Cloud Migration Factory on AWS: Implementation Guide

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Coordinate and automate large scale migrations to the AWS Cloud using the Cloud Migration Factory on AWS solution

Publication date: June 2020 (last update: January 2024)

The Cloud Migration Factory on AWS solution is designed to coordinate and automate manual processes for large-scale migrations involving a substantial number of servers. This solution helps enterprises improve performance and prevents long cutover windows by providing an orchestration platform for migrating workloads to AWS at scale. AWS Professional Services, AWS Partners, and other enterprises have already used this solution to help customers migrate thousands of servers to the AWS Cloud.

This solution helps you to:

- Integrate the many different types of tools that support migration, such as discovery tools, migration tools, and configuration management database (CMDB) tools.
- Automate migrations that involve many small, manual tasks, which take time to run and are slow and hard to scale.

For a complete end-to-end deployment guide using this solution, refer to Automating large-scale server migrations with Cloud Migration Factory in the AWS Prescriptive Guidance Cloud Migration Factory Guide.

This implementation guide discusses architectural considerations and configuration steps for deploying the Cloud Migration Factory on AWS solution in the Amazon Web Services (AWS) Cloud. It includes links to AWS CloudFormation templates that launch and configure the AWS services required to deploy this solution using AWS best practices for security and availability.

The guide is intended for IT infrastructure architects, administrators, and DevOps professionals who have practical experience architecting in the AWS Cloud.

Use this navigation table to quickly find answers to these questions:

<table>
<thead>
<tr>
<th>If you want to . . .</th>
<th>Read . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know the cost for running this solution.</td>
<td>Cost</td>
</tr>
</tbody>
</table>
### Features and benefits

The solution provides the following features:

**Manage, track and initiate your workload migration to AWS from a single web interface, supporting multiple target AWS accounts and regions.**

Provided with Amazon S3 static web site hosting, or in private deployment from an Amazon EC2 instance running a web server. All activities performed by the solution are initiated from within a single web interface, provided by the solution. See Migration Factory web interface for details.

**Prepackaged automation tasks to perform many of the tasks required to fully migrate workloads to AWS using AWS Application Migration Service.**

The solution provides all the automation tasks required to migrate thousands of workloads to AWS without requiring scripting and with limited knowledge required to get started. All automations can be initiated from the web interface and behind the scenes use AWS System Manager to initiate and run the automation jobs on the provided automation server(s).

**Customize the solution with automation packages and attribute schema extensions**
The majority of migrations require custom automation tasks to be run for applications and other environmental specific reasons, Cloud Migration Factory on AWS supports user customization of the provided scripts as well as the ability to load custom script into the solution. The solution also allows for the migration metadata store to be extended in seconds, providing administrators the ability to add and remove attributes to the schema that are needing to be tracked or used during the migration.

**Integration with Service Catalog AppRegistry and AWS Systems Manager Application Manager**

This solution includes a Service Catalog AppRegistry resource to register the solution's CloudFormation template and its underlying resources as an application in both Service Catalog AppRegistry and AWS Systems Manager Application Manager. With this integration, you can centrally manage the solution's resources and enable application search, reporting, and management actions.

**Use cases**

**Migrate and manage large scale migrations of workloads to AWS**

Enable a single pane of glass view of large scale workload migrations to AWS. Providing prebuilt automation, reporting and role based access via a single web interface designed specifically for migrations.

**Concepts and definitions**

This section describes key concepts and defines terminology specific to this solution:

**application**

A group of resources that make up a single business service or application.

**wave**

A group of applications that will be migrated in the same event. This could be based on affinity between one another, or any other reason.

**server**

Source server to be migrated.
database

Source database to be migrated.

For a general reference of AWS terms, refer to the AWS glossary in the AWS General Reference.
Architecture overview

This section provides a reference implementation architecture diagram for the components deployed with this solution.

Architecture diagram

Deploying the default solution builds the following serverless environment in the AWS Cloud.

Cloud Migration Factory on AWS architecture diagram

The solution’s AWS CloudFormation template launches the AWS services necessary to help enterprises migrate their servers.

⚠️ Note

The Cloud Migration Factory on AWS solution uses a migration automation server which is not a part of the AWS CloudFormation deployment. For more details on manually building the server, refer to Build a migration automation server.
1. **Amazon API Gateway** receives migration requests from the migration automation server via RestAPIs.

2. **AWS Lambda** functions provide the necessary services for you to log in to the web interface, perform the necessary administrative functions to manage the migration, and connect to third-party APIs to automate the migration process.

   - The `user` Lambda function ingests the migration metadata into an **Amazon DynamoDB** table. Standard HTTP status codes are returned to you via the RestAPI from the API Gateway. An **Amazon Cognito** user pool is used for user authentication to the web interface and Rest APIs, and you can optionally configure it to authenticate against external Security Assertion Markup Language (SAML) identity providers.

   - The `tools` Lambda functions processes external Rest APIs and calls the **CloudEndure Migration** and **AWS Application Migration Service (AWS MGN)** for AWS migration. The `tools` Lambda function also calls the **Amazon EC2** for launching EC2 instances, and calls **AWS Systems Manager** to run automation scripts on the Migration Automation Server.

3. The migration metadata stored in Amazon DynamoDB is routed to the AWS MGN API to initiate a Rehost migration jobs and launch servers. If your migration pattern is Replatform to EC2, the `tools` Lambda function launches launch CloudFormation templates in the target AWS account to launch Amazon EC2 instances.

### Optional migration tracker

This solution also deploys an optional migration tracker component that tracks the progress of your migration.
Optional migration tracker component

The CloudFormation template deploys AWS Glue to get the migration metadata from the Cloud Migration Factory DynamoDB table and exports the metadata to Amazon Simple Storage Service (Amazon S3) twice a day (at 5:00 AM and 1:00 PM UTC). After the AWS Glue job completes, an Amazon Athena save query is initiated, and you can set up Amazon QuickSight to pull the data from the Athena query results. You can then create the visualizations and build a dashboard that meets your business needs. For guidance on creating visuals and building a dashboard, refer to Build a migration tracker dashboard.

This optional component is managed by the Tracker parameter in the CloudFormation template. By default, this option is activated, but you can deactivate this option by changing the Tracker parameter to false.

AWS Well-Architected design considerations

This solution uses the best practices from the AWS Well-Architected Framework, which helps customers design and operate reliable, secure, efficient, and cost-effective workloads in the cloud.
This section describes how the design principles and best practices of the Well-Architected Framework benefit this solution.

**Operational excellence**

This section describes how we architected this solution using the principles and best practices of the operational excellence pillar.

- Resources defined as IaC using CloudFormation.
- All actions and audit logging sent to Amazon CloudWatch, allowing for automated responses to be deployed.

**Security**

This section describes how we architected this solution using the principles and best practices of the security pillar.

- IAM used for authentication and authorization.
- Role permissions scoped to be as narrow as possible, though in many cases this solution requires wildcard permissions to be able to act on any resources.
- Optional use of WAF to further secure the solution.
- Amazon Cognito and optional ability to federate with external IDPs.

**Reliability**

This section describes how we architected this solution using the principles and best practices of the reliability pillar.

- Serverless services allow the solution to provide a fault tolerant architecture.

**Performance efficiency**

This section describes how we architected this solution using the principles and best practices of the performance efficiency pillar.

- Serverless services allow the solution to scale as needed.
Cost optimization

This section describes how we architected this solution using the principles and best practices of the [cost optimization pillar](#).

- Serverless services allow you to pay for only what you use.

Sustainability

This section describes how we architected this solution using the principles and best practices of the [sustainability pillar](#).

- Serverless services allow you to scale up or down as needed.
Architecture details

Migration automation server

This solution leverages a migration automation server to run migrations using Rest APIs. This server isn’t automatically deployed with the solution and must be built manually. For more information, refer to Build a Migration Automation Server. We recommend that you build the server in your AWS environment, but you can also build on-premises in your network environment. The server must meet the following requirements:

- Windows Server 2016 or later versions
- Minimum 4 CPUs with 8 GB RAM
- Deployed as a new virtual machine with no additional applications installed
- (If built in AWS) In the same AWS account and Region as Cloud Migration Factory

Once installed, the server requires internet access and non-restrictive internal network connectivity to the in-scope source servers (servers to be migrated to AWS).

If port restriction is required from the migration automation server to the source servers, the following ports must be open from the migration automation server to the source servers:

- SMB port (TCP 445)
- SSH port (TCP 22)
- WinRM port (TCP 5985, 5986)

We recommend that the migration automation server be in the same Active Directory domain as the source servers. If the source servers reside in multiple domains, the security configuration for the domain trust in each domain determines whether you need more than one migration automation server.

- If domain trust exists in all the domains with source servers, a single migration automation server will be able to connect to and run automation scripts for all domains.
- If a domain trust does not exist in all the domains, you must create an additional migration automation server for each untrusted domain, or for each action to be performed on the
automation server alternative credentials will need to be provided with appropriate permissions on the source servers.

Migration services RestAPIs

The Cloud Migration Factory on AWS solution automates the migration process using Rest APIs that are processed through AWS Lambda functions, an Amazon API Gateway, AWS Managed Services, AWS Application Migration Service (AWS MGN) and CloudEndure Migration. When you make a request or initiate a transaction, such as adding a server or viewing a list of servers or applications, Rest API calls are made to Amazon API Gateway which initiates an AWS Lambda function to run the request. The following services detail the components for the automated migration process.

Log in services

Log in services include the login Lambda functions and Amazon Cognito. Once you log in to the solution using the login API via the API Gateway, the function validates the credentials, retrieves an authentication token from Amazon Cognito, and returns the token details back to you. You can use this authentication token to connect to the other services in this solution.

Admin services

Admin services include the Amazon API Gateway, admin Lambda functions, and Amazon DynamoDB. Administrators for the solution can use the admin Lambda function to define the migration metadata schema, which are the application and server attributes. The admin services API provides the schema definition for the DynamoDB table. User data including application and server attributes must adhere to this schema definition. Typical attributes include the app_name, wave_id, server_name, and other fields as identified in Import migration metadata into the factory. By default, the AWS CloudFormation template deploys a common schema automatically, but this can be customized after deployment.

Administrators can also use admin services to define migration roles for the members of their migration team. The administrator has granular control to map specific user roles to specific attributes and migration stages. A migration stage is a period of time to run certain migration tasks, for example, a build stage, a testing stage, and a cutover stage.
User services

User services include the Amazon API Gateway, user Lambda functions, and Amazon DynamoDB. Users can manage the migration metadata, allowing them to read, create, update, and delete the wave, application, and server data in the migration metadata pipeline.

Note

A migration wave is a concept of application grouping with a start and an end or cutover date. Wave data includes the migration candidate applications and application groupings scheduled for a particular migration wave.

User services offer an API for the migration team to manipulate the data in the solution: create, update, and delete the data using the Python script and source CSV files. For detailed steps, refer to Automated migration activities using Migration Factory web console and Automated migration activities using command prompt.

Tools services

Tool services include the Amazon API Gateway, tools Lambda functions, Amazon DynamoDB, AWS Managed Services, AWS Application Migration Service, and CloudEndure Migration. You can use these services to connect to third-party APIs and automate the migration process. Using CloudEndure Migration and AWS Application Migration Service, the migration team can orchestrate the server launch process with a single button press to launch all servers in the same wave consisting of a group of applications and servers that have the same cutover date. Using AWS Managed Services, the Cloud Migration Factory on AWS solution automates the workload ingestion RFC process, and reduces the manual effort needed during the migration process.

Migration Factory web interface

The solution includes a Migration Factory web interface which can be hosted, by default in an Amazon S3 bucket, or on a provided web server (not part of the solution deployment) which allows you to complete the following tasks using a web browser:

- Update wave, application, and server metadata from your web browser
- Manage application and server schema definitions
• Run automation scripts to automate migration activities such as check prerequisites, install MGN agents

• Create migration credentials to connect to the source servers

• Connect to third-party services such as AWS Application Migration Service, CloudEndure Migration and AWS Managed Services to automate the migration process

AWS services in this solution

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<tr>
<th>AWS service</th>
<th>Description</th>
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<td><strong>Amazon API Gateway</strong></td>
<td><strong>Core.</strong> Provides REST APIs to the whole solution, used to access backend data and initiate and manage migration automation tasks.</td>
</tr>
<tr>
<td><strong>AWS Lambda</strong></td>
<td><strong>Core.</strong> Provide the necessary services for you to log in to the web interface, perform the necessary administrative functions to manage the migration, and connect to third-party APIs to automate the migration process.</td>
</tr>
<tr>
<td><strong>Amazon DynamoDB</strong></td>
<td><strong>Core.</strong> Metadata store for all user and system managed data, accessed via Amazon API Gateways and Lambda functions.</td>
</tr>
<tr>
<td><strong>Amazon Cognito</strong></td>
<td><strong>Core.</strong> User authorization and authentication, optional federation with other IDPs is also achieved through Amazon Cognito.</td>
</tr>
<tr>
<td>AWS service</td>
<td>Description</td>
</tr>
<tr>
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</tr>
<tr>
<td>AWS Systems Manager</td>
<td><strong>Supporting.</strong> Supports the running of Cloud Migration Factory on AWS automation packages on the customer provided Automation server.</td>
</tr>
<tr>
<td>Amazon EC2</td>
<td><strong>Supporting.</strong> Automation server running AWS Systems Manager agents to allow running of automation packages.</td>
</tr>
<tr>
<td>Amazon S3</td>
<td><strong>Supporting.</strong> Used in multiple areas of the solution, 1/ using the static web hosting feature of Amazon S3, it serves the main web interface (via Amazon CloudFront), 2/ logs and other automation outputs are stored in Amazon S3 by the solution.</td>
</tr>
<tr>
<td>AWS Secrets Manager</td>
<td><strong>Supporting.</strong> When using the automation features of the solution, AWS Secrets Manager is used to securely store the credentials that are used to access migrating resources in order to run tasks and actions to facilitate and migrate workloads.</td>
</tr>
<tr>
<td>AWS service</td>
<td>Description</td>
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</tr>
<tr>
<td><strong>Amazon CloudFront</strong></td>
<td><strong>Optional.</strong> For standard deployments Amazon CloudFront provides the distribution of the web interface content from Amazon S3, making it highly available globally, and providing secure TLS access to the web interface content from anywhere.</td>
</tr>
<tr>
<td><strong>AWS Application Migration Service (AWS MGN)</strong></td>
<td><strong>Optional.</strong> When performing rehost migrations of Windows or Linux workloads, Cloud Migration Factory on AWS uses AWS MGN to facilitate the system migration to Amazon EC2.</td>
</tr>
<tr>
<td><strong>Amazon QuickSight</strong></td>
<td><strong>Optional.</strong> Allows for customizable migration dashboards to be created based on the data stored in the migration metastore held in Amazon DynamoDB, providing teams the data they need to track and report on their migrations.</td>
</tr>
<tr>
<td>AWS service</td>
<td>Description</td>
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</tr>
<tr>
<td>AWS Glue</td>
<td><strong>Optional.</strong> Regularly extracts data held in Amazon DynamoDB to Amazon S3, providing reporting data for use in Amazon Athena and Amazon QuickSight dashboards.</td>
</tr>
<tr>
<td>Amazon Athena</td>
<td><strong>Optional.</strong> Provides access to reporting data extracted by AWS Glue from the migration metadata, allowing dashboards to be created using Amazon QuickSight.</td>
</tr>
<tr>
<td>AWS Web Application Firewall</td>
<td><strong>Optional.</strong> Applies additional security on the endpoints for Amazon API Gateway and Amazon CloudFront to restrict access to specific devices based on source IP address or other access criteria.</td>
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Plan your deployment

This section helps you plan your cost, security, AWS Regions, and deployment types for the Cloud Migration Factory on AWS solution.

Cost

You are responsible for the cost of the AWS services used while running this solution. As of this revision, the estimated cost for running this solution with default settings in the US East (N. Virginia) Region and assuming that you are migrating 200 servers a month with this solution is approximately $14.31 per month. The cost for running this solution depends on the amount of data being loaded, requested, stored, processed, and presented as shown in the following table.

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<th>AWS service</th>
<th>Factors</th>
<th>Cost/month [USD]</th>
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<tr>
<td><strong>Core services</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amazon API Gateway</td>
<td>10,000 requests/month x ($3.50/million)</td>
<td>$0.035</td>
</tr>
<tr>
<td>AWS Lambda</td>
<td>10,000 invocations/month</td>
<td>$0.065</td>
</tr>
<tr>
<td></td>
<td>(avg 3,000 ms duration and 128 MB memory)</td>
<td></td>
</tr>
<tr>
<td>Amazon DynamoDB</td>
<td>20,000 write requests/month x ($1.25/million)</td>
<td>$0.035</td>
</tr>
<tr>
<td></td>
<td>40,000 read requests/month x ($0.25/million)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data storage: 1 GB x $0.25</td>
<td></td>
</tr>
<tr>
<td>Amazon S3</td>
<td>Storage (10MB) &amp; 50,000 get requests/month</td>
<td>$0.25</td>
</tr>
<tr>
<td>Amazon CloudFront</td>
<td>Regional data transfer out to internet: first 10 TB</td>
<td>$0.92</td>
</tr>
<tr>
<td>AWS service</td>
<td>Factors</td>
<td>Cost/month [USD]</td>
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<tr>
<td>---------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>AWS Systems Manager</td>
<td>10,000 steps/month</td>
<td>$0.00</td>
</tr>
<tr>
<td>AWS Secrets Manager</td>
<td>5 secrets x 30 days duration</td>
<td>$2.00</td>
</tr>
<tr>
<td>Amazon Cognito (direct sign-in)</td>
<td>Up to 50,000 monthly active users (MAUs) covered by AWS Free Tier</td>
<td>$0.00</td>
</tr>
<tr>
<td>Amazon Athena</td>
<td>10MB daily x $5.00 per TB of data scanned</td>
<td>$0.0015</td>
</tr>
</tbody>
</table>

**Optional services**

<table>
<thead>
<tr>
<th>AWS Glue (optional migration tracker)</th>
<th>2 mins daily x Default 10 DPU x $0.44 per DPU-Hour</th>
<th>$4.40</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWS WAF</td>
<td>2 Web ACLs $5.00 per month (prorated hourly)</td>
<td>$6.60</td>
</tr>
<tr>
<td></td>
<td>2 Rules $1.00 per month (prorated hourly)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10,000 requests x ($0.60 per 1 million requests)</td>
<td></td>
</tr>
<tr>
<td>Amazon Cognito (SAML sign-in)</td>
<td>Up to 50 MAUs covered by AWS Free Tier</td>
<td>$0.00</td>
</tr>
<tr>
<td></td>
<td>Above 50 MAUs, $0.015/MAU</td>
<td></td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td></td>
<td>~$14.31/month</td>
</tr>
</tbody>
</table>
(Recommended) Deploy an Amazon Elastic Compute Cloud instance to help run automation scripts

We recommend deploying an Amazon Elastic Compute Cloud (Amazon EC2) instance to automate the connection to the solution’s APIs and AWS Boto3 APIs with IAM roles. The following cost estimate assumes that the Amazon EC2 instance is located in the us-east-1 Region and runs eight hours a day, five days a week.

