPC must be set to true:

- enableDnsHostnames
- enableDnsSupport

For more information, see Viewing and updating DNS support for your VPC in the Amazon VPC User Guide.

d. For Security group, select the security groups to associate with the endpoint network interfaces.

e. (Optional) Add or remove a tag. To add a tag, choose Add tag and do the following:
   - For Key, enter the tag name.
   - For Value, enter the tag value.

f. To remove a tag, choose the delete button (x) to the right of the tag Key and Value.

8. Choose Create endpoint.

To create an interface VPC endpoint policy

You can attach a policy to your VPC endpoint to control access to the Amazon EC2 API. The policy specifies the following:

- The principal that can perform actions
- The actions that can be performed
- The resource on which the actions can be performed

For more details on creating a VPC endpoint policy, see Amazon EC2 and interface VPC endpoints In the Amazon EC2 User Guide for Linux Instances.

[EC2.15] EC2 subnets should not automatically assign public IP addresses

Category: Protect > Network security

Severity: Medium

Resource type: AWS::EC2::Subnet

AWS Config rule: subnet_auto_assign_public_ip_disabled

Parameters: None

This control checks whether the assignment of public IPs in Amazon Virtual Private Cloud (Amazon VPC) subnets have MapPublicIpOnLaunch set to FALSE. The control passes if the flag is set to FALSE.

All subnets have an attribute that determines whether a network interface created in the subnet automatically receives a public IPv4 address. Instances that are launched into subnets that have this attribute enabled have a public IP address assigned to their primary network interface.

**Note**

This control is not supported in the following Regions:

- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
You can configure a subnet from the Amazon VPC console.

**To configure a subnet to not assign public IP addresses**
1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. In the navigation pane, choose **Subnets**.
3. Select your subnet and then choose **Subnet Actions, Modify auto-assign IP settings**.
4. Clear the **Enable auto-assign public IPv4 address** check box and then choose **Save**.

**[EC2.16] Unused network access control lists should be removed**

*Category:* Prevent > Network security  
*Severity:* Low  
*Resource type:* AWS::EC2::NetworkAcl  

**AWS Config rule:** vpc_network_acl_unused_check  

**Parameters:** None  

This control checks whether there are any unused network access control lists (ACLs).

The control checks the item configuration of the resource `AWS::EC2::NetworkAcl` and determines the relationships of the network ACL.

If the only relationship is the VPC of the network ACL, then the control fails.

If other relationships are listed, then the control passes.

**Note**  
This control is not supported in the following Regions:

- Asia Pacific (Osaka)  
- China (Beijing)  
- China (Ningxia)  
- AWS GovCloud (US-East)  
- AWS GovCloud (US-West)

**Remediation**

For instructions on how to delete an unused network ACL, see Deleting a network ACL in the Amazon VPC User Guide.

**[EC2.17] EC2 instances should not use multiple ENIs**

*Category:* Network security  
*Severity:* Low  
*Resource type:* AWS::EC2::Instance  

**AWS Config rule:** ec2_instance_multiple_eni_check
Parameters:

- AdapterIds (Optional) – A list of network interface IDs that are attached to EC2 instances

This control checks whether an EC2 instance uses multiple Elastic Network Interfaces (ENIs) or Elastic Fabric Adapters (EFAs). This control passes if a single network adapter is used. The control includes an optional parameter list to identify the allowed ENIs.

Multiple ENIs can cause dual-homed instances, meaning instances that have multiple subnets. This can add network security complexity and introduce unintended network paths and access.

This control also fails if an Amazon EKS cluster that belongs to an Amazon EKS cluster has more than one ENI. If you need to use EC2 instances that have multiple ENIs as part of an Amazon EKS cluster, you can suppress those findings.

Note
This control is not supported in the following Regions:

- Asia Pacific (Osaka)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

Remediation

To remediate this issue, detach the additional ENIs.

To detach a network interface

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
3. Filter the list by the noncompliant instance IDs to see the associated ENIs.
4. Select the ENIs that you want to remove.
5. From the Actions menu, choose Detach.
6. If you see the prompt Are you sure that you want to detach the following network interface?, choose Detach.

[EC2.18] Security groups should only allow unrestricted incoming traffic for authorized ports

Category: Protect > Secure network configuration > Security group configuration

Severity: High

Resource type: AWS::EC2::SecurityGroup

AWS Config rule: vpc_sg_open_only_to_authorized_ports

Parameters:

- authorizedTcpPorts (Optional) – Comma-separated list of ports to which to allow unrestricted access. For example: ’80, 443’. For this rule, the default values for authorizedTcpPorts are 80 and 443.

This control checks whether the security groups that are in use allow unrestricted incoming traffic. Optionally the rule checks whether the port numbers are listed in the authorizedTcpPorts parameter.
• If the security group rule port number allows unrestricted incoming traffic, but the port number is specified in `authorizedTcpPorts`, then the control passes. The default value for `authorizedTcpPorts` is 80, 443.
• If the security group rule port number allows unrestricted incoming traffic, but the port number is not specified in `authorizedTcpPorts` input parameter, then the control fails.
• If the parameter is not used, then the control fails for any security group that has an unrestricted inbound rule.

Security groups provide stateful filtering of ingress and egress network traffic to AWS. Security group rules should follow the principal of least privileged access. Unrestricted access (IP address with a /0 suffix) increases the opportunity for malicious activity such as hacking, denial-of-service attacks, and loss of data.

Unless a port is specifically allowed, the port should deny unrestricted access.

**Note**
This control is not supported in Asia Pacific (Osaka).

**Remediation**
For information on how to modify a security group, see Add, remove, or update rules in the Amazon VPC User Guide.

**[EC2.19] Security groups should not allow unrestricted access to ports with high risk**

**Category:** Protect > Restricted network access

**Severity:** Medium

**Resource type:** AWS::EC2::SecurityGroup

**AWS Config rule:** vpc-sg-restricted-common-ports (Custom rule developed by Security Hub)

**Parameters:** None

This control checks whether unrestricted incoming traffic for the security groups is accessible to the specified ports that have the highest risk. This control passes when none of the rules in a security group allow ingress traffic from 0.0.0.0/0 for those ports.

Unrestricted access (0.0.0.0/0) increases opportunities for malicious activity, such as hacking, denial-of-service attacks, and loss of data.

Security groups provide stateful filtering of ingress and egress network traffic to AWS resources. No security group should allow unrestricted ingress access to the following ports:

- 3389 (RDP)
- 20, 21 (FTP)
- 22 (SSH)
- 23 (Telnet)
- 110 (POP3)
- 143 (IMAP)
- 3306 (mySQL)
- 8080 (proxy)
- 1433, 1434 (MSSQL)
- 9200 or 9300 (OpenSearch)
• 5601 (OpenSearch Dashboards)
• 25 (SMTP)
• 445 (CIFS)
• 135 (RPC)
• 4333 (ahsp)
• 5432 (postgresql)
• 5500 (fcp-addr-srvr1)

Remediation

For information on how to delete rules from a security group, see Delete rules from a security group in the Amazon EC2 User Guide for Linux Instances.

[EC2.1] Amazon VPC should not expose non-essential ports

Category: Protect > Secure access management

Severity: High

Resource type: AWS::VPC

AWS Config rule: ec2-vpc-security-group-rule-check

Parameters:

• SkipInactiveSecurityGroups: true

This control checks whether a security group allows access to ports that are not required for the security group's intended purpose. The control fails if the security group allows access to ports that are not required for the security group's intended purpose.

If a security group allows access to non-essential ports, it is because the customer has specifically opted in to that configuration. This control checks for unexpected access to non-essential ports when a security group allows access to ports that are not required for the security group's intended purpose.

Note
This control is not supported in the following Regions:

• Asia Pacific (Osaka)
• China (Beijing)
• China (Ningxia)
• AWS GovCloud (US-East)
• AWS GovCloud (US-West)

Remediation

For information on how to update a task definition, see Updating a task definition in the Amazon Elastic Container Service Developer Guide.

Note that when you update a task definition, it does not update running tasks that were launched from the previous task definition. To update a running task, you must redeploy the task with the new task definition.
[ECS.2] Amazon ECS services should not have public IP addresses assigned to them automatically

Category: Protect > Secure network configuration > Resources not publicly accessible

Severity: High

Resource type: AWS::ECS::Service

AWS Config rule: ecs-service-assign-public-ip-disabled (Custom rule developed by Security Hub)

Parameters:

- exemptEcsServiceArns (Optional). Security Hub does not populate this parameter. Comma-separated list of ARNs of Amazon ECS services that are exempt from this rule.

  This rule is COMPLIANT if an Amazon ECS service has AssignPublicIP set to ENABLED and is specified in this parameter list.

  This rule is NON_COMPLIANT if an Amazon ECS service has AssignPublicIP set to ENABLED and is not specified in this parameter list.

This control checks whether Amazon ECS services are configured to automatically assign public IP addresses. This control fails if AssignPublicIP is ENABLED. This control passes if AssignPublicIP is DISABLED.

A public IP address is an IP address that is reachable from the internet. If you launch your Amazon ECS instances with a public IP address, then your Amazon ECS instances are reachable from the internet. Amazon ECS services should not be publicly accessible, as this may allow unintended access to your container application servers.

Note
This control is not supported in the Asia Pacific (Osaka) Region.

Remediation
To disable automatic public IP assignment, see To configure VPC and security group settings for your service in the Amazon Elastic Container Service Developer Guide.

[EFS.1] Amazon EFS should be configured to encrypt file data at rest using AWS KMS

Category: Protect > Data protection > Encryption of data at rest

Severity: Medium

Resource type: AWS::EFS::FileSystem

AWS Config rule: efs-encrypted-check

Parameters: None

This control checks whether Amazon Elastic File System is configured to encrypt the file data using AWS KMS. The check fails in the following cases.

- Encrypted is set to false in the DescribeFileSystems response.
- The KmsKeyId key in the DescribeFileSystems response does not match the KmsKeyId parameter for efs-encrypted-check.
Note that this control does not use the KmsKeyId parameter for `efs-encrypted-check`. It only checks the value of `Encrypted`.

For an added layer of security for your sensitive data in Amazon EFS, you should create encrypted file systems. Amazon EFS supports encryption for file systems at-rest. You can enable encryption of data at rest when you create an Amazon EFS file system. To learn more about Amazon EFS encryption, see Data encryption in Amazon EFS in the Amazon Elastic File System User Guide.

**Note**
This control is not supported in Africa (Cape Town) or Europe (Milan).

**Remediation**

For details on how to encrypt a new Amazon EFS file system, see Encrypting data at rest in the Amazon Elastic File System User Guide.

**[EFS.2] Amazon EFS volumes should be in backup plans**

**Category:** Recover > Resilience > Backup

**Severity:** Medium

**Resource type:** AWS::EFS::FileSystem

**AWS Config rule:** `efs_in_backup_plan`

**Parameters:** None

This control checks whether Amazon Elastic File System (Amazon EFS) file systems are added to the backup plans in AWS Backup. The control fails if Amazon EFS file systems are not included in the backup plans.

Including EFS file systems in the backup plans helps you to protect your data from deletion and data loss.

**Note**
This control is not supported in the following Regions:

- Africa (Cape Town)
- Europe (Milan)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

**Remediation**

To remediate this issue, update your file system to enable automatic backups.

**To enable automatic backups for an existing file system**

2. On the **File systems** page, choose the file system for which to enable automatic backups.
   
   The **File system details** page is displayed.
3. Under **General**, choose **Edit**.
4. To enable automatic backups, select **Enable automatic backups**.
5. Choose **Save changes**.

To learn more, visit Using AWS Backup with Amazon EFS in the Amazon Elastic File System User Guide.
[ElasticBeanstalk.1] Elastic Beanstalk environments should have enhanced health reporting enabled

**Category:** Detect > Detection services > Application monitoring  
**Severity:** Low  
**Resource type:** AWS::ElasticBeanstalk::Environment  
**AWS Config rule:** beanstalk_enhanced_health_reporting_enabled  
**Parameters:** None  

This control checks whether enhanced health reporting is enabled for your AWS Elastic Beanstalk environments. Elastic Beanstalk enhanced health reporting enables a more rapid response to changes in the health of the underlying infrastructure. These changes could result in a lack of availability of the application. Elastic Beanstalk enhanced health reporting provides a status descriptor to gauge the severity of the identified issues and identify possible causes to investigate. The Elastic Beanstalk health agent, included in supported Amazon Machine Images (AMIs), evaluates logs and metrics of environment EC2 instances. For additional information, see Enhanced health reporting and monitoring in the *AWS Elastic Beanstalk Developer Guide*.  

**Note**  
This control is not supported in the following Regions:  
- Asia Pacific (Osaka)  
- China (Beijing)  
- China (Ningxia)  
- AWS GovCloud (US-East)  
- AWS GovCloud (US-West)  

**Remediation**

For instructions on how to enable enhanced health reporting, see Enabling enhanced health reporting using the Elastic Beanstalk console in the *AWS Elastic Beanstalk Developer Guide*.  

[ElasticBeanstalk.2] Elastic Beanstalk managed platform updates should be enabled

**Category:** Detect > Vulnerability, patch, and version management  
**Severity:** High  
**Resource type:** AWS::ElasticBeanstalk::Environment  
**AWS Config rule:** elastic_beanstalk_managed_updates_enabled  
**Parameters:** None  

This control checks whether managed platform updates are enabled for the Elastic Beanstalk environment. Enabling managed platform updates ensures that the latest available platform fixes, updates, and features for the environment are installed. Keeping up to date with patch installation is an important step in securing systems.
Note
This control is not supported in the following Regions:

- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

Remediation

For instructions on how to enable managed platform updates, see To configure managed platform updates under Managed platform updates in the AWS Elastic Beanstalk Developer Guide.

[ELB.3] Classic Load Balancer listeners should be configured with HTTPS or TLS termination

Category: Protect > Data protection > Encryption of data in transit

Severity: Medium

Resource type: AWS::ElasticLoadBalancing::LoadBalancer

AWS Config rule: elb_tls_https_listeners_only

Parameters: None

This control checks whether your Classic Load Balancer listeners are configured with HTTPS or TLS protocol for front-end (client to load balancer) connections. The control is applicable if a Classic Load Balancer has listeners. If your Classic Load Balancer does not have a listener configured, then the control does not report any findings.

The control passes if the Classic Load Balancer listeners are configured with TLS or HTTPS for front-end connections.

The control fails if the listener is not configured with TLS or HTTPS for front-end connections.

Before you start to use a load balancer, you must add one or more listeners. A listener is a process that uses the configured protocol and port to check for connection requests. Listeners can support both HTTP and HTTPS/TLS protocols. You should always use an HTTPS or TLS listener, so that the load balancer does the work of encryption and decryption in transit.

Remediation

To remediate this issue, update your listeners to use the TLS or HTTPS protocol.

To change all noncompliant listeners to TLS/HTTPS listeners

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. In the navigation pane, choose Load Balancers. Then choose your Classic Load Balancer.
3. Choose the Listeners tab, and then choose Edit.
4. For all listeners where Load Balancer Protocol is not set to HTTPS or SSL, change the setting to HTTPS or SSL.
5. For all modified listeners, under SSL Certificate, choose Change.
6. For all modified listeners, select Choose a certificate from ACM.
7. Select the certificate from the Certificates drop-down list. Then choose Save.
8. After you update all of the listeners, choose Save.

[ELB.4] Application load balancers should be configured to drop HTTP headers

Category: Protect > Network security
Severity: Medium
Resource type: AWS::ElasticLoadBalancing::LoadBalancer

AWS Config rule: alb_http_drop_invalid_header_enabled

Parameters: None

This control evaluates AWS Application Load Balancers (ALB) to ensure they are configured to drop invalid HTTP headers. The control fails if the value of routing.http.drop_invalid_header_fields.enabled is set to false.

By default, ALBs are not configured to drop invalid HTTP header values. Removing these header values prevents HTTP desync attacks.

Note
This control is not supported in the following Regions:

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Europe (Milan)

Remediation

To remediate this issue, configure your load balancer to drop invalid header fields.

To configure the load balancer to drop invalid header fields

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. In the navigation pane, choose Load balancers.
3. Choose an Application Load Balancer.
4. From Actions, choose Edit attributes.
5. Under Drop Invalid Header Fields, choose Enable.
6. Choose Save.

[ELB.5] Application and Classic Load Balancers logging should be enabled

Category: Logging
Severity: Medium
Resource type: AWS::ElasticLoadBalancing::LoadBalancer

AWS Config rule: elb-logging-enabled

Parameters: None

This control checks whether the Application Load Balancer and the Classic Load Balancer have logging enabled. The control fails if access_logs.s3.enabled is false.
Elastic Load Balancing provides access logs that capture detailed information about requests sent to your load balancer. Each log contains information such as the time the request was received, the client's IP address, latencies, request paths, and server responses. You can use these access logs to analyze traffic patterns and to troubleshoot issues.

To learn more, see Access logs for your Classic Load Balancer in User Guide for Classic Load Balancers.

**Remediation**

To remediate this issue, update your load balancers to enable logging.

**To enable access logs**

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. In the navigation pane, choose **Load balancers**.
3. Choose an Application Load Balancer.
4. From **Actions**, choose **Edit attributes**.
5. Under **Access logs**, choose **Enable**.
6. Enter your S3 location. This location can exist or it can be created for you. If you do not specify a prefix, the access logs are stored in the root of the S3 bucket.
7. Choose **Save**.

[ELB.6] Application Load Balancer deletion protection should be enabled

**Category:** Recover > Resilience > High availability

**Severity:** Medium

**Resource type:** AWS::ElasticLoadBalancingV2::LoadBalancer

**AWS Config rule:** elb-deletion-protection-enabled

**Parameters:** None

This control checks whether an Application Load Balancer has deletion protection enabled. The control fails if deletion protection is not configured.

Enable deletion protection to protect your Application Load Balancer from deletion.

**Remediation**

To prevent your load balancer from being deleted accidentally, you can enable deletion protection. By default, deletion protection is disabled for your load balancer.

If you enable deletion protection for your load balancer, you must disable delete protection before you can delete the load balancer.

To enable deletion protection from the console

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. On the navigation pane, under **LOAD BALANCING**, choose **Load Balancers**.
3. Choose the load balancer.
4. On the **Description** tab, choose **Edit attributes**.
5. On the **Edit load balancer attributes** page, select **Enable for Delete Protection**, and then choose **Save**.
6. Choose **Save**.
[ELB.7] Classic Load Balancers should have connection draining enabled

Category: Recover > Resilience

Severity: Medium

Resource type: AWS::ElasticLoadBalancing::LoadBalancer

AWS Configrule: elb-connection-draining-enabled (Custom rule developed by Security Hub)

Parameters: None

This control checks whether Classic Load Balancers have connection draining enabled.

Enabling connection draining on Classic Load Balancers ensures that the load balancer stops sending requests to instances that are de-registering or unhealthy. It keeps the existing connections open. This is particularly useful for instances in Auto Scaling groups, to ensure that connections aren’t severed abruptly.

Remediation

To enable connection draining on Classic Load Balancers, following the steps in Configure connection draining for your Classic Load Balancer in User Guide for Classic Load Balancers.

[ELBv2.1] Application Load Balancer should be configured to redirect all HTTP requests to HTTPS

Category: Protect > Data protection > Encryption of data in transit

Severity: Medium

Resource type: AWS::ElasticLoadBalancingV2::LoadBalancer

AWS Config rule: alb-http-to-https-redirection-check

Parameters: None

This control checks whether HTTP to HTTPS redirection is configured on all HTTP listeners of Application Load Balancers. The check fails if one or more HTTP listeners of Application Load Balancers do not have HTTP to HTTPS redirection configured.

Before you start to use your Application Load Balancer, you must add one or more listeners. A listener is a process that uses the configured protocol and port to check for connection requests. Listeners support both HTTP and HTTPS protocols. You can use an HTTPS listener to offload the work of encryption and decryption to your Application Load Balancer. You should use redirect actions with Application Load Balancer to redirect client HTTP request to an HTTPS request on port 443 to enforce encryption in-transit.

To learn more, see Listeners for your Application Load Balancers in User Guide for Application Load Balancers.

Note

This control is not supported in Africa (Cape Town) or Europe (Milan).

Remediation

To remediate this issue, update your load balancers to redirect HTTP requests.
To redirect HTTP requests to HTTPS on an Application Load Balancer

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. In the navigation pane, choose Load balancers.
3. Choose an Application Load Balancer.
4. Choose the Listeners tab.
5. Choose an HTTP listener (port 80 TCP) and then choose Edit.
6. If there is an existing rule, you must delete it. Otherwise, choose Add action and then choose Redirect to...
7. Choose HTTPS and then enter 443.
8. Choose the check mark in a circle symbol and then choose Update.

[EMR.1] Amazon EMR cluster master nodes should not have public IP addresses

Category: Protect > Secure network configuration

Severity: High

Resource type: AWS::EMR::Cluster

AWS Config rule: emr-master-no-public-ip

Parameters: None

This control checks whether master nodes on Amazon EMR clusters have public IP addresses.

The control fails if the master node has public IP addresses that are associated with any of its instances. Public IP addresses are designated in the PublicIp field of the NetworkInterfaces configuration for the instance. This control only checks Amazon EMR clusters that are in a RUNNING or WAITING state.

Note

This control is not supported in Africa (Cape Town) or Europe (Milan).

Remediation

During launch, you can control whether your instance in a default or nondefault subnet is assigned a public IPv4 address.

By default, default subnets have this attribute set to true. Nondefault subnets have the IPv4 public addressing attribute set to false, unless it was created by the Amazon EC2 launch instance wizard. In that case, the wizard sets the attribute to true.

You need to launch your cluster in a VPC with a private subnet that has the IPv4 public addressing attribute set to false.

After launch, you cannot manually disassociate a public IPv4 address from your instance.

To remediate this finding, you need to create a new cluster in VPC private subnet. For information on how to launch a cluster into a VPC private subnet, see Launch clusters into a VPC in the Amazon EMR Management Guide.

[ES.1] Elasticsearch domains should have encryption at rest enabled

Category: Protect > Data protection > Encryption of data at rest

Severity: Medium

Resource type: AWS::Elasticsearch::Domain
**AWS Config rule:** `elasticsearch-encrypted-at-rest`  

**Parameters:** None  

This control checks whether Elasticsearch domains have encryption at rest configuration enabled. The check fails if encryption at rest is not enabled.

For an added layer of security for your sensitive data in OpenSearch, you should configure your OpenSearch to be encrypted at rest. Elasticsearch domains offer encryption of data at rest. The feature uses AWS KMS to store and manage your encryption keys. To perform the encryption, it uses the Advanced Encryption Standard algorithm with 256-bit keys (AES-256).

To learn more about OpenSearch encryption at rest, see Encryption of data at rest for Amazon OpenSearch Service in the *Amazon OpenSearch Service Developer Guide*.

**Note**  
Certain instance types, such as `t.small` and `t.medium`, do not support encryption of data at rest. For details, see Supported instance types in the *Amazon OpenSearch Service Developer Guide*.

**Remediation**

By default, domains do not encrypt data at rest, and you cannot configure existing domains to use the feature.

To enable the feature, you must create another domain and migrate your data. For information about creating domains, see the *Amazon OpenSearch Service Developer Guide*.

