Copyright © 2023 Amazon Web Services, Inc. and/or its affiliates. All rights reserved.

Amazon's trademarks and trade dress may not be used in connection with any product or service that is not Amazon's, in any manner that is likely to cause confusion among customers, or in any manner that disparages or discredits Amazon. All other trademarks not owned by Amazon are the property of their respective owners, who may or may not be affiliated with, connected to, or sponsored by Amazon.
# Table of Contents

What are the AWS Tools for PowerShell? ........................................................................................................... 1
Maintenance and support for SDK major versions .............................................................................................. 1
AWS . Tools ......................................................................................................................................................... 1
AWSPowerShell.NetCore ...................................................................................................................................... 2
AWSPowerShell .................................................................................................................................................... 2
How to use this guide .......................................................................................................................................... 3
Installation .......................................................................................................................................................... 4
Installing on Windows ......................................................................................................................................... 4
  Prerequisites .................................................................................................................................................. 4
  Install AWSPowerShell.NetCore ..................................................................................................................... 5
  Install AWSPowerShell .................................................................................................................................. 6
  Enable Script Execution .................................................................................................................................. 7
  Versioning ....................................................................................................................................................... 8
Updating AWS Tools for PowerShell .................................................................................................................. 9
Installing on Linux or macOS .......................................................................................................................... 10
  Overview of Setup ........................................................................................................................................ 11
  Prerequisites ................................................................................................................................................ 4
  Install AWSPowerShell.NetCore ..................................................................................................................... 11
  Script Execution ......................................................................................................................................... 13
  Configuring the PowerShell Console ............................................................................................................... 14
  Initialize Your PowerShell Session ................................................................................................................. 14
  Versioning ..................................................................................................................................................... 8
Updating the AWS Tools for PowerShell on Linux or macOS ........................................................................ 15
Related Information ......................................................................................................................................... 16
Migrating from AWS Tools for PowerShell Version 3.3 to Version 4 .................................................................. 16
  New Fully Modularized AWSPowerShell Version ......................................................................................... 16
  New Get-AWSService cmdlet .......................................................................................................................... 17
  New -Select Parameter to Control the Object Returned by a Cmdlet ................................................................ 17
  More Consistent Limiting of the Number of Items in the Output ..................................................................... 18
  Easier to Use Stream Parameters ................................................................................................................... 19
  Extending the Pipe by Property Name ........................................................................................................... 19
  Static Common Parameters ............................................................................................................................ 19
  AWSPowerShell Declares and Enforces Mandatory Parameters ..................................................................... 20
  All Parameters Are Nullable ........................................................................................................................... 20
  Removing Previously Deprecated Features ................................................................................................... 20
Get started ........................................................................................................................................................... 21
  Configure tool authentication ........................................................................................................................ 21
  Enable and configure IAM Identity Center ....................................................................................................... 21
Configure the Tools for PowerShell to use IAM Identity Center ........................................................................ 22
  Start an AWS access portal session ................................................................................................................ 22
  Example ....................................................................................................................................................... 23
  Additional information ................................................................................................................................ 23
Specify AWS Regions ....................................................................................................................................... 23
  Specifying a Custom or Nonstandard Endpoint ............................................................................................ 25
Configure federated identity ................................................................................................................................ 25
  Prerequisites ................................................................................................................................................ 25
  How an Identity-Federated User Gets Federated Access to AWS Service APIs .............................................. 26
  How SAML Support Works in the AWS Tools for PowerShell ...................................................................... 27
  How to Use the PowerShell SAML Configuration Cmdlets .......................................................................... 28
  Additional Reading ..................................................................................................................................... 31
Cmdlet discovery and aliases ............................................................................................................................ 31
Cmdlet Discovery ............................................................................................................................................... 31
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cmdlet Naming and Aliases</td>
<td>35</td>
</tr>
<tr>
<td>Pipelining and $AWSHistory</td>
<td>37</td>
</tr>
<tr>
<td>$AWSHistory</td>
<td>38</td>
</tr>
<tr>
<td>Credential and profile resolution</td>
<td>40</td>
</tr>
<tr>
<td>Credentials Search Order</td>
<td>40</td>
</tr>
<tr>
<td>Users and roles</td>
<td>41</td>
</tr>
<tr>
<td>Users and permission sets</td>
<td>41</td>
</tr>
<tr>
<td>Service roles</td>
<td>42</td>
</tr>
<tr>
<td>Using legacy credentials</td>
<td>42</td>
</tr>
<tr>
<td>Important warnings and guidelines</td>
<td>42</td>
</tr>
<tr>
<td>AWS Credentials</td>
<td>43</td>
</tr>
<tr>
<td>Shared Credentials</td>
<td>49</td>
</tr>
<tr>
<td>Work with AWS services</td>
<td>53</td>
</tr>
<tr>
<td>PowerShell File Concatenation Encoding</td>
<td>53</td>
</tr>
<tr>
<td>Returned Objects for the PowerShell Tools</td>
<td>53</td>
</tr>
<tr>
<td>Amazon EC2</td>
<td>54</td>
</tr>
<tr>
<td>Amazon S3</td>
<td>54</td>
</tr>
<tr>
<td>AWS Lambda and AWS Tools for PowerShell</td>
<td>54</td>
</tr>
<tr>
<td>Amazon SNS and Amazon SQS</td>
<td>54</td>
</tr>
<tr>
<td>CloudWatch</td>
<td>54</td>
</tr>
<tr>
<td>See Also</td>
<td>54</td>
</tr>
<tr>
<td>Topics</td>
<td>55</td>
</tr>
<tr>
<td>Amazon S3 and Tools for Windows PowerShell</td>
<td>55</td>
</tr>
<tr>
<td>Create an Amazon S3 Bucket, Verify Its Region, and Optionally Remove It</td>
<td>55</td>
</tr>
<tr>
<td>Configure an Amazon S3 Bucket as a Website and Enable Logging</td>
<td>56</td>
</tr>
<tr>
<td>Upload Objects to an Amazon S3 Bucket</td>
<td>56</td>
</tr>
<tr>
<td>Delete Amazon S3 Objects and Buckets</td>
<td>58</td>
</tr>
<tr>
<td>Upload In-Line Text Content to Amazon S3</td>
<td>59</td>
</tr>
<tr>
<td>Amazon EC2 and Tools for Windows PowerShell</td>
<td>59</td>
</tr>
<tr>
<td>Create a Key Pair</td>
<td>60</td>
</tr>
<tr>
<td>Create a Security Group</td>
<td>61</td>
</tr>
<tr>
<td>Find an AMI</td>
<td>64</td>
</tr>
<tr>
<td>Launch an Instance</td>
<td>66</td>
</tr>
<tr>
<td>AWS Lambda and AWS Tools for PowerShell</td>
<td>69</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>4</td>
</tr>
<tr>
<td>Install the AWSLambdaPSCore Module</td>
<td>70</td>
</tr>
<tr>
<td>See Also</td>
<td>54</td>
</tr>
<tr>
<td>Amazon SNS, Amazon SNS and Tools for Windows PowerShell</td>
<td>70</td>
</tr>
<tr>
<td>Create an Amazon SNS queue and get queue ARN</td>
<td>71</td>
</tr>
<tr>
<td>Create an Amazon SNS topic</td>
<td>71</td>
</tr>
<tr>
<td>Give permissions to the SNS topic</td>
<td>71</td>
</tr>
<tr>
<td>Subscribe the queue to the SNS topic</td>
<td>72</td>
</tr>
<tr>
<td>Give permissions</td>
<td>72</td>
</tr>
<tr>
<td>Verify results</td>
<td>72</td>
</tr>
<tr>
<td>CloudWatch from the AWS Tools for Windows PowerShell</td>
<td>73</td>
</tr>
<tr>
<td>Publish a Custom Metric to Your CloudWatch Dashboard</td>
<td>73</td>
</tr>
<tr>
<td>See Also</td>
<td>54</td>
</tr>
<tr>
<td>Using ClientConfig</td>
<td>74</td>
</tr>
<tr>
<td>Using the ClientConfig parameter</td>
<td>74</td>
</tr>
<tr>
<td>Using an undefined property</td>
<td>74</td>
</tr>
<tr>
<td>Specifying the AWS Region</td>
<td>75</td>
</tr>
<tr>
<td>Security</td>
<td>76</td>
</tr>
<tr>
<td>Data protection</td>
<td>76</td>
</tr>
<tr>
<td>Data encryption</td>
<td>77</td>
</tr>
<tr>
<td>Identity and Access Management</td>
<td>77</td>
</tr>
<tr>
<td>Audience</td>
<td>77</td>
</tr>
<tr>
<td>Authenticating with identities</td>
<td>78</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Managing access using policies</td>
<td>80</td>
</tr>
<tr>
<td>How AWS services work with IAM</td>
<td>82</td>
</tr>
<tr>
<td>Troubleshooting AWS identity and access</td>
<td>82</td>
</tr>
<tr>
<td>Compliance Validation</td>
<td>83</td>
</tr>
<tr>
<td>Enforcing a minimum TLS version</td>
<td>84</td>
</tr>
<tr>
<td>Document history</td>
<td>85</td>
</tr>
</tbody>
</table>
What are the AWS Tools for PowerShell?