<table>
<thead>
<tr>
<th>AWS service</th>
<th>Factors</th>
<th>Cost/month [USD]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazon EC2</td>
<td>176 hours a month x $0.1108/per hour (t3.large)</td>
<td>$19.50</td>
</tr>
<tr>
<td>Amazon Elastic Block Store (Amazon EBS)</td>
<td>30 GB x $0.08/GB-month (gp3) x (176 hours/720 hours)</td>
<td>$0.59</td>
</tr>
</tbody>
</table>

**Total:** ~$20.09

Prices are subject to change. For full details, refer to the pricing webpage for each AWS service you will be using in this solution.

**Security**

When you build systems on AWS infrastructure, security responsibilities are shared between you and AWS. This shared model can reduce your operational burden as AWS operates, manages, and controls the components from the host operating system and virtualization layer down to the physical security of the facilities in which the services operate. For more information about security on AWS, visit [AWS Cloud Security](https://aws.amazon.com/security/).

**IAM roles**

AWS Identity and Access Management (IAM) roles allow you to assign granular access policies and permissions to services and users in the AWS Cloud. This solution creates IAM roles that grants the AWS Lambda function access to the other AWS services used in this solution.
Amazon Cognito

The Amazon Cognito user created by this solution is a local user with permissions to access only the Rest APIs for this solution. This user does not have permissions to access any other services in your AWS account. For more information, refer to Amazon Cognito User Pools in the Amazon Cognito Developer Guide.

The solution optionally supports external SAML sign-in through the configuration of federated identity providers and the hosted UI functionality of Amazon Cognito.

Amazon CloudFront

This default solution deploys a web console hosted in an Amazon S3 bucket. To help reduce latency and improve security, this solution includes an Amazon CloudFront distribution with an origin access identity, which is a special CloudFront user that helps provide public access to the solution's website bucket contents. For more information, refer to Restricting Access to Amazon S3 Content by Using an Origin Access Identity in the Amazon CloudFront Developer Guide.

If a private deployment type is selected during stack deployment, then a CloudFront distribution is not deployed, and requires that another web hosting service is used to host the web console.

AWS WAF - Web Application Firewall

If deployment type selected in the stack is Public with AWS WAF then the CloudFormation will deploy the required AWS WAF Web ACLs and Rules configured to protect CloudFront, API Gateway, and Cognito endpoints created by the CMF solution. These endpoints will be restricted to allow only specified source IP addresses to access these endpoints. During stack deployment, two CIDR ranges must be supplied with the facility to add additional rules after deployment via the AWS WAF console.

Supported AWS Regions

This solution uses Amazon Cognito and Amazon QuickSight, which are currently available in specific AWS Regions only. Therefore, you must launch this solution in a Region where these services are available. For the most current service availability by Region, refer to the AWS Regional Services List.
**Note**
Data transfer during the migration process is not affected by Regional deployments.

Cloud Migration Factory on AWS is available in the following AWS Regions:

<table>
<thead>
<tr>
<th>Region names</th>
<th>Region names</th>
</tr>
</thead>
<tbody>
<tr>
<td>US East (Ohio)</td>
<td>Asia Pacific (Tokyo)</td>
</tr>
<tr>
<td>US East (N. Virginia)</td>
<td>Canada (Central)</td>
</tr>
<tr>
<td>US West (N. California)</td>
<td>Europe (Frankfurt)</td>
</tr>
<tr>
<td>US West (Oregon)</td>
<td>Europe (Ireland)</td>
</tr>
<tr>
<td>*Africa (Cape Town)</td>
<td>Europe (London)</td>
</tr>
<tr>
<td>*Asia Pacific (Hong Kong)</td>
<td>*Europe (Milan)</td>
</tr>
<tr>
<td>*Asia Pacific (Hyderabad)</td>
<td>*Europe (Spain)</td>
</tr>
<tr>
<td>*Asia Pacific (Jakarta)</td>
<td>Europe (Paris)</td>
</tr>
<tr>
<td>*Asia Pacific (Melbourne)</td>
<td>Europe (Stockholm)</td>
</tr>
<tr>
<td>Asia Pacific (Mumbai)</td>
<td>*Europe (Zurich)</td>
</tr>
<tr>
<td>Asia Pacific (Osaka)</td>
<td>*Middle East (Bahrain)</td>
</tr>
<tr>
<td>Asia Pacific (Seoul)</td>
<td>*Middle East (UAE)</td>
</tr>
<tr>
<td>Asia Pacific (Singapore)</td>
<td>Israel (Tel Aviv)</td>
</tr>
<tr>
<td>Asia Pacific (Sydney)</td>
<td>South America (São Paulo)</td>
</tr>
</tbody>
</table>
Cloud Migration Factory on AWS is not available in the following AWS Regions:

<table>
<thead>
<tr>
<th>Region name</th>
<th>Unavailable service(s) or service option</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWS GovCloud (US-East)</td>
<td>Amazon Cognito</td>
</tr>
<tr>
<td>AWS GovCloud (US-West)</td>
<td>Amazon Cognito</td>
</tr>
</tbody>
</table>

**Quotas**

Service quotas, also referred to as limits, are the maximum number of service resources or operations for your AWS account.

**Quotas for AWS services in this solution**

Make sure you have sufficient quota for each of the services implemented in this solution. For more information, refer to AWS service quotas.

Select one of the following links to go to the page for that service. To view the service quotas for all AWS services in the documentation without switching pages, view the information in the Service endpoints and quotas page in the PDF instead.

**AWS CloudFormation quotas**

Your AWS account has CloudFormation quotas that you should be aware of when launching the stack for this solution. By understanding these quotas, you can avoid limitation errors that would prevent you from deploying this solution successfully. For more information, refer to AWS CloudFormation quotas in the AWS CloudFormation Users Guide.
Deploy the solution

This solution uses AWS CloudFormation templates and stacks to automate its deployment. The CloudFormation template(s) specifies(y) the AWS resources included in this solution and their properties. The CloudFormation stack provisions the resources that are described in the template(s).

Prerequisites

Source server permissions

A domain user with local admin permissions to the in-scope source servers targeted for migration is required for Windows and Linux (sudo permissions) servers. If source servers are not in a domain, other users may be used, including an LDAP user with sudo/administrator permissions or a local sudo/administrator user. Before launching this solution, verify that you have the necessary permissions or have coordinated with the appropriate person in your organization with permissions.

AWS Application Migration Service (AWS MGN)

If you use AWS MGN for this solution, you must first initialize the AWS MGN service in every target account and region before launching the target account stack, refer to Initializing Application Migration Service in the Application Migration Service User Guide for more details.

Private deployment

If you have chosen to deploy a Private instance of CMF, deploy a web server in your environment before proceeding with the CMF solution deployment.

AWS CloudFormation templates

This solution uses AWS CloudFormation to automate the deployment of the Cloud Migration Factory on AWS solution in the AWS Cloud. It includes the following AWS CloudFormation template, which you can download before deployment.
Cloud Migration Factory on AWS

Implementation Guide

**aws-cloud-migration-factory-solution.template** - Use this template to launch the Cloud Migration Factory on AWS solution and all associated components. The default configuration deploys AWS Lambda functions, Amazon DynamoDB tables, an Amazon API Gateway, Amazon CloudFront, Amazon S3 buckets, an Amazon Cognito user pool, AWS Systems Manager Automation Document, and AWS Secrets Manager Secrets, but you can also customize the template based on your specific needs.

**aws-cloud-migration-factory-solution-target-account.template** - Use this template to launch the Cloud Migration Factory on AWS solution target account(s). The default configuration deploys IAM roles and a user, but you can also customize the template based on your specific needs.

**Deployment process overview**

Before you launch the automated deployment, review the architecture, components, and other considerations discussed in this guide. Follow the step-by-step instructions in this section to configure and deploy the Cloud Migration Factory on AWS solution into your account.

**Time to deploy:** Approximately 20 minutes

**Note**

If you deploy this solution to AWS Regions other than US East (N. Virginia), the Migration Factory CloudFront URL may take longer to become available. During this time, you will receive an **Access Denied** message when accessing the web interface.

**Step 1:** Choose your deployment option

**Step 2:** Launch the Stack

**Step 3:** Launch the target account stack in the target AWS account

**Step 4:** Create the first user
Step 1: Choose your deployment option

There are three options for deployment of the initial stack and choosing the correct one depends on the security policies for the target environment.

These options are:

- Public (default): All Cloud Migration Factory on AWS endpoints are publicly addressible with user authentication. This option deploys the following entry points: CloudFront, Public API Gateway Endpoints, and Cognito.

- Public with AWS WAF: Access to Cloud Migration Factory endpoints is restricted to customizable CIDR ranges. This option deploys the following entry points: CloudFront, Public API Gateway Endpoints, Cognito, and AWS WAF restricting access to specific CIDR ranges.

- Private: All Cloud Migration Factory endpoints are accessible only from your VPC networks and the Cloud Migration Factory on AWS web console must be hosted on a private web server.
deployed separately. This option deploys the following entry points: Private API Gateway Endpoints (accessible within a VPC only) and Cognito.

**Step 2: Launch the stack**

⚠️ **Important**

This solution includes an option to send anonymized operational metrics to AWS. We use this data to better understand how customers use this solution and related services and products. AWS owns the data gathered though this survey. Data collection is subject to the AWS Privacy Policy. To opt out of this feature, download the template, modify the AWS CloudFormation mapping section, and then use the AWS CloudFormation console to upload your template and deploy the solution. For more information, refer to the Anonymized data collection section of this guide.

This automated AWS CloudFormation template deploys the Cloud Migration Factory on AWS solution in the AWS Cloud.

ℹ️ **Note**

You are responsible for the cost of the AWS services used while running this solution. Refer to the Cost section for more details. For full details, refer to the pricing webpage for each AWS service you will be using in this solution.

1. Sign in to the AWS Management Console and select the button to launch the cloud-migration-factory-solution AWS CloudFormation template.

You can also download the template as a starting point for your own implementation.

2. The template launches in the US East (N. Virginia) Region by default. To launch this solution in a different AWS Region, use the Region selector in the console navigation bar.
### Note

This solution uses Amazon Cognito and Amazon QuickSight, which are currently available in specific AWS Regions only. Therefore, you must launch this solution in an AWS Region where these services are available. For the most current availability by Region, refer to the [AWS Regional Services List](#).

When deployed in Public and Public with WAF deployment types, the solution also uses Amazon CloudFront logging to Amazon S3. Today, log delivery from Amazon CloudFront to Amazon S3 is only available in specific Regions. Refer to [Choosing an Amazon S3 bucket for your standard logs](#) to verify your Region is supported.

3. On the **Create stack** page, verify that the correct template URL shows in the **Amazon S3 URL** text box and choose **Next**.

4. On the **Specify stack details** page, assign a name to your solution stack.

5. Under **Parameters**, review the parameters for the template and modify them as necessary. This solution uses the following default values.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application name</td>
<td>migration-factory</td>
<td>Enter a prefix to the AWS CloudFormation <strong>Physical ID</strong> that identifies the AWS services deployed by this solution.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Default</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
<td>-------------</td>
</tr>
</tbody>
</table>

*urce>*. If changing the default name, we recommend that you keep the combined prefix labels to 40 characters or less to ensure you do not exceed character limitations.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment name</td>
<td>test</td>
<td>Enter a name to identify the network environment where the solution is deployed. We recommend a descriptive name such as test, dev, or prod.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The <strong>Environment name</strong> is used as a prefix to identify the AWS resources that are deployed:</td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>&lt;application-name&gt; -&lt;environment-name&gt; -&lt;aws-resource&gt;</code>. If changing the default name, we recommend that you keep the combined prefix labels to 40 characters or less to ensure you do not exceed character limitations.</td>
</tr>
<tr>
<td>Migration Tracker</td>
<td>true</td>
<td>By default, the optional migration tracker dashboard is activated, but you can deactivate it by changing this parameter to false.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Default</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Replatform EC2</td>
<td>true</td>
<td>By default, the Replatform EC2 feature is activated, but you can deactivate it by changing this parameter to false.</td>
</tr>
<tr>
<td>ServiceAccountEmail</td>
<td><a href="mailto:serviceaccount@yourdomain.com">serviceaccount@yourdomain.com</a></td>
<td>Default service account email address, the migration factory automation scripts uses this account to connect to the factory API.</td>
</tr>
<tr>
<td>Allow additional identity provider to be configured in Cognito</td>
<td>false</td>
<td>By default, the solution uses Amazon Cognito to create and manage access. Changing this parameter to true will configure the solution to allow external SAML identity providers to be added to Amazon Cognito and used to sign in.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Default</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Deployment Type</td>
<td>Public</td>
<td>By default, the deployment type is <strong>Public</strong>, and all Cloud Migration Factory endpoints are publicly accessible with user authentication.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Public with AWS WAF:</strong> Access to CMF endpoints is restricted to customizable CIDR ranges.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Private:</strong> All Cloud Migration Factory endpoints are accessible only from your VPC networks and the Cloud Migration Factory Web UI must be hosted on a private web server deployed separately.</td>
</tr>
</tbody>
</table>

*(Optional) Private Deployment Type Only*
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full URL used to access web user interface</td>
<td>[not set]</td>
<td>Required when <strong>Deployment Type</strong> is set to <strong>Private</strong>. Specify the migration factory web interface URL that will serve the static web web content. Example <a href="https://cmf.yourdomain.local">https://cmf.yourdomain.local</a>.</td>
</tr>
</tbody>
</table>

**Important**

- Do not add a trailing forward slash to the URL, this will cause the web interface to fail when loading.
- In private deployments a web server is required to host the static content and needs to be deployed before deployment of the CloudFormation template.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPC ID to host API Gateway Endpoints</td>
<td>[not set]</td>
<td>Required when Deployment Type is set to Private. Specify a single VPC ID where the private API Gateway endpoints will be created.</td>
</tr>
<tr>
<td>Subnets to host API Gateway Interface Endpoints</td>
<td>[not set]</td>
<td>Required when Deployment Type is set to Private. Specify a two Subnet IDs where the private API Gateway endpoints will be created. The Subnet IDs specified have to be within the VPC specified above.</td>
</tr>
<tr>
<td>(Optional) Public with AWS WAF Deployment Type Only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Default</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>----------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Allowed CIDR</td>
<td>[not set]</td>
<td>Required when <strong>Deployment Type</strong> is set to <strong>Public with AWS WAF</strong>. Specify two CIDR ranges from which the users and the automation server will be accessing the endpoints from.</td>
</tr>
</tbody>
</table>

**Important**

- You must specify 2 CIDR ranges.
- Once deployed, it is possible to add additional ranges and restrictions to the AWS WAF rules as required.

6. Choose **Next**.

7. On the **Configure stack options** page, choose **Next**.

8. On the **Review** page, review and confirm the settings. Check the boxes acknowledging that the template will create **AWS Identity and Access Management (IAM)** resources and that it might require the capability **CAPABILITY_AUTO_EXPAND**.

9. Choose **Submit** to deploy the stack.

You can view the status of the stack in the AWS CloudFormation console in the **Status** column. You should receive a **CREATE_COMPLETE** status in approximately 20 minutes.

**Important**

If you are using AWS MGN, you must complete the prerequisite for AWS MGN before continuing to Step 3.
Step 3: Launch the target account stack in the target AWS account

This automated AWS CloudFormation template deploys IAM roles in the target AWS account to allow the factory account to assume roles and perform MGN actions in the target account. Repeat this step for each target account. If the factory stack in the previous step is a target account, it will need to have this target stack deployed to it.

⚠️ Note

The target account must be initialized for AWS Application Migration Service before launching this stack, refer to Initializing Application Migration Service in the Application Migration Service User Guide for more details. The target account stack must be launched in the same Region as the factory stack in the previous step regardless of which Region will be used as the migration target Region. This stack is for cross account permissions only.

1. Sign in to the AWS CloudFormation console. Choose Create stack then select With new resources, to start the deployment of the template. You can also download the template as a starting point for your own implementation.

2. On the Specify stack details page, assign a name to your solution stack.

3. Under Parameters, review the parameters for the template and modify them as necessary. This solution uses the following default values.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FactoryAWSAccountId</td>
<td>111122223333</td>
<td>Enter an account ID where the Migration Factory was deployed.</td>
</tr>
</tbody>
</table>

⚠️ Note

Launch this stack in the same AWS Region as the


<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replatform</td>
<td>Yes</td>
<td>Turn on this option if you plan to use the Replatform EC2 module of this solution</td>
</tr>
<tr>
<td>RehostMGN</td>
<td>Yes</td>
<td>Turn on this option if you plan to use the Rehost MGN module of this solution</td>
</tr>
</tbody>
</table>

4. Choose **Next**.
5. On the **Configure stack options** page, choose **Next**.
6. On the **Review** page, review and confirm the settings. Check the box acknowledging that the template will create **AWS Identity and Access Management** (IAM) resources.
7. Choose **Submit** to deploy the stack.

You can view the status of the stack in the AWS CloudFormation console in the **Status** column. You should receive a **CREATE_COMPLETE** status in approximately 5 minutes.

**Step 4: Create the first user**

**Create the initial user and log in to the solution**

Use the following procedure to create the initial user.

1. Navigate to the **Amazon Cognito console**.
2. From the navigation pane, choose **User pools**.
3. On the **User pools** page, choose the user pool that starts with the migration-factory prefix.
4. Select the **Users** tab and choose **Create user**.
5. In the **Create user** screen, **User information** section, do the following:
   1. Verify that the **Send an invitation** option is selected.
2. Enter an email address.

⚠️ **Important**
This email address must be different from the one you used in the ServiceAccountEmail parameter, which the solution uses when deploying the primary CloudFormation template.

3. Select **Set a password**.

4. In the **Password** field, enter a password.

>Note
The password must be at least eight characters in length, including upper and lower case letters, numbers, and special characters.

6. Choose **Create user**.

>Note
You will receive an email with the temporary password. Until you change the temporary password, the **Account status** for this user will display as **Force change password**. You can update the password later in the deployment.

### Add a user to the admin group

In the Amazon Cognito console, use the following procedure to add a user to the default Admin group.

1. Navigate to the Amazon Cognito console.
2. From the navigation menu, choose **User pools**.
3. On the **User pools** page, choose the user pool that starts with the migration-factory prefix.
4. Select the **Groups** tab and open the group named **admin** by selecting the name.
5. Choose **Add user to group**, then select the user name to add.
6. Choose Add.

The chosen user will now be added to the members list of the group. This default admin group authorizes the user to manage all aspects of the solution.

Note
After you create the initial users, you can manage group membership in the solution UI by selecting Administration, then Permissions, then Groups.