Encryption of data at rest requires OpenSearch Service 5.1 or later. For more information about encrypting data at rest for OpenSearch Service, see the *Amazon OpenSearch Service Developer Guide*.

[ES.2] Elasticsearch domains should be in a VPC

**Category:** Protect > Secure network configuration > Resources within VPC  

**Severity:** Critical  

**Resource type:** AWS::Elasticsearch::Domain  

**AWS Config rule:** `elasticsearch-in-vpc-only`  

**Parameters:** None

This control checks whether Elasticsearch domains are in a VPC. It does not evaluate the VPC subnet routing configuration to determine public access. You should ensure that Elasticsearch domains are not attached to public subnets. See Resource-based policies in the *Amazon OpenSearch Service Developer Guide*. You should also ensure that your VPC is configured according to the recommended best practices. See Security best practices for your VPC in the *Amazon VPC User Guide*.

Elasticsearch domains deployed within a VPC can communicate with VPC resources over the private AWS network, without the need to traverse the public internet. This configuration increases the security posture by limiting access to the data in transit. VPCs provide a number of network controls to secure access to Elasticsearch domains, including network ACL and security groups. Security Hub recommends that you migrate public Elasticsearch domains to VPCs to take advantage of these controls.

**Remediation**

If you create a domain with a public endpoint, you cannot later place it within a VPC. Instead, you must create a new domain and migrate your data. The reverse is also true. If you create a domain within a VPC, it cannot have a public endpoint. Instead, you must either create another domain or disable this control.
[ES.3] Elasticsearch domains should encrypt data sent between nodes

Category: Protect > Data protection > Encryption of data in transit

Severity: Medium

Resource type: AWS::Elasticsearch::Domain

AWS Config rule: elasticsearch-node-to-node-encryption-check

Parameters: None

This control checks whether Elasticsearch domains have node-to-node encryption enabled.

HTTPS (TLS) can be used to help prevent potential attackers from eavesdropping on or manipulating network traffic using person-in-the-middle or similar attacks. Only encrypted connections over HTTPS (TLS) should be allowed. Enabling node-to-node encryption for Elasticsearch domains ensures that intra-cluster communications are encrypted in transit.

There can be a performance penalty associated with this configuration. You should be aware of and test the performance trade-off before enabling this option.

Note
This control is not supported in the following Regions:

- Africa (Cape Town)
- China (Beijing)
- China (Ningxia)
- Europe (Milan)

Remediation

Node-to-node encryption can only be enabled on a new domain. To remediate this finding, first create a new domain with the Node-to-node encryption check box selected. Then follow Using a snapshot to migrate data to migrate your data to the new domain.

[ES.4] Elasticsearch domain error logging to CloudWatch Logs should be enabled

Category: Identify - Logging

Severity: Medium

Resource type: AWS::Elasticsearch::Domain

AWS Config rule: elasticsearch_logs_to_cloudwatch

Parameters:
- logtype = 'error'

This control checks whether Elasticsearch domains are configured to send error logs to CloudWatch Logs.

You should enable error logs for Elasticsearch domains and send those logs to CloudWatch Logs for retention and response. Domain error logs can assist with security and access audits, and can help to diagnose availability issues.
Note
This control is not supported in the following Regions:

- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

Remediation
For information on how to enable log publishing, see Enabling log publishing (console) in the Amazon OpenSearch Service Developer Guide.

[ES.5] Elasticsearch domains should have audit logging enabled

Category: Identify > Logging
Severity: Medium
Resource type: AWS::Elasticsearch::Domain

AWS Config rule: elasticsearch-audit-logging-enabled (Custom rule developed by Security Hub)

Parameters:

- cloudWatchLogsLogGroupArnList (Optional). Security Hub does not populate this parameter. Comma-separated list of CloudWatch Logs log groups that should be configured for audit logs.

This rule is NON_COMPLIANT if the CloudWatch Logs log group of the Elasticsearch domain is not specified in this parameter list.

This control checks whether Elasticsearch domains have audit logging enabled. This control fails if an Elasticsearch domain does not have audit logging enabled.

Audit logs are highly customizable. They allow you to track user activity on your Elasticsearch clusters, including authentication successes and failures, requests to OpenSearch, index changes, and incoming search queries.

Remediation
For detailed instructions on enabling audit logs, see Enabling audit logs in the Amazon OpenSearch Service Developer Guide.

[ES.6] Elasticsearch domains should have at least three data nodes

Category: Recover > Resilience > High availability
Severity: Medium
Resource type: AWS::Elasticsearch::Domain

AWS Config rule: elasticsearch-data-node-fault-tolerance (Custom rule developed by Security Hub)

Parameters: None
This control checks whether Elasticsearch domains are configured with at least three data nodes and zoneAwarenessEnabled is true.

An Elasticsearch domain requires at least three data nodes for high availability and fault-tolerance. Deploying an Elasticsearch domain with at least three data nodes ensures cluster operations if a node fails.

**Remediation**

**To modify the number of data nodes in an Elasticsearch domain**

2. Under *My domains*, choose the name of the domain to edit.
3. Choose *Edit domain*.
4. Under *Data nodes*, set *Number of nodes* to a number greater than or equal to three.
   - For three Availability Zone deployments, set to a multiple of three to ensure equal distribution across Availability Zones.
5. Choose *Submit*.

[ES.7] Elasticsearch domains should be configured with at least three dedicated master nodes

**Category:** Recover > Resilience > High availability

**Severity:** Medium

**Resource type:** AWS::Elasticsearch::Domain

**AWS Configrule:** elasticsearch-primary-node-fault-tolerance (Custom rule developed by Security Hub)

**Parameters:** None

This control checks whether Elasticsearch domains are configured with at least three dedicated master nodes. This control fails if the domain does not use dedicated master nodes. This control passes if Elasticsearch domains have five dedicated master nodes. However, using more than three master nodes might be unnecessary to mitigate the availability risk, and will result in additional cost.

An Elasticsearch domain requires at least three dedicated master nodes for high availability and fault-tolerance. Dedicated master node resources can be strained during data node blue/green deployments because there are additional nodes to manage. Deploying an Elasticsearch domain with at least three dedicated master nodes ensures sufficient master node resource capacity and cluster operations if a node fails.

**Remediation**

**To modify the number of dedicated master nodes in an OpenSearch domain**

2. Under *My domains*, choose the name of the domain to edit.
3. Choose *Edit domain*.
4. Under *Dedicated master nodes*, set *Instance type* to the desired instance type.
5. Set *Number of master nodes* equal to three or greater.
6. Choose *Submit*.
[ES.8] Connections to Elasticsearch domains should be encrypted using TLS 1.2

Category: Protect > Data protection > Encryption of data in transit

Severity: Medium

Resource type: AWS::Elasticsearch::Domain

AWS Config rule: elasticsearch-https-required (Custom rule developed by Security Hub)

Parameters: None

This control checks whether connections to Elasticsearch domains are required to use TLS 1.2. The check fails if the Elasticsearch domain TLSSecurityPolicy is not Policy-Min-TLS-1-2-2019-07.

HTTPS (TLS) can be used to help prevent potential attackers from using person-in-the-middle or similar attacks to eavesdrop on or manipulate network traffic. Only encrypted connections over HTTPS (TLS) should be allowed. Encrypting data in transit can affect performance. You should test your application with this feature to understand the performance profile and the impact of TLS. TLS 1.2 provides several security enhancements over previous versions of TLS.

Remediation

To enable TLS encryption, use the UpdateDomainConfig API operation to configure the DomainEndpointOptions in order to set the TLSSecurityPolicy. For more information, see the Amazon OpenSearch Service Developer Guide.

[GuardDuty.1] GuardDuty should be enabled

Category: Detect > Detection services

Severity: High

Resource type: AWS account

AWS Config rule: guardduty-enabled-centralized

Parameters: None

This control checks whether Amazon GuardDuty is enabled in your GuardDuty account and Region.

It is highly recommended that you enable GuardDuty in all supported AWS Regions. Doing so allows GuardDuty to generate findings about unauthorized or unusual activity, even in Regions that you do not actively use. This also allows GuardDuty to monitor CloudTrail events for global AWS services such as IAM.

Note
This control is not supported in the following Regions.

- Africa (Cape Town)
- China (Beijing)
- China (Ningxia)
- Europe (Milan)
- Middle East (Bahrain)
- AWS GovCloud (US-East)

Remediation

To remediate this issue, you enable GuardDuty.
For details on how to enable GuardDuty, including how to use AWS Organizations to manage multiple accounts, see Getting started with GuardDuty in the Amazon GuardDuty User Guide.

[IAM.1] IAM policies should not allow full "*" administrative privileges

Category: Protect > Secure access management

Severity: High

Resource type: AWS::IAM::Policy

AWS Config rule: iam-policy-no-statements-with-admin-access

Parameters: None

This control checks whether the default version of IAM policies (also known as customer managed policies) has administrator access that includes a statement with "Effect": "Allow" with "Action": "*" over "Resource": "*".

The control only checks the customer managed policies that you create. It does not check inline and AWS managed policies.

IAM policies define a set of privileges that are granted to users, groups, or roles. Following standard security advice, AWS recommends that you grant least privilege, which means to grant only the permissions that are required to perform a task. When you provide full administrative privileges instead of the minimum set of permissions that the user needs, you expose the resources to potentially unwanted actions.

Instead of allowing full administrative privileges, determine what users need to do and then craft policies that let the users perform only those tasks. It is more secure to start with a minimum set of permissions and grant additional permissions as necessary. Do not start with permissions that are too lenient and then try to tighten them later.

You should remove IAM policies that have a statement with "Effect": "Allow" with "Action": "*" over "Resource": "*".

Remediation

To remediate this issue, update your IAM policies so that they do not allow full "*" administrative privileges.

To modify an IAM policy

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Policies.
3. Choose the button next to the policy to remove.
4. From Policy actions, choose Detach.
5. For each user to detach the policy from, choose the button next to the user, then choose Detach policy.

Confirm that the user that you detached the policy from can still access AWS services and resources as expected.

[IAM.2] IAM users should not have IAM policies attached

Category: Protect > Secure access management

Severity: Low
Resource type: AWS::IAM::User

AWS Config rule: iam-user-no-policies-check

Parameters: None

This control checks that none of your IAM users have policies attached. Instead, IAM users must inherit permissions from IAM groups or roles.

By default, IAM users, groups, and roles have no access to AWS resources. IAM policies grant privileges to users, groups, or roles. We recommend that you apply IAM policies directly to groups and roles but not to users. Assigning privileges at the group or role level reduces the complexity of access management as the number of users grows. Reducing access management complexity might in turn reduce the opportunity for a principal to inadvertently receive or retain excessive privileges.

Note that this control also generates failed findings for IAM users that are created by Amazon Simple Email Service (Amazon SES). Amazon SES generates users that have inline policies attached. You can suppress these findings.

Remediation

To resolve this issue, create an IAM group, assign the policy to the group, and then add the users to the group. The policy is applied to each user in the group.

To create an IAM group

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Groups and then choose Create New Group.
3. Enter a name for the group to create and then choose Next Step.
4. Select each policy to assign to the group and then choose Next Step. The policies that you choose should include any policies currently attached directly to a user account.
5. Add users to a group and then assign the policies to that group. Each user in the group is then assigned the policies that are assigned to the group.
6. Confirm the details on the Review page and then choose Create Group.

For more information about creating groups, see Creating IAM groups in the IAM User Guide.

To add users to an IAM group

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Groups.
3. Choose Group Actions and then choose Add Users to Group.
4. Select the users to add to the group and then choose Add Users.

For more information about adding users to groups, see Adding and removing users in an IAM group in the IAM User Guide.

To remove a policy attached directly to a user

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Users.
3. For the user to detach a policy from, choose the name in the User name column.
4. For each policy listed under Attached directly, choose the X on the right side of the page to remove the policy from the user and then choose Remove.
5. Confirm that the user can still use AWS services as expected.
[IAM.3] IAM users' access keys should be rotated every 90 days or less

Category: Protect > Secure access management

Severity: Medium

Resource type: AWS::IAM::User

AWS Config rule: access-keys-rotated

Parameters:

- maxAccessKeyAge: 90

This control checks whether the active access keys are rotated within 90 days.

We highly recommend that you do not generate and remove all access keys in your account. Instead, the recommended best practice is to either create one or more IAM roles or to use federation. You can use these methods to allow your users to use their existing corporate credentials to log into the AWS Management Console and AWS CLI.

Each approach has its use cases. Federation is generally better for enterprises that have an existing central directory or plan to need more than the current limit IAM users. Applications that run outside of an AWS environment need access keys for programmatic access to AWS resources.

However, if the resources that need programmatic access run inside AWS, the best practice is to use IAM roles. Roles allow you to grant a resource access without hardcoding an access key ID and secret access key into the configuration.

To learn more about protecting your access keys and account, see Best practices for managing AWS access keys in the AWS General Reference. Also see the blog post Guidelines for protecting your AWS account while using programmatic access.

If you already have an access key, Security Hub recommends that you rotate the access keys every 90 days. Rotating access keys reduces the chance that an access key that is associated with a compromised or terminated account is used. It also ensures that data cannot be accessed with an old key that might have been lost, cracked, or stolen. Always update your applications after you rotate access keys.

Access keys consist of an access key ID and a secret access key. They are used to sign programmatic requests that you make to AWS. AWS users need their own access keys to make programmatic calls to AWS from the AWS CLI, Tools for Windows PowerShell, the AWS SDKs, or direct HTTP calls using the API operations for individual AWS services.

If your organization uses AWS Single Sign-On (AWS SSO), your users can sign in to Active Directory, a built-in AWS SSO directory, or another identity provider (IdP) connected to AWS SSO. They can then be mapped to an IAM role that enables them to run AWS CLI commands or call AWS API operations without the need for IAM user access keys. To learn more, see Configuring the AWS CLI to use AWS Single Sign-On in the AWS Command Line Interface User Guide.

Note
This control is not supported in Africa (Cape Town) or Europe (Milan).

Remediation

To remediate this issue, replace any keys that are older than 90 days.

To ensure that access keys aren't more than 90 days old

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Users.
3. For each user that shows an **Access key age** that is greater than 90 days, choose the **User name** to open the settings for that user.

4. Choose **Security credentials**.

5. Create a new key for the user:
   a. Choose **Create access key**.
   b. To save the key content, either download the secret access key, or choose **Show** and then copy it from the page.
   c. Store the key in a secure location to provide to the user.
   d. Choose **Close**.

6. Update all applications that were using the previous key to use the new key.

7. For the previous key, choose **Make inactive** to make the access key inactive. The user now cannot use that key to make requests.

8. Confirm that all applications work as expected with the new key.

9. After confirming that all applications work with the new key, delete the previous key. After you delete the access key, you cannot recover it.

   To delete the previous key, choose the X at the end of the row and then choose **Delete**.

---

**[IAM.4] IAM root user access key should not exist**

**Category:** Protect > Secure access management

**Severity:** Critical

**Resource type:** AWS account

**AWS Config rule:** *iam-root-access-key-check*

**Parameters:** None

This control checks whether the root user access key is present.

The root account is the most privileged user in an AWS account. AWS access keys provide programmatic access to a given account.

Security Hub recommends that you remove all access keys that are associated with the root account. This limits that vectors that can be used to compromise the account. It also encourages the creation and use of role-based accounts that are least privileged.

**Note**

This control is not supported in Africa (Cape Town).

**Remediation**

To remediate this issue, delete the root user access key.

**To delete access keys**

1. Log in to your account using the AWS account root user credentials.
2. Choose the account name near the top-right corner of the page and then choose **My Security Credentials**.
3. In the pop-up warning, choose **Continue to Security Credentials**.
4. Choose **Access keys (access key ID and secret access key)**.
5. To permanently delete the key, choose **Delete** and then choose **Yes**. You cannot recover deleted keys.
6. If there is more than one root user access key, then repeat steps 4 and 5 for each key.

**[IAM.5] MFA should be enabled for all IAM users that have a console password**

*Category:* Protect > Secure access management  
*Severity:* Medium  
*Resource type:* AWS::IAM::User  
*AWS Config rule:* mfa-enabled-for-iam-console-access  
*Parameters:* None

This control checks whether AWS multi-factor authentication (MFA) is enabled for all IAM users that use a console password.

Multi-factor authentication (MFA) adds an extra layer of protection on top of a user name and password. With MFA enabled, when a user signs in to an AWS website, they are prompted for their user name and password. In addition, they are prompted for an authentication code from their AWS MFA device.

We recommend that you enable MFA for all accounts that have a console password. MFA is designed to provide increased security for console access. The authenticating principal must possess a device that emits a time-sensitive key and must have knowledge of a credential.

**Remediation**

To remediate this issue, add MFA to users that do not yet have it.

**To configure MFA for a user**

2. Choose Users.
3. Choose the User name of the user to configure MFA for.
5. Next to Assigned MFA Device, choose Manage.
6. Follow the Manage MFA Device wizard to assign the type of device appropriate for your environment.

To learn how to delegate MFA setup to users, see the blog post [How to delegate management of multi-factor authentication to AWS IAM users](https://aws.amazon.com/blogs/security/how-to-delegate-management-of-multi-factor-authentication-to-aws-iam-users/).

**[IAM.6] Hardware MFA should be enabled for the root user**

*Category:* Protect > Secure access management  
*Severity:* Critical  
*Resource type:* AWS account  
*AWS Config rule:* root-account-hardware-mfa-enabled  
*Parameters:* None

This control checks whether your AWS account is enabled to use a hardware multi-factor authentication (MFA) device to sign in with root user credentials.
Virtual MFA might not provide the same level of security as hardware MFA devices. We recommend that you use only a virtual MFA device while you wait for hardware purchase approval or for your hardware to arrive. To learn more, see Enabling a virtual multi-factor authentication (MFA) device (console) in the IAM User Guide.

**Note**
This control is not supported in the following Regions.

- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West).

**Remediation**
To remediate this issue, add hardware-based MFA to the root account.

**To enable hardware-based MFA for the root account**
1. Log in to your account using the root user credentials.
2. Choose the account name near the top-right corner of the page and then choose My Security Credentials.
3. In the pop-up warning, choose Continue to Security Credentials.
5. Choose Activate MFA.
6. Choose a hardware-based (not virtual) device to use for MFA and then choose Continue.
7. Complete the steps to configure the device type appropriate to your selection.

**[IAM.7] Password policies for IAM users should have strong configurations**

**Category:** Protect > Secure access management

**Severity:** Medium

**Resource type:** AWS account

**AWS Config rule:** iam-password-policy

**Parameters:**
- RequireUppercaseCharacters: true
- RequireLowercaseCharacters: true
- RequireSymbols: true
- RequireNumbers: true
- MinimumPasswordLength: 8

This control checks whether the account password policy for IAM users uses the following recommended configurations.

- RequireUppercaseCharacters: true
- RequireLowercaseCharacters: true
- RequireSymbols: true
- RequireNumbers: true
To access the AWS Management Console, IAM users need passwords. As a best practice, Security Hub highly recommends that instead of creating IAM users, you use federation. Federation allows users to use their existing corporate credentials to log into the AWS Management Console. Use AWS Single Sign-On (AWS SSO) to create or federate the user, and then assume an IAM role into an account.

To learn more about identity providers and federation, see Identity providers and federation in the IAM User Guide. To learn more about AWS SSO, see the AWS Single Sign-On User Guide.

If you need to use IAM users, Security Hub recommends that you enforce the creation of strong user passwords. You can set a password policy on your AWS account to specify complexity requirements and mandatory rotation periods for passwords. When you create or change a password policy, most of the password policy settings are enforced the next time users change their passwords. Some of the settings are enforced immediately. To learn more, see Setting an account password policy for IAM users in the IAM User Guide.

Remediation

To remediate this issue, update your password policy to use the recommended configuration.

To modify the password policy

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Account settings.
3. Select Requires at least one uppercase letter.
4. Select Requires at least one lowercase letter.
5. Select Requires at least one non-alphanumeric character.
6. Select Requires at least one number.
7. For Minimum password length, enter 8.
8. Choose Apply password policy.

[IAM.8] Unused IAM user credentials should be removed

Category: Protect > Secure access management

Severity: Medium

Resource type: AWS::IAM::User

AWS Config rule: iam-user-unused-credentials-check

Parameters:

- maxCredentialUsageAge: 90

This control checks whether your IAM users have passwords or active access keys that have not been used for 90 days.

IAM users can access AWS resources using different types of credentials, such as passwords or access keys.

Security Hub recommends that you remove or deactivate all credentials that were unused for 90 days or more. Disabling or removing unnecessary credentials reduces the window of opportunity for credentials associated with a compromised or abandoned account to be used.
Remediation

To get some of the information that you need to monitor accounts for dated credentials, use the IAM console. For example, when you view users in your account, there is a column for **Access key age**, **Password age**, and **Last activity**. If the value in any of these columns is greater than 90 days, make the credentials for those users inactive.

You can also use credential reports to monitor user accounts and identify those with no activity for 90 or more days. You can download credential reports in `.csv` format from the IAM console. For more information about credential reports, see [Getting credential reports for your AWS account](#) in the IAM User Guide.

After you identify the inactive accounts or unused credentials, use the following steps to disable them.

**To disable credentials for inactive accounts**

2. Choose **Users**.
3. Choose the name of the user that has credentials over 90 days old.
4. Choose **Security credentials**.
5. For each sign-in credential and access key that hasn't been used in at least 90 days, choose **Make inactive**.

---

**[IAM.21] IAM customer managed policies that you create should not allow wildcard actions for services**

**Category:** Detect > Secure access management

**Severity:** Low

**Resource type:** AWS::IAM::Policy

**AWS Config rule:** iam-policy-no-statements-with-full-access

**Parameters:** None

This control checks whether the IAM identity-based policies that you create have Allow statements that use the `*` wildcard to grant permissions for all actions on any service. The control fails if any policy statement includes "Effect": "Allow" with "Action": "Service:*".

For example, the following statement in a policy results in a failed finding.

```json
"Statement": [
  {
    "Sid": "EC2-Wildcard",
    "Effect": "Allow",
    "Action": "ec2:*",
    "Resource": "*"
  }
]
```

The control also fails if you use "Effect": "Allow" with "NotAction": "service:*". In that case, the NotAction element provides access to all of the actions in an AWS service, except for the actions specified in NotAction.

This control only applies to customer managed IAM policies. It does not apply to IAM policies that are managed by AWS.
When you assign permissions to AWS services, it is important to scope the allowed IAM actions in your IAM policies. You should restrict IAM actions to only those actions that are needed. This helps you to provision least privilege permissions. Overly permissive policies might lead to privilege escalation if the policies are attached to an IAM principal that might not require the permission.

In some cases, you might want to allow IAM actions that have a similar prefix, such as DescribeFlowLogs and DescribeAvailabilityZones. In these authorized cases, you can add a suffixed wildcard to the common prefix. For example, ec2:Describe*.

This control passes if you use a prefixed IAM action with a suffixed wildcard. For example, the following statement in a policy results in a passed finding.

```json
"Statement": [  
   "Sid": "EC2-Wildcard",  
   "Effect": "Allow",  
   "Action": "ec2:Describe*",  
   "Resource": "*"
]  
```

When you group related IAM actions in this way, you can also avoid exceeding the IAM policy size limits.