The AWS Tools for PowerShell are a set of PowerShell modules that are built on the functionality exposed by the AWS SDK for .NET. The AWS Tools for PowerShell enable you to script operations on your AWS resources from the PowerShell command line.

The cmdlets provide an idiomatic PowerShell experience for specifying parameters and handling results even though they are implemented using the various AWS service HTTP query APIs. For example, the cmdlets for the AWS Tools for PowerShell support PowerShell pipelining—that is, you can pipe PowerShell objects in and out of the cmdlets.

The AWS Tools for PowerShell are flexible in how they enable you to handle credentials, including support for the AWS Identity and Access Management (IAM) infrastructure. You can use the tools with IAM user credentials, temporary security tokens, and IAM roles.

The AWS Tools for PowerShell support the same set of services and AWS Regions that are supported by the SDK. You can install the AWS Tools for PowerShell on computers running Windows, Linux, or macOS operating systems.

**Note**

AWS Tools for PowerShell version 4 is the latest major release, and is a backward-compatible update to AWS Tools for PowerShell version 3.3. It adds significant improvements while maintaining existing cmdlet behavior. Your existing scripts should continue to work after upgrading to the new version, but we do recommend that you test them thoroughly before upgrading. For more information about the changes in version 4, see Migrating from AWS Tools for PowerShell Version 3.3 to Version 4 (p. 16).

The AWS Tools for PowerShell are available as the following three distinct packages:

- AWS.Tools (p. 1)
- AWSPowerShell.NetCore (p. 2)
- AWSPowerShell (p. 2)

**Maintenance and support for SDK major versions**

For information about maintenance and support for SDK major versions and their underlying dependencies, see the following in the AWS SDKs and Tools Reference Guide:

- AWS SDKs and tools maintenance policy
- AWS SDKs and tools version support matrix

**AWS.Tools - A modularized version of the AWS Tools for PowerShell**
This version of AWS Tools for PowerShell is the recommended version for any computer running PowerShell in a production environment. Because it's modularized, you need to download and load only the modules for the services you want to use. This reduces download times, memory usage, and enables auto-importing of AWS.Tools cmdlets without the need to manually call Import-Module first.

This is the latest version of AWS Tools for PowerShell and runs on all supported operating systems, including Windows, Linux, and macOS. This package provides one installation module, AWS.Tools.Installer, one common module, AWS.Tools.Common, and one module for each AWS service, for example, AWS.Tools.EC2, AWS.Tools.IAM, AWS.Tools.S3, and so on.

The AWS.Tools.Installer module provides cmdlets that enable you to install, update, and remove the modules for each of the AWS services. The cmdlets in this module automatically ensure that you have all the dependent modules required to support the modules you want to use.

The AWS.Tools.Common module provides cmdlets for configuration and authentication that are not service specific. To use the cmdlets for an AWS service, you just run the command. PowerShell automatically imports the AWS.Tools.Common module and the module for the AWS service whose cmdlet you want to run. This module is automatically installed if you use the AWS.Tools.Installer module to install the service modules.

You can install this version of AWS Tools for PowerShell on computers that are running:

- PowerShell Core 6.0 or later on Windows, Linux, or macOS.
- Windows PowerShell 5.1 or later on Windows with the .NET Framework 4.7.2 or later.

Throughout this guide, when we need to specify this version only, we refer to it by its module name: AWS.Tools.

AWSPowerShell.NetCore - A single-module version of the AWS Tools for PowerShell

This version consists of a single, large module that contains support for all AWS services. Before you can use this module, you must manually import it.

You can install this version of AWS Tools for PowerShell on computers that are running:

- PowerShell Core 6.0 or later on Windows, Linux, or macOS.
- Windows PowerShell 3.0 or later on Windows with the .NET Framework 4.7.2 or later.

Throughout this guide, when we need to specify this version only, we refer to it by its module name: AWSPowerShell.NetCore.

AWSPowerShell - A single-module version for Windows PowerShell

This version consists of a single, large module that contains support for all AWS services. Before you can use this module, you must manually import it.

You can install this version of AWS Tools for PowerShell on computers that are running:

- Windows PowerShell 3.0 or later on Windows with the .NET Framework 4.7.2 or later.

Throughout this guide, when we need to specify this version only, we refer to it by its module name: AWSPowerShell.
This version of AWS Tools for PowerShell is compatible with and installable on only Windows computers that are running Windows PowerShell versions 2.0 through 5.1. It is not compatible with PowerShell Core 6.0 or later, or any other operating system (Linux or macOS). This version consists of a single, large module that contains support for all AWS services.

Throughout this guide, when we need to specify this version only, we refer to it by its module name: AWSPowerShell.

How to use this guide

The guide is divided into the following major sections.

**Installing the AWS Tools for PowerShell (p. 4)**

This section explains how to install the AWS Tools for PowerShell. It includes how to sign up for AWS if you don't already have an account, and how to create an IAM user that you can use to run the cmdlets.

**Get started with the AWS Tools for Windows PowerShell (p. 21)**

This section describes the fundamentals of using the AWS Tools for PowerShell, such as specifying credentials and AWS Regions, finding cmdlets for a particular service, and using aliases for cmdlets.