Identify the CloudFront URL (Public and Public with AWS WAF deployments only)

Use the following procedure to identify the solution's Amazon CloudFront URL. This allows you to log in and change the password.

1. Navigate to the AWS CloudFormation console and select the solution's stack.
2. On the Stacks page, select the Outputs tab and select the Value for the MigrationFactoryURL.

Note
If you launched the solution in an AWS Region other than US East (N. Virginia), CloudFront may take longer to deploy and the MigrationFactoryURL may not be accessible immediately (you will receive an access denied error). It can take up to four hours before the URL becomes available. The URL includes cloudfront.net as part of the string.

3. Sign in with your username and temporary password, then create a new password and choose Change Password.

Note
The password must be at least eight characters in length, including upper and lower case letters, numbers, and special characters.
Step 5: (Optional) Deploy private web console static content

If you selected the Private deployment type during the stack deployment, you are required to manually deploy the CMF web console code to the web server that you created and then specified in Full URL used to access web user interface parameter of the stack. For all other deployment types, skip this step.

Setup and configuration instructions for each web server are different, so this guide will only provide generic instructions on where to copy the content from, and you should configure the web server to your own requirements before updating the content.

1. Ensure that the web server has access to S3, and the AWS CLI installed and configured. Alternatively, download the contents of the front-end bucket and copy them to the web server using another device.

2. Using the AWS CLI, run the following command, replacing the environment name with the one specified during the stack deployment, AWS account ID with the ID of the AWS account the stack was deployed into, and the target directory with that of the web server's default root directory. This will copy the static Cloud Migration Factory web console code along with the specific configuration needed for this Cloud Migration Factory solution deployment:

**Windows example:**

```
aws s3 cp --recursive s3://migration-factory-<environment name>-<AWS Account Id>-front-end/ C:\inetpub\wwwroot --recursive
```

**Linux example:**

```
aws s3 cp s3://migration-factory-<environment name>-<AWS Account Id>-front-end/ /var/www/html --recursive
```

**Note**

If an update is made to the stack parameters, it is required to replace the files on the web server from the front end bucket to ensure that any configuration changes are available to the web console.
Step 6: Update the factory schema

Update the target AWS Account Id for AWS MGN migrations

1. On the Migration Factory web interface, select Administration, then select Attributes.
2. On the Attribute Configuration page, select Application, then select Attributes.
3. Select AWS Account Id, then choose Edit.
4. On the Amend attribute page, update Value list with your target AWS account IDs and choose Save.

Note
If you have more than one AWS account ID, separate the ID with commas.

Step 7: Configuring a migration automation server

The migration automation server is used to run migration automation.
Build a Windows Server 2016 or later server

We recommend creating the server in your AWS account, but it can also be created in your on-premises environment. If built in an AWS account, it must be in the same AWS account and Region as Cloud Migration Factory. To review the server requirements, refer to Migration automation server.

Wherever you deploy the Windows instance, it should be deployed as a standard Windows 2016 or later installation that meets your security and operational requirements.

Installing required software to support the automations

2. Log in as administrator and install Python v3.12.1, and choose Customize installation.
3. Choose Next, and select Install for all users and Add Python to environment variables. Choose Install.
4. Verify that you have administrator privileges, open cmd.exe, and run the following commands to install the Python packages one at a time:

   python \-m pip install requests
5. Install AWS CLI (Command Line Interface).

6. Install using the PowerShell for AWS module, ensuring that you have the -Scope AllUsers parameter included in the command.

   ```powershell
   Install-Module -Name AWSPowerShell -Scope AllUsers
   ```

7. Open PowerShell Script Execution, by opening the PowerShell CLI as Administrator and run the following command:

   ```powershell
   Set-ExecutionPolicy RemoteSigned
   ```

Configure AWS permissions for the migration automation server and install AWS Systems Manager Agent (SSM Agent)

Depending on where you deploy the migration execution server, choose one of the options below to configure AWS permissions for the migration automation server. The IAM role or policy provides the permission to the automation server and the access to AWS Secrets Manager to get agent installation keys and factory service account credentials. You can deploy the migration automation server either to AWS as an EC2 instance or on-premises.

**Option 1: Use the following procedure to configure the permissions for the migration automation server in Amazon EC2 and in the same AWS account and Region as the factory.**

1. Navigate to the AWS CloudFormation console and select the solution's stack.

2. Select the Outputs tab, under the Key column, locate AutomationServerIAMRole and record the Value to use later in the deployment.
3. Navigate to the Amazon Elastic Compute Cloud console.

4. From the left navigation pane, select Instances.

5. On the Instances page, use the Filter Instances field and enter the name of the migration execution server to find the instance.

6. Select the instance and select Actions on the menu.

7. Select Security from the drop down list then select Modify IAM role.

8. From the list of IAM roles, locate and select the IAM role containing the value for AutomationServerIAMRole that you recorded in Step 2, and choose Save.

9. Use your remote desktop protocol (RDP) to log in to the migration automation server.

10. Download and install SSM Agent on the migration automation server.
11. Add the following tag to the migration automation server EC2 instance: **Key** = role and **Value** = mf_automation.

12. Open the AWS Systems Manager console and choose **Fleet Manager**. Check the automation server status, and make sure the SSM Agent ping status is **online**.

**Option 2: Use the following procedure to configure the permissions for the migration automation server on-premises.**

1. Navigate to the **AWS CloudFormation console** and select the solution’s stack.
2. Select the **Outputs** tab, under the **Key** column, locate AutomationServerIAMPolicy and record the value to use later in the deployment.

4. From the left navigation pane, select Users, then choose Add users.

5. In the User name field, create a new user.

6. Choose Next.

7. On the Set permissions page, under Permissions options, select Attach policies directly. A list of policies displays.

8. From the list of policies, locate and select the policy containing the value for AutomationServerIAMPolicy that you recorded in Step 2.

9. Choose Next, then verify that the correct policy is selected.

10. Choose Create user.

11. After you're redirected to the Users page, choose the user you created in the previous step, and then choose the Security credentials tab.

12. In the Access keys section, choose Create access key.

**Note**

Access keys consist of an access key ID and secret access key, which are used to sign programmatic requests that you make to AWS. If you don't have access keys, you can create them from the AWS Management Console. As a best practice, do not use the root user access keys for any task where it's not required. Instead, create a new administrator IAM user with access keys for yourself.

The only time that you can view or download the secret access key is when you create the keys. You cannot recover them later. However, you can create new access keys at any time. You must also have permissions to perform the required IAM actions. For more information, see Permissions required to access IAM resources in the IAM User Guide.

13. To view the new access key pair, choose Show. You will not have access to the secret access key again after this dialog box closes. Your credentials will look something like this:

   - Access key ID: AKIAIOSFODNN7EXAMPLE
   - Secret access key: wJalrXUtfnEMI/K7MDENG/bPxFrIcyEXAMPLEKEY

14. To download the key pair, choose Download .csv file. Store the keys in a secure location. You will not have access to the secret access key again after this dialog box closes.
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**Important**

Keep the keys confidential to protect your AWS account and never email them. Do not share them outside your organization, even if an inquiry appears to come from AWS or Amazon.com. No one who legitimately represents Amazon will ever ask you for your secret key.

15. After you download the .csv file, choose **Close**. When you create an access key, the key pair is active by default, and you can use the pair right away.

16. Use your remote desktop protocol (RDP) to log in to the migration execution server.

17. Signed in as an administrator, open a command prompt (CMD.exe).

18. Run the following command to configure the AWS credentials on the server. Replace `<your_access_key_id>`, `<your_secret_access_key>`, and `<your_region>` with your values:

   ```
   SETX /m AWS_ACCESS_KEY_ID <your_access_key_id>
   SETX /m AWS_SECRET_ACCESS_KEY <your_secret_access_key>
   SETX /m AWS_DEFAULT_REGION <your_region>
   ```


20. Install the AWS Systems Manager agent using Hybrid mode (on-prem servers).

   a. Create a hybrid activation; see **Create an activation (console)** in the *AWS Systems Manager User Guide*. During this process, when asked to provide an IAM Role, select an existing IAM role and choose the role with the suffix `-automation-server` which was automatically created when the Cloud Migration Factory stack was deployed.

   b. Log in to the migration automation server as administrator.

   c. Install AWS Systems Manager Agent (SSM Agent); see **Install SSM Agent for a hybrid and multicloud environment** in the *AWS Systems Manager User Guide*. Use the hybrid activation created in step 20.a.

   d. Once the agent is successfully installed, in the AWS Systems Manager console, choose **Fleet Manager**. Identify the node ID with `mi-` prefix with **Online** status.
e. Select the **Node ID** and make sure the IAM role is the one you selected with **automation-server** suffix.

f. Add the following tag for this Hybrid node: **Key = role** and **Value = mf_automation**. All lower case.

---

**Step 8: Test the solution using the automation scripts**

**Import migration metadata into the factory**

To start the migration process, download the `server-list.csv` file from the GitHub repository. The `server-list.csv` file is an example AWS MGN Service migration intake form to import the attributes for the in-scope source servers.
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Note
The .csv file and the sample automation scripts were part of the package from the same GitHub repository.

You can customize the form for your migration by replacing the sample data with your specific server and application data. The following table details the data to replace to customize this solution for your migration needs.

<table>
<thead>
<tr>
<th>Field name</th>
<th>Required?</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>wave_name</td>
<td>Yes</td>
<td>The wave name is based on priority and application server dependencies. Obtain this identifier from your migration plan.</td>
</tr>
<tr>
<td>app_name</td>
<td>Yes</td>
<td>The names of the applications that are in-scope for migration. Confirm that your application grouping includes all the applications sharing the same servers.</td>
</tr>
<tr>
<td>aws_accountid</td>
<td>Yes</td>
<td>A 12-digit identifier for your AWS account located in your account profile. To access, select your account profile from the upper-right corner of the AWS Management Console and select My Account from the drop-down menu.</td>
</tr>
<tr>
<td>Field name</td>
<td>Required?</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>aws_region</td>
<td>Yes</td>
<td>AWS Region code. For example, <code>us-east-1</code>. Refer to the full Region code list.</td>
</tr>
<tr>
<td>server_name</td>
<td>Yes</td>
<td>The name of the on-premises servers that are in-scope for migration.</td>
</tr>
<tr>
<td>server_os_family</td>
<td>Yes</td>
<td>The operating system (OS) that is running on the in-scope source servers. Use either <code>windows</code> or <code>linux</code> since this solution supports only these operating systems.</td>
</tr>
<tr>
<td>server_os_version</td>
<td>Yes</td>
<td>The version of the OS running on the in-scope source servers.</td>
</tr>
</tbody>
</table>

**Note**

Use the OS version, not the Kernel version, for example, use RHEL 7.1, Windows Server 2012 R2, or CentOS 7.5, 7.6. Do not use Linux 3.xx, 4.xx, or Windows 8.1.x.
<table>
<thead>
<tr>
<th>Field name</th>
<th>Required?</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>server_fqdn</td>
<td>Yes</td>
<td>The source server’s fully qualified domain name, which is the server name followed by the domain name. For example, server123.company.com.</td>
</tr>
<tr>
<td>server_tier</td>
<td>Yes</td>
<td>A label to identify whether the source server is a web, app, or a database server. We recommend designating the source server as app if the server functions as more than one tier, for example, if the server runs web, app, and database tiers together.</td>
</tr>
<tr>
<td>server_environment</td>
<td>Yes</td>
<td>A label to identify the server’s environment. For example, dev, test, prod, QA, or pre-prod.</td>
</tr>
<tr>
<td>r_type</td>
<td>Yes</td>
<td>A label to identify the migration strategy. For example, Retire, Retain, Relocate, Rehost, Repurchase, Replatform, Rearchitect, TBC.</td>
</tr>
<tr>
<td>subnet_IDs</td>
<td>Yes</td>
<td>The subnet ID for the target Amazon EC2 instance for the migration post-cutover.</td>
</tr>
<tr>
<td>Field name</td>
<td>Required?</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>securitygroup_IDs</td>
<td>Yes</td>
<td>The security group ID for the target Amazon EC2 instance for the migration post-cutover.</td>
</tr>
<tr>
<td>subnet_IDs_test</td>
<td>Yes</td>
<td>The target subnet ID for the source server that will be tested.</td>
</tr>
<tr>
<td>securitygroup_IDs_test</td>
<td>Yes</td>
<td>The target security group ID for the source server that will be tested.</td>
</tr>
<tr>
<td>instanceType</td>
<td>Yes</td>
<td>The Amazon EC2 instance type identified in the discovery and planning effort. For information about EC2 instance types, refer to <a href="#">Amazon EC2 Instance Types</a>.</td>
</tr>
<tr>
<td>tenancy</td>
<td>Yes</td>
<td>The tenancy type, which is identified during the discovery and planning efforts. Use one of the following values to identify the tenancy: Shared, Dedicated, or Dedicated Host. You can use Shared as the default value unless an application's license requires a specified type.</td>
</tr>
<tr>
<td>Tags</td>
<td>No</td>
<td>The tags for the server resources, such as CostCenter=123;BU=IT;Location=US.</td>
</tr>
<tr>
<td>Field name</td>
<td>Required?</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>private_ip</td>
<td>No</td>
<td>The private IP for the target instance. If not included, instance will get an IP from DHCP.</td>
</tr>
<tr>
<td>iamRole</td>
<td>No</td>
<td>IAM role for the target instance. If not included, no IAM role will be attached to the target instance.</td>
</tr>
</tbody>
</table>

1. Log in to the Cloud Migration Factory web console.
2. Under **Migration Management**, select **Import** and choose **Select file**. Select the intake form you completed previously and choose **Next**.
3. Review the changes and make sure you do not see any errors (information message is normal), and choose **Next**.
4. Choose **Upload** to upload servers.

### Access the domains

The sample automation scripts included with this solution connect to the in-scope source servers to automate migration tasks, such as the installation of the replication agent, and shutting down the source servers. In order to conduct a test run of the solution, a domain user with local admin permissions to the source servers is required, for Windows and Linux (sudo permissions) servers. If Linux is not in the domain, other users such as LDAP user with sudo permissions or a local sudo user may be used. For more information about automated migration tasks, refer to Automated migration activities using Migration Factory web console and Automated migration activities using command prompt.

### Conduct a test run of the migration automation

This solution lets you conduct a test run of the migration automation. Using automation scripts, the migration process imports the data from the migration CSV file into the solution. Prerequisite checks are conducted for the source servers, the replication agent is pushed to the source servers, replication status is verified, and the target server is launched from the Migration Factory web console.
interface. For step-by-step instructions on running a test, refer to Automated migration activities using Migration Factory web console and Automated migration activities using command prompt.

Step 9: (Optional) Build a migration tracker dashboard

If you deployed the optional migration tracker component, you can set up a QuickSight dashboard that will visualize the migration metadata stored in the Amazon DynamoDB table.

Use the following procedures to:

1. Set the QuickSight permissions and connections
2. Create a dashboard

Note
If the Migration Factory is empty and there is no wave, application, and server data, then there will not be any data to build a QuickSight dashboard.

Set the QuickSight permission and connections

If you have not set up Amazon QuickSight in your AWS account, refer to Setting Up for Amazon QuickSight in the Amazon QuickSight User Guide. After you have set up a QuickSight subscription, use the following procedure to set the permissions and connections between QuickSight and this solution.

Note
This solution uses Amazon QuickSight enterprise license. However if you don’t want the email reporting, insights, and the hourly data refresh, you can opt for a standard license, which can also be used with migration tracker.

First, connect QuickSight with the Amazon S3 bucket:

1. Navigate to the QuickSight console.
2. On the QuickSight page, choose the icon displaying a person in the upper-right corner and Manage QuickSight.
3. On the **Account name** page, from the left menu pane, select **Security & permissions**.

4. On the **Security & permissions** page, under the **QuickSight access to AWS services** section, select **Manage**.

5. From the **QuickSight access to AWS services** page, select the checkbox for **Amazon S3**.

6. On the **Select Amazon S3 buckets** dialog box, verify that you are in the **S3 Buckets Linked to QuickSight Account** tab and tick both the right and left checkboxes for the **athena-results** and **migration-tracker** S3 buckets.

**Note**

If you are already using QuickSight for other S3 data analysis, untick and retick the Amazon S3 option to display the bucket selection dialog box.
7. Choose Finish.

Next, set up permissions for Amazon Athena:

1. From the QuickSight access to AWS services page, tick the checkbox for Amazon Athena.
2. On the Amazon Athena permissions dialog box, choose Next.
3. On the Amazon Athena resources dialog box, verify that you are in the S3 Buckets Linked to QuickSight Account tab and verify that the same S3 buckets are checked - athena-results and migration-tracker.


5. From the QuickSight access to AWS services page, choose Save.

Next, set up a new analysis:
1. Select the QuickSight logo to return to the QuickSight homepage.

2. On the **Analysis** page, choose **New Analysis**.

3. Choose **New dataset**.

4. On the **Create a Data Set** page, choose **Athena**.

5. In the **New Athena data source** dialog box, take the following actions:
   
   a. In the **Data source name** field, enter a name for the data source
   
   b. In the **Athena workgroup** field, select the appropriate `<migration-factory>-workgroup`.

   **Note**
   
   If you have deployed this solution multiple times, there will be more than one workgroup. Select the one that was created for your current deployment.

6. Choose **Validate connection** to ensure that QuickSight can communicate with Athena.

7. After the connection is validated, choose **Create data source**.

8. In the next dialog box, choose **Choose your table**, take the following actions:
a. From the **Catalog** list, choose **AwsDataCatalog**.

b. From the **Database** list, choose `<Athena-table>-tracker`.

c. From the **Tables** list, choose `<tracker-name>-general-view`.

d. Choose **Select**.

9. In the next dialog box, **Finish data set creation**, choose **Visualize**.
10. In **New sheet**, choose **Interactive sheet**, then choose **Create**.

After the data is imported, you will be redirected to the Analysis page. However, before creating your visuals, set up a schedule to refresh your dataset.

1. Navigate to the QuickSight homepage.
2. In the navigation pane, choose **Datasets**.
3. On the **Datasets** page, select the `<migration-factory>-general-view` dataset.
4. On the `<migration-factory>-general-view` **Datasets** page, choose the **Refresh** tab.
5. Choose **Add new schedule**.

6. On the **Create a refresh schedule** page, select **Full refresh**, select the appropriate **Time zone**, enter a **Start time**, and select the Frequency.

7. Choose **Save**.
Create a dashboard

Amazon QuickSight offers the flexibility of building a custom dashboard that helps you to visualize your migration metadata. The following tutorial creates a dashboard containing a count visual that shows the server count by waves and bar charts showing the migration status. You can customize this dashboard to meet your business needs.
Use the following steps to create a count overview by migration waves. This view counts all the servers in the dataset that are grouped per wave, providing a granular view of the total number of servers in a wave. To create this view, you will convert the server_name into a measure, which allows you to count distinct servers names. Then you will create a wave by wave filter.