**Note**

This control is not supported in the following Regions:

- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

**Remediation**

To remediate this issue, update your IAM policies so that they do not allow full "*" administrative privileges.

For details on how to edit an IAM policy, see Editing IAM policies in the IAM User Guide.

**[KMS.1] IAM customer managed policies should not allow decryption actions on all KMS keys**

**Category:** Protect > Secure access management  
**Severity:** Medium  
**Resource type:** AWS::IAM::Policy  
**AWS Config rule:** iam_customer_policy_blocked_kms_actions  
**Parameters:**

- kms:ReEncryptFrom, kms:Decrypt

Checks whether the default version of IAM customer managed policies allow principals to use the AWS KMS decryption actions on all resources. This control uses Zelkova, an automated reasoning engine, to validate and warn you about policies that may grant broad access to your secrets across AWS accounts.
This control fails if the `kms:Decrypt` or `kms:ReEncryptFrom` actions are allowed on all KMS keys. The control evaluates both attached and unattached customer managed policies. It does not check inline policies or AWS managed policies.

With AWS KMS, you control who can use your KMS keys and gain access to your encrypted data. IAM policies define which actions an identity (user, group, or role) can perform on which resources. Following security best practices, AWS recommends that you allow least privilege. In other words, you should grant to identities only the `kms:Decrypt` or `kms:ReEncryptFrom` permissions and only for the keys that are required to perform a task. Otherwise, the user might use keys that are not appropriate for your data.

Instead of granting permissions for all keys, determine the minimum set of keys that users need to access encrypted data. Then design policies that allow users to use only those keys. For example, do not allow `kms:Decrypt` permission on all KMS keys. Instead, allow `kms:Decrypt` only on keys in a particular Region for your account. By adopting the principle of least privilege, you can reduce the risk of unintended disclosure of your data.

Remediation

To remediate this issue, you modify the IAM customer managed policies to restrict access to the keys.

**To modify an IAM customer managed policy**

2. In the IAM navigation pane, choose Policies.
3. Choose the arrow next to the policy you want to modify.
4. Choose Edit policy.
5. Choose the JSON tab.
6. Change the “Resource” value to the specific key or keys that you want to allow.
7. After you modify the policy, choose Review policy.
8. Choose Save changes.

For more information, see Using IAM policies with AWS KMS in the [AWS Key Management Service Developer Guide](https://docs.aws.amazon.com/kms/latest/developerguide/iam-key-policy.html).

[KMS.2] IAM principals should not have IAM inline policies that allow decryption actions on all KMS keys

**Category:** Protect > Secure access management

**Severity:** Medium

**Resource type:**

* AWS::IAM::Role
* AWS::IAM::User
* AWS::IAM::Group

**AWS Config rule:** `iam_inline_policy_blocked_kms_actions`

**Parameters:**

* `kms:ReEncryptFrom`, `kms:Decrypt`

Checks whether the inline policies that are embedded in your IAM identities (role, user, or group) allow the AWS KMS decryption actions on all KMS keys. This control uses Zelkova, an automated reasoning
engine, to validate and warn you about policies that may grant broad access to your secrets across AWS accounts.

This control fails if `kms:Decrypt` or `kms:ReEncryptFrom` actions are allowed on all KMS keys in an inline policy.

With AWS KMS, you control who can use your KMS keys and gain access to your encrypted data. IAM policies define which actions an identity (user, group, or role) can perform on which resources. Following security best practices, AWS recommends that you allow least privilege. In other words, you should grant to identities only the permissions they need and only for keys that are required to perform a task. Otherwise, the user might use keys that are not appropriate for your data.

Instead of granting permission for all keys, determine the minimum set of keys that users need to access encrypted data. Then design policies that allow the users to use only those keys. For example, do not allow `kms:Decrypt` permission on all KMS keys. Instead, allow them only on keys in a particular Region for your account. By adopting the principle of least privilege, you can reduce the risk of unintended disclosure of your data.

**Remediation**

To remediate this issue, you modify the inline policy to restrict access to the keys.

**To modify an IAM inline policy**

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. In the IAM navigation pane, choose Users, Groups, or Roles.
3. Choose the name of the user, group or role for which to modify IAM inline policies.
4. Choose the arrow next to the policy to modify.
5. Choose Edit policy.
6. Choose the JSON tab.
7. Change the "Resource" value to the specific keys you want to allow.
8. After you modify the policy, choose Review policy.
9. Choose Save changes.

For more information, see Using IAM policies with AWS KMS in the AWS Key Management Service Developer Guide.

[KMS.3] AWS KMS keys should not be unintentionally deleted

**Category:** Protect > Data protection > Data deletion protection

**Severity:** Critical

**Resource type:** AWS::KMS::Key

**AWS Config rule:** kms-cmk-not-scheduled-for-deletion

**Parameters:** None

This control checks whether KMS keys are scheduled for deletion. The control fails if a KMS key is scheduled for deletion.

KMS keys cannot be recovered once deleted. Data encrypted under a KMS key is also permanently unrecoverable if the KMS key is deleted. If meaningful data has been encrypted under a KMS key scheduled for deletion, consider decrypting the data or re-encrypting the data under a new KMS key unless you are intentionally performing a cryptographic erasure.
When a KMS key is scheduled for deletion, a mandatory waiting period is enforced to allow time to reverse the deletion, if it was scheduled in error. The default waiting period is 30 days, but it can be reduced to as short as 7 days when the KMS key is scheduled for deletion. During the waiting period, the scheduled deletion can be canceled and the KMS key will not be deleted.

For additional information regarding deleting KMS keys, see Deleting KMS keys in the AWS Key Management Service Developer Guide.

**Note**
This control is not supported in the Asia Pacific (Osaka) and Europe (Milan) Regions.

**Remediation**

For detailed remediation instructions to cancel a scheduled KMS key deletion, see To cancel key deletion under Scheduling and canceling key deletion (console) in the AWS Key Management Service Developer Guide.

**Lambda.1** Lambda function policies should prohibit public access

**Category:** Protect > Secure network configuration

**Severity:** Critical

**Resource type:** AWS::Lambda::Function

**AWS Config rule:** lambda-function-public-access-prohibited

**Parameters:** None

This control checks whether the Lambda function resource-based policy prohibits public access outside of your account.

The control also fails if a Lambda function is invoked from Amazon S3 and the policy does not include a condition for AWS:SourceAccount.

The Lambda function should not be publicly accessible, as this may allow unintended access to your code stored in the function.

**Note**
This control is not supported in the China (Beijing) or China (Ningxia) Regions.

**Remediation**

If a Lambda function fails this control, it indicates that the resource-based policy statement for the Lambda function allows public access.

To remediate the issue, you must update the policy to remove the permissions or to add the AWS:SourceAccount condition. You can only update the resource-based policy from the Lambda API.

The following instructions use the console to review the policy and the AWS Command Line Interface to remove the permissions.

**To view the resource-based policy for a Lambda function**

1. Open the AWS Lambda console at https://console.aws.amazon.com/lambda/.
2. In the navigation pane, choose Functions.
3. Choose the function.
4. Choose Permissions. The resource-based policy shows the permissions that are applied when another account or AWS service attempts to access the function.
5. Examine the resource-based policy. Identify the policy statement that has Principal field values that make the policy public. For example, allowing "*" or ( "AWS": "*" ).
You cannot edit the policy from the console. To remove permissions from the function, you use the `remove-permission` command from the AWS CLI.

Note the value of the statement ID (Sid) for the statement that you want to remove.

To use the AWS CLI to remove permissions from a Lambda function, issue the `remove-permission` command.

```
$ aws lambda remove-permission --function-name <function-name> --statement-id <statement-id>
```

Replace `<function-name>` with the name of the Lambda function, and `<statement-id>` with the statement ID of the statement to remove.

**To verify that the permissions are updated**

1. Open the AWS Lambda console at https://console.aws.amazon.com/lambda/.
2. In the navigation pane, choose Functions.
3. Choose the function that you updated.
4. Choose Permissions.

The resource-based policy should be updated. If there was only one statement in the policy, then the policy is empty.

For more information, see Using resource-based policies for AWS Lambda in the AWS Lambda Developer Guide.

[Lambda.2] Lambda functions should use supported runtimes

**Category:** Protect > Secure development

**Severity:** Medium

**Resource type:** AWS::Lambda::Function

**AWS Config rule:** `lambda-function-settings-check`

**Parameters:**

- runtime: nodejs14.x, nodejs12.x, python3.9, python3.8, python3.7, python3.6, ruby2.7, java11, java8, java8.al2, go1.x, dotnetcore3.1, dotnetcore2.1

This control checks that the Lambda function settings for runtimes match the expected values set for the supported runtimes for each language. This control checks for the following runtimes: nodejs14.x, nodejs12.x, python3.9, python3.8, python3.7, python3.6, ruby2.7, java11, java8, java8.al2, go1.x, dotnetcore3.1, dotnetcore2.1

The AWS Config rule ignores functions that have a package type of Image.

**Lambda runtimes** are built around a combination of operating system, programming language, and software libraries that are subject to maintenance and security updates. When a runtime component is no longer supported for security updates, Lambda deprecates the runtime. Even though you cannot create functions that use the deprecated runtime, the function is still available to process invocation events. Make sure that your Lambda functions are current and do not use out-of-date runtime environments.
To learn more about the supported runtimes that this control checks for the supported languages, see AWS Lambda runtimes in the AWS Lambda Developer Guide.

**Note**
This control is not supported in the China (Beijing) or China (Ningxia) Regions.

**Remediation**

For more information on supported runtimes and deprecation schedules, see the Runtime support policy section of the AWS Lambda Developer Guide. When you migrate your runtimes to the latest version, follow the syntax and guidance from the publishers of the language.

### [Lambda.4] Lambda functions should have a dead-letter queue configured (Retired)

This control is retired.

### [RDS.1] RDS snapshots should be private

**Category:** Protect > Secure network configuration  
**Severity:** Critical  
**Resource type:** Amazon RDS DB snapshot  
**AWS Config rule:** rds-snapshots-public-prohibited  
**Parameters:** None

This control checks whether Amazon RDS snapshots are public.

This control is intended for RDS instances. It can also return findings for snapshots of Aurora DB instances, Neptune DB instances, and Amazon DocumentDB clusters, even though they are not evaluated for public accessibility. If these findings are not useful, you can suppress them.

RDS snapshots are used to back up the data on your RDS instances at a specific point in time. They can be used to restore previous states of RDS instances.

An RDS snapshot must not be public unless intended. If you share an unencrypted manual snapshot as public, this makes the snapshot available to all AWS accounts. This may result in unintended data exposure of your RDS instance.

Note that if the configuration is changed to allow public access, the AWS Config rule may not be able to detect the change for up to 12 hours. Until the AWS Config rule detects the change, the check passes even though the configuration violates the rule.

To learn more about sharing a DB snapshot, see Sharing a DB snapshot in the Amazon RDS User Guide.

**Note**
This control is not supported in Africa (Cape Town) or Europe (Milan).

**Remediation**

To remediate this issue, update your RDS snapshots to remove public access.

### To remove public access for RDS snapshots

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.  
2. Navigate to Snapshots and then choose the public snapshot you want to modify.  
3. From Actions, choose Share Snapshots.
4. From **DB snapshot visibility**, choose **Private**.
5. Under **DB snapshot visibility**, choose **all**.
6. Choose **Save**.

**[RDS.2] RDS DB instances should prohibit public access, determined by the PubliclyAccessible configuration**

**Category:** Protect > Secure network configuration

**Severity:** Critical

**Resource type:** AWS::RDS::DBInstance

**AWS Config rule:** rds-instance-public-access-check

**Parameters:** None

This control checks whether Amazon RDS instances are publicly accessible by evaluating the PubliclyAccessible field in the instance configuration item.

Neptune DB instances and Amazon DocumentDB clusters do not have the PubliclyAccessible flag and cannot be evaluated. However, this control can still generate findings for these resources. You can suppress these findings.

The PubliclyAccessible value in the RDS instance configuration indicates whether the DB instance is publicly accessible. When the DB instance is configured with PubliclyAccessible, it is an Internet-facing instance with a publicly resolvable DNS name, which resolves to a public IP address. When the DB instance isn't publicly accessible, it is an internal instance with a DNS name that resolves to a private IP address.

Unless you intend for your RDS instance to be publicly accessible, the RDS instance should not be configured with PubliclyAccessible value. Doing so might allow unnecessary traffic to your database instance.

**Remediation**

To remediate this issue, update your RDS DB instances to remove public access.

**To remove public access from RDS DB instances**

1. Open the Amazon RDS console at [https://console.aws.amazon.com/rds/](https://console.aws.amazon.com/rds/).
2. Navigate to **Databases** and then choose your public database.
3. Choose **Modify**.
4. Under **Connectivity**, expand **Additional connectivity configuration**.
5. Under **Public access**, choose **Not publicly accessible**.
6. Choose **Continue**.
7. Under **Scheduling of modifications**, choose **Apply immediately**.
8. Choose **Modify DB Instance**.

For more information, see Working with a DB instance in a VPC in the *Amazon RDS User Guide*.

**[RDS.3] RDS DB instances should have encryption at rest enabled**

**Category:** Protect > Data protection > Encryption of data at rest

**Severity:** Medium
**Resource type:** AWS::RDS::DBInstance

**AWS Config rule:** rds-storage-encrypted

**Parameters:** None

This control checks whether storage encryption is enabled for your Amazon RDS DB instances.

This control is intended for RDS DB instances. However, it can also generate findings for Aurora DB instances, Neptune DB instances, and Amazon DocumentDB clusters. If these findings are not useful, then you can suppress them.

For an added layer of security for your sensitive data in RDS DB instances, you should configure your RDS DB instances to be encrypted at rest. To encrypt your RDS DB instances and snapshots at rest, enable the encryption option for your RDS DB instances. Data that is encrypted at rest includes the underlying storage for DB instances, its automated backups, read replicas, and snapshots.

RDS encrypted DB instances use the open standard AES-256 encryption algorithm to encrypt your data on the server that hosts your RDS DB instances. After your data is encrypted, Amazon RDS handles authentication of access and decryption of your data transparently with a minimal impact on performance. You do not need to modify your database client applications to use encryption.

Amazon RDS encryption is currently available for all database engines and storage types. Amazon RDS encryption is available for most DB instance classes. To learn about DB instance classes that do not support Amazon RDS encryption, see Encrypting Amazon RDS resources in the Amazon RDS User Guide.

**Remediation**

For information about encrypting DB instances in Amazon RDS, see Encrypting Amazon RDS resources in the Amazon RDS User Guide.

[RDS.4] RDS cluster snapshots and database snapshots should be encrypted at rest

**Category:** Protect > Data protection > Encryption of data at rest

**Severity:** Medium

**Resource type:** Amazon RDS DB cluster snapshot, Amazon RDS DB snapshot

**AWS Config rule:** rds-snapshots-encrypted

**Parameters:** None

This control checks whether RDS DB snapshots are encrypted.

This control is intended for RDS DB instances. However, it can also generate findings for snapshots of Aurora DB instances, Neptune DB instances, and Amazon DocumentDB clusters. If these findings are not useful, then you can suppress them.

Encrypting data at rest reduces the risk that an unauthenticated user gets access to data that is stored on disk. Data in RDS snapshots should be encrypted at rest for an added layer of security.

**Remediation**

You can use the Amazon RDS console to remediate this issue.

**To encrypt an unencrypted RDS snapshot**

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Snapshots.
3. Find the snapshot to encrypt under Manual or System.
4. Select the check box next to the snapshot to encrypt.
5. Choose Actions, then choose Copy Snapshot.
6. Under New DB Snapshot Identifier, type a name for the new snapshot.
8. Choose the KMS key to use to encrypt the snapshot.
9. Choose Copy Snapshot.
10. After the new snapshot is created, delete the original snapshot.
11. For Backup Retention Period, choose a positive nonzero value. For example, 30 days.

[RDS.5] RDS DB instances should be configured with multiple Availability Zones

Category: Recover > Resilience > High availability
Severity: Medium
Resource type: AWS::RDS::DBInstance
AWS Config rule: rds-multi-az-support
Parameters: None

This control checks whether high availability is enabled for your RDS DB instances.

RDS DB instances should be configured for multiple Availability Zones (AZs). This ensures the availability of the data stored. Multi-AZ deployments allow for automated failover if there is an issue with Availability Zone availability and during regular RDS maintenance.

Remediation

To remediate this issue, update your DB instances to enable multiple Availability Zones.

To enable multiple Availability Zones for a DB instance

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Databases, and then choose the DB instance that you want to modify.
3. Choose Modify. The Modify DB Instance page appears.
4. Under Instance Specifications, set Multi-AZ deployment to Yes.
5. Choose Continue and then check the summary of modifications.
6. (Optional) Choose Apply immediately to apply the changes immediately. Choosing this option can cause an outage in some cases. For more information, see Using the Apply Immediately setting in the Amazon RDS User Guide.
7. On the confirmation page, review your changes. If they are correct, choose Modify DB Instance to save your changes.

[RDS.6] Enhanced monitoring should be configured for RDS DB instances and clusters

Category: Detect > Detection services
Severity: Low
Resource type: AWS::RDS::DBInstance
**AWS Config rule:** rds-enhanced-monitoring-enabled

**Parameters:** None

This control checks whether enhanced monitoring is enabled for your RDS DB instances.

In Amazon RDS, Enhanced Monitoring enables a more rapid response to performance changes in underlying infrastructure. These performance changes could result in a lack of availability of the data. Enhanced Monitoring provides real-time metrics of the operating system that your RDS DB instance runs on. An agent is installed on the instance. The agent can obtain metrics more accurately than is possible from the hypervisor layer.

Enhanced Monitoring metrics are useful when you want to see how different processes or threads on a DB instance use the CPU. For more information, see Enhanced Monitoring in the Amazon RDS User Guide.

**Remediation**

For detailed instructions on how to enable Enhanced Monitoring for your DB instance, see Setting up for and enabling Enhanced Monitoring in the Amazon RDS User Guide.

---

**[RDS.7] RDS clusters should have deletion protection enabled**

**Category:** Protect > Data protection > Data deletion protection

**Severity:** Low

**Resource type:** AWS::RDS::DBCluster

**AWS Config rule:** rds-cluster-deletion-protection-enabled

**Parameters:** None

This control checks whether RDS clusters have deletion protection enabled.

This control is intended for RDS DB instances. However, it can also generate findings for Aurora DB instances, Neptune DB instances, and Amazon DocumentDB clusters. If these findings are not useful, then you can suppress them.

Enabling cluster deletion protection is an additional layer of protection against accidental database deletion or deletion by an unauthorized entity.

When deletion protection is enabled, an RDS cluster cannot be deleted. Before a deletion request can succeed, deletion protection must be disabled.

**Note**

This control is not supported in the following Regions.

- China (Beijing)
- China (Ningxia)
- Middle East (Bahrain)
- South America (São Paulo).

**Remediation**

To remediate this issue, update your RDS DB cluster to enable delete protection.

**To enable deletion protection for an RDS DB cluster**

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Databases, then choose the DB cluster that you want to modify.
3. Choose Modify.
4. Under Deletion protection, choose Enable deletion protection.
5. Choose Continue.
6. Under Scheduling of modifications, choose to apply modifications. The options are Apply during the next scheduled maintenance window or Apply immediately.
7. Choose Modify Cluster.

[RDS.8] RDS DB instances should have deletion protection enabled

Category: Protect > Data protection > Data deletion protection

Severity: Low

Resource type: AWS::RDS::DBInstance

AWS Config rule: rds-instance-deletion-protection-enabled

Parameters:
- databaseEngines: mariadb, mysql, oracle-ee, oracle-se2, oracle-se1, oracle-se, postgres, sqlserver-ee, sqlserver-se, sqlserver-ex, sqlserver-web

This control checks whether your RDS DB instances that use one of the listed database engines have deletion protection enabled.

Enabling instance deletion protection is an additional layer of protection against accidental database deletion or deletion by an unauthorized entity.

While deletion protection is enabled, an RDS DB instance cannot be deleted. Before a deletion request can succeed, deletion protection must be disabled.

Remediation

To remediate this issue, update your RDS DB instance to enable deletion protection.

To enable deletion protection for an RDS DB instance

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Databases, then choose the DB instance that you want to modify.
3. Choose Modify.
4. Under Deletion protection, choose Enable deletion protection.
5. Choose Continue.
6. Under Scheduling of modifications, choose when to apply modifications. The options are Apply during the next scheduled maintenance window or Apply immediately.
7. Choose Modify DB Instance.

[RDS.9] Database logging should be enabled

Category: Identify > Logging

Severity: Medium

Resource type: AWS::RDS::DBInstance

AWS Config rule: rds_logging_enabled
Parameters: None

This control checks whether the following logs of Amazon RDS are enabled and sent to CloudWatch Logs:

- Oracle: (Alert, Audit, Trace, Listener)
- PostgreSQL: (Postgresql, Upgrade)
- MySQL: (Audit, Error, General, SlowQuery)
- MariaDB: (Audit, Error, General, SlowQuery)
- SQL Server: (Error, Agent)
- Aurora: (Audit, Error, General, SlowQuery)
- Aurora-MySQL: (Audit, Error, General, SlowQuery)
- Aurora-PostgreSQL: (Postgresql, Upgrade).

RDS databases should have relevant logs enabled. Database logging provides detailed records of requests made to RDS. Database logs can assist with security and access audits and can help to diagnose availability issues.

**Note**
This control is not supported in the following Regions:
Africa (Cape Town)
Asia Pacific (Osaka)
China (Ningxia)
Europe (Milan)

**Remediation**

Logging options are contained in the DB parameter group associated with the RDS DB cluster or instance. To enable logging when the default parameter group for the database engine is used, you must create a new DB parameter group that has the required parameter values. You must then associate the customer DB parameter group with the DB cluster or instance.

To enable and publish MariaDB, MySQL, or PostgreSQL logs to CloudWatch Logs from the AWS Management Console, set the following parameters in a custom DB Parameter Group:

<table>
<thead>
<tr>
<th>Database engine</th>
<th>Parameters</th>
</tr>
</thead>
</table>
| MariaDB         | general_log=1  
|                 | slow_query_log=1  
|                 | log_output = FILE  
|                 | MariaDB also requires a custom options group, explained below. |
| MySQL           | general_log=1  
|                 | slow_query_log=1  
|                 | log_output = FILE  |
| PostgreSQL      | log_statement=all  
|                 | log_min_duration_statement=minimum  
|                 | query_duration (ms) to log  |
To create a custom DB parameter group

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Parameter groups.
3. Choose Create parameter group. The Create parameter group window appears.
4. In the Parameter group family list, choose a DB parameter group family.
5. In the Type list, choose DB Parameter Group.
6. In Group name, enter the name of the new DB parameter group.
7. In Description, enter a description for the new DB parameter group.
8. Choose Create.

To create a new option group for MariaDB logging by using the console

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Option groups.
3. Choose Create group.
4. In the Create option group window, do the following:
   a. For Name, type a name for the option group that is unique within your AWS account. The name can contain only letters, digits, and hyphens.
   b. For Description, type a brief description of the option group. The description is used for display purposes.
   c. For Engine, choose the DB engine that you want.
   d. For Major engine version, choose the major version of the DB engine that you want.
5. To continue, choose Create.
6. Choose the name of the option group you just created.
7. Choose Add option.
8. Choose MARIADB_AUDIT_PLUGIN from the Option name list.
9. Set SERVER_AUDIT_EVENTS to CONNECT, QUERY, TABLE, QUERY_DDL, QUERY_DML, QUERY_DCL.
10. Choose Add option.