**Work with AWS services in the AWS Tools for PowerShell (p. 53)**

This section includes information about using the AWS Tools for PowerShell to perform some of the most common AWS tasks.
Installing the AWS Tools for PowerShell

To successfully install and use the AWS Tools for PowerShell cmdlets, see the steps in the following topics.

Topics

- Installing the AWS Tools for PowerShell on Windows (p. 4)
- Installing AWS Tools for PowerShell on Linux or macOS (p. 10)
- Migrating from AWS Tools for PowerShell Version 3.3 to Version 4 (p. 16)

Installing the AWS Tools for PowerShell on Windows

A Windows-based computer can run any of the AWS Tools for PowerShell package options:

- **AWS.Tools (p. 5)** - The modularized version of AWS Tools for PowerShell. Each AWS service is supported by its own individual, small module, with shared support modules AWS.Tools.Common and AWS.Tools.Installer.
- **AWSPowerShell.NetCore (p. 6)** - The single, large-module version of AWS Tools for PowerShell. All AWS services are supported by this single, large module.
- **AWSPowerShell (p. 7)** - The legacy Windows-specific, single, large-module version of AWS Tools for PowerShell. All AWS services are supported by this single, large module.

The package you choose depends on the release and edition of Windows that you're running.

**Note**
The Tools for Windows PowerShell (AWSPowerShell module) are installed by default on all Windows-based Amazon Machine Images (AMIs).

Setting up the AWS Tools for PowerShell involves the following high-level tasks, described in detail in this topic.

1. Install the AWS Tools for PowerShell package option that's appropriate for your environment.
2. Verify that script execution is enabled by running the `Get-ExecutionPolicy` cmdlet.
3. Import the AWS Tools for PowerShell module into your PowerShell session.

**Prerequisites**

Newer versions of PowerShell, including PowerShell Core, are available as downloads from Microsoft at [Installing various versions of PowerShell](on Microsoft's Web site).
Install AWS.Tools on Windows

You can install the modularized version of AWS Tools for PowerShell on computers that are running Windows with Windows PowerShell 5.1, or PowerShell Core 6.0 or later. For information about how to install PowerShell Core, see Installing various versions of PowerShell on Microsoft's Web site.

You can install AWS.Tools in one of three ways:

- **Using the cmdlets in the AWS.Tools package.** The AWS.Tools.Installer module simplifies the installation and update of other AWS.Tools modules. The AWS.Tools.Installer requires, automatically downloads, and installs an updated version of PowerShellGet. The AWS.Tools.Installer module automatically keeps your module versions in sync; when you install or update to a newer version of one module, the cmdlets in the AWS.Tools.Installer automatically update all of your other AWS.Tools modules to the same version.

- **Downloading the modules from AWS.Tools.zip and extracting them in one of the module folders.** You can discover your module folders by displaying the value of the PSModulePath environment variable.

- **Installing each service module from the PowerShell Gallery using the Install-Module and Install-AWSToolsModule cmdlets.** This method is described in the following procedure.

To install AWS.Tools on Windows using the Install-Module cmdlet

1. Start a PowerShell session.
   
   **Note**
   We recommend that you *don’t* run PowerShell as an administrator with elevated permissions except when required by the task at hand. This is because of the potential security risk and is inconsistent with the principle of least privilege.

2. To install the modularized AWS.Tools package, run the following command.

   ```powershell
   PS > Install-Module -Name AWS.Tools.Installer
   Untrusted repository
   You are installing the modules from an untrusted repository. If you trust this repository, change its InstallationPolicy value by running the Set-PSRepository cmdlet. Are you sure you want to install the modules from 'PSGallery'? [Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "N"): y
   ```

   If you are notified that the repository is "untrusted", it asks you if you want to install anyway. Enter *y* to allow PowerShell to install the module. To avoid the prompt and install the module without trusting the repository, you can run the command with the `-Force` parameter.

   ```powershell
   PS > Install-Module -Name AWS.Tools.Installer -Force
   ```

3. You can now install the module for each AWS service that you want to use by using the Install-AWSToolsModule cmdlet. For example, the following command installs the IAM module. This command also installs any dependent modules that are required for the specified module to work. For example, when you install your first AWS.Tools service module, it also installs AWS.Tools.Common. This is a shared module required by all AWS service modules. It also removes older versions of the modules, and updates other modules to the same newer version.

   ```powershell
   PS > Install-AWSToolsModule AWS.Tools.EC2,AWS.Tools.S3 -CleanUp
   Confirm
   Are you sure you want to perform this action?
   ```
Performing the operation "Install-AWSToolsModule" on target "AWS Tools version 4.0.0.0".

[Y] Yes  [A] Yes to All  [N] No  [L] No to All  [S] Suspend  [?] Help (default is "Y"):

Installing module AWS.Tools.Common version 4.0.0.0
Installing module AWS.Tools.EC2 version 4.0.0.0
Installing module AWS.Tools.Glacier version 4.0.0.0
Installing module AWS.Tools.S3 version 4.0.0.0

Uninstalling AWS.Tools version 3.3.618.0
Uninstalling module AWS.Tools.Glacier
Uninstalling module AWS.Tools.S3
Uninstalling module AWS.Tools.SimpleNotificationService
Uninstalling module AWS.Tools.SQS
Uninstalling module AWS.Tools.Common

Note
The Install-AWSToolsModule cmdlet downloads all requested modules from the PSRepository named PSGallery (https://www.powershellgallery.com/) and considers it a trusted source. Use the command Get-PSRepository -Name PSGallery for more information about this PSRepository.

By default, this command installs modules into the %USERPROFILE%\Documents\WindowsPowerShell\Modules folder. To install the AWS Tools for PowerShell for all users of a computer, you must run the following command in a PowerShell session that you started as an administrator. This installs modules to the %ProgramFiles%\WindowsPowerShell\Modules folder that is accessible by all users.

PS > Install-AWSToolsModule AWS.Tools.IdentityManagement -Scope AllUsers

Install AWSPowerShell.NetCore on Windows

You can install the AWSPowerShell.NetCore on computers that are running Windows with PowerShell version 3 through 5.1, or PowerShell Core 6.0 or later. For information about how to install PowerShell Core, see Installing various versions of PowerShell on the Microsoft PowerShell website.

You can install AWSPowerShell.NetCore in one of two ways

- Downloading the module from AWSPowerShell.NetCore.zip and extracting it in one of the module directories. You can discover your module directories by displaying the value of the PSModulePath environment variable.
- Installing from the PowerShell Gallery using the Install-Module cmdlet, as described in the following procedure.

To install AWSPowerShell.NetCore from the PowerShell Gallery using the Install-Module cmdlet

To install the AWSPowerShell.NetCore from the PowerShell Gallery, your computer must be running PowerShell 5.0 or later, or running PowerShellGet on PowerShell 3 or later. Run the following command.