1. Navigate to the QuickSight homepage.
2. In the navigation pane, choose Analyses.
3. Select <migration-factory>-general-view.
4. On the Visualize page, hover over the server_name and choose the ellipsis to the right.
5. Select **Convert to measure** to convert the dataset from a dimension to a measure. The **server_name** text turns green to indicate that the dataset has been converted to a measure.

6. Select **server_name** to visualize the image. The visual will contain an error message indicating that the field data types must be updated.

7. On the **Visuals** pane, select the **server_name (Sum)**, under **Value**, select **Aggregate: Sum**, then select **Count distinct**.
A count of the number of unique server names you have in your dataset is displayed. You can resize the visualization as needed to ensure it displays the information clearly on your monitor.

**Note**
You may need to convert your dataset back to dimension when you create another visual.

Next, add filters to the visualization to identify the server count for each migration wave. The following steps will apply a `wave_id` filter to your visualization.

1. Verify that the visualization is selected. In the top navigation pane, select **Filter**.
2. From the left Filters pane, choose **ADD** and select **wave_id** from the list.
3. Choose **wave_id** from the filters list.
4. In the **Filter** pane, under **Search values** select the checkbox next to the value `1`.
5. Choose **Apply**.
6. In the visualization, change the title to **Wave 1 Server Count** by double clicking on the current title.

Repeat these steps for the other waves that are visualized in your dashboard.

**Edit filter pane**

The next visualization we will add in the dashboard is a doughnut graph showing servers that are in progress of being migrated versus ones that have completed the migration. This chart uses Super-fast, Parallel, In-memory Calculation Engine (SPICE) Queries by creating a new column in the
dataset that determines that an incomplete status will be identified as *in progress*. All values in the dataset that are not completed are combined and categorized as *in progress*.

![Wave 1 Migration In Progress vs Completed](image)

---

**Note**

By default, when there is no custom query applied to the dataset, up to five migration/replication statuses can be shown. For this solution, a *MigrationStatusSummary* query is created in a new column:

```r
ifelse(migration_status = 'Cutover instance launched', 'Completed', 'InProgress')
```

This query combines the values of the statuses to create one column that is used for the visualization. For information about creating a query, refer to [Using the Query Editor](#) in the *Amazon QuickSight User Guide*.

---

Use the following steps to create the *MigrationStatusSummary* column:

1. Navigate to the QuickSight homepage.
2. In the navigation pane, select **Datasets**.
3. On the **Datasets** page, select the `<migration-factory>-general-view` dataset.
4. On the dataset page, choose **Edit dataset**.
5. In the Fields pane, choose +, then choose Add calculated field.

6. On the Add calculated field page, enter a name for your SQL query, for example, MigrationStatusSummary.

7. Enter the following SQL query into the SQL editor:

   ```sql
   ifelse(migration_status = 'Cutover instance launched', 'Completed', 'InProgress')
   ```

8. Choose Save.

Your newly added query will be listed in the **Data set Fields list**.

Next, build the dashboard.

1. Navigate to the QuickSight homepage.
2. Choose **Analyses**, and then choose the migration_factory analyses created earlier.
3. Ensure that no charts are selected in **Sheet 1**.
4. From the Data set pane, hover over the **MigrationStatusSummary** and choose the ellipsis to the right.
5. Choose **Add to visual**.
6. Then, choose **wave_id**.
7. In the **Visuals** pane, select and move the **MigrationStatusSummary** to the x-axis dimension and select **wave_name** as the **GROUP/COLOR**.

If you have an enterprise license for Amazon QuickSight, insights will be generated after the custom columns are created. You can customize your narratives for each insight. For example:
You can also customize the data by breaking down the metadata into waves. For example:

Wave 1 Server Breakdown
Server status breakdown:
- **Completed** with 4,205
- **InProgress** with 1,582

**Note**

You can use the following procedure if you have an enterprise license for Amazon QuickSight.

Use the following steps to add an insight to your dashboard which shows a breakdown of completed and in progress migrations.

1. In the top navigation pane, choose **Insights**.
2. On the **Insights** page, in the **Count of Records BY MIGRATIONSTATUSSUMMARY** section, hover over **Top 2 MigrationSummarys** item and choose the + to add an insight to the visual.
3. Customize the insight for your analysis by choosing **Customize Narrative** on the visual.

```
Top ranked
Top 2 MigrationStatusSummary for total count of server_name are:
  • InProgress with 15,979
  • Completed with 4,205
```

4. Edit the narrative to fit your use case and choose **Save**. For example:
Return to the dashboard and filter it to show each wave:

5. On the left menu pane, choose Filter.

6. Choose the + button and select wave_id.

7. Select a wave to visualize and choose Apply.

8. To visualize all the migration waves, duplicate the visuals by choosing the ellipsis to the left side of the visual and selecting Duplicate visual.

9. Modify the filter for each visual to show a breakdown for each migration wave.

This insight is customized summarize the total count of servers across all waves. For more information and guide on how to customize insights, refer to Working with Insights in the QuickSight User Guide. You can access this QuickSight dashboard from any device and seamlessly embed it into your applications, portals, and websites. For more information about QuickSight dashboards, refer to Working with Dashboards in the Amazon QuickSight User Guide.
Step 10: (Optional) Configure additional identity providers in Amazon Cognito

If you selected `true` for the optional **Allow additional identity provider to be configured in Cognito** parameter when launching the stack, you can set up additional IdPs in Amazon Cognito to allow sign in using existing SAML IdP. The process for setting up the external IdP varies between providers. This section describes the Amazon Cognito configuration and generic steps to configure the external IdP.

Perform the following steps to collect information from Amazon Cognito to provide to the external IdP:

1. Navigate to the [AWS CloudFormation console](https://aws.amazon.com/cognito) and select the Cloud Migration Factory on AWS stack.
2. Select the **Outputs** tab.
3. In the **Key** column, locate **UserPoolId** and record the **Value** to use later during setup.
5. Choose the User pool that matches the User pool ID from the solution stack output.
6. Choose the **App Integration** tab and record the **Cognito domain** to use later during setup.

Perform the following steps within your existing IdP's management interface:

**Note**
These instructions are generic and will differ between providers. Consult your IdP's documentation for full details on setting up SAML applications.

1. Navigate to your IdP's management interface.
2. Choose the option to add applications or setup SAML authentication for an application, and create or add a new application.
3. Within the setup of this SAML application, you will be asked for the following values:
   a. **Identifier (Entity ID)** or something similar. Provide the following value:

   `urn:amazon:cognito:sp:<UserPoolId recorded earlier>`
b. **Reply URL (Assertion Consumer Service URL)** or something similar. Provide the following value:

```
https://<Amazon Cognito domain recorded earlier>/saml2/idpresponse
```

c. **Attributes and Claims** or something similar. At a minimum, ensure that a unique identifier or subject is configured along with an attribute that provides the email address of the user.

4. There will either be a **Metadata URL** or the ability to download a **Metadata XML** file. Download a copy of the file or record the URL provided to use later during setup.

5. Within the setup, configure the access list of users from the IdP that are allowed to sign in to the CMF application. All users that are granted access to the application in the IdP will automatically be granted read only access to the CMF console.

Perform the following steps to add the new IdP to the Amazon Cognito user pool created during the stack deployment:

1. Navigate to the [Amazon Cognito console](https://cognito.amazonaws.com).
2. Choose the User pool that matches the User pool ID from the solution stack output.
3. Choose the **Sign-in experience** tab.
4. Choose **Add identity provider** then choose **SAML** as the third-party provider.
5. Provide a name for the provider; this will be displayed to the user on the CMF sign-in screen.
6. In the **Metadata document source** section, either provide the **Metadata URL** captured from the IdP SAML setup or upload the **Metadata XML** file.
7. In the **Map attributes** section, choose **Add another attribute**.
8. Choose **email** for the **User pool attribute** value. For the **SAML attribute**, enter the name of the attribute that your external IdP will provide the email address to.
9. Choose **Add identity provider** to save this configuration.
10. Choose the **App integration** tab.
11. From within the **App client list** section, choose the migration factory application client (there should only be one listed) by clicking the name.
12. From the **Hosted UI** section, choose **Edit**.
13. Update the **Identity providers** selected by selecting the new IdP name you added in step 5 and deselecting **Cognito User Pool**.
14. Choose **Save changes**.

The configuration is now complete. On the CMF sign-in page, you will see the button **Sign in with your corporate ID**. Choosing this option will display the provider you have configured previously. Users who choose this option will be directed to sign in and then return to the CMF console once successfully signed in.
Monitoring the solution with Service Catalog AppRegistry

This solution includes a Service Catalog AppRegistry resource to register the CloudFormation template and underlying resources as an application in both Service Catalog AppRegistry and AWS Systems Manager Application Manager.

Application Manager gives you an application-level view into this solution and its resources so that you can:

- Monitor its resources, costs for the deployed resources across stacks and AWS accounts, and logs associated with this solution from a central location.
- View operations data for the solution’s AWS resources (such as deployment status, Amazon CloudWatch alarms, resource configurations, and operational issues) in the context of an application.

The following figure depicts an example of the application view for the Cloud Migration Factory one AWS stack in Application Manager.
Note
You must activate CloudWatch Application Insights, AWS Cost Explorer, and cost allocation tags associated with this solution. They are not activated by default.

Activate CloudWatch Application Insights

1. Sign in to the Systems Manager console.
2. In the navigation pane, choose Application Manager.
3. In Applications, choose AppRegistry applications.
4. In AppRegistry applications, search for the application name for this solution and select it.
   The next time you open Application Manager, you can find the new application for your solution in the AppRegistry application category.
5. In the Components tree, choose the application stack you want to activate.
7. Monitoring for your applications is now activated and the following status box appears:
Activate AWS Cost Explorer

You can see the overview of the costs associated with the application and application components within the Application Manager console through integration with AWS Cost Explorer which must be first activated. Cost Explorer helps you manage costs by providing a view of your AWS resource costs and usage over time. To activate Cost Explorer for the solution:

1. Sign in to the AWS Cost Management console.
2. In the left navigation menu, select Cost Explorer.

The activation process can take up to 24 hours to complete. Once activated, you can open the Cost Explorer user interface to further analyze cost data for the solution.
Activate cost allocation tags associated with the solution

After you activate Cost Explorer, you must activate the cost allocation tags associated with this solution to see the costs for this solution. The cost allocation tags can only be activated from the management account for the organization. To activate cost allocation tags:

2. On the Cost allocation tags page, filter for the AppManagerCFNStackKey tag, then select the tag from the results shown.
3. Choose Activate.

The activation process can take up to 24 hours to complete and the tag data to appear.

Confirm cost tags associated with the solution

After you activate cost allocation tags associated with the solution, you must confirm the cost allocation tags to see the costs for this solution. To confirm cost allocation tags:

1. Sign in to the Systems Manager console.
2. In the navigation pane, choose Application Manager.
3. In Applications, choose the application name for this solution and select it.
4. In the Overview tab, in Cost, select Add user tag.
5. On the **Add user tag** page, enter **confirm**, then select **Add user tag**.

The activation process can take up to 24 hours to complete and the tag data to appear.
Update the solution

If you have previously deployed the solution, follow this procedure to update the Cloud Migration Factory on AWS solution CloudFormation stack to get the latest version of the solution's framework.

1. Sign in to the AWS CloudFormation console, select your existing Cloud Migration Factory on AWS solution CloudFormation stack, and select Update.
2. Select Replace current template.
3. Under Specify template:
   a. Select Amazon S3 URL.
   b. Copy the link for the latest template.
   c. Paste the link in the Amazon S3 URL box.
   d. Verify that the correct template URL shows in the Amazon S3 URL text box, and choose Next. Choose Next again.
4. Under Parameters, review the parameters for the template and modify them as necessary. Refer to Step 2. Launch the Stack for details about the parameters.
5. Choose Next.
6. On the Configure stack options page, choose Next.
7. On the Review page, review and confirm the settings. Be sure to check the box acknowledging that the template might create AWS Identity and Access Management (IAM) resources.
8. Choose View change set and verify the changes.
9. Choose Update stack to deploy the stack.

You can view the status of the stack in the AWS CloudFormation console in the Status column. You should receive a UPDATE_COMPLETE status in approximately 10 minutes.

After updating the stack, it is required that you redeploy the API Gateway APIs: admin, login, tools, and user. This ensures that any changes to the configuration are available to all APIs.

1. Sign in to the Amazon API Gateway console, select APIs from the left navigation, and then select the CMF API.
2. From the API Resources, select Actions, and select Deploy API.
3. Select Deployment Stage of prod, and choose Deploy.
4. Repeat steps 1-3 for each of the CMF APIs.
Uninstall the solution

You can uninstall the Cloud Migration Factory on AWS solution from the AWS Management Console or by using the AWS Command Line Interface. You must manually empty all the Amazon Simple Storage Service (Amazon S3) buckets created by this solution. AWS Solutions Implementations do not automatically delete S3 buckets in case you have stored data to retain.

Empty the Amazon S3 buckets

If you decide to delete the AWS CloudFormation stack, this solution is configured to retain the created Amazon S3 bucket (for deploying in an opt-in Region) to prevent accidental data loss. You must manually empty all the S3 buckets before deleting the stack completely. Follow these steps to empty the Amazon S3 bucket.

1. Sign in to the Amazon S3 console.
2. Choose Buckets from the left navigation pane.
3. Locate the `<stack-name>` S3 buckets.
4. Select the S3 bucket and choose Empty.

To delete the S3 bucket using AWS CLI, run the following command:

```
aws s3 rm s3://<bucket-name> --recursive
```

Using the AWS Management Console to delete the stack

1. Sign in to the AWS CloudFormation console.
2. On the Stacks page, select this solution’s installation stack.
3. Choose Delete.

Using AWS Command Line Interface to delete the stack

Determine whether the AWS Command Line Interface (AWS CLI) is available in your environment. For installation instructions, refer to What Is the AWS Command Line Interface in the AWS CLI User Guide. After confirming that the AWS CLI is available, run the following command:
aws cloudformation delete-stack --stack-name <installation-stack-name>
User guide

The following sections provide guidance on how to use the various features available in a deployed Cloud Migration Factory on AWS instance with a large-scale migration to AWS.

Metadata management

The Cloud Migration Factory on AWS solution provides an extensible datastore that allows records to be added, edited, and deleted from within the user interface. All updates to the data stored in the datastore are audited with record level audit stamps, which provide creation and update timestamps along with user details. All update access to records is controlled by the groups and associated policies that the logged in user is assigned. For more details about granting user permissions, refer to Permission management.

Viewing data

Through the Migration Management navigation pane, you can select the record types (application, wave, database, server) held in the datastore. After you select a view, a table of the existing records for the chosen record type is shown. Each record type's table shows a default set of columns which can be changed by the user. Changes are persistent between sessions, and are stored in the browser and computer used for making the changes.

Changing the default columns displayed in tables

To change the default columns, select the settings icon located on the upper-right corner of any data table, and then select the columns to display. From this screen, you can also change the default number of rows to be displayed and activate line wrapping for columns with large amounts of data.

Viewing a record

To view a specific record in a table, you can click anywhere on the row, or select the check box next to the row. Selecting multiple rows will result in no record being displayed. This will then display the record in read-only mode under the data table at the bottom of the screen. The displayed record will have the following default tables available.

Details – This is a summary view of the required attributes and values for the record type.

All Attributes – This displays a complete list of all the attributes and their values.
Other tabs may be present depending on the record type selected that provide related data and information. For example, Application records will have a Servers tab showing a table of the servers related to the Application selected.

### Adding or editing a record

Operations are controlled by record type through user permissions. If a user does not have the required permission to add or edit a specific type of record then the Add and/or Edit buttons are greyed out and deactivated.

To add a new record:

1. Choose Add from the upper-right corner of the table for the record type you want to create.

By default, the Add application screen displays the Details and Audit sections, but depending on the type and any customizations to the schema, other sections might display too.

2. Once you have completed the form and resolved all errors, choose Save.

To edit an existing record:

1. Select a record from the table you want to edit, then choose Edit.

2. Edit the record and ensure no validation errors exist, then choose Save.

### Deleting a record

If a user does not have the permission to delete a specific type of record then the Delete button is grayed out and deactivated.

⚠️ **Important**

Records deleted from the datastore are not recoverable. We recommend making regular backups of the DynamoDB table, or exporting the data to ensure there is a recovery point in the event of an issue.

To delete one or more records:
1. Select one or more records from the table.
2. Choose **Delete** and confirm the action.

## Exporting data

The majority of data stored within the Cloud Migration Factory on AWS solution can be exported into Excel (.xlsx) files. You can export data at the record type level or a complete output of all data and types.

To export a specific record type:

1. Go to the table to export.
2. **Optional**: Select the record(s) to export to an excel sheet. If none are selected, then all records will be exported.
3. Choose the **Export** icon in the upper-right corner of the data table screen.

An excel file with the name of the record type (for example, `servers.xlsx`) will be downloaded to the browser's default download location.

To export all data:

1. Go to **Migration Management**, and select **Export**.
2. Check **Download All Data**.

An excel file with the name `all-data.xlsx` will be downloaded to the browser's default download location. This excel file contains a tab per record type, and all records for each type will be exported.

## Importing data

The Cloud Migration Factory on AWS solution provides a data import capability that can import simple record structures into the data store, for instance a list of servers. It can also import more complex relational data, for instance it could create a new application record and multiple servers contained in the same file and relate them to one another in a single import task. This allows a single import process to be used for any data type needed to be imported. The import process validates the data using the same validation rules used when the user edits data in the user interface.
Download a template

To download template intake forms from the import screen, select the required template from the Actions list. The following two default templates are available.

**Template with only required attributes** – This contains only the attributes marked as required. It provides the minimum set of attributes required to import data for all record types.

**Template with all attributes** – This contains all the attributes in the schema. This template contains additional schema helper information for each attribute to identify the schema that it was found in. These helper prefixes to the column headers can be removed if required. If left in place during an import, the values within the column will only be loaded into the specific record type and not used for relational values. Refer to Import header schema helpers for more details.

Importing a file

Import files can be created in either .xlsx or .csv format. For CSV, it must be saved using UTF8 encoding, otherwise the file will appear to be empty when viewing the pre-upload validation table.

To import a file:

1. Go to Migration Management, and select Import.
2. Choose Select file. By default, you can only select files with either the .csv or .xlsx extensions. If the file is successfully read, then the file name and size of the file will be displayed.
3. Choose Next.
4. The Pre-upload validation screen shows the outcome of the mapping of the headers within the file to attributes within the schema, and validation of the values provided.
   - The mappings of the file column headers are shown on the on-screen table column names. To check which file column header was mapped, select the expandable name in the header for more information about the mapping, including the original file header and the schema name it has been mapped to. You will see a warning in the Validation column for any unmapped file headers, or where there are duplicate names in multiple schemas.
   - All headers validate the values for each row of the file against the requirements for the mapped attribute. Any warnings or errors in the file content are displayed in the Validation column.
5. Once no validation errors are present, choose Next.
6. The **Upload data** step shows an overview of the changes that will be made once this file is uploaded. For any item where a change will be performed on upload, you can select **Details** under the specific update type to view the changes that will be performed.