To publish SQL Server DB, Oracle DB, or PostgreSQL logs to CloudWatch Logs from the AWS Management Console

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Databases.
3. Choose the DB instance that you want to modify.
4. Choose Modify.
5. Under Log exports, choose all of the log files to start publishing to CloudWatch Logs.
   Log exports is available only for database engine versions that support publishing to CloudWatch Logs.
6. Choose Continue. Then on the summary page, choose Modify DB Instance.

To apply a new DB parameter group or DB options group to an RDS DB instance

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Databases.
3. Choose the DB instance that you want to modify.
5. Under Database options, change the DB parameter group and DB options group as needed.
6. When you finish you changes, choose Continue. Check the summary of modifications.
7. (Optional) Choose Apply immediately to apply the changes immediately. Choosing this option can cause an outage in some cases. For more information, see Using the Apply Immediately setting in the Amazon RDS User Guide.
8. Choose Modify DB Instance to save your changes.

[RDS.10] IAM authentication should be configured for RDS instances

Category: Protect > Secure access management > Passwordless authentication

Severity: Medium

Resource type: AWS::RDS::DBInstance

AWS Config rule: rds-instance-iam-authentication-enabled

Parameters: None

This control checks whether an RDS DB instance has IAM database authentication enabled.

IAM database authentication allows authentication to database instances with an authentication token instead of a password. Network traffic to and from the database is encrypted using SSL. For more information, see IAM database authentication in the Amazon Aurora User Guide.

Note
This control is not supported in the following Regions:
Africa (Cape Town)
Asia Pacific (Hong Kong)
Asia Pacific (Osaka)
China (Beijing)
China (Ningxia)

Remediation
To remediate this issue, update your DB instance to enable IAM authentication.

To enable IAM authentication for an existing DB instance
1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. Choose Databases.
3. Select the DB instance to modify.
4. Choose Modify.
5. Under Database options, choose Enable IAM DB authentication.
6. Choose Continue.
7. Under Scheduling of modifications, choose when to apply modifications. The options are Apply during the next scheduled maintenance window or Apply immediately.
8. For clusters, choose Modify DB Instance.

[RDS.12] IAM authentication should be configured for RDS clusters

Category: Protect > Secure access management > Passwordless authentication
Severity: Medium

Resource type: AWS::RDS::DBCluster, AWS::RDS::DBInstance

AWS Config rule: rds_cluster_iam_authentication_enabled

Parameters: None

This control checks whether an RDS DB cluster has IAM database authentication enabled.

IAM database authentication allows for password-free authentication to database instances. The authentication uses an authentication token. Network traffic to and from the database is encrypted using SSL. For more information, see IAM database authentication in the Amazon Aurora User Guide.

Note
This control is not supported in the following Regions:

- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)
- Middle East (Bahrain)
- South America (São Paulo)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

Remediation

You can enable IAM authentication for a DB cluster from the Amazon RDS console.

To enable IAM authentication for an existing DB cluster

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. Choose Databases.
3. Choose the DB cluster to modify.
4. Choose Modify.
5. Under Database options, select Enable IAM DB authentication.
6. Choose Continue.
7. Under Scheduling of modifications, choose when to apply modifications: Apply during the next scheduled maintenance window or Apply immediately.
8. Choose Modify cluster.

[RDS.13] RDS automatic minor version upgrades should be enabled

Category: Detect > Vulnerability and patch management

Severity: High

Resource type: AWS::RDS::DBInstance

AWS Config rule: rds_automatic_minor_version_upgrade_enabled

Parameters: None

This control checks whether automatic minor version upgrades are enabled for the RDS database instance.
Enabling automatic minor version upgrades ensures that the latest minor version updates to the relational database management system (RDBMS) are installed. These upgrades might include security patches and bug fixes. Keeping up to date with patch installation is an important step in securing systems.

**Note**
This control is not supported in the following Regions:

- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

**Remediation**

You can enable minor version upgrades for a DB instance from the Amazon RDS console.

**To enable automatic minor version upgrades for an existing DB instance**

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. Choose **Databases**.
3. Choose the DB instance to modify.
4. Choose **Modify**.
5. Under **Maintenance**, select **Yes** for **Auto minor version upgrade**.
6. Choose **Continue**.
7. Under **Scheduling of modifications**, choose when to apply modifications: **Apply during the next scheduled maintenance window** or **Apply immediately**.
8. Choose **Modify DB Instance**.

**[RDS.14] Amazon Aurora clusters should have backtracking enabled**

**Category:** Recover > Resilience > Backups enabled

**Severity:** Medium

**Resource type:** AWS::RDS::DBCluster

**AWS Config rule:** aurora-mysql-backtracking-enabled

**Parameters:** None

This control checks whether Amazon Aurora clusters have backtracking enabled.

Backups help you to recover more quickly from a security incident. They also strengthens the resilience of your systems. Aurora backtracking reduces the time to recover a database to a point in time. It does not require a database restore to do so.

For more information about backtracking in Aurora, see Backtracking an Aurora DB cluster in the Amazon Aurora User Guide.

**Note**
This control is not supported in the following Regions:

- Africa (Cape Town)
Remediation

For detailed instructions on how to enable Aurora backtracking, see Configuring backtracking in the Amazon Aurora User Guide.

Note that you cannot enable backtracking on an existing cluster. Instead, you can create a clone that has backtracking enabled. For more information about the limitations of Aurora backtracking, see the list of limitations in Overview of backtracking.

For information about pricing for backtracking, see the Aurora pricing page.

[RDS.15] RDS DB clusters should be configured for multiple Availability Zones

Category: Recover > Resilience > High availability

Severity: Medium

Resource type: AWS::RDS::DBCluster

AWS Config rule: rds-cluster-multi-az-enabled

Parameters: None

This control checks whether high availability is enabled for your RDS DB clusters.

RDS DB clusters should be configured for multiple Availability Zones to ensure availability of the data that is stored. Deployment to multiple Availability Zones allows for automated failover in the event of an Availability Zone availability issue and during regular RDS maintenance events.

Note
This control is not supported in the following Regions:

- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)
- Middle East (Bahrain)
- South America (São Paulo)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

Remediation

To remediate this control, configure your DB cluster for multiple Availability Zones.
To enable multi-AZ for a DB cluster

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Databases, and then choose the DB instance to modify.
3. Choose Modify. The Modify DB Instance page appears.
4. Under Instance Specifications, set Multi-AZ deployment to Yes.
5. Choose Continue and check the summary of modifications.
6. (Optional) Choose Apply immediately to apply the changes immediately. Choosing this option can cause an outage in some cases. For more information, see Using the Apply Immediately setting in the Amazon RDS User Guide.

On the confirmation page, review your changes. If they are correct, choose Modify DB Instance.

[RDS.16] RDS DB clusters should be configured to copy tags to snapshots

Category: Identify > Inventory

Severity: Low

Resource type: AWS::RDS::DBCluster

AWS Config rule: rds-cluster-copy-tags-to-snapshots-enabled (Custom rule developed by Security Hub)

Parameters: None

This control checks whether RDS DB clusters are configured to copy all tags to snapshots when the snapshots are created.

Identification and inventory of your IT assets is a crucial aspect of governance and security. You need to have visibility of all your RDS DB clusters so that you can assess their security posture and take action on potential areas of weakness. Snapshots should be tagged in the same way as their parent RDS database clusters. Enabling this setting ensures that snapshots inherit the tags of their parent database clusters.

Note
This control is not supported in the following Regions:

- China (Beijing)
- Middle East (Bahrain)
- South America (São Paulo)

Remediation

To enable automatic tag copying to snapshots for a DB cluster

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. Choose Databases.
3. Select the DB cluster to modify.
4. Choose Modify.
5. Under Backup, select Copy tags to snapshots.
6. Choose Continue.
7. Under Scheduling of modifications, choose when to apply modifications. You can choose either Apply during the next scheduled maintenance window or Apply immediately.
[RDS.17] RDS DB instances should be configured to copy tags to snapshots

Category: Identify > Inventory
Severity: Low
Resource type: AWS::RDS::DBInstance
AWS Config rule: rds-instance-copy-tags-to-snapsots-enabled (Custom rule developed by Security Hub)
Parameters: None

This control checks whether RDS DB instances are configured to copy all tags to snapshots when the snapshots are created.

Identification and inventory of your IT assets is a crucial aspect of governance and security. You need to have visibility of all your RDS DB instances so that you can assess their security posture and take action on potential areas of weakness. Snapshots should be tagged in the same way as their parent RDS database instances. Enabling this setting ensures that snapshots inherit the tags of their parent database instances.

Remediation

To enable automatic tag copying to snapshots for a DB instance

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. Choose Databases.
3. Select the DB instance to modify.
4. Choose Modify.
5. Under Backup, select Copy tags to snapshots.
6. Choose Continue.
7. Under Scheduling of modifications, choose when to apply modifications. You can choose either Apply during the next scheduled maintenance window or Apply immediately.

[RDS.18] RDS instances should be deployed in a VPC

Category: Protect > Secure network configuration > Resources within VPC
Severity: High
Resource type: AWS::RDS::DBInstance
AWS Config rule: rds-deployed-in-vpc (Custom rule developed by Security Hub)
Parameters: None

This control checks whether an RDS instance is deployed in a VPC (EC2-VPC).

VPCs provide a number of network controls to secure access to RDS resources. These controls include VPC Endpoints, network ACLs, and security groups. To take advantage of these controls, we recommend that you move EC2-Classic RDS instances to EC2-VPC.

Remediation

For detailed instructions on how to move RDS instances to VPC, see Updating the VPC for a DB instance in the Amazon RDS User Guide.
[RDS.19] An RDS event notifications subscription should be configured for critical cluster events

Category: Detect > Detection services > Application monitoring

Severity: Low

Resource type: AWS::RDS::EventSubscription

AWS Config rule: rds-cluster-event-notifications-configured (Custom rule developed by Security Hub)

Parameters: None

This control checks whether an Amazon RDS event subscription exists that has notifications enabled for the following source type, event category key-value pairs.

```
DBCluster: ["maintenance","failure"]
```

RDS event notifications uses Amazon SNS to make you aware of changes in the availability or configuration of your RDS resources. These notifications allow for rapid response. For additional information about RDS event notifications, see Using Amazon RDS event notification in the Amazon RDS User Guide.

Remediation

To subscribe to RDS cluster event notifications

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Event subscriptions.
3. Under Event subscriptions, choose Create event subscription.
4. In the Create event subscription dialog, do the following:
   a. For Name, enter a name for the event notification subscription.
   b. For Send notifications to, choose an existing Amazon SNS ARN for an SNS topic. To use a new topic, choose create topic to enter the name of a topic and a list of recipients.
   c. For Source type, choose Clusters.
   d. Under Instances to include, select All clusters.
   e. Under Event categories to include, select Specific event categories. The control also passes if you select All event categories.
   f. Select maintenance and failure.
   g. Choose Create.

[RDS.20] An RDS event notifications subscription should be configured for critical database instance events

Category: Detect > Detection services > Application monitoring

Severity: Low

Resource type: AWS::RDS::EventSubscription

AWS Config rule: rds-instance-event-notifications-configured (Custom rule developed by Security Hub)
Parameters: None

This control checks whether an Amazon RDS event subscription exists with notifications enabled for the following source type, event category key-value pairs.

<table>
<thead>
<tr>
<th>Source Type</th>
<th>Event Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBInstance</td>
<td>&quot;maintenance&quot;, &quot;configuration change&quot;, &quot;failure&quot;</td>
</tr>
</tbody>
</table>

RDS event notifications use Amazon SNS to make you aware of changes in the availability or configuration of your RDS resources. These notifications allow for rapid response. For additional information about RDS event notifications, see Using Amazon RDS event notification in the Amazon RDS User Guide.

Remediation

To subscribe to RDS instance event notifications

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Event subscriptions.
3. Under Event subscriptions, choose Create event subscription.
4. In the Create event subscription dialog, do the following:
   a. For Name, enter a name for the event notification subscription.
   b. For Send notifications to, choose an existing Amazon SNS ARN for an SNS topic. To use a new topic, choose create topic to enter the name of a topic and a list of recipients.
   c. For Source type, choose Instances.
   d. Under Instances to include, select All instances.
   e. Under Event categories to include, select Specific event categories. The control also passes if you select All event categories.
   f. Select maintenance, configuration change, and failure.
   g. Choose Create.

[RDS.21] An RDS event notifications subscription should be configured for critical database parameter group events

Category: Detect > Detection services > Application monitoring

Severity: Low

Resource type: AWS::RDS::EventSubscription

AWS Config rule: rds-pg-event-notifications-configured (Custom rule developed by Security Hub)

Parameters: None

This control checks whether an Amazon RDS event subscription exists with notifications enabled for the following source type, event category key-value pairs.

<table>
<thead>
<tr>
<th>Source Type</th>
<th>Event Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBParameterGroup</td>
<td>&quot;configuration change&quot;</td>
</tr>
</tbody>
</table>

RDS event notifications use Amazon SNS to make you aware of changes in the availability or configuration of your RDS resources. These notifications allow for rapid response. For additional information about RDS event notifications, see Using Amazon RDS event notification in the Amazon RDS User Guide.
Remediation

To subscribe to RDS database parameter group event notifications

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Event subscriptions.
3. Under Event subscriptions, choose Create event subscription.
4. In the Create event subscription dialog, do the following:
   a. For Name, enter a name for the event notification subscription.
   b. For Send notifications to, choose an existing Amazon SNS ARN for an SNS topic. To use a new topic, choose create topic to enter the name of a topic and a list of recipients.
   c. For Source type, choose Parameter groups.
   d. Under Instances to include, select All parameter groups.
   e. Under Event categories to include, select Specific event categories. The control also passes if you select All event categories.
   f. Select configuration change.
   g. Choose Create.

[RDS.22] An RDS event notifications subscription should be configured for critical database security group events

Category: Detect > Detection Services > Application monitoring

Severity: Low

Resource type: AWS::RDS::EventSubscription

AWS Config rule: rds-sg-event-notifications-configured (Custom rule developed by Security Hub)

Parameters: None

This control checks whether an Amazon RDS event subscription exists with notifications enabled for the following source type, event category key-value pairs.

| DBSecurityGroup | "configuration change","failure" |

RDS event notifications use Amazon SNS to make you aware of changes in the availability or configuration of your RDS resources. These notifications allow for a rapid response. For additional information about RDS event notifications, see Using Amazon RDS event notification in the Amazon RDS User Guide.

Remediation

To subscribe to RDS database security group event notifications

1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
2. In the navigation pane, choose Event subscriptions.
3. Under Event subscriptions, choose Create event subscription.
4. In the Create event subscription dialog, do the following:
   a. For Name, enter a name for the event notification subscription.
b. For **Send notifications to**, choose an existing Amazon SNS ARN for an SNS topic. To use a new topic, choose **create topic** to enter the name of a topic and a list of recipients.

c. For **Source type**, choose **Security groups**.

d. Under **Instances to include**, select **All security groups**.

e. Under **Event categories to include**, select **Specific event categories**. The control also passes if you select **All event categories**.

f. Select **configuration change** and **failure**.

g. Choose **Create**.

[RDS.23] RDS databases and clusters should not use a database engine default port

**Category:** Protect > Secure network configuration

**Severity:** Low

**Resource type:** AWS::RDS::DBInstance

**AWS Config rule:** rds-no-default-ports (Custom rule developed by Security Hub)

**Parameters:** None

This control checks whether the RDS cluster or instance uses a port other than the default port of the database engine.

If you use a known port to deploy an RDS cluster or instance, an attacker can guess information about the cluster or instance. The attacker can use this information in conjunction with other information to connect to an RDS cluster or instance or gain additional information about your application.

When you change the port, you must also update the existing connection strings that were used to connect to the old port. You should also check the security group of the DB instance to ensure that it includes an ingress rule that allows connectivity on the new port.

**Remediation**

**To modify the default port of an existing DB instance**

1. Open the Amazon RDS console at [https://console.aws.amazon.com/rds/](https://console.aws.amazon.com/rds/).
2. Choose **Databases**.
3. Select the DB instance to modify.
4. Choose **Modify**.
5. Under **Database options**, change **Database port** to a non-default value.
6. Choose **Continue**.
7. Under **Scheduling of modifications**, choose when to apply modifications. You can choose either **Apply during the next scheduled maintenance window** or **Apply immediately**.
8. For clusters, choose **Modify cluster**. For instances, choose **Modify DB Instance**.

[Redshift.1] Amazon Redshift clusters should prohibit public access

**Category:** Protect > Secure network configuration > Resources not publicly accessible

**Severity:** Critical

**Resource type:** AWS::Redshift::Cluster
**AWS Config rule:** redshift-cluster-public-access-check

**Parameters:** None

This control checks whether Amazon Redshift clusters are publicly accessible. It evaluates the `PubliclyAccessible` field in the cluster configuration item.

The `PubliclyAccessible` attribute of the Amazon Redshift cluster configuration indicates whether the cluster is publicly accessible. When the cluster is configured with `PubliclyAccessible` set to **true**, it is an Internet-facing instance that has a publicly resolvable DNS name, which resolves to a public IP address.

When the cluster is not publicly accessible, it is an internal instance with a DNS name that resolves to a private IP address. Unless you intend for your cluster to be publicly accessible, the cluster should not be configured with `PubliclyAccessible` set to **true**.

**Remediation**

To remediate this issue, update your Amazon Redshift cluster to disable public access.

**To disable public access to an Amazon Redshift cluster**

1. Open the Amazon Redshift console at `https://console.aws.amazon.com/redshift/`.
2. In the navigation menu, choose **Clusters**, then choose the name of the cluster with the security group to modify.
3. Choose **Actions**, then choose **Modify publicly accessible setting**.
4. Under **Allow instances and devices outside the VPC to connect to your database through the cluster endpoint**, choose **No**.
5. Choose **Confirm**.

[Redshift.2] Connections to Amazon Redshift clusters should be encrypted in transit

**Category:** Protect > Data protection > Encryption of data in transit

**Severity:** Medium

**Resource type:** AWS::Redshift::Cluster

**AWS Config rule:** redshift-require-tls-ssl

**Parameters:** None

This control checks whether connections to Amazon Redshift clusters are required to use encryption in transit. The check fails if the Amazon Redshift cluster parameter `require_SSL` is not set to **1**.

TLS can be used to help prevent potential attackers from using person-in-the-middle or similar attacks to eavesdrop on or manipulate network traffic. Only encrypted connections over TLS should be allowed. Encrypting data in transit can affect performance. You should test your application with this feature to understand the performance profile and the impact of TLS.

**Note**

This control is not supported in Europe (Milan).

**Remediation**

To remediate this issue, update the parameter group to require encryption.
To modify a parameter group

1. Open the Amazon Redshift console at https://console.aws.amazon.com/redshift/.
2. In the navigation menu, choose Config, then choose Workload management to display the Workload management page.
3. Choose the parameter group that you want to modify.
4. Choose Parameters.
5. Choose Edit parameters then set require_ssl to 1.
6. Enter your changes and then choose Save.

[Redshift.3] Amazon Redshift clusters should have automatic snapshots enabled

Category: Recover > Resilience > Backups enabled

Severity: Medium

Resource type: AWS::Redshift::Cluster

AWS Config rule: redshift-backup-enabled

Parameters:

- MinRetentionPeriod = 7

This control checks whether Amazon Redshift clusters have automated snapshots enabled. It also checks whether the snapshot retention period is greater than or equal to seven.

Backups help you to recover more quickly from a security incident. They strengthen the resilience of your systems. Amazon Redshift takes periodic snapshots by default. This control checks whether automatic snapshots are enabled and retained for at least seven days. For more details on Amazon Redshift automated snapshots, see Automated snapshots in the Amazon Redshift Cluster Management Guide.

Note

This control is not supported in the following Regions:

- Africa (Cape Town)
- Asia Pacific (Osaka)
- Asia Pacific (Sydney)
- China (Ningxia)
- Europe (Milan)

Remediation

To remediate this issue, update the snapshot retention period to at least 7.

To modify the snapshot retention period

1. Open the Amazon Redshift console at https://console.aws.amazon.com/redshift/.
2. In the navigation menu, choose Clusters, then choose the name of the cluster to modify.
3. Choose Edit.
4. Under Backup, set Snapshot retention to a value of 7 or greater.
5. Choose Modify Cluster.
[Redshift.4] Amazon Redshift clusters should have audit logging enabled

Category: Identify > Logging

Severity: Medium

Resource type: AWS::Redshift::Cluster

AWS Config rule: redshift-cluster-audit-logging-enabled (Custom rule developed by Security Hub)

Parameters:

- loggingEnabled = true

This control checks whether an Amazon Redshift cluster has audit logging enabled.

Amazon Redshift audit logging provides additional information about connections and user activities in your cluster. This data can be stored and secured in Amazon S3 and can be helpful in security audits and investigations. For more information, see Database audit logging in the Amazon Redshift Cluster Management Guide.

Remediation

To enable cluster audit logging

1. Open the Amazon Redshift console at https://console.aws.amazon.com/redshift/.
2. In the navigation menu, choose Clusters, then choose the name of the cluster to modify.
3. Choose Maintenance and monitoring.
4. Under Audit logging, choose Edit.
5. Set Enable audit logging to yes, then enter the log destination bucket details.
6. Choose Confirm.

[Redshift.6] Amazon Redshift should have automatic upgrades to major versions enabled

Category: Detect > Vulnerability and patch management

Severity: Medium

Resource type: AWS::Redshift::Cluster

AWS Config rule: redshift-cluster-maintenancesettings-check

Parameters:

- allowVersionUpgrade = true

This control checks whether automatic major version upgrades are enabled for the Amazon Redshift cluster.

Enabling automatic major version upgrades ensures that the latest major version updates to Amazon Redshift clusters are installed during the maintenance window. These updates might include security patches and bug fixes. Keeping up to date with patch installation is an important step in securing systems.
**Note**
This control is not supported in Middle East (Bahrain).

**Remediation**

To remediate this issue from the AWS CLI, use the Amazon Redshift `modify-cluster` command to set the `--allow-version-upgrade` attribute.

```bash
aws redshift modify-cluster --cluster-identifier clustername --allow-version-upgrade
```

Where `clustername` is the name of your Amazon Redshift cluster.

**[Redshift.7] Amazon Redshift clusters should use enhanced VPC routing**

**Category:** Protect > Secure network configuration > API private access

**Severity:** High

**Resource type:** AWS::Redshift::Cluster

**AWS Config rule:** `redshift_enhanced_vpc_routing_enabled`

**Parameters:** None

This control checks whether an Amazon Redshift cluster has `EnhancedVpcRouting` enabled.

Enhanced VPC routing forces all `COPY` and `UNLOAD` traffic between the cluster and data repositories to go through your VPC. You can then use VPC features such as security groups and network access control lists to secure network traffic. You can also use VPC Flow Logs to monitor network traffic.

**Note**
This control is not supported in the following Regions:

- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

**Remediation**

For detailed remediation instructions, see [Enabling enhanced VPC routing](https://docs.aws.amazon.com/redshift/latest/guides/enable-enhanced-vpc-routing.html) in the *Amazon Redshift Cluster Management Guide*.