PS > Install-Module -name AWSPowerShell.NetCore

If you're running PowerShell as administrator, the previous command installs AWS Tools for PowerShell for all users on the computer. If you're running PowerShell as a standard user without administrator permissions, that same command installs AWS Tools for PowerShell for only the current user.
To install for only the current user when that user has administrator permissions, run the command with the -Scope CurrentUser parameter set, as follows.

```
PS > Install-Module -name AWSPowerShell.NetCore -Scope CurrentUser
```

Although PowerShell 3.0 and later releases typically load modules into your PowerShell session the first time you run a cmdlet in the module, the AWSPowerShell.NetCore module is too large to support this functionality. You must instead explicitly load the AWSPowerShell.NetCore Core module into your PowerShell session by running the following command.

```
PS > Import-Module AWSPowerShell.NetCore
```

To load the AWSPowerShell.NetCore module into a PowerShell session automatically, add that command to your PowerShell profile. For more information about editing your PowerShell profile, see About Profiles in the PowerShell documentation.

### Install AWSPowerShell on Windows PowerShell

You can install the AWS Tools for Windows PowerShell in one of two ways:

- Downloading the module from AWSPowerShell.zip and extracting it in one of the module directories. You can discover your module directories by displaying the value of the PSModulePath environment variable.
- Installing from the PowerShell Gallery using the Install-Module cmdlet as described in the following procedure.

#### To install AWSPowerShell from the PowerShell Gallery using the Install-Module cmdlet

You can install the AWSPowerShell from the PowerShell Gallery if you're running PowerShell 5.0 or later, or have installed PowerShellGet on PowerShell 3 or later. You can install and update AWSPowerShell from Microsoft's PowerShell Gallery by running the following command.

```
PS > Install-Module -Name AWSPowerShell
```

To load the AWSPowerShell module into a PowerShell session automatically, add the previous import-module cmdlet to your PowerShell profile. For more information about editing your PowerShell profile, see About Profiles in the PowerShell documentation.

**Note**
The Tools for Windows PowerShell are installed by default on all Windows-based Amazon Machine Images (AMIs).

### Enable Script Execution

To load the AWS Tools for PowerShell modules, you must enable PowerShell script execution. To enable script execution, run the Set-ExecutionPolicy cmdlet to set a policy of RemoteSigned. For more information, see About Execution Policies on the Microsoft Technet website.

**Note**
This is a requirement only for computers that are running Windows. The ExecutionPolicy security restriction is not present on other operating systems.

#### To enable script execution

1. Administrator rights are required to set the execution policy. If you are not logged in as a user with administrator rights, open a PowerShell session as Administrator. Choose Start, and then choose
All Programs. Choose Accessories, and then choose Windows PowerShell. Right-click Windows PowerShell, and on the context menu, choose Run as administrator.

2. At the command prompt, enter the following.

```
PS > Set-ExecutionPolicy RemoteSigned
```

**Note**

On a 64-bit system, you must do this separately for the 32-bit version of PowerShell, Windows PowerShell (x86).

If you don’t have the execution policy set correctly, PowerShell shows the following error whenever you try to run a script, such as your profile.

```
File C:\Users\username\Documents\WindowsPowerShell\Microsoft.PowerShell_profile.psl1 cannot be loaded because the execution of scripts is disabled on this system. Please see "get-help about_signing" for more details.
At line:1 char:2
+ . <<<< 'C:\Users\username\Documents\WindowsPowerShell\Microsoft.PowerShell_profile.psl' + CategoryInfo : NotSpecified: () [], PSSecurityException + FullyQualifiedErrorId : RuntimeMethod
```

The Tools for Windows PowerShell installer automatically updates the **PSModulePath** to include the location of the directory that contains the AWSPowerShell module.

Because the PSModulePath includes the location of the AWS module's directory, the Get-Module -ListAvailable cmdlet shows the module.

```
PS > Get-Module -ListAvailable

ModuleType Name                      ExportedCommands
---------- ----                      ----------------
Manifest   AppLocker                 {}
Manifest   BitsTransfer              {}
Manifest   PSDiagnostics             {}
Manifest   TroubleshootingPack       {}
Manifest   AWSPowerShell             {Update-EBApplicationVersion, Set-DPStatus, Remove-
IAMGroupPol...
```

**Versioning**

AWS releases new versions of the AWS Tools for PowerShell periodically to support new AWS services and features. To determine the version of the Tools that you have installed, run the **Get-AWSPowerShellVersion** cmdlet.

```
PS > Get-AWSPowerShellVersion

Tools for PowerShell
Version 4.1.11.0
Copyright 2012-2021 Amazon.com, Inc. or its affiliates. All Rights Reserved.

Amazon Web Services SDK for .NET
Core Runtime Version 3.7.0.12
Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.

Release notes: https://github.com/aws/aws-tools-for-powershell/blob/master/CHANGELOG.md
This software includes third party software subject to the following copyrights:
```
You can also add the -ListServiceVersionInfo parameter to a Get-AWSPowerShellVersion command to see a list of the AWS services that are supported in the current version of the tools. If you use the modularized AWS.Tools.* option, only the modules that you currently have imported are displayed.

```
PS > Get-AWSPowerShellVersion -ListServiceVersionInfo
...

<table>
<thead>
<tr>
<th>Service</th>
<th>Noun Prefix</th>
<th>Module Name</th>
<th>SDK Assembly Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexa For Business</td>
<td>ALXB</td>
<td>AWS.Tools.AlexaForBusiness</td>
<td>3.7.0.11</td>
</tr>
<tr>
<td>Amplify Backend</td>
<td>AMPB</td>
<td>AWS.Tools.AmplifyBackend</td>
<td>3.7.0.11</td>
</tr>
<tr>
<td>Amazon API Gateway</td>
<td>AG</td>
<td>AWS.Tools.APIGateway</td>
<td>3.7.0.11</td>
</tr>
<tr>
<td>Amazon API Gateway Management API</td>
<td>AGM</td>
<td>AWS.Tools.ApiGatewayManagementApi</td>
<td>3.7.0.11</td>
</tr>
<tr>
<td>Amazon API Gateway V2</td>
<td>AG2</td>
<td>AWS.Tools.ApiGatewayV2</td>
<td>3.7.0.11</td>
</tr>
<tr>
<td>Amazon Appflow</td>
<td>AF</td>
<td>AWS.Tools.Appflow</td>
<td>3.7.1.4</td>
</tr>
<tr>
<td>Amazon Route 53</td>
<td>RS3</td>
<td>AWS.Tools.Route53</td>
<td>3.7.0.12</td>
</tr>
<tr>
<td>Amazon Route 53 Domains</td>
<td>RS3D</td>
<td>AWS.Tools.Route53Domains</td>
<td>3.7.0.11</td>
</tr>
<tr>
<td>Amazon Route 53 Resolver</td>
<td>RS3R</td>
<td>AWS.Tools.Route53Resolver</td>
<td>3.7.1.5</td>
</tr>
<tr>
<td>Amazon Simple Storage Service (S3)</td>
<td>S3</td>
<td>AWS.Tools.S3</td>
<td>3.7.0.13</td>
</tr>
</tbody>
</table>
...
```

To determine the version of PowerShell that you are running, enter $PSVersionTable to view the contents of the $PSVersionTable automatic variable.

```
PS > $PSVersionTable

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSVersion</td>
<td>6.2.2</td>
</tr>
<tr>
<td>PSEdition</td>
<td>Core</td>
</tr>
<tr>
<td>GitCommitId</td>
<td>6.2.2</td>
</tr>
<tr>
<td>OS</td>
<td>Darwin 18.7.0 Darwin Kernel Version 18.7.0: Tue Aug 20 16:57:14 PDT 2019; root:xnu-4903.271.2-2/RELEASE_X86_64</td>
</tr>
<tr>
<td>Platform</td>
<td>Unix</td>
</tr>
<tr>
<td>PSCOMPATIBLEVERSIONS</td>
<td>{1.0, 2.0, 3.0, 4.0..}</td>
</tr>
<tr>
<td>PSRemotingProtocolVersion</td>
<td>2.3</td>
</tr>
<tr>
<td>SerializationVersion</td>
<td>1.1.0.1</td>
</tr>
<tr>
<td>WSMANStackVersion</td>
<td>3.0</td>
</tr>
</tbody>
</table>
```

**Updating the AWS Tools for PowerShell on Windows**

Periodically, as updated versions of the AWS Tools for PowerShell are released, you should update the version that you are running locally.