7. Once the review has been completed, choose **Upload** to commit these changes to the live data.

A message appears at the top of the form if the upload is successful. Any errors that occur during the upload are displayed under **Upload Overview**.

**Import header schema helpers**

By default, the column headers in the intake file should be set to the name of an attribute from any schema, the import process searches all schemas and attempts to match the header name with an attribute. If an attribute is found in multiple schemas you will see a warning, especially for relationship attributes which can be ignored in most cases. However, if the intention is to map a specific column to a specific schema attribute then you can override this behavior by prefixing the column header with a schema helper prefix. This prefix is in the format `{schema name}`{attribute name}, where `{schema name}` is the name of the schema based on its system name (wave, application, server, database) and the `{attribute name}` is the system name of the attribute in the schema. If this prefix is present then all values will only be populated into records for this specific schema, even if the attribute name is present in other schemas.

As shown in the following figure, the header in column C has been prefixed with `[database]`, forcing the attribute to map to the `database_type` attribute in the database schema.

**Import header schema helper**

**Attribute import format**

The following table provides a guide to formatting the values in an import file to import correctly into the Cloud Migration Factory attributes.

<table>
<thead>
<tr>
<th>Type</th>
<th>Supported import format</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>String</td>
<td>Accepts alphanumeric and special characters.</td>
<td>123456AbCd.!</td>
</tr>
<tr>
<td>Type</td>
<td>Supported import format</td>
<td>Example</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Multivalue String</td>
<td>A list of string type, delimited by a semicolon.</td>
<td>Item1;Item2;Item3</td>
</tr>
<tr>
<td>Password</td>
<td>Accepts alphanumeric and special characters.</td>
<td>123456AbCd.!</td>
</tr>
<tr>
<td>Date</td>
<td>MM/DD/YYYY HH:mm</td>
<td>01/30/2023 10:00</td>
</tr>
<tr>
<td>Checkbox</td>
<td>Boolean value, in the form of a string, TRUE for selected, and FALSE for not selected.</td>
<td>TRUE or FALSE</td>
</tr>
<tr>
<td>Textarea</td>
<td>String type with support for line feeds and carriage returns.</td>
<td>Test line1 or Testline 2</td>
</tr>
<tr>
<td>Tag</td>
<td>Tags must be formatted as key=value; multiple tags must be delimited by a semicolon.</td>
<td>TagKey1=Tagvalue1; TagKey2=tagvalue2;</td>
</tr>
<tr>
<td>List</td>
<td>If setting a single value list attribute use the same formatting as String type, if multiple selection list then, as per Multivalue String type.</td>
<td>Selection1;Selection2;</td>
</tr>
<tr>
<td>Relationship</td>
<td>Accepts alphanumeric and special characters that need to match with a value based on the key defined in the attribute definition.</td>
<td>Application1</td>
</tr>
</tbody>
</table>
Credentials management

The Cloud Migration Factory on AWS solution features a Credentials Manager which integrates with AWS Secrets Manager within the account in which the instance is deployed. The feature allows administrators to save system credentials to AWS Secrets Manager for use in automation scripts without providing users access to retrieve the credentials directly, or needing to provide users' access to AWS Secrets Manager. Users can select stored credentials based on their name and description when providing them to an automation job. The automation job will then only retrieve the credentials requested when running on the automation server, and at this point the IAM Role allocated to the EC2 instance will be used to access the required secrets.

The Credentials Manager administration area is only visible to users that are members of the admin group within Amazon Cognito. Non-admin users will only be able to view credential names and descriptions when referenced through an automation, or other records relationship.

The following three secret types can be stored in AWS Secrets Manager via Credentials Manager.

OS Credentials – In the form of a username and password.

Secret key/value – In the form of a key and value.

Plaintext – In the form of a single plain text string.

Add a secret

1. Choose Add from the Credential Manager Secrets list.
2. Select the Secret Type to add.
3. Enter a Secret Name. This will be the same name that will be displayed inside AWS Secrets Manager for the secret name.
4. Enter a Secret Description. This will be the same description that will be displayed inside AWS Secrets Manager for the secret description.
5. Enter the credential information for the secret type.

⚠️ Note

For OS Credentials secret type, there is an option to select the OS Type which can be referenced in custom scripts.
Edit a secret

Except the secret name and type, you can edit all properties of the secret using the Credentials Manager user interface.

Delete a secret

From the Credentials Manager view, select the secret you want to delete and choose **Delete**. The secret will be scheduled for deletion within AWS Secrets Manager which may take a few minutes to complete. Any attempt to add a new secret with the same name during this time will fail.

Run automation from console

The Cloud Migration Factory on AWS solution provides an automation engine allowing users to run jobs in the form of scripts against the inventory within the datastore. With this feature, you can manage, customize, and deploy all automations required to complete the end-to-end migration activities.

Jobs initiated from AWS CMF are run on automation servers that can be hosted in the AWS Cloud or on-premise. These servers need to run Windows with the AWS SSM agent installed, along with Python and Microsoft PowerShell. You can also install other frameworks as required for custom automations. Refer to **Step 6. Build a migration automation server** for details of the automation server build. At least one automation server is required to run jobs from the AWS CMF console.

On deployment, you can use scripts for the most common tasks needed to rehost workloads using AWS MGN. Download the scripts from the web interface and use it as a starting point for custom scripts. For details on creating custom automation script, refer to **Scripts management**.

To initiate a job from the console, select a wave to run the automation against, then select **Actions**, and choose **Run Automation**. Or, you can select a job to run the automation against, then select **Actions**, and choose **Run Automation**.

From the **Run Automation**:

1. Enter the **Job Name**. This will be used to identify the job in the log.
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Note
Job names do not have to be unique, as all jobs are also allocated a unique ID and timestamps to further identify them.

2. Select the **Script Name** from the list. This is a list of all scripts that have been loaded into the AWS CMF instance. When the job is submitted, the default version of the script selected will be run. To check the details of the script, including the current default version, choose **Related details** under the script name. Refer to **Change default version of script package** for details about updating the default version of scripts. When you select the script to run, the required parameters are shown under **Script Arguments**.

3. From the **Instance ID**, select the automation server for the job from the list.

   **Note**
   The list will only show instances that have the SSM agent installed and where either the EC2 instance, or for non-EC2 hosted automation servers, the Managed Instance tag of role is set to `mf_automation`.

4. In **Script Arguments**, enter the required input arguments for the script.

5. Once you have entered all the required parameters and verified them, choose **Submit Automation Job**.

When you submit the automation job, the following process is initiated:

1. A job record will be created with the AWS Cloud Migration Factory **Jobs** view containing the details of the job and current status.

2. An AWS Systems Manager automation job will be created, and will start to run the AWS Cloud Migration Factory SSM automation document against the automation server provided via the **Instance ID**. The automation document:
   a. Downloads the current default version of the script package from the AWS Cloud Migration Factory S3 bucket to the automation server into the `C:\migration\scripts` directory.
   b. Unzips and verifies the package.
c. Launches the master file python script specified in the `package-structure.yml` included in the zip.

3. Once the master file python script has been launched, any output from the script is captured by the SSM agent and fed into CloudWatch. It is then captured regularly and stored in the AWS Cloud Migration Factory datastore with the original job record, providing a complete audit of the job run.

   a. If the script requires credentials to AWS Cloud Migration Factory then the script will contact AWS Secrets Manager to obtain the service account credentials. If the credentials are incorrect or not present then the script will return a failure.

   b. If the script has a requirement to access other secrets stored using the AWS Cloud Migration Factory Credentials Manager feature, then it will contact AWS Secrets Manager to access those credentials. If this is not possible then the script will return a failure.

4. Once the master file python script exits, the outcome of this script will determine the status provided to the AWS Cloud Migration Factory job record. A non-zero return will set Job Status to Failed.

### Note

Currently, if a failure occurs in the initial run of the AWS SSM document, it is not shown in the web interface. Failures are only logged once the master file python is launched. All jobs initiated from the console will timeout after 12 hours if they have not returned a success or failure status.

---

### Run automations from command prompt

Although we recommend running automation jobs through the web interface, you can run automation scripts manually from a command line on the automation server. This provides additional options where organizations cannot or do not want to use the combination of AWS CMF Credentials Manager, AWS Secrets Manager and AWS Systems Manager in the environment, or if Cloud Migration Factory on AWS users need to provide multi-factor authentication (MFA) one-time access codes to logon to Cloud Migration Factory on AWS.

When scripts are run from the command line, job history and logs are not available from within the Jobs view in the web interface. Log output will only be directed to the command-line output only.
The scripts can still access the Cloud Migration Factory on AWS APIs to read and update records, and other functions available through the APIs.

We recommend storing scripts in the scripts library or another central location to ensure you are accessing and using the latest version of the script, or the version that is currently approved for use.

**Manually running an automation package**

This section describes the steps to download a package from Cloud Migration Factory on AWS and manually run it on the automation server. You can also follow the process for other script source locations by replacing steps 1 and 2 with the source specific download steps.

1. If scripts are stored in Cloud Migration Factory on AWS, follow the steps covered in Download script packages to obtain the automation package zip file.

2. Copy the zip file to a location on the automation server, such as `c:\migrations\scripts`, and unzip the contents.

3. Copy the `FactoryEndpoints.json` file to each of the unzipped script folder. Configure the file with the specific API endpoints for the Cloud Migration Factory instance that contains the servers, or other records this automation job will reference. Refer to Creation of the `FactoryEndpoints.json` for more information on how to create this file.

4. From the command line, ensure that you are within the root directory of the unzipped package, and run the following command:

   ```
   python [package master script file] [script arguments]
   ```

   *package master script file* – this can be obtained from the `Package-Structure.yml` under the MasterFileName key.

   *script arguments* – information about the arguments is provided in the `Package-Structure.yml` under the Arguments key.

5. The scripts will request credentials required for Cloud Migration Factory on AWS APIs and the remote server. Any credentials manually entered are cached in memory for the duration of this process to avoid entering the same credentials again. If you enter script arguments to access secrets stored using the Credentials Manager feature, then access to AWS Secrets Manager and
associated secrets is required. If secret retrieval fails for any reason, the script will prompt for user credentials.

**Creation of the FactoryEndpoints.json**

We recommend creating this file once when deploying Cloud Migration Factory on AWS solution, as the content does not change after initial deployment, and stored in a central location on the automation server. This file provides the automation scripts with the Cloud Migration Factory on AWS API endpoints and other key parameters. An example of the default contents of the file is shown here:

```json
{
    "UserApiUrl": "https://cmfuserapi.execute-api.us-east-1.amazonaws.com",
    "Region": "us-east-1",
    "UserPoolId": "us-east-1_AbCdEfG",
    "UserPoolClientId": "123456abcdef7890ghijk",
    "LoginApiUrl": "https://cmfloginapi.execute-api.us-east-1.amazonaws.com"
}
```

**Note**

Most information required to compose this file for a deployed AWS Cloud Migration Factory instance is available from the AWS CloudFormation **Outputs** tab of the deployed stack, except the UserPoolClientId. Obtain this value by completing the following steps:

1. Navigate to the Amazon Cognito console.
2. Open the **User pool configuration**.
3. Select **App integration**, which will provide the **App client configuration**.

```json
{
    "UserApiUrl": "<UserApi-value>",
    "Region": "<Region-value>",
    "UserPoolId": "<UserPoolId-value>",
    "UserPoolClientId": "<Amazon-Cognito-user-pool-app-clients-console>",
    "LoginApiUrl": "<LoginApi-value>
```
Replace `<LoginApi-value>`, `<UserApi-value>`, `<Region-value>`, and `<UserPoolId-value>` with the corresponding values you retrieved from the AWS CloudFormation Outputs console. Do not add a forward slash (/) to the end of the URLs.

The file has an optional `DefaultUser` key. You can set the value for this key to the default user ID to be used to access the Cloud Migration Factory on AWS instance to avoid having to enter it every time. When prompted for the Cloud Migration Factory user ID, you can either enter a user ID or use the default value by pressing the enter key. You can only do this when the scripts are run manually.

**Launch AWS MGN jobs from Cloud Migration Factory**

The Cloud Migration Factory on AWS solution has built in automation to initiate and manage Rehost migration using AWS MGN. These automations allow migration teams to manage all aspects of their migration from a single user interface, combining the key actions available within the AWS MGN service console, with the AWS Cloud Migration Factory automation library that extends the functionality with prebuilt scripts for mass migrations, which helps to increase the speed of the migration activities. Refer to List of automated migration activities for AWS Application Migration Service (AWS MGN) for a full list of AWS MGN automation jobs available.

Using AWS Cloud Migration Factory also provides seamless multi account migrations using AWS MGN as the Cloud Migration Factory has the ability to assume roles in different target accounts automatically based on the Cloud Migration Factory application and server definitions being migrated.

**Prerequisite activities**

1. Target account AWS CMF CloudFormation deployed into each target account. For more information, review the [AWS CloudFormation templates](#) section in this document.

2. [AWS MGN is initialized in each target account](#).

**Initial definition**

Definition of the on-premises inventory is performed through the creation of wave, application and server items using either the user interface, or through the import of a CSV intake form. These definitions are used to provide the on-premise server identities and also the target EC2 parameters and well as other required data to manage the migration activity.
User interface definition

In order to use the AWS MGN functionality, you need to create a wave record, with associated application records, and finally one or more server records associated to the applications. The wave record is used to group the applications, and does not provide parameters to the automation, whereas the application record defines the target AWS account ID and AWS Region that the application will be migrated to. The server records provide the automations actions and AWS MGN integration the target parameters for the EC2 instances, such as instance type, subnets, security groups, etc.

When defining a server in the AWS CMF datastore for use with the AWS MGN functionality the server needs to be configured with a Migration Strategy of Rehost. Once Rehost is selected then the additional attributes required for this functionality will be shown on the screen. The following attributes are required to be populated in order to successfully initiate an AWS MGN migration job:

**Required**

- **Server OS Family** – Set to either linux or windows depending on the OS family.
- **Server OS Version** – Set to the detailed OS version running on the server.
- **Instance Type** – EC2 instance type to be used.
- **Tenancy** – Shared hosting, dedicated host.
- **Security Group Ids** – List of security groups that will be assigned to the instance when the final cutover is initiated.
- **Security Group Ids - Test** – List of security groups that will be assigned to the instance when the testing is initiated.

**Conditional**

- **Subnet Ids** – Subnet ID to assign this EC2 instance to when the final cutover is initiated. (not applicable when Network Interface ID specified)
- **Subnet Ids - Test** – Subnet ID to assign this EC2 instance to when testing is initiated. (not applicable when Network Interface ID -Test specified)
- **Network Interface ID** – ENI ID to be used when the final cutover is initiated.
Network Interface ID - Test - ENI ID to be used when testing is initiated.

Dedicated Host ID – Dedicated host ID that the instance will be launched on. (only applicable when Tenancy is set to Dedicated host).

Optional

Tags – EC2 Instance tags to be applied to instance.

All other attributes not listed here do not have any bearing on the AWS MGN Jobs initiated from within the AWS CMF solution.

Intake form definition

Intake forms can contain the details to create or update multiple types of record with the datastore in a single row of the csv file, this enables the import of related data. In the example below, the wave, application and server records will be created and related to each other automatically during the import.

To import the intake form, follow the same process as other data imports into the Cloud Migration Factory on AWS solution covered in Importing data.

Initiating a job

Initiating an AWS MGN job from AWS CMF is performed against a wave, from the wave list view select the wave, and then from the Actions select Rehost>MGN.

This screen requires the user to make the following choices before they can Submit the job.

1. Select the AWS MGN Action to perform against the applications and servers in the wave. These actions mostly replicate those available in the AWS MGN service console and API, with the exception of Validate Launch Template (see below for details on this action). For details of the effects of each action, refer to AWS MGN user guide.

2. Select the Wave to run the action against.

3. Select the Applications from the wave that the action will be run against. This list will only show applications that are associated to the Wave selected.

4. Once all options are correct, choose Submit.
The automation will now initiate the selected action against each selected application's target AWS account, as specified in the Application record. The results of the action will be displayed in the notification message, including any errors.

**Validate launch template**

This action is used to validate the configuration data stored in CMF for each server is valid before attempting cutover activities. In order to run this action, you must have successfully deployed the AWS MGN agents onto the source server.

The validations performed for each server are:

- Verify instance type is valid.
- Verify IAM instance profile exists.
- Security groups exist for both test and live.
- Subnets exist for both test and live (if ENI not specified).
- Dedicated host exists (if specified).
  - If dedicated host is specified then the following checks are made:
    - Does the dedicated host support the instance type specified?
    - Does the dedicated host have free capacity for all the requirements of this wave, based on instance types required?
- ENI exists (if specified).

The results of the action will be displayed in the notification message, including any errors.

**Replatform to EC2**

The Cloud Migration Factory on AWS solution allows groups of EC2 instances to be launched automatically from configurations defined in its datastore; deploying EC2 instances with EBS volumes attached. This provides the ability to provision new EC2 instances, allowing Replatform through AWS CloudFormation, and Rehost of on-premise servers with AWS MGN within a single CMF user interface. Before you can use this functionality the datastore must contain the definition of the servers. Once this has been addressed the servers should be linked to a wave. When the decision is taken to launch the EC2 instances, the user can initiate the following actions against the wave:

- EC2 Input Validation
• EC2 Generate CF Template
• EC2 Deployment

Prerequisites

Permissions to add the Replatform attribute access.

Initial configuration

Configuration of the new EC2 instances is performed through the creation of new server items using either the user interface or through the import of a CSV intake form containing the server items. These definitions are converted to AWS CloudFormation templates stored in an S3 bucket within the same AWS account that the AWS CMF instance is deployed.

User interface definition

When defining a server in the AWS Cloud Migration Factory datastore for use with the Replatform to EC2 functionality the server needs to be configured with a Migration Strategy of Replatform. Once Replatform is selected then the additional attributes required for this functionality will be shown on the screen. The following attributes are required to be populated for the functionality to work:

Required attributes

- **AMI Id** – ID of the Amazon Machine Image used to launch the EC2 instance.
- **Availability Zone** – AZ that the EC2 instance will be deployed to.
- **Root Volume Size** – Size in GB of the root volume for the instance.
- **Instance Type** – EC2 instance type to be used.
- **Security Group Ids** – List of security groups assigned to the instance.
- **Subnet Ids** – Subnet ID to assign this EC2 instance to.

**Tenancy** – Currently the only supported option for the Replatform to EC2 integration is **Shared** any other option will be replaced with **Shared** when the template is generated.