**[S3.1] S3 Block Public Access setting should be enabled**

**Category:** Protect > Secure network configuration

**Severity:** Medium

**Resource type:** AWS account

**AWS Config rule:** `s3-account-level-public-access-blocks-periodic`

**Parameters:**

- `ignorePublicAcls`: true
- `blockPublicPolicy`: true
This control checks whether the following Amazon S3 public access block settings are configured at the account level:

- ignorePublicAcls: true
- blockPublicPolicy: true
- blockPublicAcls: true
- restrictPublicBuckets: true

The control passes if all of the public access block settings are set to true. The control fails if any of the settings are set to false, or if any of the settings are not configured.

Amazon S3 public access block is designed to provide controls across an entire AWS account or at the individual S3 bucket level to ensure that objects never have public access. Public access is granted to buckets and objects through access control lists (ACLs), bucket policies, or both.

Unless you intend to have your S3 buckets be publicly accessible, you should configure the account level Amazon S3 Block Public Access feature.

To learn more, see Using Amazon S3 Block Public Access in the Amazon Simple Storage Service Developer Guide.

**Note**
This control is not supported in the following Regions.

- Africa (Cape Town)
- Europe (Milan)
- Middle East (Bahrain)

**Remediation**

To remediate this issue, enable Amazon S3 Block Public Access.

**To enable Amazon S3 Block Public Access**

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Choose **Block public access (account settings)**.
3. Choose **Edit**.
4. Select **Block all public access**.
5. Choose **Save changes**.

For more information, see Using Amazon S3 block public access in the Amazon Simple Storage Service Developer Guide.

**[S3.2] S3 buckets should prohibit public read access**

**Category:** Protect > Secure network configuration

**Severity:** Critical

**Resource type:** AWS::S3::Bucket
AWS Config rule: s3-bucket-public-read-prohibited

Parameters: None

This control checks whether your S3 buckets allow public read access. It evaluates the Block Public Access settings, the bucket policy, and the bucket access control list (ACL).

Some use cases require that everyone on the internet be able to read from your S3 bucket. However, those situations are rare. To ensure the integrity and security of your data, your S3 bucket should not be publicly readable.

Remediation

To remediate this issue, update your S3 bucket to remove public access.

To remove public access from an S3 bucket

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. In the left navigation pane, choose Buckets.
3. Choose the name of the S3 bucket to update.
4. Choose Permissions and then choose Block public access.
5. Choose Edit.
6. Select Block all public access. Then choose Save.
7. If prompted, enter confirm and then choose Confirm.

[S3.3] S3 buckets should prohibit public write access

Category: Protect > Secure network configuration

Severity: Critical

Resource type: AWS::S3::Bucket

AWS Config rule: s3-bucket-public-write-prohibited

Parameters: None

This control checks whether your S3 buckets allow public write access. It evaluates the block public access settings, the bucket policy, and the bucket access control list (ACL).

Some use cases require that everyone on the internet be able to write to your S3 bucket. However, those situations are rare. To ensure the integrity and security of your data, your S3 bucket should not be publicly writable.

Remediation

To remediate this issue, update your S3 bucket to remove public access.

To remove public access for an S3 bucket

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. In the left navigation pane, choose Buckets.
3. Choose the name of the S3 bucket to update.
4. Choose Permissions and then choose Block public access.
5. Choose Edit.
6. Select Block all public access. Then choose Save.
7. If prompted, enter confirm and then choose Confirm.

[S3.4] S3 buckets should have server-side encryption enabled

Category: Protect > Data protection > Encryption of data at rest

Severity: Medium

Resource type: AWS::S3::Bucket

AWS Config rule: s3-bucket-server-side-encryption-enabled

Parameters: None

This control checks that your S3 bucket either has Amazon S3 default encryption enabled or that the S3 bucket policy explicitly denies put-object requests without server-side encryption.

For an added layer of security for your sensitive data in S3 buckets, you should configure your buckets with server-side encryption to protect your data at rest. Amazon S3 encrypts each object with a unique key. As an additional safeguard, it encrypts the key itself with a master key that it rotates regularly. Amazon S3 server-side encryption uses one of the strongest block ciphers available to encrypt your data, 256-bit Advanced Encryption Standard (AES-256).

To learn more, see Protecting data using server-side encryption with Amazon S3-managed encryption keys (SSE-S3) in the Amazon Simple Storage Service Developer Guide.

Remediation

To remediate this issue, update your S3 bucket to enable default encryption.

To enable default encryption on an S3 bucket

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. In the left navigation pane, choose Buckets.
3. Choose the S3 bucket from the list.
5. Choose Default encryption.
6. For the encryption, choose either AES-256 or AWS-KMS.
   - Choose AES-256 to use keys that are managed by Amazon S3 for default encryption. For more information about using Amazon S3 server-side encryption to encrypt your data, see the Amazon Simple Storage Service Developer Guide.
   - Choose AWS-KMS to use keys that are managed by AWS KMS for default encryption. Then choose a master key from the list of the AWS KMS master keys that you have created.

Type the Amazon Resource Name (ARN) of the AWS KMS key to use. You can find the ARN for your AWS KMS key in the IAM console, under Encryption keys. Or, you can choose a key name from the drop-down list.

Important

If you use the AWS KMS option for your default encryption configuration, you are subject to the RPS (requests per second) quotas of AWS KMS. For more information about AWS KMS quotas and how to request a quota increase, see the AWS Key Management Service Developer Guide.

For more information about creating an AWS KMS key, see the AWS Key Management Service Developer Guide.
For more information about using AWS KMS with Amazon S3, see the Amazon Simple Storage Service Developer Guide.

When enabling default encryption, you might need to update your bucket policy. For more information about moving from bucket policies to default encryption, see the Amazon Simple Storage Service Developer Guide.

7. Choose Save.

For more information about default S3 bucket encryption, see the Amazon Simple Storage Service Console User Guide.

[S3.5] S3 buckets should require requests to use Secure Socket Layer

Category: Protect > Secure access management

Severity: Medium

Resource type: AWS::S3::Bucket

AWS Config rule: s3-bucket-ssl-requests-only

Parameters: None

This control checks whether S3 buckets have policies that require requests to use Secure Socket Layer (SSL).

S3 buckets should have policies that require all requests (Action: S3:*) to only accept transmission of data over HTTPS in the S3 resource policy, indicated by the condition key aws:SecureTransport.

Remediation

To remediate this issue, update the permissions policy of the S3 bucket.

To configure an S3 bucket to deny nonsecure transport

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Navigate to the noncompliant bucket, then choose the bucket name.
3. Choose Permissions, and then choose Bucket Policy.
4. Add a similar policy statement to that in the policy below. Replace awsexamplebucket with the name of the bucket you are modifying.

```json
{
    "Id": "ExamplePolicy",
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "AllowSSLRequestsOnly",
            "Action": "s3:*",
            "Effect": "Deny",
            "Resource": [
                "arn:aws:s3:::awsexamplebucket",
                "arn:aws:s3:::awsexamplebucket/*"
            ],
            "Condition": {
                "Bool": {
                    "aws:SecureTransport": "false"
                }
            }
        }
    ]
}
```
5. Choose Save.

For more information, see the knowledge center article What S3 bucket policy should I use to comply with the AWS Config rule s3-bucket-ssl-requests-only?.

[S3.6] Amazon S3 permissions granted to other AWS accounts in bucket policies should be restricted

**Category:** Protect > Secure access management > Sensitive API operations actions restricted

**Severity:** High

**Resource type:** AWS::S3::Bucket

**AWS Config rule:** s3-bucket-blacklisted-actions-prohibited

**Parameters:**

- blacklistedactionpatterns: s3:DeleteBucketPolicy, s3:PutBucketAcl, s3:PutBucketPolicy, s3:PutEncryptionConfiguration, s3:PutObjectAcl

This control checks whether the S3 bucket policy prevents principals from other AWS accounts from performing denied actions on resources in the S3 bucket. The control fails if the S3 bucket policy allows any of the following actions for a principal in another AWS account:

- s3:DeleteBucketPolicy
- s3:PutBucketAcl
- s3:PutBucketPolicy
- s3:PutEncryptionConfiguration
- s3:PutObjectAcl

Implementing least privilege access is fundamental to reducing security risk and the impact of errors or malicious intent. If an S3 bucket policy allows access from external accounts, it could result in data exfiltration by an insider threat or an attacker.

The blacklistedactionpatterns parameter allows for successful evaluation of the rule for S3 buckets. The parameter grants access to external accounts for action patterns that are not included in the blacklistedactionpatterns list.

**Remediation**

To remediate this issue, edit the S3 bucket policy to remove the permissions.

**To edit an S3 bucket policy**

1. Open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. In the Bucket name list, choose the name of the S3 bucket for which you want to edit the policy.
3. Choose Permissions, and then choose Bucket Policy.
4. In the Bucket policy editor text box, do one of the following:
   - Remove the statements that grant access to denied actions to other AWS accounts
• Remove the permitted denied actions from the statements
5. Choose Save.

[S3.8] S3 Block Public Access setting should be enabled at the bucket level

Category: Protect > Secure access management > Access control
Severity: High
Resource type: AWS::S3::Bucket
AWS Config rule: s3_bucket_level_public_access_prohibited

Parameters:
• excludedPublicBuckets (Optional) – A comma-separated list of known allowed public S3 bucket names.

This control checks whether S3 buckets have bucket-level public access blocks applied. This control fails if any of the following settings are set to false:

• ignorePublicAcls
• blockPublicPolicy
• blockPublicAcls
• restrictPublicBuckets

Block Public Access at the S3 bucket level provides controls to ensure that objects never have public access. Public access is granted to buckets and objects through access control lists (ACLs), bucket policies, or both.

Unless you intend to have your S3 buckets publicly accessible, you should configure the bucket level Amazon S3 Block Public Access feature.

Note
This control is not supported in the following Regions:

• Asia Pacific (Osaka)
• China (Beijing)
• China (Ningxia)
• AWS GovCloud (US-East)
• AWS GovCloud (US-West)

Remediation
For information on how to remove public access at a bucket level, see Blocking public access to your Amazon S3 storage in the Amazon S3 User Guide.

[SageMaker.1] SageMaker notebook instances should not have direct internet access

Category: Protect > Secure network configuration
Severity: High
Resource type: AWS::SageMaker::NotebookInstance
**AWS Config rule:** sagemaker-notebook-no-direct-internet-access

**Parameters:** None

This control checks whether direct internet access is disabled for an SageMaker notebook instance. To do this, it checks whether the DirectInternetAccess field is disabled for the notebook instance.

If you configure your SageMaker instance without a VPC, then by default direct internet access is enabled on your instance. You should configure your instance with a VPC and change the default setting to **Disable — Access the internet through a VPC**.

To train or host models from a notebook, you need internet access. To enable internet access, make sure that your VPC has a NAT gateway and your security group allows outbound connections. To learn more about how to connect a notebook instance to resources in a VPC, see [Connect a notebook instance to resources in a VPC](https://docs.aws.amazon.com/sagemaker/latest/dg/about-connecting-vpc.html) in the *Amazon SageMaker Developer Guide*.

You should also ensure that access to your SageMaker configuration is limited to only authorized users. Restrict users' IAM permissions to modify SageMaker settings and resources.

**Note**

This control is not supported in the following Regions.

- Africa (Cape Town)
- China (Beijing)
- China (Ningxia)
- Europe (Milan)
- AWS GovCloud (US-East)

**Remediation**

Note that you cannot change the internet access setting after a notebook instance is created. It must be stopped, deleted, and recreated.

**To configure an SageMaker notebook instance to deny direct internet access**

2. Navigate to **Notebook instances**.
3. Delete the instance that has direct internet access enabled. Choose the instance, choose **Actions**, then choose **stop**.
   
   After the instance is stopped, choose **Actions**, then choose **delete**.
4. Choose **Create notebook instance**. Provide the configuration details.
5. Expand the network section, then choose a VPC, subnet, and security group. Under **Direct internet access**, choose **Disable — Access the internet through a VPC**.
6. Choose **Create notebook instance**.

For more information, see [Connect a notebook instance to resources in a VPC](https://docs.aws.amazon.com/sagemaker/latest/dg/about-connecting-vpc.html) in the *Amazon SageMaker Developer Guide*.

**[SecretsManager.1] Secrets Manager secrets should have automatic rotation enabled**

**Category:** Protect > Secure development

**Severity:** Medium
**Resource type:** AWS::SecretsManager::Secret

**AWS Config rule:** secretsmanager-rotation-enabled-check

**Parameters:** None

This control checks whether a secret stored in AWS Secrets Manager is configured with automatic rotation.

Secrets Manager helps you improve the security posture of your organization. Secrets include database credentials, passwords, and third-party API keys. You can use Secrets Manager to store secrets centrally, encrypt secrets automatically, control access to secrets, and rotate secrets safely and automatically.

Secrets Manager can rotate secrets. You can use rotation to replace long-term secrets with short-term ones. Rotating your secrets limits how long an unauthorized user can use a compromised secret. For this reason, you should rotate your secrets frequently. To learn more about rotation, see Rotating your AWS Secrets Manager secrets in the AWS Secrets Manager User Guide.

**Remediation**

To remediate this issue, you enable automatic rotation for your secrets.

**To enable automatic rotation for secrets**

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. To find the secret that requires rotating, enter the secret name in the search field.
3. Choose the secret you want to rotate, which displays the secrets details page.
4. Under Rotation configuration, choose Edit rotation.
5. From Edit rotation configuration, choose Enable automatic rotation.
6. For Select Rotation Interval, choose a rotation interval.
7. Choose a Lambda function for rotation. For information about customizing your Lambda rotation function, see Understanding and customizing your Lambda rotation function in the AWS Secrets Manager User Guide.
8. To configure the secret for rotation, choose Next.

To learn more about Secrets Manager rotation, see Rotating your AWS Secrets Manager secrets in the AWS Secrets Manager User Guide.

[SecretsManager.2] Secrets Manager secrets configured with automatic rotation should rotate successfully

**Category:** Protect > Secure development

**Severity:** Medium

**Resource type:** AWS::SecretsManager::Secret

**AWS Config rule:** secretsmanager-scheduled-rotation-success-check

**Parameters:** None

This control checks whether an AWS Secrets Manager secret rotated successfully based on the rotation schedule. The control fails if RotationOccurringAsScheduled is false. The control does not evaluate secrets that do not have rotation configured.

Secrets Manager helps you improve the security posture of your organization. Secrets include database credentials, passwords, and third-party API keys. You can use Secrets Manager to store secrets centrally, encrypt secrets automatically, control access to secrets, and rotate secrets safely and automatically.
Secrets Manager can rotate secrets. You can use rotation to replace long-term secrets with short-term ones. Rotating your secrets limits how long an unauthorized user can use a compromised secret. For this reason, you should rotate your secrets frequently.

In addition to configuring secrets to rotate automatically, you should ensure that those secrets rotate successfully based on the rotation schedule.

To learn more about rotation, see Rotating your AWS Secrets Manager secrets in the AWS Secrets Manager User Guide.

Remediation

If the automatic rotation fails, then Secrets Manager might have encountered errors with the configuration.

To rotate secrets in Secrets Manager, you use a Lambda function that defines how to interact with the database or service that owns the secret.

For help on how to diagnose and fix common errors related to secrets rotation, see Troubleshooting AWS Secrets Manager rotation of secrets in the AWS Secrets Manager User Guide.

[SecretsManager.3] Remove unused Secrets Manager secrets

Category: Protect > Secure access management

Severity: Medium

Resource type: AWS::SecretsManager::Secret

AWS Config rule: secretsmanager_secret_unused

Parameters: None

This control checks whether your secrets have been accessed within a specified number of days. The default value is 90 days. If a secret was not accessed within the defined number of days, this control fails.

Deleting unused secrets is as important as rotating secrets. Unused secrets can be abused by their former users, who no longer need access to these secrets. Also, as more users get access to a secret, someone might have mishandled and leaked it to an unauthorized entity, which increases the risk of abuse. Deleting unused secrets helps revoke secret access from users who no longer need it. It also helps to reduce the cost of using Secrets Manager. Therefore, it is essential to routinely delete unused secrets.

Note
This control is not supported in the following Regions:

- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

Remediation

You can delete inactive secrets from the Secrets Manager console.

To delete inactive secrets

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. To locate the secret, enter the secret name in the search box.
3. Choose the secret to delete.
4. Under **Secret details**, from **Actions**, choose **Delete secret**.
5. Under **Schedule secret deletion**, enter the number of days to wait before the secret is deleted.
6. Choose **Schedule deletion**.

[SecretsManager.4] Secrets Manager secrets should be rotated within a specified number of days

**Category:** Protect > Secure access management  
**Severity:** Medium  
**Resource type:** AWS::SecretsManager::Secret

**AWS Config rule:** secretsmanager_secret_periodic_rotation

**Parameters:**
- **Rotation period:** 90 days by default

This control checks whether your secrets have been rotated at least once within 90 days.

Rotating secrets can help you to reduce the risk of an unauthorized use of your secrets in your AWS account. Examples include database credentials, passwords, third-party API keys, and even arbitrary text. If you do not change your secrets for a long period of time, the secrets are more likely to be compromised.

As more users get access to a secret, it can become more likely that someone mishandled and leaked it to an unauthorized entity. Secrets can be leaked through logs and cache data. They can be shared for debugging purposes and not changed or revoked once the debugging completes. For all these reasons, secrets should be rotated frequently.

You can configure your secrets for automatic rotation in AWS Secrets Manager. With automatic rotation, you can replace long-term secrets with short-term ones, significantly reducing the risk of compromise.

Security Hub recommends that you enable rotation for your Secrets Manager secrets. To learn more about rotation, see Rotating your AWS Secrets Manager secrets in the **AWS Secrets Manager User Guide**.

**Note**

This control is not supported in the following Regions:
- Asia Pacific (Osaka)
- China (Beijing)
- China (Ningxia)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)

**Remediation**

You can enable automatic secret rotation in the Secrets Manager console.

**To enable secret rotation**

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. To locate the secret, enter the secret name in the search box.
3. Choose the secret to display.
4. Under Rotation configuration, choose Edit rotation.
5. From Edit rotation configuration, choose Enable automatic rotation.
6. From Select Rotation Interval, choose the rotation interval.
7. Choose a Lambda function to use for rotation.
8. Choose Next.
9. After you configure the secret for automatic rotation, under Rotation Configuration, choose Rotate secret immediately.

[SNS.1] SNS topics should be encrypted at rest using AWS KMS

Category: Protect > Data protection > Encryption of data at rest
Severity: Medium
Resource type: AWS::SNS::Topic
AWS Config rule: sns-encrypted-kms
Parameters: None

This control checks whether an SNS topic is encrypted at rest using AWS KMS.

Encrypting data at rest reduces the risk of data stored on disk being accessed by a user not authenticated to AWS. It also adds another set of access controls to limit the ability of unauthorized users to access the data. For example, API permissions are required to decrypt the data before it can be read. SNS topics should be encrypted at-rest for an added layer of security. For more information, see Encryption at rest in the Amazon Simple Notification Service Developer Guide.

Remediation

To remediate this issue, update your SNS topic to enable encryption.

To encrypt an unencrypted SNS topic

2. In the navigation pane, choose Topics.
3. Choose the name of the topic to encrypt.
4. Choose Edit.
6. Choose the KMS key to use to encrypt the topic.
7. Choose Save changes.

[SQS.1] Amazon SQS queues should be encrypted at rest

Category: Protect > Data protection > Encryption of data at rest
Severity: Medium
Resource type: AWS::SQS::Queue
AWS Config rule: sqs-queue-encrypted (Custom rule developed by Security Hub)
Parameters:

- **KmsKeyAliasList** (Optional). Security Hub does not populate this parameter. Comma-separated list of customer-managed AWS KMS key aliases that are used to encrypt queues.

  For example: "alias/myKey".

  This rule is **NON_COMPLIANT** if the key used to encrypt a queue is not specified in this parameter list.

This control checks whether Amazon SQS queues are encrypted at rest.

Server-side encryption (SSE) allows you to transmit sensitive data in encrypted queues. To protect the content of messages in queues, SSE uses keys managed in AWS KMS. For more information, see [Encryption at rest](https://docs.aws.amazon.com/AmazonSimpleQueueService/latest/SQSDeveloperGuide/sqs-at-rest-encryption.html) in the *Amazon Simple Queue Service Developer Guide*.

**Remediation**

For information about managing SSE using the AWS Management Console, see [Configuring server-side encryption (SSE) for a queue (console)](https://docs.aws.amazon.com/AmazonSimpleQueueService/latest/SQSDeveloperGuide/sqs-console.html) in the *Amazon Simple Queue Service Developer Guide*.

[SSM.1] **EC2 instances should be managed by AWS Systems Manager**

**Category:** Identify > Inventory  

**Severity:** Medium  

**Resource type:** AWS::EC2::Instance  

**AWS Config rule:** ec2-instance-managed-by-systems-manager  

**Parameters:** None  

This control checks whether the stopped and running EC2 instances in your account are managed by AWS Systems Manager. Systems Manager is an AWS service that you can use to view and control your AWS infrastructure.

To help you to maintain security and compliance, Systems Manager scans your stopped and running managed instances. A managed instance is a machine that is configured for use with Systems Manager. Systems Manager then reports or takes corrective action on any policy violations that it detects. Systems Manager also helps you to configure and maintain your managed instances.

To learn more, see [AWS Systems Manager User Guide](https://docs.aws.amazon.com/systems-manager/latest/userguide/index.html).

**Remediation**

You can use the Systems Manager console to remediate this issue.

**To ensure that EC2 instances are managed by Systems Manager**

2. In the navigation menu, choose **Quick setup**.  
3. Choose **Create**.  
4. Under **Configuration type**, choose **Host Management**, then choose **Next**.  
5. On the configuration screen, you can keep the default options.

You can optionally make the following changes:

- If you use CloudWatch to monitor EC2 instances, select **Install and configure the CloudWatch agent** and **Update the CloudWatch agent once every 30 days**.
b. Under **Targets**, choose the management scope to determine the accounts and Regions where this configuration is applied.

c. Under **Instance profile options**, select **Add required IAM policies to existing instance profiles attached to your instances**.

6. Choose **Create**.

To determine whether your instances support Systems Manager associations, see **Systems Manager prerequisites** in the **AWS Systems Manager User Guide**.

**[SSM.2] All EC2 instances managed by Systems Manager should be compliant with patching requirements**

**Category:** Detect > Detection services  
**Severity:** High  
**Resource type:** SSM patch compliance

**AWS Config rule:** *ec2-managedinstance-patch-compliance-status-check*

**Parameters:** None

This control checks whether the compliance status of the Amazon EC2 Systems Manager patch compliance is **COMPLIANT** or **NON_COMPLIANT** after the patch installation on the instance. It only checks instances that are managed by Systems Manager Patch Manager.

Having your EC2 instances fully patched as required by your organization reduces the attack surface of your AWS accounts.

**Note**  
This control is not supported in the following Regions.

- Africa (Cape Town)  
- Europe (Milan)  
- Middle East (Bahrain)

**Remediation**

To remediate this issue, install the required patches on your noncompliant instances.