**Update the Modularized AWS.Tools**

To upgrade your AWS.Tools modules to the latest version, run the following command.

```
PS > Update-AWSToolsModule -CleanUp
```

This command updates all of the currently installed AWS.Tools modules and, after a successful update, removes other installed versions.
Note
The Update-AWSToolsModule cmdlet downloads all modules from the PSRepository named PSGallery ([https://www.powershellgallery.com/](https://www.powershellgallery.com/)) and considers it a trusted source. Use the command: Get-PSRepository -Name PSGallery for more information on this PSRepository.

Update the Tools for PowerShell Core

Run the Get-AWSPowerShellVersion cmdlet to determine the version that you are running, and compare that with the version of Tools for Windows PowerShell that is available on the PowerShell Gallery website. We suggest you check every two to three weeks. Support for new commands and AWS services is available only after you update to a version with that support.

Before you install a newer release of AWSPowerShell.NetCore, uninstall the existing module. Close any open PowerShell sessions before you uninstall the existing package. Run the following command to uninstall the package.

```powershell
PS > Uninstall-Module -Name AWSPowerShell.NetCore -AllVersions
```

After the package is uninstalled, install the updated module by running the following command.

```powershell
PS > Install-Module -Name AWSPowerShell.NetCore
```

After installation, run the command Import-Module AWSPowerShell.NetCore to load the updated cmdlets into your PowerShell session.

Update the Tools for Windows PowerShell

Run the Get-AWSPowerShellVersion cmdlet to determine the version that you are running, and compare that with the version of Tools for Windows PowerShell that is available on the PowerShell Gallery website. We suggest you check every two to three weeks. Support for new commands and AWS services is available only after you update to a version with that support.

- If you installed by using the Install-Module cmdlet, run the following commands.

```powershell
PS > Uninstall-Module -Name AWSPowerShell -AllVersions
PS > Install-Module -Name AWSPowerShell
```

- If you installed by using a downloaded ZIP file:
  1. Download the most recent version from the Tools for PowerShell web site. Compare the package version number in the downloaded file name with the version number you get when you run the Get-AWSPowerShellVersion cmdlet.
  2. If the download version is a higher number than the version you have installed, close all Tools for Windows PowerShell consoles.
  3. Install the newer version of the Tools for Windows PowerShell.

After installation, run Import-Module AWSPowerShell to load the updated cmdlets into your PowerShell session. Or run the custom AWS Tools for PowerShell console from your Start menu.

Installing AWS Tools for PowerShell on Linux or macOS

This topic provides instructions on how to install the AWS Tools for PowerShell on Linux or macOS.
Overview of Setup

To install AWS Tools for PowerShell on a Linux or macOS computer, you can choose from two package options:

- **AWS.Tools** (p. 11) – The modularized version of AWS Tools for PowerShell. Each AWS service is supported by its own individual, small module, with shared support modules AWS.Tools.Common.

- **AWSPowerShell.NetCore** (p. 13) – The single, large-module version of AWS Tools for PowerShell. All AWS services are supported by this single, large module.

Setting either of these up on a computer running Linux or macOS involves the following tasks, described in detail later in this topic:

1. Install PowerShell Core 6.0 or later on a supported system.
2. After installing PowerShell Core, start PowerShell by running `pwsh` in your system shell.
3. Install either AWS.Tools or AWSPowerShell.NetCore.
4. Run the appropriate `Import-Module` cmdlet to import the module into your PowerShell session.
5. Run the `Initialize-AWSDefaultConfiguration` cmdlet to provide your AWS credentials.

Prerequisites

To run the AWS Tools for PowerShell Core, your computer must be running PowerShell Core 6.0 or later.

- For a list of supported Linux platform releases and for information about how to install the latest version of PowerShell on a Linux-based computer, see [Installing PowerShell on Linux](https://docs.microsoft.com/en-us/powershell/scripting/install/installing-powershell) on Microsoft's website. Some Linux-based operating systems, such as Arch, Kali, and Raspbian, are not officially supported, but have varying levels of community support.

- For information about supported macOS versions and about how to install the latest version of PowerShell on macOS, see [Installing PowerShell on macOS](https://docs.microsoft.com/en-us/powershell/scripting/install/installing-powershell) on Microsoft's website.

Install AWS.Tools on Linux or macOS

You can install the modularized version of AWS Tools for PowerShell on computers that are running PowerShell Core 6.0 or later. For information about how to install PowerShell Core, see [Installing various versions of PowerShell](https://docs.microsoft.com/en-us/powershell/scripting/install/installing-powershell) on the Microsoft PowerShell website.

You can install AWS.Tools in one of three ways:

- Using the cmdlets in the AWS.Tools.Installer module. The AWS.Tools.Installer module simplifies the installation and update of other AWS.Tools modules. AWS.Tools.Installer requires, automatically downloads and installs, an updated version of PowerShellGet. The AWS.Tools.Installer module also automatically keeps your module versions in sync. When you install or update to a newer version of one module, the cmdlets in the AWS.Tools.Installer automatically update all of your other AWS.Tools modules to the same version.

- Downloading the modules from `AWS.Tools.zip` and extracting them in one of the module directories. You can discover your module directories by printing the value of the `$Env:PSModulePath` variable.

- Installing each service module from the PowerShell Gallery using the `Install-Module` cmdlet, as described in the following procedure.
To install AWS.Tools on Linux or macOS using the Install-Module cmdlet

1. Start a PowerShell Core session by running the following command.

```bash
$ pwsh
```

**Note**
We recommend that you *don't* run PowerShell as an administrator with elevated permissions except when required by the task at hand. This is because of the potential security risk and is inconsistent with the principle of least privilege.