Optional Attributes

- **Enable Detailed Monitoring** – Check to enable detailed monitoring.
**Additional Volume Names** – List of Additional EBS volume names. Each item in the list needs to map to the same line as the **Size** and **Type** lists.

**Additional Volume Sizes** – List of additional EBS volume sizes. Each item in the list needs to map to the same line as the **Names** and **Type** lists.

**Additional Volume Types** – List of additional EBS volume types. Each item in the list must map to the same line as the **Names** and **Size** lists, if not specified then defaults to **gp2** for all volumes.

**EBS KMS Key Id for Volume Encryption** – If EBS volumes will be encrypted then specify the **Key ID**, **Key ARN**, **Key Alias**, or **Alias ARN**.

**Enable EBS Optimized** – Select to turn on **EBS Optimized**.

**Root Volume Name** – Select from the options provided, if not specified then the ID will be used.

**Root Volume Type** – Provide the EBS type of the volume to be created, if not specified then defaults to **gp2**.

**Intake form definition**

Intake forms can contain the details to create or update multiple types of record with the datastore in a single row of the csv file, this enables the import of related data. In the following example, the wave, application and server records will be created and related to each other automatically during the import.

Example: Intake form

<table>
<thead>
<tr>
<th>Column name</th>
<th>Example data</th>
<th>Required</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>wave_name</td>
<td>wave1</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>app_name</td>
<td>app1</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>aws_accountid</td>
<td>1234567890</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>server_name</td>
<td>Server1</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>server_fqdn</td>
<td>Server1</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>server_os_family</td>
<td>linux</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Column name</td>
<td>Example data</td>
<td>Required</td>
<td>Notes</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------</td>
<td>----------</td>
<td>-------</td>
</tr>
<tr>
<td>server_os_version</td>
<td>Amazon</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>server_tier</td>
<td>Web</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>server_environment</td>
<td>Dev</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>subnet_IDs</td>
<td>subnet-xxxxxxx</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>securitygroup_IDs</td>
<td>sg-yyyyyyyyyy</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>instanceType</td>
<td>m5.large</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>iamRole</td>
<td>ec2customrole</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>tenancy</td>
<td>Shared</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>r_type</td>
<td>Replatform</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>root_vol_size</td>
<td>50</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>ami_id</td>
<td>ami-zzzzzzzzz</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>availabilityzone</td>
<td>us-west-2a</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>root_vol_type</td>
<td>gp2</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>add_vols_size</td>
<td>40:100</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>add_vols_type</td>
<td>gp2:gp3</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>ebs_optimized</td>
<td>false</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>ebs_kmskey_id</td>
<td>1111-1111</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>detailed_monitoring</td>
<td>true</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>root_vol_name</td>
<td>Server1_root_volume</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
To import the intake form, follow the same process as any other data imports into the Cloud Migration Factory on AWS solution.

**Deployment actions**

**EC2 input validation**

After defining the instance parameters, you must first run the wave action: Replatform>EC2>EC2 Input Validation. This action verifies that all the correct parameters have been provided for each server in order to create a valid CloudFormation template.

> **Note**
> This validation does not currently verify that the input parameters are valid, only that they are present in each server definition. You must verify the correct values before creating the template otherwise the deployment of the template will fail.

**EC2 generate CloudFormation template**

Once the definitions for all servers included in a wave have been verified the CloudFormation template can be generated. To do this, run the wave action: Replatform>EC2>EC2 Generate CF Template. This action creates a CloudFormation template for each application in the wave, where the servers in the application have a Migration Strategy of Replatform; any servers with other migration strategies defined will not be included in the template.

Once run, the templates for each application will be stored in the S3 bucket: [instance specific prefix]-gfbuild-cftemplates, which was automatically created when the Cloud Migration Factory on AWS solution was deployed. The folder structure of this bucket is as follows:

- [Target AWS Account ID]
  - [Wave Name]
Cloud Migration Factory on AWS

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- **CFN_Template_[Application ID]_[Application Name].yaml**

Each time the generate action is run a new version of the template is stored in the S3 bucket. The S3 URIs for the templates will be provided in the notification, these templates can be reviewed or edited as required before deployment.

The CloudFormation templates generate the following CloudFormation resource types currently:

- AWS::EC2::Instance
- AWS::EC2::Volume
- AWS::EC2::VolumeAttachment

**EC2 deployment**

Once you’re ready to deploy the new EC2 instances, you can initiate the **EC2 Deployment** action can be initiated through the wave action **Replatform>EC2>EC2 Deployment**. This action will use the latest version of the CloudFormation template for each application in the wave, and deploy these templates into the target accounts selected, through AWS CloudFormation.

**Scripts management**

The Cloud Migration Factory on AWS solution allows users to fully manage the library of automation scripts or packages within the user interface. You can upload new custom scripts as well as new versions of the script using the scripts management interface. When multiple versions are available, an administrator can switch between these versions allowing the ability to test updates before making them default. The script management interface also allows administrators to download script packages to update or review the content.

A supported script package is a compressed zip archive containing the following mandatory files in the root:

- **Package-Structure.yml** – Used to define the script’s arguments and other metadata, such as description and default name. Refer to **Composing a new script package** for more details.
- **[custom python script].py** – This is the initial script that will be run when a job is submitted. This script can call other scripts and modules and if so these should be included in the archive. The name of this script must match the value specified in the MasterFileName key in the Package-Structure.yml.
Upload new script package

**Note**
A script package must conform to the supported format. Refer to [Composing a new script package](#) for more details.

2. Select the package archive file you want to upload.
3. Enter a unique name for the script. Users will reference the script by this name for initiating jobs.

**Download script packages**

You can download script packages from the console to activate updates and content verification.

1. Select Automation, then Scripts.
2. Select the script you want to download from the table, then select Actions and choose Download default version or Download latest version.

You can download specific versions of a script. To do so, select the script, then Actions and choose Change default version. From the Script Default Version list, choose Download selected version.

**Add new version of a script package**

Updates to AWS Cloud Migration Factory script packages can be uploaded in the Automation > Scripts section by following these steps:

1. Select Automation, then Scripts.
2. Select the existing script to add a new version, then select Actions and choose Add new version.
3. Select the updated package archive file you want to upload, and choose Next. The new script version will keep the existing name by default. Enter a unique script name. Any name change will only be applied to this version of the script.
4. You can make the new version of the script the default version by selecting Make default version.
5. Choose Upload.
Deleting script packages and versions

You cannot delete scripts or versions of a script for auditing purposes. This allows reviewing the exact script that was run against a system at a point in time. Every script version has a unique signature and ID when uploaded which is recorded against the job history that the script and version was used in.

Composing a new script package

Cloud Migration Factory on AWS script packages support Python as the primary scripting language. You can initiate other shell scripting languages as required from within a Python main program or wrapper. To create a new script package quickly, we recommend downloading a copy of one of the prepackaged scripts and updating it to perform the required task. You must first create a master Python script that will perform the core functionality of the script. Then, create a Package-Structure.yml file to define the arguments and other metadata the script requires. Refer to Package-Structure.yml options for more details.

Main Python script

This is the initial main script that runs when a job is initiated. Once the script completes running, the task is finished and the final return code determines the status of the job. All output from this script is captured when run remotely and passed into the output audit log of the job for reference. This log is also stored in Amazon CloudWatch.

Accessing Cloud Migration Factory on AWS data and APIs from a script

To provide access to the Cloud Migration Factory on AWS APIs and data, you can use the included python helper module. The module provides the following common functions:

Factorylogin

Returns an access token that can be used to call Cloud Migration Factory on AWS APIs. This function will attempt login to CMF using a number of attempts for credentials:

1. By attempting to access the default secret containing the service account userid and password if it exists and access is allowed. This secret name MFServiceAccount-[userpool id] will be checked.
2. If Step 1 is unsuccessful, and the user is running the script from the command line, then the user will be prompted to supply an AWS Cloud Migration factory userid and password. If run from a remote automation job, the job will fail.
getServerCredentials

Returns the login credentials for a server stored in AWS Cloud Migration Factory in either
Credentials Manager, or through user input. This function will check a number of different sources
to determine the credentials for a specific server, the order of the sources is:

1. If local_username and local_password is set and valid then these will be returned.
2. If secret_overide is set then this will be used to retrieve the secret specified from AWS Secret
   Manager, otherwise, checks if the server record contains the key `secret_name` and this is not
   empty then this secret name will be used.
3. If there is a failure locating or accessing the secrets specified then the function will fall back
   to prompting the user for the credentials, but only if the `no_user_prompts` is set to `False`,
   otherwise it will return a failure.

**Parameters**

local_username – If passed, then will be returned.
local_password – If passed, then will be returned.
server – Server name, as stored in the server_name attribute in AWS Cloud Migration Factory.
Secret_overide – Is passed this will set the secret name to retrieve from Secrets Manager for this
server.
No_user_prompts – Tells the function not to prompt a user for a userid and password if not stored,
this should be True for any remote automation script.

getCredentials

Gets the credentials stored using AWS Cloud Migration Factory Credentials Manager from Secrets
Manager.

**Parameters**

secret_name – name of the secret to retrieve.

get_factory_servers

Returns an array of servers from the AWS Cloud Migration Factory datastore based on the waveid
provided.
Parameters

Waveid – Wave record ID of the servers that will be returned.

Token – Authentication token obtained from the FactoryLogin Lambda function.

UserHOST – AWS Cloud Migration Factory User API Endpoint URL.

osSplit – If set to true, then two lists will be returned one for Linux and one windows servers, if False, then a single combined list will be returned.

Final message summary

It is recommended to provide a summary message of the script's outcome as the final output to the screen or sysout. This will be shown on the console in the Last Message property, which provides a quick status of the script outcome without the user having to read the full output log.

Return code

The main python script should return a non-zero return code on exit if the function of the script was not completely successful. On receiving a non-zero return code the job status will be shown as Failed in the jobs log indicating to the user that they should review the output log for details of the failure.