**To remediate noncompliant patches**

2. Under **Node Management**, choose **Run Command** and then choose **Run command**.
3. Choose the button next to **AWS-RunPatchBaseline**.
4. Change the **Operation** to **Install**.
5. Choose **Choose instances manually** and then choose the noncompliant instances.
6. At the bottom of the page, choose **Run**.
7. After the command is complete, to monitor the new compliance status of your patched instances, in the navigation pane, choose **Compliance**.

For more information about using Systems Manager documents to patch a managed instance, see **About SSM documents for patching instances** and **Running commands using Systems Manager Run command** in the **AWS Systems Manager User Guide**.
[SSM.3] Instances managed by Systems Manager should have an association compliance status of COMPLIANT

**Category:** Detect > Detection services

**Severity:** Low

**Resource type:** SSM association compliance

**AWS Config rule:** ec2-managedinstance-association-compliance-status-check

**Parameters:** None

This control checks whether the status of the AWS Systems Manager association compliance is COMPLIANT or NON_COMPLIANT after the association is run on an instance. The control passes if the association compliance status is COMPLIANT.

A State Manager association is a configuration that is assigned to your managed instances. The configuration defines the state that you want to maintain on your instances. For example, an association can specify that antivirus software must be installed and running on your instances or that certain ports must be closed.

After you create one or more State Manager associations, compliance status information is immediately available to you. You can view the compliance status in the console or in response to AWS CLI commands or corresponding Systems Manager API actions. For associations, Configuration Compliance shows the compliance status (Compliant or Non-compliant). It also shows the severity level assigned to the association, such as Critical or Medium.

To learn more about State Manager association compliance, see About State Manager association compliance in the AWS Systems Manager User Guide.

**Note**
This control is not supported in Africa (Cape Town) or Europe (Milan).

**Remediation**

A failed association can be related to different things, including targets and SSM document names. To remediate this issue, you must first identify and investigate the association. You can then update the association to correct the specific issue.

You can edit an association to specify a new name, schedule, severity level, or targets. After you edit an association, AWS Systems Manager creates a new version.

**To investigate and update a failed association**

2. In the navigation pane, under Node Management, choose Fleet Manager.
3. Choose the instance ID that has an Association status of Failed.
4. Choose View details.
5. Choose Associations.
6. Note the name of the association that has an Association status of Failed. This is the association that you need to investigate. You need to use the association name in the next step.
7. In the navigation pane, under Node Management, choose State Manager. Search for the association name, then select the association.
8. After you determine the issue, edit the failed association to correct the problem. For information on how to edit an association, see Edit an association.
For more information on creating and editing State Manager associations, see Working with associations in Systems Manager in the AWS Systems Manager User Guide.

[WAF.1] AWS WAF Classic global web ACL logging should be enabled

**Category:** Identify > Logging

**Severity:** Medium

**Resource type:** AWS::WAF::WebACL

**AWS Config rule:** waf-classic-logging-enabled

**Parameters:** None

This control checks whether logging is enabled for an AWS WAF global Web ACL. This control fails if logging is not enabled for the web ACL.

Logging is an important part of maintaining the reliability, availability, and performance of AWS WAF globally. It is a business and compliance requirement in many organizations, and allows you to troubleshoot application behavior. It also provides detailed information about the traffic that is analyzed by the web ACL that is attached to AWS WAF.

**Note**

This control is not supported in the following Regions:

- US East (Ohio)
- US West (N. California)
- US West (Oregon)
- Africa (Cape Town)
- Asia Pacific (Hong Kong)
- Asia Pacific (Mumbai)
- Asia Pacific (Osaka)
- Asia Pacific (Seoul)
- Asia Pacific (Singapore)
- Asia Pacific (Sydney)
- Asia Pacific (Tokyo)
- Canada (Central)
- China (Beijing)
- China (Ningxia)
- Europe (Frankfurt)
- Europe (Ireland)
- Europe (London)
- Europe (Milan)
- Europe (Paris)
- Europe (Stockholm)
- Middle East (Bahrain)
- South America (São Paulo)
- AWS GovCloud (US-East)
- AWS GovCloud (US-West)
Remediation

You can enable logging for a web ACL from the Kinesis Data Firehose console.

To enable logging for a web ACL

1. Open the Kinesis Data Firehose console at https://console.aws.amazon.com/firehose/.
2. Create a Kinesis Data Firehose delivery stream.
   - The name must start with the prefix `aws-waf-logs-`. For example, `aws-waf-logs-us-east-2-analytics`.
   - Create the Kinesis Data Firehose delivery stream with a PUT source and in the Region where you operate. If you capture logs for Amazon CloudFront, create the delivery stream in US East (N. Virginia). For more information, see Creating an Amazon Kinesis Data Firehose delivery stream in the Amazon Kinesis Data Firehose Developer Guide.
3. From Services, choose WAF & Shield. Then choose Switch to AWS WAF Classic.
4. From Filter, choose Global (CloudFront).
5. Choose the web ACL to enable logging for.
6. Under Logging, choose Enable logging.
7. Choose the Kinesis Data Firehose delivery stream that you created earlier. You must choose a delivery stream that has a name that begins with `aws-waf-logs-`.
8. Choose Enable logging.

Control categories

Each control is assigned a category. The category for a control reflects the security function that the control applies to.

The category value contains the category, the subcategory within the category, and, optionally, a classifier within the subcategory. For example:

- Identify > Inventory
- Protect > Data protection > Encryption of data in transit

Here are the descriptions of the available categories, subcategories, and classifiers.

Identify

Develop the organizational understanding to manage cybersecurity risk to systems, assets, data, and capabilities.

Inventory

Has the service implemented the correct resource tagging strategies? Do the tagging strategies include the resource owner?

What resources does the service use? Are they approved resources for this service?

Do you have visibility into the approved inventory? For example, do you use services such as Amazon EC2 Systems Manager and AWS Service Catalog?

Logging

Have you securely enabled all relevant logging for the service? Examples of log files include the following:
• Amazon VPC Flow Logs
• Elastic Load Balancing access logs
• Amazon CloudFront logs
• Amazon CloudWatch Logs
• Amazon Relational Database Service logging
• Amazon OpenSearch Service slow index logs
• X-Ray tracing
• AWS Directory Service logs
• AWS Config items
• Snapshots

Protect

Develop and implement the appropriate safeguards to ensure delivery of critical infrastructure services and secure coding practices.

Secure access management

Does the service use least privilege practices in its IAM or resource policies?

Are passwords and secrets sufficiently complex? Are they rotated appropriately?

Does the service use multi-factor authentication (MFA)?

Does the service avoid the root account?

Do resource-based policies allow public access?

Secure network configuration

Does the service avoid public and insecure remote network access?

Does the service use VPCs properly? For example, are jobs required to run in VPCs?

Does the service properly segment and isolate sensitive resources?

Data protection

Encryption of data at rest – Does the service encrypt data at rest?

Encryption of data in transit – Does the service encrypt data in transit?

Data integrity – Does the service validate data for integrity?

Data deletion protection – Does the service protect data from accidental deletion?

Data management / usage – Do you use services such as Amazon Macie to track the location of your sensitive data?

API protection

Does the service use AWS PrivateLink to protect the service API operations?

Protective services

Are the correct protective services in place? Do they provide the correct amount of coverage?

Protective services help you deflect attacks and compromises that are directed at the service. Examples of protective services in AWS include AWS Control Tower, AWS WAF, AWS Shield Advanced, Vanta, Secrets Manager, IAM Access Analyzer, and AWS Resource Access Manager.
Secure development

Do you use secure coding practices?
Do you avoid vulnerabilities such as the Open Web Application Security Project (OWASP) Top Ten?

Detect

Develop and implement the appropriate activities to identify the occurrence of a cybersecurity event.

Detection services

Are the correct detection services in place?
Do they provide the correct amount of coverage?

Examples of AWS detection services include Amazon GuardDuty, AWS Security Hub, Amazon Inspector, Amazon Detective, Amazon CloudWatch Alarms, AWS IoT Device Defender, and AWS Trusted Advisor.

Respond

Develop and implement the appropriate activities to take action regarding a detected cybersecurity event.

Response actions

Do you respond to security events swiftly?
Do you have any active critical or high severity findings?

Forensics

Can you securely acquire forensic data for the service? For example, do you acquire Amazon EBS snapshots associated with true positive findings?
Have you set up a forensic account?

Recover

Develop and implement the appropriate activities to maintain plans for resilience and to restore any capabilities or services that were impaired due to a cybersecurity event.

Resilience

Does the service configuration support graceful failovers, elastic scaling, and high availability?
Have you established backups?

AWS Foundational Best Practices controls that you might want to disable

To save on the cost of AWS Config, you can disable recording of global resources in all but one Region, and then disable these controls that deal with global resources in all Regions except for the Region that runs global recording.

- [IAM.1] IAM policies should not allow full "*" administrative privileges (p. 655)
AWS Foundational Security Best Practices standard

- [IAM.2] IAM users should not have IAM policies attached (p. 655)
- [IAM.3] IAM users' access keys should be rotated every 90 days or less (p. 657)
- [IAM.4] IAM root user access key should not exist (p. 658)
- [IAM.5] MFA should be enabled for all IAM users that have a console password (p. 659)
- [IAM.6] Hardware MFA should be enabled for the root user (p. 659)
- [IAM.7] Password policies for IAM users should have strong configurations (p. 660)

If you disable these controls and disable recording of global resources in a particular Region, you should also disable [Config.1] AWS Config should be enabled (p. 626). This is because [Config.1] AWS Config should be enabled (p. 626) requires recording of global resources in order to pass.
Logging AWS Security Hub API calls with AWS CloudTrail

AWS Security Hub is integrated with AWS CloudTrail, a service that provides a record of actions taken by a user, role, or an AWS service in Security Hub. CloudTrail captures API calls for Security Hub as events. The captured calls include calls from the Security Hub console and code calls to the Security Hub API operations. If you create a trail, you can enable continuous delivery of CloudTrail events to an Amazon S3 bucket, including events for Security Hub. If you don't configure a trail, you can still view the most recent events on the CloudTrail console in Event history. Using the information that CloudTrail collects, you can determine the request that was made to Security Hub, the IP address that the request was made from, who made the request, when it was made, and additional details.

To learn more about CloudTrail, including how to configure and enable it, see the AWS CloudTrail User Guide.

Security Hub information in CloudTrail

CloudTrail is enabled on your AWS account when you create the account. When supported event activity occurs in Security Hub, that activity is recorded in a CloudTrail event along with other AWS service events in Event history. You can view, search, and download recent events in your account. For more information, see Viewing events with CloudTrail event history.

For an ongoing record of events in your account, including events for Security Hub, create a trail. A trail enables CloudTrail to deliver log files to an Amazon S3 bucket. By default, when you create a trail on the console, the trail applies to all AWS Regions. The trail logs events from all Regions in the AWS partition and delivers the log files to the Amazon S3 bucket that you specify. Additionally, you can configure other AWS services to further analyze and act upon the event data collected in CloudTrail logs. For more information, see the following:

- Overview for creating a trail
- CloudTrail supported services and integrations
- Configuring Amazon SNS notifications for CloudTrail
- Receiving CloudTrail log files from multiple regions and Receiving CloudTrail log files from multiple accounts

Security Hub supports logging all of the Security Hub API actions as events in CloudTrail logs. To view a list of Security Hub operations, see the Security Hub API Reference.

When activity for the following actions is logged to CloudTrail, the value for responseElements is set to null. This ensures that sensitive information isn't included in CloudTrail logs.

- BatchImportFindings
- GetFindings
- GetInsights
- GetMembers
- UpdateFindings
Every event or log entry contains information about who generated the request. The identity information helps you determine the following:

- Whether the request was made with root or AWS Identity and Access Management (IAM) user credentials
- Whether the request was made with temporary security credentials for a role or federated user
- Whether the request was made by another AWS service

For more information, see the CloudTrail userIdentity element.

Example: Security Hub log file entries

A trail is a configuration that enables delivery of events as log files to an Amazon S3 bucket that you specify. CloudTrail log files contain one or more log entries. An event represents a single request from any source and includes information about the requested action, the date and time of the action, request parameters, and so on. CloudTrail log files aren't an ordered stack trace of the public API calls, so they don't appear in any specific order.

The following example shows a CloudTrail log entry that demonstrates the CreateInsight action. In this example, an insight called Test Insight is created. The ResourceId attribute is specified as the Group by aggregator, and no optional filters for this insight are specified. For more information about insights, see Insights in AWS Security Hub (p. 79).

```
{
  "eventVersion": "1.05",
  "userIdentity": {
    "type": "IAMUser",
    "principalId": "AIDAJK6G5DS822IAUI7BW",
    "arn": "arn:aws:iam::012345678901:user/TestUser",
    "accountId": "012345678901",
    "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
    "userName": "TestUser"
  },
  "eventTime": "2018-11-25T01:02:18Z",
  "eventSource": "securityhub.amazonaws.com",
  "eventName": "CreateInsight",
  "awsRegion": "us-west-2",
  "sourceIPAddress": "205.251.233.179",
  "userAgent": "aws-cli/1.11.76 Python/2.7.10 Darwin/17.7.0 botocore/1.5.39",
  "requestParameters": {
    "Filters": {},
    "ResultField": "ResourceId",
    "Name": "Test Insight"
  },
  "responseElements": {
    "InsightArn": "arn:aws:securityhub:us-west-2:0123456789010:insight/custom/f4c4890b-ac6b-4c26-95f9-e62cc46f3055"
  },
  "requestID": "c0ffecd-f04d-11e8-93fc-ddcd14710066",
  "eventID": "3dabcebf-35b0-443f-a1a2-26e186ce23bf",
  "readOnly": false,
  "eventType": "AwsApiCall",
  "recipientAccountId": "012345678901"
}
```
Automated response and remediation

With Amazon EventBridge, you can automate your AWS services to respond automatically to system events such as application availability issues or resource changes. Events from AWS services are delivered to EventBridge in near-real time and on a guaranteed basis. You can write simple rules to indicate which events you are interested in and what automated actions to take when an event matches a rule. The actions that can be automatically triggered include the following:

- Invoking an AWS Lambda function
- Invoking the Amazon EC2 run command
- Relaying the event to Amazon Kinesis Data Streams
- Activating an AWS Step Functions state machine
- Notifying an Amazon SNS topic or an Amazon SQS queue
- Sending a finding to a third-party ticketing, chat, SIEM, or incident response and management tool

Security Hub automatically sends all new findings and all updates to existing findings to EventBridge as EventBridge events. You can also create custom actions that allow you to send selected findings and insight results to EventBridge.

You then configure EventBridge rules to respond to each type of event.

For more information about using EventBridge, see the Amazon EventBridge User Guide.

Note
As a best practice, make sure that the permissions granted to your users to access EventBridge use least-privilege IAM policies that grant only the required permissions.
For more information, see Identity and access management in Amazon EventBridge.

A set of templates for cross-account automated response and remediation is also available in AWS Solutions. The templates leverage EventBridge event rules and Lambda functions. You deploy the solution using AWS CloudFormation and AWS Systems Manager. The solution can create fully automated response and remediation actions. It can also use Security Hub custom actions to create user-triggered response and remediation actions. For details on how to configure and use the solution, see the AWS Solutions page for the Security Hub Automated Response and Remediation Solution.

Topics

- Types of Security Hub integration with EventBridge (p. 711)
- EventBridge event formats for Security Hub (p. 713)
- Configuring an EventBridge rule for automatically sent findings (p. 715)
- Using custom actions to send findings and insight results to EventBridge (p. 718)

Types of Security Hub integration with EventBridge

Security Hub uses the following EventBridge event types to support the following types of integration with EventBridge.
On the EventBridge dashboard for Security Hub, **All Events** includes all of these event types.

**All findings (Security Hub Findings - Imported)**

Security Hub automatically sends all new findings and all updates to existing findings to EventBridge as **Security Hub Findings - Imported** events. Each **Security Hub Findings - Imported** event contains a single finding.

Every **BatchImportFindings** and **BatchUpdateFindings** request triggers a **Security Hub Findings - Imported** event.

For administrator accounts, the event feed in EventBridge includes events for findings from both their account and from their member accounts.

You can define rules in EventBridge that automatically route findings to an Amazon S3 bucket, a remediation workflow, or a third-party tool. The rules can include filters that only apply the rule if the finding has specific attribute values.

You use this method to automatically send all findings, or all findings that have specific characteristics, to a response or remediation workflow.

See the section called "Configuring a rule for automatically sent findings" (p. 715).

**Findings for custom actions (Security Hub Findings - Custom Action)**

Security Hub also sends findings that are associated with custom actions to EventBridge as **Security Hub Findings - Custom Action** events.

This is useful for analysts working with the Security Hub console who want to send a specific finding, or a small set of findings, to a response or remediation workflow. You can select a custom action for up to 20 findings at a time. Each finding is sent to EventBridge as a separate EventBridge event.

When you create a custom action, you assign it a custom action ID. You can use this ID to create an EventBridge rule that takes a specified action after receiving a finding that is associated with that custom action ID.

See the section called “Configuring and using custom actions” (p. 718).

For example, you can create a custom action in Security Hub called *send_to_ticketing*. Then in EventBridge, you create a rule that is triggered when EventBridge receives a finding that includes the *send_to_ticketing* custom action ID. The rule includes logic to send the finding to your ticketing system. You can then select findings within Security Hub and use the custom action in Security Hub to manually send findings to your ticketing system.

For examples of how to send Security Hub findings to EventBridge for further processing, see How to Integrate AWS Security Hub Custom Actions with PagerDuty and How to Enable Custom Actions in AWS Security Hub on the AWS Partner Network (APN) Blog.

**Insight results for custom actions (Security Hub Insight Results)**

You can also use custom actions to send sets of insight results to EventBridge as **Security Hub Insight Results** events. Insight results are the resources that match an insight. Note that when you send insight results to EventBridge, you are not sending the findings to EventBridge. You are only sending
the resource identifiers that are associated with the insight results. You can send up to 100 resource identifiers at a time.

Similar to custom actions for findings, you first create the custom action in Security Hub, and then create a rule in EventBridge.

See the section called "Configuring and using custom actions" (p. 718).

For example, suppose you see a particular insight result of interest that you want to share with a colleague. In that case, you can use a custom action to send that insight result to the colleague through a chat or ticketing system.

EventBridge event formats for Security Hub

The Security Hub Findings - Imported, Security Findings - Custom Action, and Security Hub Insight Results event types use the following event formats.

The event format is the format that is used when Security Hub sends an event to EventBridge.

Security Hub Findings - Imported

Security Hub Findings - Imported events that are sent from Security Hub to EventBridge use the following format.

```
{
  "version": "0",
  "id": "CWE-event-id",
  "detail-type": "Security Hub Findings - Imported",
  "source": "aws.securityhub",
  "account": "111122223333",
  "time": "2019-04-11T21:52:17Z",
  "region": "us-west-2",
  "resources": [
  ],
  "detail": {
    "findings": [
      <finding content>
    ]
  }
}
```

<finding content> is the content, in JSON format, of the finding that is sent by the event.

For a complete list of finding attributes, see AWS Security Finding Format (ASFF) (p. 105).

For information about how to configure EventBridge rules that are triggered by these events, see the section called “Configuring a rule for automatically sent findings” (p. 715).

Security Hub Findings - Custom Action

Security Hub Findings - Custom Action events that are sent from Security Hub to EventBridge use the following format. Each finding is sent in a separate event.

```
Security Hub Insight Results

Security Hub Insight Results events that are sent from Security Hub to EventBridge use the following format.

```json
{
  "version": "0",
  "id": "1a111a1-b22b-3c33-444d-5555e5ee5555",
  "detail-type": "Security Hub Insight Results",
  "source": "aws.securityhub",
  "account": "111122223333",
  "time": "2017-12-22T18:43:48Z",
  "region": "us-west-1",
  "resources": [
    "arn:aws:securityhub:us-west-1:111122223333::product/aws/macie:us-west-1:222233334444:test/trigger/1ec9cf700e6be062b18584e0b7d84ec/alert/f2893b211841"
  ],
  "detail": {
    "actionName": "name of the action",
    "actionDescription": "description of the action",
    "insightArn": "ARN of the insight",
    "insightName": "Name of the insight",
    "resultType": "ResourceAwsIamAccessKeyUserName",
    "numberOfResults": "number of results, max of 100",
    "insightResults": [
      {"result 1": 5},
      {"result 2": 6}
    ]
  }
}
```

For information about how to create an EventBridge rule that is triggered by these events, see the section called “Configuring and using custom actions” (p. 718).
Configuring an EventBridge rule for automatically sent findings

You can create a rule in EventBridge that defines an action to take when a Security Hub Findings - Imported event is received. Security Hub Findings - Imported events are triggered by updates from both BatchImportFindings and BatchUpdateFindings.

Each rule contains an event pattern, which identifies the events that trigger the rule. The event pattern always contains the event source (aws.securityhub) and the event type (Security Hub Findings - Imported). The event pattern can also specify filters to identify the findings that the rule applies to.

The rule then identifies the rule targets. The targets are the actions to take when EventBridge receives a Security Hub Findings - Imported event and the finding matches the filters.

The instructions provided here use the EventBridge console. When you use the console, EventBridge automatically creates the required resource-based policy that enables EventBridge to write to CloudWatch Logs.

You can also use the PutRule API operation of the EventBridge API. However, if you use the EventBridge API, then you must create the resource-based policy. For details on the required policy, see CloudWatch Logs permissions in the Amazon EventBridge User Guide.

Format of the event pattern

The format of the event pattern for Security Hub Findings - Imported events is as follows:

```json
{
    "source": [
        "aws.securityhub"
    ],
    "detail-type": [
        "Security Hub Findings - Imported"
    ],
    "detail": {
        "findings": {
            "<attribute filter values>"
        }
    }
}
```

- source identifies Security Hub as the service that generates the event.
- detail-type identifies the type of event.
- detail is optional and provides the filter values for the event pattern. If the event pattern does not contain a detail field, then all findings trigger the rule.

You can filter the findings based on any finding attribute. For each attribute, you provide a comma-separated array of one or more values.

```
"<attribute name>": [ "<value1>" , "<value2>"
```

If you provide more than one value for an attribute, then those values are joined by OR. A finding matches the filter for an individual attribute if the finding has any of the listed values. For example, if you provide both INFORMATIONAL and LOW as values for Severity.Label, then the finding matches if it has a severity label of either INFORMATIONAL or LOW.
The attributes are joined by AND. A finding matches if it matches the filter criteria for all of the provided attributes.

When you provide an attribute value, it must reflect the location of that attribute within the AWS Security Finding Format (ASFF) structure.

For example, the following event pattern provides filter values for `ProductArn` and `Severity.Label`.