2. To install the modularized AWS.Tools package using the AWS.Tools.Installer module, run the following command.

```bash
PS > Install-Module -Name AWS.Tools.Installer
```

Untrusted repository
You are installing the modules from an untrusted repository. If you trust this repository, change its InstallationPolicy value by running the Set-PSRepository cmdlet. Are you sure you want to install the modules from 'PSGallery'? [Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "N"): y

If you are notified that the repository is "untrusted", you're asked if you want to install anyway. Enter y to allow PowerShell to install the module. To avoid the prompt and install the module without trusting the repository, you can run the following command.

```bash
PS > Install-Module -Name AWS.Tools.Installer -Force
```

3. You can now install the module for each service that you want to use. For example, the following command installs the IAM module. This command also installs any dependent modules that are required for the specified module to work. For example, when you install your first AWS.Tools service module, it also installs AWS.Tools.Common. This is a shared module required by all AWS service modules. It also removes older versions of the modules, and updates other modules to the same newer version.

```bash
PS > Install-AWSToolsModule AWS.Tools.EC2,AWS.Tools.S3 -CleanUp
```

Confirm
Are you sure you want to perform this action?
Performing the operation "Install-AWSToolsModule" on target "AWS Tools version 4.0.0.0".
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): y

Installing module AWS.Tools.Common version 4.0.0.0
Installing module AWS.Tools.EC2 version 4.0.0.0
Installing module AWS.Tools.Glacier version 4.0.0.0
Installing module AWS.Tools.S3 version 4.0.0.0

Uninstalling AWS.Tools version 3.3.618.0
Uninstalling module AWS.Tools.Glacier
Uninstalling module AWS.Tools.S3
Uninstalling module AWS.Tools.SimpleNotificationService
Uninstalling module AWS.Tools.SQS
Uninstalling module AWS.Tools.Common
Install AWSPowerShell.NetCore on Linux or macOS

To upgrade to a newer release of AWSPowerShell.NetCore, follow the instructions in Updating the AWS Tools for PowerShell on Linux or macOS (p. 15). Uninstall earlier versions of AWSPowerShell.NetCore first.

You can install AWSPowerShell.NetCore in one of two ways:

- Downloading the module from AWSPowerShell.NetCore.zip and extracting it in one of the module directories. You can discover your module directories by printing the value of the $Env:PSModulePath variable.
- Installing from the PowerShell Gallery using the Install-Module cmdlet as described in the following procedure.

To install AWSPowerShell.NetCore on Linux or macOS using the Install-Module cmdlet

Start a PowerShell Core session by running the following command.

```
$ pwsh
```

**Note**

We recommend that you *don't* start PowerShell by running `sudo pwsh` to run PowerShell with elevated, administrator rights. This is because of the potential security risk and is inconsistent with the principle of least privilege.

To install the AWSPowerShell.NetCore single-module package from the PowerShell Gallery, run the following command.

```
PS > Install-Module -Name AWSPowerShell.NetCore
```

Untrusted repository

You are installing the modules from an untrusted repository. If you trust this repository, change its InstallationPolicy value by running the Set-PSRepository cmdlet. Are you sure you want to install the modules from ‘PSGallery’?

```
[Y] Yes  [A] Yes to All  [N] No  [L] No to All  [S] Suspend  [?] Help (default is “N”): y
```

If you are notified that the repository is "untrusted", you're asked if you want to install anyway. Enter y to allow PowerShell to install the module. To avoid the prompt without trusting the repository, you can run the following command.

```
PS > Install-Module -Name AWSPowerShell.NetCore -Force
```
You don't have to run this command as root, unless you want to install the AWS Tools for PowerShell for all users of a computer. To do this, run the following command in a PowerShell session that you have started with `sudo pwsh`.

```
PS > Install-Module -Scope AllUsers -Name AWSPowerShell.NetCore -Force
```

**Script Execution**

The `Set-ExecutionPolicy` command isn't available on non-Windows systems. You can run `Get-ExecutionPolicy`, which shows that the default execution policy setting in PowerShell Core running on non-Windows systems is `Unrestricted`. For more information, see [About Execution Policies](https://docs.microsoft.com/en-us/powershell/module/about/about-executionpolicies) on the Microsoft Technet website.

Because the `PSModulePath` includes the location of the AWS module's directory, the `Get-Module -ListAvailable` cmdlet shows the module that you installed.

**AWS.Tools**

```
PS > Get-Module -ListAvailable
```

```
Directory: /Users/username/.local/share/powershell/Modules

<table>
<thead>
<tr>
<th>ModuleType</th>
<th>Version</th>
<th>Name</th>
<th>PSEdition</th>
<th>ExportedCommands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary</td>
<td>3.3.563.1</td>
<td>AWS.Tools.Common</td>
<td>Desk</td>
<td>{Clear-AWSHistory, Set-AWSHistoryConfiguration, Initialize-AWSDefaultConfiguration, Clear-AWSDefaultConfiguration, Clear-AWSDefaultConfiguration...</td>
</tr>
</tbody>
</table>
```

**AWSPowerShell.NetCore**

```
PS > Get-Module -ListAvailable
```

```
Directory: /Users/username/.local/share/powershell/Modules

<table>
<thead>
<tr>
<th>ModuleType</th>
<th>Version</th>
<th>Name</th>
<th>ExportedCommands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary</td>
<td>3.3.563.1</td>
<td>AWSPowerShell.NetCore</td>
<td></td>
</tr>
</tbody>
</table>
```

**Configure a PowerShell Console to Use the AWS Tools for PowerShell Core (AWSPowerShell.NetCore Only)**

PowerShell Core typically loads modules automatically whenever you run a cmdlet in the module. But this doesn't work for `AWSPowerShell.NetCore` because of its large size. To start running `AWSPowerShell.NetCore` cmdlets, you must first run the `Import-Module` command. This isn't required for cmdlets in `AWS.Tools` modules.

**Initialize Your PowerShell Session**

When you start PowerShell on a Linux-based or macOS-based system after you have installed the AWS Tools for PowerShell, you must run `Initialize-AWSDefaultConfiguration` to specify which AWS access key to use. For more information about `Initialize-AWSDefaultConfiguration`, see [Using AWS Credentials](https://docs.aws.amazon.com/cli/latest/userguide/cli-configure-files.html) (p. 43).
**Versioning**

AWS releases new versions of the AWS Tools for PowerShell periodically to support new AWS services and features. To determine the version of the AWS Tools for PowerShell that you have installed, run the `Get-AWSPowerShellVersion` cmdlet.

```powershell
PS > Get-AWSPowerShellVersion

Tools for PowerShell
Version 4.0.123.0
Copyright 2012-2019 Amazon.com, Inc. or its affiliates. All Rights Reserved.

Amazon Web Services SDK for .NET
Core Runtime Version 3.3.103.22
Copyright 2009-2015 Amazon.com, Inc. or its affiliates. All Rights Reserved.

Release notes: https://github.com/aws/aws-tools-for-powershell/blob/master/CHANGELOG.md

This software includes third party software subject to the following copyrights:
- Logging from log4net, Apache License
  [http://logging.apache.org/log4net/license.html]
```

To see a list of the supported AWS services in the current version of the tools, add the `-ListServiceVersionInfo` parameter to a `Get-AWSPowerShellVersion` cmdlet.

To determine the version of PowerShell that you are running, enter `$PSVersionTable` to view the contents of the `$PSVersionTable` automatic variable.

```powershell
PS > $PSVersionTable

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Value</td>
</tr>
<tr>
<td>PSVersion</td>
<td>6.2.2</td>
</tr>
<tr>
<td>PSEdition</td>
<td>Core</td>
</tr>
<tr>
<td>GitCommitId</td>
<td>6.2.2</td>
</tr>
<tr>
<td>OS</td>
<td>Darwin 18.7.0 Darwin Kernel Version 18.7.0: Tue Aug 20 16:57:14 PDT 2019; root:xnu-4903.271.2-2/RELEASE_X86_64</td>
</tr>
<tr>
<td>Platform</td>
<td>Unix</td>
</tr>
<tr>
<td>PSCompatibleVersions</td>
<td>{1.0, 2.0, 3.0, 4.0...}</td>
</tr>
<tr>
<td>PSRemotingProtocolVersion</td>
<td>2.3</td>
</tr>
<tr>
<td>SerializationVersion</td>
<td>1.1.0.1</td>
</tr>
<tr>
<td>WSManStackVersion</td>
<td>3.0</td>
</tr>
</tbody>
</table>
```

**Updating the AWS Tools for PowerShell on Linux or macOS**

Periodically, as updated versions of the AWS Tools for PowerShell are released, you should update the version that you're running locally.