YAML Package-Structure.yml options

Example YAML file

```yaml
Name: "0-Check MGN Prerequisites"
Description: "This script will verify the source servers meet the basic requirements for AWS MGN agent installation."
MasterFileName: "0-Prerequisites-checks.py"
UpdateUrl: ""
Arguments:
  - name: "ReplicationServerIP"
    description: "Replication Server IP."
    long_desc: "IP Address of an AWS MGN Replication EC2 Instance."
    type: "standard"
    required: true
  - name: "SecretWindows"
    description: "Windows Secret to use for credentials."
    long_desc: ""
YAML key descriptions

Required

Name – Default name that the script will use on import.

Description – Description of the usage of the script.

MasterFileName – This is the starting point for the script to run, it has to be a python file name that is included within the script package archive.

Arguments – A list of arguments that the MasterFileName Python script accepts. Each argument needs specified is in the AWS Cloud Migration Factory Attribute definition format. Required properties for each argument are Name and Type, all other properties are optional.
Optional

**UpdateUrl** – Provide a URL where the script package's source is available for providing updates. Currently this is for reference only.

**SchemaExtensions** – A list of attributes that the Python script requires to be in the schema to store output or retrieve additional data. Each attribute must be specified in the AWS CMF Attribute definition format. Required properties for each attribute are *Schema*, *Name*, *Description* and *Type*. All other properties are optional. Any new attributes will be automatically added to the schema when the script is initially loaded, and changes to SchemaExtensions will not be processed for new versions of the script. If this is required for a new script to be added, manual updates to the schema must be made.

**Schema management**

The Cloud Migration Factory on AWS solution provides a fully extensible metadata repository, allowing data for automation, auditing and status tracking to be stored in a single tool. The repository provides a default set of entities (Waves, Applications, Servers, and Databases) and attributes at deployment time to get you started with capturing and using the most frequently used data, and from here you can customize the schema as required.

Only Cognito admin group users have permissions to manage the schema. To make a user a member of the admin or other groups, refer to [User management](#).

Go to **Administration**, and select **Attributes** for the default entity tabs. The following tabs are available to support management of the entity.

**Attributes** – Allows for adding, editing and deleting attributes.

**Info Panel** – Allows for editing of the Info panel help content, this is shown on the right of the entities’ screen in the Migration Management section.

**Schema Settings** – Currently this tab only provides the ability to change the friendly name of the entity, this is the name that is shown on the user interface. If not defined, then the user interface uses the programmatic name of the entity.

**Adding/editing an attribute**

Attributes can be amended dynamically through the **Attributes** administration section of the Cloud Migration Factory on AWS solution. When attributes are added, edited or deleted the updates will
be applied in real-time for the administrator making the change. Any other user that is currently logged into the same instance will have their session updated automatically within a minute of the changes being saved by the administrator.

Some attributes are defined as system attributes, which means that the attribute is key to the core functionality of Cloud Migration Factory on AWS and so only some properties are available for administrators to amend. Any attribute that is a system attribute will be shown with a warning on the top of the **Amend attribute** screen.

For system defined attributes only the following can be edited:

- Info Panel
- Advanced Options
  - Attribute Grouping & Positioning
  - Input Validation

All other properties of the system defined attribute are read-only.

**Adding an attribute:**

You can add new attributes by choosing the **Add** button on the attributes tab of the entity you wish to add the attribute to. In the example above, choosing **Add** will add a new attribute to the database entity.

On the **Amend attribute** dialog, you must to provide the following required properties:

**Programmatic name** – This is the key that will be used to store data for the attribute against items in the DynamoDB table. It is also referenced when using the Migration Factory APIs, and in automation scripts.
**Display name** – This is the label that will be displayed on the web interface against the data entry field.

**Type** – This drop-down selection defines the type of data that the user will be allowed to store against the attribute. The following options are available:

<table>
<thead>
<tr>
<th>Type</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>String</td>
<td>Users can enter any single line of text carriage returns are not permitted.</td>
</tr>
<tr>
<td>Multivalue String</td>
<td>Similar to a <strong>String</strong> the only difference being that the user can enter multiple values on separate lines within the field, these are then stored as an array/list.</td>
</tr>
<tr>
<td>Password</td>
<td>Provides the user with a way to securely enter data that should not be displayed on the screen by default.</td>
</tr>
</tbody>
</table>

**Note**

Data is not stored encrypted when using this attribute type, and is shown in clear text when viewed in API payloads, thus should not be used to store sensitive data. Any passwords or secrets should be stored in the Migration Factory Credential Manager (covered in this document) which utilizes AWS Secrets Manager to securely store and provide access to credentials.

<p>| Date                    | Provides a field with a date picker for the user to select a date, or they can manually enter the date required. |</p>
<table>
<thead>
<tr>
<th>Type</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checkbox</td>
<td>Provides a standard checkbox, when checked the key value will store ‘true’ if not checked then it will be ‘false’ or the key will not exist in the record.</td>
</tr>
<tr>
<td>TextArea</td>
<td>Unlike the <strong>String</strong> type <strong>TextAreas</strong> provide the ability to store multi line text, it supports basic text characters only.</td>
</tr>
<tr>
<td>Tag</td>
<td>Allows users to store a list of key/value pairs.</td>
</tr>
<tr>
<td>List</td>
<td>Provides the user a list of predefined options to select from, these options are defined in the schema attribute definition in the Value List property of the attribute.</td>
</tr>
<tr>
<td>Relationship</td>
<td>This attribute type provides the ability to store relationships between any two entities or records. When defining a relationship attribute you select the entity that the relationship will be to, and then the key value used to relate the items and select the attribute from the related item that you wish to display to the user. The user is presented with a drop-down list based on the entity and display values available for the relationship. Under each relationship field the user has a quick link to show the summary of the related item.</td>
</tr>
<tr>
<td>Type</td>
<td>Usage</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>JSON</td>
<td>Provides a JSON editor field where JSON data can be stored and edited. This could be used for storing script input/output parameters or other data needed for automation of tasks, or any other use.</td>
</tr>
</tbody>
</table>

When adding a new attribute, you must grant users access to the new attribute through a policy. See the Permission management section for details on how to grant attribute access.

**Info panel**

Provides the facility to specify contextual help and guidance for the attribute's usage. When specified, the attribute's label on the UI will have an Info link displayed to the right. Clicking this link provides the user with the Help content and Help links specified in this section to the right of the screen.

The Info panel section provides two views of the data, the Edit view where you can define the content, and the Preview view to provide a quick preview of what the user will see when updates to the attribute are saved.

The Help title supports only plain text values. The Help content supports a subset of html tags that allow text formatting. For example, adding `<b>` start and `</b>` end tags around the text will make the enclosed text bold (i.e. `<b>Network Interface ID</b>` would result in **Network Interface ID**). The supported tags are as follows:

<table>
<thead>
<tr>
<th>Tag</th>
<th>Usage</th>
<th>UI Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>&lt;p&gt;</code>/<code>&lt;/p&gt;</code></td>
<td>Defines a paragraph.</td>
<td><code>&lt;p&gt;My first paragraph&lt;/p&gt;</code>&lt;br&gt;<code>&lt;p&gt;My second paragraph&lt;/p&gt;</code></td>
</tr>
<tr>
<td><code>&lt;a&gt;</code></td>
<td>Defines a hyperlink.</td>
<td><code>&lt;a href=&quot;https://aws.amazon.com/&quot;&gt;Visit AWS!&lt;/a&gt;</code></td>
</tr>
</tbody>
</table>

---

Adding/editing an attribute
<table>
<thead>
<tr>
<th>Tag</th>
<th>Usage</th>
<th>UI Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>&lt;h3&gt;</code>, <code>&lt;h4&gt;</code> and <code>&lt;h5&gt;</code></td>
<td>Defines headings h3 to h5</td>
<td><code>&lt;h3&gt;My heading 3&lt;/h3&gt;</code></td>
</tr>
<tr>
<td><code>&lt;span&gt;</code></td>
<td>Defines a section of text, allowing additional formatting to be applied, such as text color, size, font.</td>
<td><code>&lt;span style=&quot;color:blue&quot;&gt;blue&lt;/span&gt;</code></td>
</tr>
<tr>
<td><code>&lt;div&gt;</code></td>
<td>Defines a block of the document, allowing additional formatting to be applied, such as text color, size, font.</td>
<td><code>&lt;div style=&quot;color:blue&quot;&gt;</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>&lt;h3&gt;This is a blue heading &lt;/h3&gt;</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>&lt;p&gt;This is some blue text in a div.&lt;/p&gt;</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>&lt;/div&gt;</code></td>
</tr>
<tr>
<td><code>&lt;ul&gt;</code> + <code>&lt;li&gt;</code></td>
<td>Defines an unordered bulleted list.</td>
<td><code>&lt;ul&gt;</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>&lt;li&gt;Rehost&lt;/li&gt;</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>&lt;li&gt;Replatform&lt;/li&gt;</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>&lt;li&gt;Retire&lt;/li&gt;</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>&lt;/ul&gt;</code></td>
</tr>
<tr>
<td><code>&lt;ol&gt;</code>, <code>&lt;li&gt;</code></td>
<td>Defines an ordered/numbered list.</td>
<td><code>&lt;ol&gt;</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>&lt;li&gt;Rehost&lt;/li&gt;</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>&lt;li&gt;Replatform&lt;/li&gt;</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>&lt;li&gt;Retire&lt;/li&gt;</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>&lt;/ol&gt;</code></td>
</tr>
<tr>
<td><code>&lt;code&gt;</code></td>
<td>Defines a block or section of text containing code.</td>
<td><code>&lt;code&gt;background-color&lt;/code&gt;</code></td>
</tr>
<tr>
<td>Tag</td>
<td>Usage</td>
<td>UI Example</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>&lt;pre&gt;</code></td>
<td>Defines a block of preformatted text, all line breaks, tabs, and spaces are output.</td>
<td><code>&lt;pre&gt;</code>&lt;br&gt;My preformatted text.&lt;br&gt;This is displayed in a fixed width font and will display as typed &lt;&lt;these spaces will be shown.&lt;br&gt;<code>&lt;/pre&gt;</code></td>
</tr>
<tr>
<td><code>&lt;dl&gt;</code>, <code>&lt;dt&gt;</code> and <code>&lt;dd&gt;</code></td>
<td>Defines a description list.</td>
<td><code>&lt;dl&gt;</code>&lt;br&gt;<code>&lt;dt&gt;Rehost&lt;/dt&gt;</code>&lt;br&gt;<code>&lt;dt&gt;Lift and shift migration&lt;/dt&gt;</code>&lt;br&gt;<code>&lt;dt&gt;Retire&lt;/dt&gt;</code>&lt;br&gt;<code>&lt;dd&gt;Decommission the instance or service&lt;/dd&gt;</code>&lt;br&gt;<code>&lt;/dl&gt;</code></td>
</tr>
<tr>
<td><code>&lt;hr&gt;</code></td>
<td>Defines a horizontal rule across the page to show a switch in topic or section.</td>
<td><code>&lt;hr&gt;</code></td>
</tr>
<tr>
<td><code>&lt;br&gt;</code></td>
<td>Defines a line break in text. These are supported but not required as any carriage returns in the editor will be replaced with <code>&lt;br&gt;</code> when saved.</td>
<td><code>&lt;br&gt;</code></td>
</tr>
</tbody>
</table>
Another option available to provide help is links to external content and guidance. To add an external link to the attribute's contextual help click [Add new URL](#) and provide a [Label](#) and URL. You can add multiple links to the same attribute type as required.

**Advanced options**

**Attribute grouping and positioning**

This section provides the administrator with the ability to set where on the Add/Edit UI the attribute will be positioned and also allows for grouping of attributes providing the user with a simple way to locate related attributes.

UI Group is a text value that defines the name of the group that the attribute should be shown in, all attributes with the same UI Group value will be placed in the same group, any attribute with no UI Group specified will be placed in the default group at the top of the form entitled [Details](#). When UI Group is specified the user interface will display the text shown here as the title of the group.

The second property in this section is Order in group, this can be set to any positive or negative number, and when specified the attributes will be listed based on a sort of lowest to highest based on this value. Any attributes that do not have an Order in group specified will be lower priority and sorted alphabetically.

**Input validation**

This section allows the administrator to define validation criteria that ensures that the user has entered valid data before they are able to save an item. The validation uses a regular expression or regex string which is a series of characters that specify a search pattern for a text value. For example, the pattern `^subnet-([a-z0-9]{17})*$` will search for the text `subnet-` followed by

<table>
<thead>
<tr>
<th>Tag</th>
<th>Usage</th>
<th>UI Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>&lt;i&gt;</code> and <code>&lt;em&gt;</code></td>
<td>Defined the enclosed text in <em>Italic</em> or alternative localized format.</td>
<td><code>&lt;i&gt;This is in Italic&lt;/i&gt;</code> or <code>&lt;em&gt;This is also Italic&lt;/em&gt;</code></td>
</tr>
<tr>
<td><code>&lt;b&gt;</code> and <code>&lt;strong&gt;</code></td>
<td>Defines the enclosed text in <strong>bold</strong> font.</td>
<td><code>&lt;b&gt;I'm in bold&lt;/b&gt;</code> or <code>&lt;strong&gt;This is different&lt;/strong&gt;</code></td>
</tr>
</tbody>
</table>
any combination of the characters a to z (lowercase) and digits 0 to 9 with an exact number of characters of 17, if it finds anything else it will return false indicating that the validation has failed. Within this guide we cannot cover all the possible combinations and patterns available, but there are many resources on the internet that can provide help on creating the prefect on for your use case. Here are some common examples to get you started:

<table>
<thead>
<tr>
<th>Regex Pattern</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>^(?&lt;!\s*$).+</td>
<td>Ensures that the value is set.</td>
</tr>
<tr>
<td>^(subnet-([a-z0-9]{17}))*$</td>
<td>Checks that the value is a valid subnet ID.</td>
</tr>
<tr>
<td>[Starts with the text subnet- followed by 17 characters made up of letters and numbers only]</td>
<td></td>
</tr>
<tr>
<td>^(ami-([a-z0-9]{8,17}))+$</td>
<td>Check that the value is a valid AMI ID.</td>
</tr>
<tr>
<td>[Starts with the text ami- followed by between 8 and 17 characters made up of letters and numbers only]</td>
<td></td>
</tr>
<tr>
<td>^(sg-([a-z0-9]{17}))*$</td>
<td>Checks that the value is in a valid security group ID format.</td>
</tr>
<tr>
<td>[Starts with the text sg- followed by 17 characters made up of letters and numbers only]</td>
<td></td>
</tr>
<tr>
<td>^([a-zA-Z0-9][a-zA-Z0-9-]<em>[a-zA-Z0-9])</em>([a-zA-Z0-9][a-zA-Z0-9-]*[a-zA-Z0-9])$</td>
<td>Ensures that server names are valid and only contain alphanumeric characters, hyphens and periods.</td>
</tr>
<tr>
<td>^([1-9][1-9][0-9][1-9][0-9][0-9][1-9][0-9][0-9][0-9][0-9][0-9])<em>([1-9])</em>([0-3][0-8][0-4])$</td>
<td>Ensures that a number is entered that is between 1 and 1634.</td>
</tr>
<tr>
<td>^(standard</td>
<td>io1</td>
</tr>
</tbody>
</table>
Once you have created your regex search pattern, you can specify the specific error message that will be shown to the user under the field, enter this into the Validation help message property.

Once these two properties are set then in the same screen you will see below a Validation simulator, here you can test that your search pattern is working as expected and that the error message is displayed correctly. Just type some test text into the Test validation field to verify the pattern is matched correctly.

Example data

The example data section provides the administrator with the ability to show the user an example of data format required for an attribute, this can be specified for the format of data required when provided in an intake form upload, through the user interface and/or through the API directly.

Example data shown in the Intake form example data property will be output in any intake template created where the attribute is included, when using the Download, a template intake form function, under Migration Management > Import.

User interface example data and API example data are stored in the attribute, but not currently exposed in the web interface. These can be used in integrations and scripts.

Permission management

The Cloud Migration Factory on AWS solution provides granular role-based access control to the data and automation functions available in the solution, underlying this is Amazon Cognito, providing the user directory and authentication engine.

The following table shows the various elements that make up the access control framework within the Cloud Migration Factory on AWS solution and where each element is managed from.

<table>
<thead>
<tr>
<th>Access control element</th>
<th>Management interface</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>User</td>
<td>Amazon Cognito and Cloud Migration Factory on AWS</td>
<td>Users are created, deleted, and updated in Amazon Cognito, where the users’ profile can be established as well as multi-factor authentication (MFA) if required. Within</td>
</tr>
<tr>
<td>Access control element</td>
<td>Management interface</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Group</td>
<td>Cloud Migration Factory on AWS</td>
<td>You can create or delete groups from within the AWS CMF user interface.</td>
</tr>
<tr>
<td>Role</td>
<td>Cloud Migration Factory on AWS</td>
<td>A Role is mapped to one or many Groups, changing the groups a Role is assigned to is performed in the AWS CMF administration section. Any user that is a member of a group assigned to a role will be assigned all policies that are mapped to the role. One or many policies can be assigned to a role.</td>
</tr>
<tr>
<td>Policy</td>
<td>Cloud Migration Factory on AWS</td>
<td>A policy contains the detailed rights that are assigned to any user to which the policy applies (via group membership). A single policy can include data access rights for multiple entities or a single entity, along with access rights to run automation jobs and other actions within the AWS CMF user interface. These policies also apply when a user is interacting with the AWS CMF APIs.</td>
</tr>
</tbody>
</table>
Policies

A policy provides the most granular permissions possible in Cloud Migration Factory on AWS, it holds the tasks level definition of what rights are provided to a user. Within a policy there are two main permission types that can be granted to a user group, **Metadata Permissions** and **Automation Action Permissions**. Metadata permissions allow an administrator to control the level of access a group has to individual schemas and their attributes, specifying rights to create, read, update and/or delete as required. Automation Action permissions grant users access to run specific automation actions, such as the AWS MGN integration action.

**Metadata permissions**

For each schema or entity within AWS CMF an administrator can define a policy that allows users access to specific attributes and also define the level of access they have to those attributes. On creation of a new policy the default rights for all schemas is no access, the first thing that should be set is the level of access required for this policy at the item/record level. Below is a table describing the record level access permissions available.

<table>
<thead>
<tr>
<th>Access level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create</td>
<td>When selected, a user where this policy applies will have the ability to Add new records/items of this type to the metadata store. When create is selected but no other rights are allowed the user will have the ability to create records and set only required attributes to a value regardless of the selected attributes.</td>
</tr>
<tr>
<td>Read</td>
<td><strong>Not yet implemented</strong></td>
</tr>
<tr>
<td></td>
<td>When selected, a user will have read rights to all records/items for this entity type, when not selected they will not see the data items in the UI or the API.</td>
</tr>
<tr>
<td>Update</td>
<td>When selected, a user where this policy applies will have the ability to update records/</td>
</tr>
<tr>
<td>Access level</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td>items of this type to the metadata store, but only for the attributes specified in the Attribute level access list. When update is selected at least one Attribute has to be selected or an error will be show on saving.</td>
</tr>
<tr>
<td>Delete</td>
<td>When selected, a user where this policy applies will have the ability to delete records/items of this type from the metadata store.</td>
</tr>
</tbody>
</table>

**Roles**

Roles allow one or more policies to be assigned to one or more groups. The combination of all policies assigned to a role provides access permissions. Roles can be created based on job roles or functions within the project or organization.
Developer guide

Source code

You can visit our GitHub repository to download the templates and scripts for this solution, and to share your customizations with others. If you require an earlier version of the CloudFormation template or have a technical issue to report, you can do so from the GitHub issues page. Report technical issues with the solution on the Issues page of the GitHub repository.
Supplemental topics

List of automated migration activities using Migration Factory web console

The Cloud Migration Factory on AWS solution deploys automated migration activities that you can leverage for your migration projects. You can follow the migration activities listed below and customize them based on your business needs.

Before starting any of the activities, make sure you read User Guide – Run Automation from console to understand how this works. Also, you must Build an Automation server and create Windows and Linux users to run automation from the console.

Use the following procedures in the same order to conduct a complete test run of the solution using the sample automation script and activities.

Check prerequisites

Connect with the in-scope source servers to verify the necessary prerequisites such as TCP 1500, TCP 443, root volume free space, .Net framework version, and other parameters. These prerequisites are required for replication.

Before you can conduct the prerequisites check, you must install the first manually on one source server, so this will create a replication server in EC2. We will connect to this server for port 1500 testing. After installation, AWS Application Migration Service (AWS MGN) creates the replication server in Amazon Elastic Compute Cloud (Amazon EC2). You must verify the TCP port 1500 from the source server to the replication server in this activity. For information about installing the AWS MGN agent on your source servers, refer to Installation instructions in the AWS Application Migration Service User Guide.

Use the following procedure while signed in to the migration factory web console.

1. On the Migration Factory console, select Jobs on the left-hand side menu, and select Actions, and then Run Automation on the right-hand side.
2. Enter Job Name, select 0-Check MGN Prerequisites script and your automation server to run the script. If automation server does not exist, make sure you complete Build a migration automation server.
3. Select **Linux Secrets** and/or **Windows Secrets** depending on what OSs you have for this wave. Enter MGN replication server IP, choose the wave you want to run automation on and choose **Submit Automation Job**.

4. You will be redirected to the **Jobs** list page, the job status should be **RUNNING**. Choose **Refresh** to see the status. It should change to Complete after a few minutes.

5. The script will also update the solution’s **migration status** in the Migration Factory web interface as shown in the following screenshot of an example project.

![](image)

## Install the replication agents

**Note**

Before you install the agent, make sure **AWS MGN is initialized in each target account** and region.

Use the following procedure to automatically install the Replication agents in the in-scope source servers.

1. On the Migration Factory console, select **Jobs** on the left-hand side menu, and select **Actions**, and then **Run Automation** on the right-hand side.

2. Enter **Job Name**, select **1-Install MGN Agents** script and your automation server to run the script. If automation server does not exist, make sure you complete **Build a migration automation server**.

3. Select **Linux Secrets** and/or **Windows Secrets** depending on what OSs you have for this wave. Choose the wave you want to run automation, and choose **Submit Automation Job**.
4. You will be redirected to the Jobs list page, the job status should be running. Choose Refresh to see the status. It should change to Complete after a few minutes.

5. The script also provides the migration status in the Migration Factory web interface as shown in the following example screenshot.

---

**Push the post-launch scripts**

AWS Application Migration Service (MGN) supports post-launch scripts to help you automate OS-level activities, such as installing/uninstalling the software after launching target instances. This activity pushes the post-launch scripts to Windows and/or Linux machines, depending on the servers identified for migration.

**Note**
Before you push the post-launch scripts, you must copy the files to a folder on the migration automation server.

Use the following procedure to push the post-launch scripts to Windows machines.

1. On the Migration Factory console, select Jobs on the left-hand side menu, and select Actions, and then Run Automation on the right-hand side.

2. Enter Job Name, select 1-Copy Post Launch Scripts script and your automation server to run the script. If automation server does not exist, make sure you complete Build a migration automation server.

3. Select Linux Secrets and/or Windows Secrets depends on what OSs you have for this wave. Provide a Linux source location and/or Windows source location.
4. Choose the wave you want to run automaton and choose **Submit Automation Job**.

5. You will be redirected to the **Jobs** list page, the job status should be running, and you can choose **Refresh** to see the status. It should change to **Complete** after a few minutes.

### Verify the replication status

This activity verifies the replication status for the in-scope source servers automatically. The script repeats every five minutes until the status of all source servers in the given wave changes to a **Healthy** status.

Use the following procedure to verify the replication status.

1. On the Migration Factory console, select **Jobs** on the left-hand side menu, and select **Actions**, and then **Run Automation** on the right-hand side.

2. Enter Job Name, select **2-Verify Replication Status** script and your automation server to run the script. If automation server does not exist, make sure you complete **Build a migration automation server**.

3. Choose the wave you want to run automaton and choose **Submit Automation Job**.

4. You will be redirected to the **Jobs** list page, the job status should be running, and you can click **refresh** button to see the status. It should change to **Complete** after a few minutes.
Validate launch template

This activity validates the server metadata in the migration factory and makes sure it works with EC2 template and no typos. It will validate both test and cutover metadata.

Use the following procedure to validate EC2 launch template.

1. Navigate to the Migration Factory console, and select Wave in the menu pane.
2. Select the target wave, and choose Actions. Select Rehost, and then select MGN.
3. Select Validate Launch Template for the Action, then select All applications.
4. Choose Submit to initiate the validation.

After some time, the validation will return a successful result.

Note
If validation is not successful, you will receive a specific error message:
The errors may be due to invalid data in the server attribute such as an invalid subnet_IDs, securitygroup_IDs, or instanceType.
You can switch to the Pipeline page from the Migration Factory web interface and select the problematic server to fix the errors.

Launch instances for testing

This activity launches all target machines for a given wave in AWS Application Migration Service (MGN) in test mode.

Use the following procedure to launch test instances.

1. On the Migration Factory console, select Wave on the navigation menu.
2. Select target wave, and choose Actions. Select Rehost, and then select MGN.
3. Select Launch Test Instances Action, select All applications.
4. Choose Submit to launch test instances.
5. After some time, the validation will return a successful result.

Note
This action will also update the migration status for the server launched.

Verify the target instance status

This activity verifies the status of the target instance by checking the boot up process for all in-scope source servers in the same wave. It may take up to 30 minutes for the target instances to boot up. You can check the status manually by logging into the Amazon EC2 console, searching for the source server name, and checking the status. You will receive a health check message stating 2/2 checks passed, which indicates that the instance is healthy from an infrastructure perspective.

However, for a large-scale migration, it's time consuming to check the status of each instance, so you can run this automated script to verify the 2/2 checks passed status for all source servers in a given wave.

Use the following procedure to verify the status of the target instance.
Cloud Migration Factory on AWS
Implementation Guide

1. Navigate to the Migration Factory console, and select Jobs on the left-hand side menu.

2. Select Actions, then Run Automation on the right-hand side.

3. Enter Job Name, select 3-Verify Instance Status script and your automation server to run the script. If automation server does not exist, ensure you complete Build a migration automation server.

4. Choose the wave you want to run automaton, and choose Submit Automation Job.

5. You will be redirected to the Jobs list page, the job status should be running, and you can choose Refresh to see the status. It should change to Complete after a few minutes.

---

**Note**
Instance boot up can take a while and you might not see the status update from the factory console for a few minutes. Migration factory also receives a status update from the script. Refresh the screen if necessary.

---

**Note**
If your target instances fail the 2/2 health checks the first time, it may be due to the boot up process taking longer to complete. We recommend running the health checks a second time about an hour after the first health check. This ensures that the boot up process completes. If the health checks fail this second time, go to the AWS support center to log a support case.
Mark as ready for cutover

Once testing is finished, this activity changes the status of the source server to mark as ready for cutover, so that user is able to launch a cutover instance.

Use the following procedure to validate EC2 launch template.

1. On the Migration Factory console, and select Wave on the left-hand side.
2. Select target wave, and click Actions button. Select Rehost, and then select MGN.
3. Select Mark as Ready for Cutover Action, select All applications.
4. Choose Submit to launch live instances.

After some time, the validation will return a successful result.

Shut down the in-scope source servers

This activity shuts down the in-scope source servers involved with the migration. After you verify the source servers' replication status, you are ready to shut down the source servers to stop transactions from the client applications to the servers. You can shut down the source servers in the cutover window. Shutting down the source servers manually could take five minutes per server, and, for large waves, it could take a few hours in total. Instead, you can run this automation script to shut down all your servers in the given wave.

Use the following procedure to shut down all the source servers involved with the migration.
1. On the Migration Factory console, select **Jobs** on the left-hand side menu, and select **Actions**, and then **Run Automation** on the right-hand side.

2. Enter Job Name, select **3-Shutdown All Servers** script and your automation server to run the script. If automation server does not exist, make sure you complete **Build a migration automation server**.

3. Select **Linux Secrets** and/or **Windows Secrets** depends on what OSs you have for this wave.

4. Choose the wave you want to run automation and choose **Submit Automation Job**.

5. You will be redirected to the **Jobs** list page, the job status should be running, and you can click **refresh** button to see the status. It should change to **Complete** after a few minutes.

---

**Launch instances for Cutover**

This activity launches all target machines for a given wave in AWS Application Migration Service (MGN) in Cutover mode.

Use the following procedure to launch test instances.

1. On the Migration Factory console, and select **Wave** on the left-hand side.
2. Select target wave, and choose **Actions**. Select **Rehost**, and then select **MGN**.
3. Select **Launch Cutover Instances** Action, select **All applications**.
4. Choose **Submit** to launch test instances.

After some time, the validation will return a successful result.

---

**Note**

This action will also update the migration status for the server launched.

---

**List of automated migration activities using command prompt**

**Note**

We recommend running automation from the Cloud Migration Factory on AWS console. You can use the following steps to run automation scripts. Make sure you download the
The Cloud Migration Factory on AWS solution deploys automated migration activities that you can leverage for your migration projects. You can follow the migration activities listed below and customize them based on your business needs.

Before starting any of the activities, verify that you are logged on to your migration automation server as a domain user with local administrator permission on the in-scope source servers.

⚠️ **Important**

You must log in as an administrator user to complete the activities listed in this section.

Use the following procedures in the same order to conduct a complete test run of the solution using the sample automation script and activities.

### Check prerequisites

Connect with the in-scope source servers to verify the necessary prerequisites such as TCP 1500, TCP 443, root volume free space, .Net framework version, and other parameters. These prerequisites are required for replication.

Before you can conduct the prerequisite check, you must install the first agent manually on one source server, so this will create a replication server in EC2, we will be connecting to this server for port 1500 testing. After installation, AWS Application Migration Service (AWS MGN) creates the replication server in Amazon Elastic Compute Cloud (Amazon EC2). You will need to verify the TCP port 1500 from the source server to the replication server in this activity. For information about installing the AWS MGN agent on your source servers, refer to [Installation instructions](#) in the *Application Migration Service User Guide*.

Use the following procedure while signed in to the migration automation server to check for the prerequisites.

1. Signed in as an administrator, open a command prompt (CMD .exe).
2. Navigate to the `c:\migrations\scripts\script_mgn_0-Prerequisites-checks` folder and run the following Python command:

```
python 0-Prerequisites-checks.py --Waveid <wave-id> --ReplicationServerIP <rep-server-ip>
```

Replace `<wave-id>` and `<rep-server-ip>` with the appropriate values:

- The `Waveid` is a unique integer value to identify your migration waves.
- The `ReplicationServerIP` value identifies the replication server IP address. Change this value to the Amazon EC2 IP address. To locate this address, sign in to the AWS Management Console, search for `Replication`, select one of the replication servers, and copy the private IP address. If the replication occurs over the public internet, use the public IP address instead.

3. The script automatically retrieves a server list for the specified wave.

The script then checks the prerequisites for Windows servers and returns a state of either pass or fail for each check.

**Note**

You might get a security warning like the following when the PowerShell script is not trusted. Run the following command in PowerShell to resolve the issue:

```
Unblock-File C:\migrations\scripts\script_mgn_0-Prerequisites-checks\0-Prerequisites-Windows.ps1
```

Next, the script checks the Linux servers.

Once the checks are completed, the script will return a final result for each server.
If the server failed one or more prerequisites checks, you can identify the faulty server by either reviewing the detailed error message provided at the completion of the check or by scrolling through the log details.

The script will also update the solution’s **Migration Status** in the Migration Factory web interface as shown in the following screenshot of an example project.

**Install the replication agents**

**Note**

Before you install the agent, make sure **AWS MGN is initialized in each target account**.

Use the following procedure to automatically install the Replication agents in the in-scope source servers.

1. In the migration automation server, signed is as an administrator, open a command prompt (CMD.exe).
2. Navigate to the `c:\migrations\scripts\script_mgn_1-AgentInstall` folder and run the following Python command:
python 1-AgentInstall.py --Waveid <wave-id>

Replace `<wave-id>` with the appropriate Wave ID value to install the Replication agent on all servers in the identified wave. The script will install the agent on all source servers in the same wave one by one.

⚠️ **Note**

To reinstall the agent, you can add `--force` argument.

3. The script generates a list identifying the source servers included for the specified wave. In addition, servers that are identified in multiple accounts and for different OS versions may also be provided.

If there are Linux machines included in this wave, you must enter your Linux sudo sign-in credentials to sign in to those source servers.

The installation starts on the Windows, then proceeds to the Linux for each AWS account.

```bash
**** Installing Agents ****

#################################################
### In Account: 51SFRS7aXVE , region: us-east-1 ###
#################################################

Installing Application Migration Service Agent for: Server-T1.mydomain.local

** Successfully downloaded Agent installer for: Server-T1.mydomain.local **

Verifying that the source server has enough free disk space to install the AWS Replication Agent. (a minimum of 2 GB of free disk space is required)

Identifying volumes for replication.

Disk to replicate identified: c:0 of size 30 GB
All volumes for replication were successfully identified.

Installing the AWS Replication Agent onto the source server... Finished.
Syncing the source server with the Application Migration Service Console... Finished.

The following is the source server ID: s-3fe3e5342c624e6a0.
The AWS Replication Agent was successfully installed.
The installation of the AWS Replication Agent has started.

** Installation finished for : Server-T1.mydomain.local **
```
Note

You might get a security warning like the following when the PowerShell script is not trusted. Run the following command in PowerShell to resolve the issue:

Unblock-File C:\migrations\scripts\script_mgn_1-AgentInstall\1-Install-Windows.ps1

Results are displayed after the script finishes installing the replication agents. Review the results for error messages to identify servers that failed to install the agents. You will need to manually install the agents on the failed servers. If manual installation does not succeed, go to the AWS support center and log a support case.

The script also provides the migration status in the Migration Factory web interface as shown in the following screenshot of an example project.

**Push the post-launch scripts**

AWS Application Migration Service supports post-launch scripts to help you automate OS-level activities such as the install/uninstall of software after launching target instances. This activity pushes the post-launch scripts to Windows and/or Linux machines, depending on the servers identified for migration.

Use the following procedure from the migration automation server to push the post-launch scripts to Windows machines.

1. Logged in as an administrator, open a command prompt (CMD.exe).
2. Navigate to the c:\migrations\scripts\script_mgn_1-FileCopy folder and run the following Python command:
python 1-FileCopy.py --Waveid <wave-id> --WindowsSource <file-path> --LinuxSource <file-path>

Replace <wave-id> with the appropriate Wave ID value and <file-path> with the full file path for Source, where the script is located. For example, c:\migrations\scripts\script_mgn_1-FileCopy. This command copies all files from the source folder to the destination folder.

### Note

At least one of these two arguments must be provided: WindowsSource, LinuxSource. If you provide WindowsSource path, this script will only push files to Windows servers in this wave, same as LinuxSource, which only pushes files to the Linux Servers in this wave. Provide both will push files to both Windows and Linux servers.

3. The script generates a list identifying the source servers included for the specified wave. In addition, servers that are identified in multiple accounts and for different OS versions may also be provided.

If there are Linux machines included in this wave, you must enter your Linux sudo sign-in credentials to sign in to those source servers.

4. The script copies the files to the destination folder. If the destination folder does not exist, the solution creates a directory and notifies you of this action.

### Verify the replication status

This activity verifies the replication status for the in-scope source servers automatically. The script repeats every five minutes until the status of all source servers in the given wave changes to a Healthy status.

Use the following procedure from the migration automation server to verify the replication status.

1. Signed in as an administrator, open a command prompt (CMD.exe).
2. Navigate to the \migrations\scripts\script_mgn_2-Verify-replication folder and run the following Python command:
python 2-Verify-replication.py --Waveid <wave-id>

Replace `<wave-id>` with the appropriate Wave ID value to verify the replication status. The script verifies the replication details for the all servers in the specific wave and updates the replication status attribute for the source server identified in the solution.

3. The script generates a list identifying the servers included for the specified wave.

The expected status for the in-scope source servers that is ready to launch is Healthy. If you receive a different status for a server, then it is not ready for launch yet.

The following screenshot of an example wave shows that all servers in the current wave have finished replication and are ready for testing or cutover.

Optionally, you can verify status in the Migration Factory web interface.

**Verify the target instance status**

This activity verifies the status of the target instance by checking the boot up process for all in-scope source servers in the same wave. It may take up to 30 minutes for the target instances to boot up. You can check the status manually by logging into the Amazon EC2 console, searching for
the source server name, and checking the status. You will receive a health check message stating 2/2 checks passed, which indicates that the instance is healthy from an infrastructure perspective.

However, for a large-scale migration, it’s time-consuming to check the status of each instance, so you can run this automated script to verify the 2/2 checks passed status for all source servers in a given wave.

Use the following procedure from the migration automation server to verify the status of the target instance.

1. Signed in as an administrator, open a command prompt (CMD.exe).
2. Navigate to the c:\migrations\scripts\script_mgn_3-Verify-instance-status folder and run the following Python command:

```
python 3-Verify-instance-status.py --Waveid <wave-id>
```

Replace `<wave-id>` with the appropriate Wave ID value to verify instance status. This script verifies the instance boot up process for all source servers in this wave.

3. The script returns a listing of the server list and Instance IDs for the specified wave.
4. The script will then return a list of target instance IDs.

**Note**

If you get an error message that the target instance Id does not exist, the launch job might still be running. Wait a few minutes before continuing.

5. You will receive instance status checks that indicates whether your target instances passed the 2/2 health checks.

**Note**

If your target instances fail the 2/2 health checks the first time, it may be due to the boot up process taking longer to complete. We recommend running the health checks a second time about an hour after the first health check. This ensures that the boot up process
completes. If the health checks fail this second time, go to the [AWS support center](https://aws.amazon.com/support/) to log a support case.

## Shut down the in-scope source servers

This activity shuts down the in-scope source servers involved with the migration. After you verify the source servers’ replication status, you are ready to shut down the source servers to stop transactions from the client applications to the servers. You can shut down the source servers in the cutover window. Shutting down the source servers manually could take five minutes per server, and, for large waves, it could take a few hours in total. Instead, you can run this automation script to shut down all your servers in the given wave.

Use the following procedure from the migration automation server to shut down all the source servers involved with the migration.

1. Signed in as an administrator, open a command prompt (CMD.exe).
2. Navigate to the `c:\migrations\scripts\script_mgn_3-Shutdown-all-servers` folder and run the following Python command:
   
   ```
   Python 3-Shutdown-all-servers.py -Waveid <wave-id>
   ```

3. Replace `<wave-id>` with the appropriate Wave ID value to shut down the source servers.
4. The script returns a listing of the server list and Instance IDs for the specified wave.
5. The script first shuts down Windows servers in the specified wave. After the Windows servers are shut down, the script proceeds to the Linux environment and prompts for the login credentials. After successful login, the script shuts down the Linux servers.

## Retrieve the target instance IP

This activity retrieves the target instance IP. If the DNS update is a manual process in your environment, you would need to get the new IP addresses for all the target instances. However, you can use the automation script to export the new IP addresses for all the instances in the given wave to a CSV file.

Use the following procedure from the migration automation server to retrieve the target instance IPs.
1. Signed in as an administrator, open a command prompt (CMD.exe).

2. Navigate to the `c:\migrations\scripts\script_mgn_4-Get-instance-IP` folder and run the following Python command:

   ```
   Python 4-Get-instance-IP.py --Waveid <wave-id>
   ```

   Replace `<wave-id>` with the appropriate Wave ID value to get the new IP addresses for the target instances.

3. The script returns a server list and the target instance ID information.

4. The script will then return the target server IP.

The script exports the server name and IP addresses information to a CSV file (`<wave-id>-<project-name>-Ips.csv`) and places it in the same directory as your migration script (`c:\migrations\scripts\script_mgn_4-Get-instance-IP`).

The CSV file provides `instance_name` and `instance_ips` details. If the instance contains more than one NIC or IP, they will all be listed and separated by commas.

**Verify the target server connections**

This activity verifies the connections for the target server. After you update the DNS records, you can connect to the target instances with the host name. In this activity, you check to determine if you can log in to the operating system by using Remote Desktop Protocol (RDP) or through Secure Shell (SSH) access. You can manually log in to each server individually, but it is more efficient to test the server connection by using the automation script.

Use the following procedure from the migration automation server to verify the connections for the target server.

1. Logged in as an administrator, open a command prompt (CMD.exe).

2. Navigate to the `c:\migrations\scripts\script_mgn_4-Verify-server-connection` folder and run the following Python command:
Python 4-Verify-server-connection.py --Waveid <wave-id>

Replace <wave-id> with the appropriate Wave ID value to get the new IP addresses for the target instances.

**Note**

This script uses the default RDP port 3389 and SSH port 22. If needed, you can add the following arguments to reset to the default ports: --RDPPort <rdp-port> --SSHPort <ssh-port>.

3. The script returns a server list.
4. The script returns the test results for both RDP and SSH access.
Reference

This section provides references for deploying the Cloud Migration Factory on AWS solution.

Anonymized data collection

This solution includes an option to send anonymized operational metrics to AWS. We use this data to better understand how customers use this solution and related services and products. When activated, the following information is collected and sent to AWS:

- **Solution ID:** The AWS solution identifier
- **Unique ID (UUID):** Randomly generated, unique identifier for each Cloud Migration Factory on AWS solution deployment
- **Timestamp:** Data-collection timestamp
- **Status:** Status is migrated once a server is launched in AWS MGN with this solution
- **Region:** The AWS Region where the solution is deployed

**Note**

AWS will own the data gathered via this survey. Data collection will be subject to the [AWS Privacy Policy](https://aws.amazon.com/privacy/). To opt out of this feature, complete the following steps before launching the AWS CloudFormation template.

1. Download the [AWS CloudFormation template](https://aws.amazon.com) to your local hard drive.
2. Open the AWS CloudFormation template with a text editor.
3. Modify the AWS CloudFormation template mapping section from:

   ```
   Send:
   AnonymousUsage:
   Data: 'Yes'
   ```

   to:

   ```
   Send:
   ```
4. Sign in to the AWS CloudFormation console.

5. Select Create stack.

6. On the Create stack page, Specify template section, select Upload a template file.

7. Under Upload a template file, choose Choose file and select the edited template from your local drive.

8. Choose Next and follow the steps in Launch the stack in the Automated deployment section of this guide.

Related resources

AWS training

- Using AWS Solutions: Cloud Migration Factory Skill Builder course - you will learn about the features, benefits, and technical implementation of the solution.

- AWS Partners Only: Advanced Migrating to AWS (Technical, classroom based) - you will learn how to migrate workloads at scale, and covers common migration patterns, including a hands on workshop for Cloud Migration Factory on AWS.

AWS services

- AWS CloudFormation
- AWS Lambda
- Amazon API Gateway
- Amazon CloudFront
- Amazon Cognito
- Amazon DynamoDB
- Amazon Simple Storage Service
- AWS Systems Manager
- AWS Secrets Manager

AWS resources
• CloudEndure Migration Factory guide

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## Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Change</th>
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<tbody>
<tr>
<td>June 2020</td>
<td>Initial release</td>
</tr>
<tr>
<td>February 2021</td>
<td>Release v1.1.0: Added optional migration tracker component; for more information on new features, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>May 2021</td>
<td>Release v1.1.1: Updated AWS Lambda functions to support Python v3.7; for more information, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>August 2021</td>
<td>Release v2.0.0: New feature to integrate with AWS Application Migration Service (AWS MGN); for more information, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>September 2021</td>
<td>Release v2.0.1: Bug fixes; for more information, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>October 2021</td>
<td>Release v2.0.2: Bug fixes; for more information, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>June 2022</td>
<td>Release v3.0.0: New web user interface and functionality to run all automation tasks directly from the UI using the new Remote Automation feature. This version removes the requirements to switch between automation server command lines and the web UI, providing a single migration automation view. Introduced Replatform to EC2, which allows the migration to perform deployments of new EC2 instances based on the configurations loaded into the Cloud Migration Factory datastore, providing migration waves the ability to have a mixture of migration strategies, with Replatform to EC2 and Rehost using MGN managed through a single Cloud Migration console. For more information about new features, refer to the CHANGELOG.md file in the GitHub repository.</td>
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<tr>
<td>Date</td>
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<tr>
<td>October 2022</td>
<td>Release v3.1.0: Added support for Public, Public with AWS WAF, and Private deployment types available as options during CloudFormation stack deployment. This release also includes minor updates based on feedback from user community. For more information about new features, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>December 2022</td>
<td>Release v3.2.0: Added optional support for external identity providers, and management of groups into CMF console. For more information about new features, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>December 2022</td>
<td>Release v3.2.0: Added optional support for external identity providers, and management of groups into CMF console. Minor updates to other components. For more information about updates, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>January 2023</td>
<td>Release v3.2.1: Updated python requests package to 4.1.0 in order to mitigate security advisory on dependent certifi python package, refer to the CHANGELOG.md file in the GitHub repository for full details.</td>
</tr>
<tr>
<td>April 2023</td>
<td>Release v3.2.2: Mitigated impact caused by new default settings for S3 Object Ownership (ACLs disabled) for all new S3 buckets. For more information, refer to the CHANGELOG.md file in the GitHub repository.</td>
</tr>
<tr>
<td>June 2023</td>
<td>Release v3.3.0: AWS Managed Services (AMS) workload ingestion automation has been removed; significant source code refactoring to improve maintainability to support future releases; and minor updates and bug fixes to other components. For more information, refer to the CHANGELOG.md file in the GitHub repository.</td>
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<td>October 2023</td>
<td>Release v3.3.1: Significant source code refactoring to improve maintainability to support future releases; and minor updates and bug fixes to other components. For more information, refer to the <a href="#">CHANGELOG.md</a> file in the GitHub repository.</td>
</tr>
<tr>
<td>November 2023</td>
<td>Documentation update: Added Confirm cost tags associated with the solution to the Monitoring the solution with AWS Service Catalog AppRegistry section.</td>
</tr>
<tr>
<td>December 2023</td>
<td>Release v3.3.2: Significant source code refactoring to improve maintainability to support future releases; and minor updates and bug fixes to other components. For more information, refer to the <a href="#">CHANGELOG.md</a> file in the GitHub repository.</td>
</tr>
<tr>
<td>January 2024</td>
<td>Release v3.3.3: Minor updates to IAM permissions in target accounts, and other bug fixes, also further source code refactoring to improve maintainability. For more information, refer to the <a href="#">CHANGELOG.md</a> file in the GitHub repository.</td>
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Notices

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