```json
{
  "source": [
    "aws.securityhub"
  ],
  "detail-type": [
    "Security Hub Findings - Imported"
  ],
  "detail": {
    "findings": {
      "ProductArn": ["arn:aws:securityhub:us-east-1::product/aws/inspector"],
      "Severity": {
        "Label": ["INFORMATIONAL", "LOW"]
      }
    }
  }
}
```

In this example, a finding matches if it was generated by Amazon Inspector and it has a severity label of either `INFORMATIONAL` or `LOW`.

### Using the predefined pattern to create the rule

EventBridge includes a predefined pattern that you can use to create the rule. When you select the predefined pattern, EventBridge automatically fills in `source` and `detail-type`. EventBridge also provides fields to specify filter values for the following finding attributes:

- `AwsAccountId`
- `Compliance.Status`
- `Criticality`
- `ProductArn`
- `RecordState`
- `Resource.Id`
- `Resource.Type`
- `Severity.Label`
- `Types`
- `Workflow.Status`

**To use the predefined pattern to create the EventBridge rule**

1. Open the Amazon EventBridge console at `https://console.aws.amazon.com/events/`.
2. In the navigation pane, under **Events**, choose **Rules**.
3. Choose **Create rule**.
4. Enter a name and description for the rule.
5. For **Event source**, choose **Event Pattern**.
6. For **Event matching pattern**, choose **Pre-defined pattern by service**.
7. For **Service provider**, choose **AWS**.
8. For **Service name**, choose **Security Hub**.
9. For **Event type**, choose **Security Hub Findings - Imported**.

   EventBridge populates the event pattern with the `source` and `detail-type` values and displays fields for the filter values.

10. By default, the event pattern is configured without any filter values. For each attribute, the **Any attribute name** option is selected. For example, **Any finding type**.

    For some attributes, such as product ARN or criticality, you enter each value manually. For other attributes, such as the severity label, you select values from a list of valid values.

    As you add and remove filter values, EventBridge updates the event pattern to reflect the changes.

    For values that are added manually, perform the following steps:

    1. Choose **Specific attribute**. For example, **Specific Resource type(s)**.
    2. To add a value, enter the value in the field, then choose **Add**.
    3. To remove a value, choose **Remove** for that value.

    For values that are added from a list, perform the following steps:

    1. Choose **Specific attribute**. For example, **Specific Workflow status(es)**.
    2. From the list, choose the attribute value.

        The selected value is added below the list.
    3. To remove a value, choose the remove icon (x) for that value.

11. Under **Select targets**, choose and configure the target to invoke when this rule is matched.
12. Choose **Create**.

### Using a custom pattern to create the rule

You can also create the rule using the custom pattern option. For a custom pattern, you enter the entire pattern manually.

You can use this option if you want to filter the findings based on attributes that do not have associated fields on the EventBridge console.

**To create an EventBridge rule for a Security Hub finding**

1. Open the Amazon EventBridge console at [https://console.aws.amazon.com/events/](https://console.aws.amazon.com/events/).
2. In the navigation pane, under **Events**, choose **Rules**.
3. Choose **Create rule**.
4. Enter a name and description for the rule.
5. For **Event source**, choose **Event Pattern**.
6. Choose **Custom pattern**.
7. Copy the following example pattern and paste it into the **Event pattern** text area. Be sure to replace the existing brackets.

```json
{
    "source": [
        "aws.securityhub"
    ]
}
```
This is the minimum required information for the event pattern. It identifies the source and the event type. With this pattern, all findings match the rule.

If you want to filter findings that trigger this rule, then you also add a detail entry. The detail entry contains the attribute values to use to filter the findings.

For each attribute that you provide, the format is as follows.

"<attribute name>": [ "<value>" ]

To match multiple values, provide a comma-separated list.

"<attribute name>": [ "<value1>", "<value2>" ]

For example, to only apply the rule to findings that have a verification state of TRUE_POSITIVE, add the following filter.

8. Choose Save to save the pattern.
9. Under Select targets, choose and configure the target to invoke when this rule is matched.
10. Choose Create.

Using custom actions to send findings and insight results to EventBridge

To use Security Hub custom actions to send findings or insight results to EventBridge, you first create the custom action in Security Hub. Then define the rule in EventBridge.
You can create up to 50 custom actions. The rule in EventBridge uses the ARN from the custom action.

**Creating a custom action (console)**

When you create a custom action, you specify the name, description, and a unique identifier.

**To create a custom action in Security Hub (console)**

2. In the navigation pane, choose **Settings** and then choose **Custom actions**.
3. Choose **Create custom action**.
4. Provide a **Name**, **Description**, and **Custom action ID** for the action.

   The **Name** must be fewer than 20 characters.

   The **Custom action ID** must be unique for each AWS account.

5. Choose **Create custom action**.
6. Make a note of the **Custom action ARN**. You need to use the ARN when you create a rule to associate with this action in EventBridge.

**Creating a custom action (Security Hub API, AWS CLI)**

To create a custom action, you can use an API call or the AWS Command Line Interface.

**To create a custom action (Security Hub API, AWS CLI)**

- **Security Hub API** – Use the `CreateActionTarget` operation. When you create a custom action, you provide the name, description, and custom action identifier.
- **AWS CLI** – At the command line, run the `create-action-target` command.

```bash
create-action-target --name <customActionName> --description <customActionDescription> --id <customActionIdentifier>
```

**Example**

```bash
aws securityhub create-action-target --name "Send to remediation" --description "Action to send the finding for remediation tracking" --id "Remediation"
```

**Defining a rule in EventBridge**

To process the custom action, you must create a corresponding rule in EventBridge. The rule definition includes the ARN of the custom action.

The event pattern for a **Security Hub Findings - Custom Action** event has the following format:

```
{
    "source": [ 
        "aws.securityhub"
    ],
```

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"detail-type": [  "Security Hub Findings - Custom Action" ],  "resources": [ "<custom action ARN>" ]  }

The event pattern for a **Security Hub Insight Results** event has the following format:

```
{  "source": [ "aws.securityhub" ],  "detail-type": [ "Security Hub Insight Results" ],  "resources": [ "<custom action ARN>" ] }
```

In both formats, `<custom action ARN>` is the ARN of a custom action. You can configure a rule that applies to more than one custom action.

The instructions provided here are for the EventBridge console. When you use the console, EventBridge automatically creates the required resource-based policy that enables EventBridge to write to CloudWatch Logs.

You can also use the `PutRule` API operation of the EventBridge API. However, if you use the EventBridge API, then you must create the resource-based policy. For details on the required policy, see CloudWatch Logs permissions in the *Amazon EventBridge User Guide*.

**To define a rule in EventBridge**

1. Open the Amazon EventBridge console at https://console.aws.amazon.com/events/.
2. In the navigation pane, choose **Rules**.
3. Choose **Create rule**.
4. Enter a name and description for the rule.
5. For **Event source**, choose **Event Pattern**.
6. For **Event matching pattern**, choose **Pre-defined pattern by service**.
7. For **Service provider**, choose **AWS**.
8. For **Service name**, choose **Security Hub**.
9. For **Event type**, to create a rule to apply when you send findings to a custom action, choose **Security Hub Findings - Custom Action**.

   To create a rule to apply when you send insight results to a custom action, choose **Security Hub Insight Results**.
10. For each custom action that this rule applies to, perform the following steps:
   a. Choose **Specific custom action**.
   b. To add a custom action ARN, enter the ARN in the field, and then choose **Add**.
   c. To remove a custom action ARN, choose **Remove** for that value.
11. Under **Select targets**, choose and configure the target to invoke when this rule is matched.
12. Choose **Create**.

After this rule is created in EventBridge, when you perform a custom action on findings or insight results in your account, events are generated in EventBridge.
Selecting a custom action for findings and insight results

After you create your Security Hub custom actions and EventBridge rules, you can send findings and insight results to EventBridge for further management and processing.

Events are sent to EventBridge only in the account in which they are viewed. If you view a finding using an administrator account, the event is sent to EventBridge in the administrator account.

For AWS API calls to be effective, the implementations of target code must switch roles into member accounts. This also means that the role you switch into must be deployed to each member where action is needed.

To send findings to EventBridge

2. Display a list of findings:
   - From Findings, you can view findings from all of the enabled product integrations and controls.
   - From Security standards, you can navigate to a list of findings generated from a selected control. See the section called “Viewing details for a control” (p. 496).
   - From Integrations, you can navigate to a list of findings generated by an enabled integration. See the section called “Viewing the findings from an integration” (p. 465).
   - From Insights, you can navigate to a list of findings for an insight result. See the section called “Viewing insight results and findings” (p. 79).
3. Select the findings to send to EventBridge. You can select up to 20 findings at a time.
4. From Actions, choose the custom action that aligns with the EventBridge rule to apply.
   Security Hub sends a separate Security Hub Findings - Custom Action event for each finding.

To send insight results to EventBridge

2. In the navigation pane, choose Insights.
3. On the Insights page, choose the insight that includes the results to send to EventBridge.
4. Select the insight results to send to EventBridge. You can select up to 20 results at a time.
5. From Actions, choose the custom action that aligns with the EventBridge rule to apply.
Disabling AWS Security Hub

To disable AWS Security Hub, you can use the Security Hub console or the Security Hub API.

You cannot disable Security Hub in the following cases:

- Your account is the designated Security Hub administrator account for an organization.
- Your account is a Security Hub administrator account by invitation, and you have member accounts that are enabled. Before you can disable Security Hub, you must disassociate all of your member accounts. See the section called "Disassociating member accounts" (p. 75).
- Your account is a member account. Before you can disable Security Hub, your account must be disassociated from your administrator account.

For an organization account, only the administrator account can disassociate member accounts. See the section called "Disassociating member accounts" (p. 70).

For manually invited accounts, either the administrator account or the member account can disassociate the member account. See the section called "Disassociating member accounts" (p. 75) or the section called "Disassociating from your administrator account" (p. 76).

When you disable Security Hub for an account, it is disabled only in the current Region. No new findings are processed for the account in that Region.

The following also occurs.

- After 90 days, your existing findings and insights and any Security Hub configuration settings are deleted and cannot be recovered.
  
  If you want to save your existing findings, you must export them before you disable Security Hub. For more information, see the section called "Effect of account actions on Security Hub data" (p. 77).
- Any enabled standards are disabled.

Disabling Security Hub (console)

You can disable Security Hub from the AWS Management Console.

To disable Security Hub (console)

2. In the navigation pane, choose Settings.

Disabling Security Hub (Security Hub API, AWS CLI)

To disable Security Hub, you can use an API call or the AWS Command Line Interface.
To disable Security Hub (Security Hub API, AWS CLI)

- **Security Hub API** – Use the `DisableSecurityHub` operation.
- **AWS CLI** – At the command line, run the `disable-security-hub` command.