**Update the Modularized AWS.Tools.***

To upgrade your `AWS.Tools` modules to the latest version, run the following command.

```powershell
PS > Update-AWSToolsModule -CleanUp
```
This command updates all of the currently installed AWS.Tools modules and, for those modules that were successfully updated, removes the earlier versions.

**Note**
The Update-AWSToolsModule cmdlet downloads all modules from the PSRepository named PSGallery (https://www.powershellgallery.com/) and considers it a trusted source. Use the command Get-PSRepository -Name PSGallery for more information about this PSRepository.

**Update the Tools for PowerShell Core**

Run the Get-AWSPowerShellVersion cmdlet to determine the version that you are running, and compare that with the version of Tools for Windows PowerShell that is available on the PowerShell Gallery website. We suggest you check every two to three weeks. Support for new commands and AWS services is available only after you update to a version with that support.

Before you install a newer release of AWSPowerShell.NetCore, uninstall the existing module. Close any open PowerShell sessions before you uninstall the existing package. Run the following command to uninstall the package.

```
PS > Uninstall-Module -Name AWSPowerShell.NetCore -AllVersions
```

After the package is uninstalled, install the updated module by running the following command.

```
PS > Install-Module -Name AWSPowerShell.NetCore
```

After installation, run the command Import-Module AWSPowerShell.NetCore to load the updated cmdlets into your PowerShell session.

**Related Information**

- Get started with the AWS Tools for Windows PowerShell (p. 21)
- Work with AWS services in the AWS Tools for PowerShell (p. 53)

**Migrating from AWS Tools for PowerShell Version 3.3 to Version 4**

AWS Tools for PowerShell version 4 is a backward-compatible update to AWS Tools for PowerShell version 3.3. It adds significant improvements while maintaining existing cmdlet behavior.

Your existing scripts should continue to work after upgrading to the new version, but we do recommend that you test them thoroughly before upgrading your production environments.

This section describes the changes and explains how they might impact your scripts.

**New Fully Modularized AWS.Tools Version**

The AWSPowerShell.NetCore and AWSPowerShell packages were "monolithic". This meant that all of the AWS services were supported in the same module, making it very large, and growing larger as each new AWS service and feature was added. The new AWS.Tools package is broken up into smaller modules that give you the flexibility to download and install only those that you require for the AWS services that you use. The package includes a shared AWS.Tools.Common module that is required by all of the other
modules, and an AWS.Tools.Installer module that simplifies installing, updating, and removing modules as needed.

This also enables auto-importing of cmdlets on first call, without having to first call Import-Module. However, to interact with the associated .NET objects before calling a cmdlet, you must still call Import-Module to let PowerShell know about the relevant .NET types.

For example, the following command has a reference to Amazon.EC2.Model.Filter. This type of reference can't trigger auto-importing, so you must call Import-Module first or the command fails.

```
PS > $filter = [Amazon.EC2.Model.Filter]@{Name="vpc-id";Values="vpc-1234abcd"}
InvalidOperation: Unable to find type [Amazon.EC2.Model.Filter]
```

```
PS > Import-Module AWS.Tools.EC2
PS > $filter = [Amazon.EC2.Model.Filter]@{Name="vpc-id";Values="vpc-1234abcd"}
PS > Get-EC2Instance -Filter $filter -Select Reservations.Instances.InstanceId
1-0123456789abcdefg
1-0123456789hijklmn
```

New Get-AWSService cmdlet

To help you discover the names of the modules for each AWS service in the AWS.Tools collection of modules, you can use the Get-AWSService cmdlet.

```
PS > Get-AWSService
Service : ACMPCA
CmdletNounPrefix : PCA
ModuleName : AWS.Tools.ACMPCA
SDKAssemblyVersion : 3.3.101.56
ServiceName : Certificate Manager Private Certificate Authority

Service : AlexaForBusiness
CmdletNounPrefix : ALXB
ModuleName : AWS.Tools.AlexaForBusiness
SDKAssemblyVersion : 3.3.106.26
ServiceName : Alexa For Business
...
```

New -Select Parameter to Control the Object Returned by a Cmdlet

Most cmdlets in version 4 support a new -Select parameter. Each cmdlet calls the AWS service APIs for you using the AWS SDK for .NET. Then the AWS Tools for PowerShell client converts the response into an object that you can use in your PowerShell scripts and pipe to other commands. Sometimes the final PowerShell object has more fields or properties in the original response than you need, and other times you might want the object to include fields or properties of the response that are not there by default. The -Select parameter enables you to specify what is included in the .NET object returned by the cmdlet.

For example, the Get-S3Object cmdlet invokes the Amazon S3 SDK operation ListObjects. That operation returns a ListObjectsResponse object. However, by default, the Get-S3Object cmdlet returns only the S3Objects element of the SDK response to the PowerShell user. In the following example, that object is an array with two elements.

```
PS > Get-S3Object -BucketName mybucket
```
More Consistent Limiting of the Number of Items in the Output

In AWS Tools for PowerShell version 4, you can specify `-Select *` to return the complete .NET response object returned by the SDK API call.

```powershell
PS > Get-S3Object -BucketName mybucket -Select *
     IsTruncated : False
     NextMarker  :
     S3Objects   : {file1.txt, file2.txt}
     Name        : mybucket
     Prefix      :
     MaxKeys     : 1000
     CommonPrefixes : {}
     Delimiter   :
```

You can also specify the path to the specific nested property you want. The following example returns only the `Key` property of each element in the `S3Objects` array.

```powershell
PS > Get-S3Object -BucketName mybucket -Select S3Objects.Key
     file1.txt
     file2.txt
```

In certain situations it can be useful to return a cmdlet parameter. You can do this with `-Select ^ParameterName`. This feature supplants the `-PassThru` parameter, which is still available but deprecated.

```powershell
PS > Get-S3Object -BucketName mybucket -Select S3Objects.Key | >> Write-S3ObjectTagSet -Select ^Key -BucketName mybucket -Tagging_TagSet @{ Key='key'; Value='value'}
     file1.txt
     file2.txt
```

The reference topic for each cmdlet identifies whether it supports the `-Select` parameter.

More Consistent Limiting of the Number of Items in the Output

Earlier versions of AWS Tools for PowerShell enabled you to use the `-MaxItems` parameter to specify the maximum number of objects returned in the final output.

This behavior is removed from AWS.Tools.

This behavior is deprecated in AWSPowerShell.NetCore and AWSPowerShell, and will be removed from those versions in a future release.
If the underlying service API supports a `MaxItems` parameter, it's still available and functions as the API specifies. But it no longer has the added behavior of limiting the number of items returned in the output of the cmdlet.