```bash
aws securityhub disable-security-hub
```
## Document history for the AWS Security Hub User Guide

The following table describes the updates to the documentation for AWS Security Hub.

<table>
<thead>
<tr>
<th>update-history-change</th>
<th>update-history-description</th>
<th>update-history-date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration with AWS Organizations is now supported in the China Regions (p. 724)</td>
<td>The Security Hub integration with Organizations is now supported in China (Beijing) and China (Ningxia).</td>
<td>September 20, 2021</td>
</tr>
<tr>
<td>New AWS Config rule for the S3.1 and PCI.S3.6 controls (p. 724)</td>
<td>Both S3.1 and PCI.S3.6 verify that the Amazon S3 Block Public Access setting is enabled. The AWS Config rule for these controls is changed from <code>s3-account-level-public-access-blocks</code> to <code>s3-account-level-public-access-blocks-periodic</code>.</td>
<td>September 14, 2021</td>
</tr>
<tr>
<td>Removed deprecated runtimes from the Lambda.2 control</td>
<td>In the AWS Foundational Security Best Practices standard, removed the <code>nodejs10.x</code> and <code>ruby2.5</code> runtimes from [Lambda.2] Lambda functions should use supported runtimes.</td>
<td>September 13, 2021</td>
</tr>
<tr>
<td>Changed the severity of the CIS 2.2 control</td>
<td>In the CIS AWS Foundations Benchmark standard, the severity for 2.2. – Ensure CloudTrail log file validation is enabled is changed from Low to Medium.</td>
<td>September 13, 2021</td>
</tr>
<tr>
<td>Updated ECS.1, Lambda.2, and SSM.1 in the AWS Foundational Security Best Practices standard</td>
<td>In the AWS Foundational Security Best Practices standard, ECS.1 now has a <code>SkipInactiveTaskDefinitions</code> parameter that is set to true. This ensures that the control only checks active task definitions. For Lambda.2, added Python 3.9 to the list of runtimes. SSM.1 now checks both stopped and running instances.</td>
<td>September 7, 2021</td>
</tr>
<tr>
<td>PCI.Lambda.2 control now excludes Lambda@Edge resources</td>
<td>In the Payment Card Industry Data Security Standard (PCI DSS) standard, the PCI.Lambda.2 control now excludes Lambda@Edge resources.</td>
<td>September 7, 2021</td>
</tr>
<tr>
<td>Event</td>
<td>Details</td>
<td>Date</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Added the integration with HackerOne Vulnerability Intelligence</td>
<td>Security Hub now offers an integration with HackerOne Vulnerability Intelligence. The integration sends findings to Security Hub.</td>
<td>September 7, 2021</td>
</tr>
<tr>
<td>Updated resource details objects in ASFF</td>
<td>For <strong>AwsKmsKey</strong>, added <strong>KeyRotationStatus</strong>. For <strong>AwsS3Bucket</strong>, added <strong>AccessControlList</strong>, <strong>BucketLoggingConfiguration</strong>, <strong>BucketNotificationConfiguration</strong>, and <strong>BucketWebsiteConfiguration</strong>.</td>
<td>September 2, 2021</td>
</tr>
<tr>
<td>Added new resource details objects to ASFF</td>
<td>Added the following new resource details objects to ASFF: <strong>AwsAutoScalingLaunchConfiguration</strong>, <strong>AwsEc2VpnConnection</strong>, and <strong>AwsEcrContainerImage</strong>.</td>
<td>September 2, 2021</td>
</tr>
<tr>
<td>Added details to the Vulnerabilities object in ASFF</td>
<td>In <strong>Cvss</strong>, added <strong>Adjustments</strong> and <strong>Source</strong>. In <strong>VulnerablePackages</strong>, added the file path and package manager.</td>
<td>September 2, 2021</td>
</tr>
<tr>
<td>Systems Manager Explorer and OpsCenter integration now supported in the China Regions (p. 724)</td>
<td>The Security Hub integration with SSM Explorer and OpsCenter is now supported in China (Beijing) and China (Ningxia).</td>
<td>August 31, 2021</td>
</tr>
<tr>
<td>Retiring the Lambda.4 control (p. 724)</td>
<td>Security Hub is retiring the control <strong>[Lambda.4]</strong> Lambda functions should have a dead-letter queue configured. When a control is retired, it no longer displays on the console, and Security Hub does not perform checks against it.</td>
<td>August 31, 2021</td>
</tr>
<tr>
<td>Retiring the PCI.EC2.3 control (p. 724)</td>
<td>Security Hub is retiring the control <strong>[PCI.EC2.3]</strong> Unused EC2 security groups should be removed. When a control is retired, it no longer displays on the console, and Security Hub does not perform checks against it.</td>
<td>August 27, 2021</td>
</tr>
<tr>
<td>Change to how Security Hub sends findings to custom actions</td>
<td>When you send findings to a custom action, Security Hub now sends each finding in a separate Security Hub Findings - Custom Action event.</td>
<td>August 20, 2021</td>
</tr>
<tr>
<td>Added a new compliance status reason code for custom Lambda runtimes</td>
<td>Added a new <code>LAMBDA_CUSTOM_RUNTIME_DETAILS_NOT_AVAILABLE</code> compliance status reason code. This reason code indicates that Security Hub could not perform a check against a custom Lambda runtime.</td>
<td>August 20, 2021</td>
</tr>
<tr>
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</tr>
<tr>
<td>AWS Firewall Manager integration now supported in the China Regions (p. 724)</td>
<td>The Security Hub integration with Firewall Manager is now supported in China (Beijing) and China (Ningxia).</td>
<td>August 19, 2021</td>
</tr>
<tr>
<td>Added new <code>CompanyName</code>, <code>ProductName</code>, and <code>Region</code> attributes to ASFF</td>
<td>Added <code>CompanyName</code>, <code>ProductName</code>, and <code>Region</code> fields to the top level of the ASFF. These fields are populated automatically and, except for custom product integrations, cannot be updated using <code>BatchImportFindings</code> or <code>BatchUpdateFindings</code>. On the console, finding filters use these new fields. In the API, the <code>CompanyName</code> and <code>ProductName</code> filters use the attributes that are under <code>ProductFields</code>.</td>
<td>July 23, 2021</td>
</tr>
<tr>
<td>Added controls to the AWS Foundational Security Best Practices standard</td>
<td>Added new controls for Amazon API Gateway (APIGateway.5), Amazon EC2 (EC2.19), Amazon ECS (ECS.2), Elastic Load Balancing (ELB.7), Amazon OpenSearch Service (ES.5 through ES.8), Amazon RDS (RDS.16 through RDS.23), Amazon Redshift (Redshift.4), and Amazon SQS (SQS.1).</td>
<td>July 20, 2021</td>
</tr>
<tr>
<td>Added controls to the AWS Foundational Security Best Practices standard</td>
<td>Added new controls for Amazon API Gateway (APIGateway.4), Amazon CloudFront (CloudFront.5 and CloudFront.6), Amazon EC2 (EC2.17 and EC2.18), Amazon ECS (ECS.1), Amazon OpenSearch Service (ES.4), AWS Identity and Access Management (IAM.21), Amazon RDS (RDS.15), and Amazon S3 (S3.8).</td>
<td>July 8, 2021</td>
</tr>
<tr>
<td>Added new compliance status reason codes for control findings</td>
<td>INTERNALSERVICE_ERROR indicates that an unknown error occurred. SNS_TOPIC_CROSS_ACCOUNT indicates that the SNS topic is owned by a different account. SNS_TOPIC_INVALID indicates that the associated SNS topic is invalid.</td>
<td>July 6, 2021</td>
</tr>
<tr>
<td>Added the integration with AWS Chatbot</td>
<td>Added the integration with AWS Chatbot. Security Hub sends findings to AWS Chatbot.</td>
<td>June 30, 2021</td>
</tr>
<tr>
<td>Added a new permission to the service-linked role managed policy</td>
<td>Added a new permission to the managed policy AWSSecurityHubServiceRolePolicy to allow the service-linked role to deliver evaluation results to AWS Config.</td>
<td>June 29, 2021</td>
</tr>
<tr>
<td>New and updated resource details objects in the ASFF</td>
<td>Added new resource details objects for ECS clusters and ECS task definitions. Updated the EC2 instance object to list the associated network interfaces. Added the client certificate ID for the API Gateway V2 stages. Added the lifecycle configuration for S3 buckets.</td>
<td>June 24, 2021</td>
</tr>
<tr>
<td>Updated the calculation of aggregated control statuses and standard security scores (p. 724)</td>
<td>Security Hub now calculates the overall control status and standard security score every 24 hours. For administrator accounts, the score now reflects whether each control is enabled or disabled for each account.</td>
<td>June 23, 2021</td>
</tr>
<tr>
<td>Updated information about Security Hub handling of suspended accounts</td>
<td>Added information on how Security Hub handles accounts that are suspended in AWS.</td>
<td>June 23, 2021</td>
</tr>
<tr>
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</tr>
<tr>
<td>Added tabs to display the enabled and disabled controls for the individual administrator account</td>
<td>For the administrator account, the main tabs on the standard details page contain aggregated information across accounts. The new <strong>Enabled for this account</strong> and <strong>Disabled for this account</strong> tabs list the accounts that are enabled or disabled for the individual administrator account.</td>
<td>June 23, 2021</td>
</tr>
<tr>
<td>Added <strong>java8.al2</strong> to the parameters for <strong>Lambda.2</strong></td>
<td>In the AWS Foundational Security Best Practices standard, added <strong>java8.al2</strong> to the supported runtimes for the <strong>Lambda.2</strong> control.</td>
<td>June 8, 2021</td>
</tr>
<tr>
<td>New integrations with MicroFocus ArcSight and NETSCOUT Cyber Investigator</td>
<td>Added integrations with MicroFocus ArcSight and NETSCOUT Cyber Investigator. MicroFocus ArcSight receives findings from Security Hub. NETSCOUT Cyber Investigator sends findings to Security Hub.</td>
<td>June 7, 2021</td>
</tr>
<tr>
<td><strong>Added details for AWSSecurityHubServiceRolePolicy</strong></td>
<td>Updated the managed policies section to add details for the existing managed policy <strong>AWSSecurityHubServiceRolePolicy</strong>, which is used by the Security Hub service-linked role.</td>
<td>June 4, 2021</td>
</tr>
<tr>
<td>New integration with Jira Service Management</td>
<td>The AWS Service Management Connector for Jira sends findings to Jira and uses them to create Jira issues. When the Jira issues are updated, the corresponding findings in Security Hub also are updated.</td>
<td>May 26, 2021</td>
</tr>
<tr>
<td>Updated the supported controls list for the Asia Pacific (Osaka) Region</td>
<td>Updated the CIS AWS Foundations standard and the Payment Card Industry Data Security Standard (PCI DSS) to indicate the controls that are not supported in Asia Pacific (Osaka).</td>
<td>May 21, 2021</td>
</tr>
<tr>
<td>New integration with Sysdig Secure for cloud</td>
<td>Added an integration with Sysdig Secure for cloud. The integration sends findings to Security Hub.</td>
<td>May 14, 2021</td>
</tr>
<tr>
<td>Added controls to the AWS Foundational Security Best Practices standard</td>
<td>Added new controls for Amazon API Gateway (APIGateway.2 and APIGateway.3), AWS CloudTrail (CloudTrail.4 and CloudTrail.5), Amazon EC2 (EC2.15 and EC2.16), AWS Elastic Beanstalk (ElasticBeanstalk.1 and ElasticBeanstalk.2), AWS Lambda (Lambda.4), Amazon RDS (RDS.12 – RDS.14), Amazon Redshift (Redshift.7), AWS Secrets Manager (SecretsManager.3 and SecretsManager.4), and AWS WAF (WAF.1).</td>
<td>May 10, 2021</td>
</tr>
<tr>
<td>Updates to GuardDuty and Amazon RDS controls (p. 724)</td>
<td>Changed the severity of GuardDuty.1 and PCI.GuardDuty.1 from Medium to High. Added a databaseEngines parameter to RDS.8.</td>
<td>May 4, 2021</td>
</tr>
<tr>
<td>Added new resource details to the ASFF</td>
<td>In Resources.Details, added new resource details objects for Amazon EC2 network ACLs, Amazon EC2 subnets, and AWS Elastic Beanstalk environments.</td>
<td>May 3, 2021</td>
</tr>
<tr>
<td>Added console fields to provide filter values for Amazon EventBridge rules (p. 724)</td>
<td>The new predefined filter patterns for Security Hub EventBridge rules provide console fields that you can use to specify filter values.</td>
<td>April 30, 2021</td>
</tr>
<tr>
<td>Added the integration with AWS Systems Manager Explorer and OpsCenter</td>
<td>Security Hub now supports an integration with Systems Manager Explorer and OpsCenter. The integration receives findings from Security Hub and updates those findings in Security Hub.</td>
<td>April 26, 2021</td>
</tr>
<tr>
<td>New type for product integrations (p. 724)</td>
<td>A new integration type, UPDATE_FINDINGS_IN_SECURITY_HUB, indicates that a product integration updates findings that it receives from Security Hub.</td>
<td>April 22, 2021</td>
</tr>
<tr>
<td>Changed &quot;master account&quot; to &quot;administrator account&quot; (p. 724)</td>
<td>The term &quot;master account&quot; is changed to &quot;administrator account.&quot; The term is also changed in the Security Hub console and API.</td>
<td>April 22, 2021</td>
</tr>
<tr>
<td>Added/Updated</td>
<td>Description</td>
<td>Date</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Updated APIGateway.1 to replace HTTP with Websocket</td>
<td>Updated the title, description, and remediation for APIGateway.1. The control now checks for Websocket API execution logging instead of for HTTP API execution logging.</td>
<td>April 9, 2021</td>
</tr>
<tr>
<td>Amazon GuardDuty integration now supported in Beijing and Ningxia (p. 724)</td>
<td>The Security Hub integration with GuardDuty is now supported in the China (Beijing) and China (Ningxia) Regions.</td>
<td>April 5, 2021</td>
</tr>
<tr>
<td>Added nodejs14.x to the supported runtimes for Lambda.2 control</td>
<td>The Lambda.2 control in the Foundational Security Best Practices standard now supports the nodejs14.x runtime.</td>
<td>March 30, 2021</td>
</tr>
<tr>
<td>Security Hub launched in Asia Pacific (Osaka) (p. 724)</td>
<td>Security Hub is now available in the Asia Pacific (Osaka) Region.</td>
<td>March 29, 2021</td>
</tr>
<tr>
<td>Added finding provider fields to finding details (p. 724)</td>
<td>On the finding details panel, the new Finding Provider Fields section contains the finding provider values for confidence, criticality, related findings, severity, and types.</td>
<td>March 24, 2021</td>
</tr>
<tr>
<td>Added option to receive sensitive findings from Amazon Macie</td>
<td>The integration with Macie can now be configured to send sensitive findings to Security Hub.</td>
<td>March 23, 2021</td>
</tr>
<tr>
<td>Added information on making the transition to using AWS Organizations for account management</td>
<td>For customers who have an existing master account with member accounts, added new information on how to change from managing accounts by invitation to managing accounts using Organizations.</td>
<td>March 22, 2021</td>
</tr>
<tr>
<td>New objects in ASFF for information about Amazon S3 Public Access Block configuration</td>
<td>In Resources, a new AwsS3AccountPublicAccessBlock resource type and details object provides information about the Amazon S3 Public Access Block configuration for accounts. In the AwsS3Bucket resource details object, the PublicAccessBlockConfiguration object provides the Public Access Block configuration for the S3 bucket.</td>
<td>March 18, 2021</td>
</tr>
<tr>
<td>New object in ASFF to allow finding providers to update specific fields</td>
<td>The new FindingProviderFields object in ASFF is used in BatchImportFindings to provide values for Confidence, Criticality, RelatedFindings, Severity, and Types. The original fields should only be updated using BatchUpdateFindings.</td>
<td>March 18, 2021</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td>New DataClassification object for resources in ASFF</td>
<td>The new Resources.DataClassification object in ASFF is used to provide information about sensitive data that was detected on the resource.</td>
<td>March 18, 2021</td>
</tr>
<tr>
<td>Added CONFIG_RETURNS_NOT_APPLICABLE value to the available compliance status codes</td>
<td>For the NOT_AVAILABLE compliance status, removed the reason code RESOURCE_NO_LONGER_EXISTS and added the reason code CONFIG_RETURNS_NOT_APPLICABLE.</td>
<td>March 16, 2021</td>
</tr>
<tr>
<td>New managed policy for integration with AWS Organizations</td>
<td>A new managed policy, AWSSecurityHubOrganizationsAccess, provides the Organizations permissions that are needed by the organization management account and the delegated Security Hub administrator account.</td>
<td>March 15, 2021</td>
</tr>
<tr>
<td>Managed policy and service-linked role information moved to the Security chapter</td>
<td>The information on managed policies is revised and expanded. Both the managed policy information and the information on service-linked roles has moved to the Security chapter.</td>
<td>March 15, 2021</td>
</tr>
<tr>
<td>New integration with SecureCloudDB</td>
<td>Added SecureCloudDB to the list of third-party integrations. SecureCloudDB is a cloud native database security tool that provides comprehensive visibility of internal and external security postures and activity. SecureCloudDB sends findings to Security Hub.</td>
<td>March 4, 2021</td>
</tr>
<tr>
<td>Revised severity for CIS 1.1 and CIS 3.1 – CIS 3.14 controls</td>
<td>The severity of the CIS 1.1 and CIS 3.1 – CIS 3.14 controls is changed to Low.</td>
<td>March 3, 2021</td>
</tr>
<tr>
<td>Updated integration for Turbot</td>
<td>The Turbot integration is updated to both send and receive findings.</td>
<td>February 26, 2021</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Added controls to the Foundational Security Best Practices standard</td>
<td>Added new controls for Amazon API Gateway (APIGateway.1), Amazon EC2 (EC2.9 and EC2.10), Amazon Elastic File System (EFS.2), Amazon OpenSearch Service (ES.2 and ES.3), Elastic Load Balancing (ELB.6), and AWS Key Management Service (AWS KMS) (KMS.3).</td>
<td>February 11, 2021</td>
</tr>
<tr>
<td>Added optional ProductArn filter to the DescribeProducts API</td>
<td>The DescribeProducts API operation now includes an optional ProductArn parameter. The ProductArn parameter is used to identify the specific product integration to return details for.</td>
<td>February 3, 2021</td>
</tr>
<tr>
<td>New integration with Antivirus for Amazon S3 from Cloud Storage Security</td>
<td>The integration with Antivirus for Amazon S3 sends the virus scan results to Security Hub as findings.</td>
<td>January 27, 2021</td>
</tr>
<tr>
<td>Updated the security score calculation process for master accounts</td>
<td>For a master account, Security Hub uses a separate process to calculate the security score. The new process ensures that the score includes controls that are enabled for member accounts but disabled for the master account.</td>
<td>January 21, 2021</td>
</tr>
<tr>
<td>New fields and objects in the ASFF</td>
<td>Added a new Action object to track actions that occurred against a resource. Added fields to the AwsEc2NetworkInterface object to track DNS names and IP addresses. Added a new AwsSsmPatchCompliance object to the resource details.</td>
<td>January 21, 2021</td>
</tr>
<tr>
<td>Added controls to the Foundational Security Best Practices standard</td>
<td>Added new controls for Amazon CloudFront (CloudFront.1 through CloudFront.4), Amazon DynamoDB (DynamoDB.1 through DynamoDB.3), Elastic Load Balancing (ELB.3 through ELB.5), Amazon RDS (RDS.9 through RDS.11), Amazon Redshift (Redshift.1 through Redshift.3 and Redshift.6), and Amazon SNS (SNS.1).</td>
<td>January 15, 2021</td>
</tr>
<tr>
<td><strong>Workflow status is reset based on the record state or compliance status</strong></td>
<td>Security Hub automatically resets the workflow status from NOTIFIED or RESOLVED to NEW if an archived finding is made active, or if the compliance status of a finding changes from PASSED to either FAILED, WARNING, or NOT AVAILABLE. These changes indicate that additional investigation is required.</td>
<td>January 7, 2021</td>
</tr>
<tr>
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</tr>
<tr>
<td><strong>Added ProductFields information for control-based findings</strong></td>
<td>For findings that are generated from controls, added information about the content of the ProductFields object in the AWS Security Finding Format (ASFF).</td>
<td>December 29, 2020</td>
</tr>
<tr>
<td><strong>Updates to managed insights</strong></td>
<td>Changed the title of insight 5. Added a new insight 32 that checks for IAM users with suspicious activity.</td>
<td>December 22, 2020</td>
</tr>
<tr>
<td><strong>Updates to IAM.7 and Lambda.1 controls</strong></td>
<td>In the AWS Foundational Security Best Practices standard, updated the parameters for IAM.7. Updated the title and description of Lambda.1.</td>
<td>December 22, 2020</td>
</tr>
<tr>
<td><strong>Expanded integration with ServiceNow ITSM</strong></td>
<td>The ServiceNow ITSM integration allows users to automatically create incidents or problems when a Security Hub finding is received. Updates to these incidents or problems result in updates to the findings in Security Hub.</td>
<td>December 11, 2020</td>
</tr>
<tr>
<td><strong>New integration with AWS Audit Manager</strong></td>
<td>Security Hub now offers an integration with AWS Audit Manager. The integration allows Audit Manager to receive control-based findings from Security Hub.</td>
<td>December 8, 2020</td>
</tr>
<tr>
<td><strong>Cloud Custodian is now available in the China Regions</strong></td>
<td>The integration with Cloud Custodian is now available in the China (Beijing) and China (Ningxia) Regions.</td>
<td>November 24, 2020</td>
</tr>
<tr>
<td>Change</td>
<td>Description</td>
<td>Date</td>
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<td>----------------------------------------------------------------------</td>
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</tr>
<tr>
<td><strong>BatchImportFindings can now be used to update additional fields</strong></td>
<td>Previously, you could not use BatchImportFindings to update the Confidence, Criticality, RelatedFindings, Severity, and Types fields. Now, if these fields have not been updated by BatchUpdateFindings, they can be updated by BatchImportFindings. Once they are updated by BatchUpdateFindings, they cannot be updated by BatchImportFindings.</td>
<td>November 24, 2020</td>
</tr>
<tr>
<td><strong>Security Hub is now integrated with AWS Organizations</strong></td>
<td>Customers can now manage member accounts using their Organizations account configuration. The organization management account designates the Security Hub administrator account, who determines which organization accounts to enable in Security Hub. The manual invitation process can still be used for accounts that are not part of an organization.</td>
<td>November 23, 2020</td>
</tr>
<tr>
<td><strong>Removed the separate finding list format for high-volume controls (p. 724)</strong></td>
<td>The finding list for a control no longer uses the Findings page format when there is a very large number of findings.</td>
<td>November 19, 2020</td>
</tr>
<tr>
<td><strong>New and updated third-party integrations</strong></td>
<td>Security Hub now supports integrations with cloudtamer.io, 3CORESec, Prowler, and StackRox Kubernetes Security. IBM QRadar no longer sends findings. It only receives findings.</td>
<td>October 30, 2020</td>
</tr>
<tr>
<td><strong>Added option to download the list of findings from the control details page.</strong></td>
<td>On the control details page, a new Download option allows you to download the finding list to a .csv file. The downloaded list respects any filters that are on the list. If you selected specific findings, then the downloaded list only includes those findings.</td>
<td>October 26, 2020</td>
</tr>
<tr>
<td>Added option to download the list of controls from the standard details page.</td>
<td>On the standard details page, a new Download option allows you to download the control list to a .csv file. The downloaded list respects any filters that are on the list. If you selected a specific control, then the downloaded list only includes that control.</td>
<td>October 26, 2020</td>
</tr>
<tr>
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</tr>
<tr>
<td>New and updated partner integrations</td>
<td>Security Hub is now integrated with ThreatModeler. Updated the following partner integrations to reflect their new product names. Twistlock Enterprise Edition is now Palo Alto Networks - Prisma Cloud Compute. Also from Palo Alto Networks, Demisto is now Cortex XSOAR and Redlock is now Prisma Cloud Enterprise.</td>
<td>October 23, 2020</td>
</tr>
<tr>
<td>Security Hub launched in China (Beijing) and China (Ningxia) (p. 724)</td>
<td>Security Hub is now available in the China (Beijing) and China (Ningxia) Regions.</td>
<td>October 21, 2020</td>
</tr>
<tr>
<td>Revised format for ASFF attributes and third-party integrations (p. 724)</td>
<td>The lists of ASFF attributes and partner integrations now use a list-based format instead of tables. The ASFF syntax, attributes, and types taxonomy are now in separate topics.</td>
<td>October 15, 2020</td>
</tr>
<tr>
<td>Redesigned standard details page</td>
<td>The standard details page for an enabled standard now displays a tabbed list of controls. The tabs filter the control list based on the control status.</td>
<td>October 7, 2020</td>
</tr>
<tr>
<td>Replaced CloudWatch Events with EventBridge (p. 724)</td>
<td>Replaced references to Amazon CloudWatch Events with Amazon EventBridge.</td>
<td>October 1, 2020</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
<td>Date</td>
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</tr>
<tr>
<td>New and updated resource details objects in ASFF</td>
<td>Added new Resources.Details objects for AwsApiGatewayRestApi, AwsApiGatewayStage, AwsApiGatewayV2Api, AwsApiGatewayV2Stage, AwsCertificateManagerCertificate, AwsElbLoadBalancer, AwsIamGroup, and AwsRedshiftCluster. Added details to the AwsCloudFrontDistribution, AwsIamRole and AwsIamAccessKey objects.</td>
<td>September 30, 2020</td>
</tr>
<tr>
<td>New ResourceRole attribute for resources in ASFF to track whether a resource is an actor or a target</td>
<td>The ResourceRole attribute for resources indicates whether the resource is the target of the finding activity or the perpetrator of the finding activity. The valid values are ACTOR and TARGET.</td>
<td>September 30, 2020</td>
</tr>
<tr>
<td>Added AWS Systems Manager Patch Manager to available AWS service integrations</td>
<td>AWS Systems Manager Patch Manager is now integrated with Security Hub. Patch Manager sends findings to Security Hub when instances in a customer's fleet go out of compliance with their patch compliance standard.</td>
<td>September 22, 2020</td>
</tr>
<tr>
<td>Added new controls to the Foundational Security Best Practices standard</td>
<td>Added new controls for the following services: Amazon EC2 (EC2.7 and EC2.8), Amazon EMR (EMR.1), IAM (IAM.8), Amazon RDS (RDS.4 through RDS.8), Amazon S3 (S3.6), and AWS Secrets Manager (SecretsManager.1 and SecretsManager.2).</td>
<td>September 15, 2020</td>
</tr>
<tr>
<td>New context keys for IAM policy to control access to BatchUpdateFindings fields</td>
<td>IAM policies can now be configured to restrict access to fields and field values when using BatchUpdateFindings.</td>
<td>September 10, 2020</td>
</tr>
<tr>
<td>Expanded access to BatchUpdateFindings for member accounts</td>
<td>By default, member accounts now have the same access to BatchUpdateFindings as master accounts.</td>
<td>September 10, 2020</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
<td>Date</td>
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</tr>
<tr>
<td>Removed account-level findings for controls (p. 724)</td>
<td>Security Hub no longer generates account-level findings for a control. Only resource-level findings are generated.</td>
<td>September 1, 2020</td>
</tr>
<tr>
<td>New PatchSummary object in ASFF</td>
<td>Added the <code>PatchSummary</code> object to the ASFF. The <code>PatchSummary</code> object provides information about the patch compliance of a resource relative to a selected compliance standard.</td>
<td>September 1, 2020</td>
</tr>
<tr>
<td>Redesigned control details page</td>
<td>The details page for controls is redesigned. The control finding list provides tabs to allow you to quickly filter the list based on the compliance status. You can also quickly see suppressed findings. Each entry provides access to additional details about the finding resource, AWS Config rule, and finding notes.</td>
<td>August 28, 2020</td>
</tr>
<tr>
<td>New filter options for findings</td>
<td>For finding filters, you can use the <code>is not</code> filter to find findings for which a field value is not equal to the filter value. You can use the <code>does not start with</code> to find findings for which a field value does not start with the specified filter value.</td>
<td>August 28, 2020</td>
</tr>
<tr>
<td>New resource details objects in ASFF</td>
<td>Added new <code>Resources.Details</code> objects for the following resource types: <code>AwsDynamoDbTable</code>, <code>AwsEc2Eip</code>, <code>AwsIamPolicy</code>, <code>AwsIamUser</code>, <code>AwsRdsDbCluster</code>, <code>AwsRdsDbClusterSnapshot</code>, <code>AwsRdsDbSnapshot</code>, <code>AwsSecretsManagerSecret</code>.</td>
<td>August 18, 2020</td>
</tr>
<tr>
<td>New integration with RSA Archer</td>
<td>Security Hub is now integrated with RSA Archer. RSA Archer receives findings from Security Hub.</td>
<td>August 18, 2020</td>
</tr>
<tr>
<td>New Description field for AwsKmsKey</td>
<td>Added a <code>Description</code> field to the <code>AwsKmsKey</code> object under <code>Resources.Details</code>.</td>
<td>August 18, 2020</td>
</tr>
<tr>
<td>Added fields to AwsRdsDbInstance</td>
<td>Added several attributes to the <code>AwsRdsDbInstance</code> object under <code>Resources.Details</code>.</td>
<td>August 18, 2020</td>
</tr>
<tr>
<td>Updated how Security Hub determines the overall status of a control</td>
<td>For controls that have no findings, the status is <strong>No data</strong> instead of <strong>Unknown</strong>. The control status includes both account-level and resource-level findings. The control status does not use the workflow status of findings, except to ignore suppressed findings.</td>
<td>August 13, 2020</td>
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<tr>
<td>Updated how Security Hub calculates the security score for a standard</td>
<td>When calculating the security score for a standard, Security Hub now ignores controls with a status of <strong>No Data</strong>. The security score is proportion of passed controls to enabled controls, excluding controls with no data.</td>
<td>August 13, 2020</td>
</tr>
<tr>
<td>New option to automatically enable new controls in enabled standards</td>
<td>Added a <strong>Settings</strong> option to automatically enable new controls in standards that are enabled. You can also use the <code>UpdateSecurityHubConfiguration</code> API operation to configure this option.</td>
<td>July 31, 2020</td>
</tr>
<tr>
<td>New controls for the Payment Card Industry Data Security Standard (PCI DSS) standard</td>
<td>Added new controls to the PCI DSS standard. The identifiers of the new controls are <code>PCI.DMS.1</code>, <code>PCI.EC2.5</code>, <code>PCI.EC2.6</code>, <code>PCI.ELBV2.1</code>, <code>PCI.GuardDuty.1</code>, <code>PCI.IAM.7</code>, <code>PCI.IAM.8</code>, <code>PCI.S3.5</code>, <code>PCI.S3.6</code>, <code>PCI.SageMaker.1</code>, <code>PCI.SSM.2</code>, and <code>PCI.SSM.3</code>.</td>
<td>July 29, 2020</td>
</tr>
<tr>
<td>New and updated controls for the Foundational Security Best Practices standard</td>
<td>Added new controls to the Foundational Security Best Practices standard. The identifiers of the new controls are <code>AutoScaling.1</code>, <code>DMS.1</code>, <code>EC2.4</code>, <code>EC2.6</code>, <code>S3.5</code>, and <code>SSM.3</code>. Updated the title of <code>ACM.1</code> and changed the value of the <code>daysToExpiration</code> parameter to 30.</td>
<td>July 29, 2020</td>
</tr>
<tr>
<td>New <strong>Vulnerabilities</strong> object in the ASFF</td>
<td>Added the <strong>Vulnerabilities</strong> object, which provides information about vulnerabilities that are associated with the finding.</td>
<td>July 1, 2020</td>
</tr>
<tr>
<td>New <strong>Resource.Details</strong> objects in the ASFF for Auto Scaling groups, EC2 volumes, and EC2 VPCs</td>
<td>Added the <code>AwsAutoScalingAutoScalingGroup</code>, <code>AWSEc2Volume</code>, and <code>AwsEc2Vpc</code> objects to <strong>Resource.Details</strong>.</td>
<td>July 1, 2020</td>
</tr>
<tr>
<td>Feature</td>
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<td>Date</td>
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<tr>
<td>New NetworkPath object in the ASFF</td>
<td>Added the <code>NetworkPath</code> object, which provides information about a network path that is related to the finding.</td>
<td>July 1, 2020</td>
</tr>
<tr>
<td>Automatically resolve findings when Compliance.Status is PASSED</td>
<td>For findings from controls, if <code>Compliance.Status</code> is <code>PASSED</code>, then Security Hub automatically sets <code>Workflow.Status</code> to <code>RESOLVED</code>.</td>
<td>June 24, 2020</td>
</tr>
<tr>
<td>New Severity.Original attribute in the ASFF</td>
<td>Added the <code>Severity.Original</code> attribute, which is the original severity from the finding provider. This replaces the deprecated <code>Severity.Product</code> attribute.</td>
<td>May 20, 2020</td>
</tr>
<tr>
<td>New Compliance.StatusReasons object in the ASFF for details about a control's status</td>
<td>Added the <code>Compliance.StatusReasons</code> object, which provides additional context for the current status of a control.</td>
<td>May 20, 2020</td>
</tr>
<tr>
<td>New AWS Foundational Security Best Practices standard</td>
<td>Added the new AWS Foundational Security Best Practices standard, which is a set of controls that detect when your deployed accounts and resources deviate from security best practices.</td>
<td>April 22, 2020</td>
</tr>
<tr>
<td>New console option to update the workflow status for a finding</td>
<td>Added information for using the Security Hub console or API to set the workflow status for findings.</td>
<td>April 16, 2020</td>
</tr>
<tr>
<td>New BatchUpdateFindings API for customer updates to findings</td>
<td>Added information on using <code>BatchUpdateFindings</code> to update information related to the process of investigating a finding. <code>BatchUpdateFindings</code> replaces <code>UpdateFindings</code>, which is deprecated.</td>
<td>April 16, 2020</td>
</tr>
<tr>
<td>Updates to the AWS Security Finding Format (ASFF)</td>
<td>Added several new resource types. Added a new <code>Label</code> attribute to the <code>Severity</code> object. <code>Label</code> is intended to replace the <code>Normalized</code> field. Added a new <code>Workflow</code> object to track the process of an investigation into a finding. <code>Workflow</code> contains a <code>Status</code> attribute, which replaces the existing <code>WorkflowState</code> attribute.</td>
<td>March 12, 2020</td>
</tr>
<tr>
<td>Updates to the Integrations page</td>
<td>Updated to reflect the changes to the <strong>Integrations</strong> page. For each integration, the page now shows the integration category and whether each integration sends findings to or receives findings from Security Hub. It also provides the specific steps required to enable each integration.</td>
<td>February 26, 2020</td>
</tr>
<tr>
<td>New security standard for the Payment Card Industry Data Security Standard (PCI DSS)</td>
<td>Added the Security Hub security standard for the Payment Card Industry Data Security Standard (PCI DSS). When this standard is enabled, Security Hub performs automated checks against controls related to PCI DSS requirements.</td>
<td>February 13, 2020</td>
</tr>
<tr>
<td>Updates to the AWS Security Finding Format (ASFF)</td>
<td>Added a field for related requirements for standards controls. Added new resource types and new resource details. The ASFF also now allows you to provide up to 32 resources.</td>
<td>February 5, 2020</td>
</tr>
<tr>
<td>New option to disable individual security standard controls</td>
<td>Added information on how to control whether each individual security standard control is enabled.</td>
<td>January 15, 2020</td>
</tr>
<tr>
<td>Updates to Terminology and Concepts</td>
<td>Updated some descriptions and added new terms to <strong>Terminology and Concepts</strong>.</td>
<td>September 21, 2019</td>
</tr>
<tr>
<td>AWS Security Hub general availability release (p. 724)</td>
<td>Content updates to reflect improvements made to Security Hub during the preview period.</td>
<td>June 25, 2019</td>
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<tr>
<td>Added remediation steps for CIS AWS Foundations checks</td>
<td>Added remediation steps to Security Standards Supported in AWS Security Hub.</td>
<td>April 15, 2019</td>
</tr>
<tr>
<td>Preview release of AWS Security Hub (p. 724)</td>
<td>Published the preview release version of the AWS Security Hub User Guide.</td>
<td>November 18, 2018</td>
</tr>
</tbody>
</table>