To limit the number of items returned in the final output, pipe the output to the `Select-Items` cmdlet and specify the `-First n` parameter, where `n` is the maximum number of items to include in the final output.

```powershell
PS > Get-S3Object -BucketName mybucket -Select S3Objects.Key | select -first 1*
file1.txt
```

Not all AWS services supported `-MaxItems` in the same way, so this removes that inconsistency and the unexpected results that sometimes occurred. Also, `-MaxItems` combined with the new `-Select` parameter could sometimes result in confusing results.

### Easier to Use Stream Parameters

Parameters of type `Stream` or `byte[]` can now accept `string`, `string[]`, or `FileInfo` values.

For example, you can use any of the following examples.

```powershell
PS > Invoke-LMFunction -FunctionName MyTestFunction -PayloadStream '{
  >> "some": "json"
  >> }
PS > Invoke-LMFunction -FunctionName MyTestFunction -PayloadStream (ls .\some.json)
PS > Invoke-LMFunction -FunctionName MyTestFunction -PayloadStream @('{"some": "json"}')
```

AWS Tools for PowerShell converts all strings to `byte[]` using UTF-8 encoding.

### Extending the Pipe by Property Name

To make the user experience more consistent, you can now pass pipeline input by specifying the property name for any parameter.

In the following example, we create a custom object with properties that have names that match the parameter names of the target cmdlet. When the cmdlet runs, it automatically consumes those properties as its parameters.

```powershell
PS > [pscustomobject] @('BucketName='myBucket'; Key='file1.txt'; PartNumber=1') | Get-S3ObjectMetadata
```

**Note**

Some properties supported this in earlier versions of AWS Tools for PowerShell. Version 4 makes this more consistent by enabling it for all parameters.

### Static Common Parameters

To improve consistency in version 4.0 of AWS Tools for PowerShell, all parameters are static.

In earlier versions of AWS Tools for PowerShell, some common parameters such as `AccessKey`, `SecretKey`, `ProfileName`, or `Region`, were dynamic, while all other parameters were
static. This could create problems because PowerShell binds static parameters before dynamic ones. For example, let's say you ran the following command.

```powershell
PS > Get-EC2Region -Region us-west-2
```

Earlier versions of PowerShell bound the value `us-west-2` to the `-RegionName` static parameter instead of the `-Region` dynamic parameter. Likely, this could confuse users.

### AWS.Tools Declares and Enforces Mandatory Parameters

The `AWS.Tools.*` modules now declare and enforce mandatory cmdlet parameters. When an AWS Service declares that a parameter of an API is required, PowerShell prompts you for the corresponding cmdlet parameter if you didn't specify it. This applies only to `AWS.Tools`. To ensure backward compatibility, this does not apply to AWSPowerShell.NetCore or AWSPowerShell.

### All Parameters Are Nullable

You can now assign `$null` to value type parameters (numbers and dates). This change should not affect existing scripts. This enables you to bypass the prompt for a mandatory parameter. Mandatory parameters are enforced in `AWS.Tools` only.

If you run the following example using version 4, it effectively bypasses client-side validation because you provide a "value" for each mandatory parameter. However, the Amazon EC2 API service call fails because the AWS service still requires that information.

```powershell
PS > Get-EC2InstanceAttribute -InstanceId $null -Attribute $null
WARNING: You are passing $null as a value for parameter Attribute which is marked as required.
In case you believe this parameter was incorrectly marked as required, report this by opening an issue at https://github.com/aws/aws-tools-for-powershell/issues.
WARNING: You are passing $null as a value for parameter InstanceId which is marked as required.
In case you believe this parameter was incorrectly marked as required, report this by opening an issue at https://github.com/aws/aws-tools-for-powershell/issues.
Get-EC2InstanceAttribute : The request must contain the parameter instanceId
```

### Removing Previously Deprecated Features

The following features were deprecated in previous releases of AWS Tools for PowerShell and are removed in version 4:

- Removed the `-Terminate` parameter from the `Stop-EC2Instance` cmdlet. Use `Remove-EC2Instance` instead.
- Removed the `-ProfileName` parameter from the `Clear-AWSCredential` cmdlet. Use `Remove-AWSCredentialProfile` instead.
- Removed cmdlets `Import-EC2Instance` and `Import-EC2Volume`. 
Get started with the AWS Tools for Windows PowerShell

Some of the topics in this section describe the fundamentals of using the Tools for Windows PowerShell after you have installed the tools (p. 4). For example, they explain how to specify which credentials (p. 21) and AWS Region (p. 23) the Tools for Windows PowerShell should use when interacting with AWS.

Other topics in this section provide information about advanced ways that you can configure the tools, your environment, and your projects.

Topics
• Configure tool authentication with AWS (p. 21)
• Specify AWS Regions (p. 23)
• Configure federated identity with the AWS Tools for PowerShell (p. 25)
• Cmdlet discovery and aliases (p. 31)
• Pipelining and $AWSHistory (p. 37)
• Credential and profile resolution (p. 40)
• Additional information about users and roles (p. 41)
• Using legacy credentials (p. 42)

Configure tool authentication with AWS

You must establish how your code authenticates with AWS when developing with AWS services. There are different ways in which you can configure programmatic access to AWS resources, depending on the environment and the AWS access available to you.

To see various methods of authentication for the Tools for PowerShell, see Authentication and access in the AWS SDKs and Tools Reference Guide.

This topic assumes that a new user is developing locally, has not been given a method of authentication by their employer, and will be using AWS IAM Identity Center to obtain temporary credentials. If your environment doesn't fall under these assumptions, some of the information in this topic might not apply to you, or some of the information might have already been given to you.

Configuring this environment requires several steps, which are summarized as follows:

1. Enable and configure IAM Identity Center (p. 21)
2. Configure the Tools for PowerShell to use IAM Identity Center. (p. 22)
3. Start an AWS access portal session (p. 22)

Enable and configure IAM Identity Center

To use AWS IAM Identity Center, it must first be enabled and configured. To see details about how to do this for PowerShell, look at Step 1 in the topic for IAM Identity Center authentication in the AWS SDKs and Tools Reference Guide. Specifically, follow any necessary instructions under I do not have established access through IAM Identity Center.
Configure the Tools for PowerShell to use IAM Identity Center.

Information about how to configure the Tools for PowerShell to use IAM Identity Center is in Step 2 in the topic for IAM Identity Center authentication in the AWS SDKs and Tools Reference Guide. After you complete this configuration, your system should contain the following elements:

- The AWS CLI, which you use to start an AWS access portal session before you run your application.
- The shared AWS config file that contains a [default] profile with a set of configuration values that can be referenced from the Tools for PowerShell. To find the location of this file, see Location of the shared files in the AWS SDKs and Tools Reference Guide. The Tools for PowerShell uses the profile's SSO token provider to acquire credentials before sending requests to AWS. The sso_role_name value, which is an IAM role connected to an IAM Identity Center permission set, should allow access to the AWS services used in your application.

The following sample config file shows a default profile set up with SSO token provider. The profile's sso_session setting refers to the named sso-session section. The sso-session section contains settings to initiate an AWS access portal session.

```
[default]
sso_session = my-sso
sso_account_id = 111122223333
sso_role_name = SampleRole
region = us-east-1
output = json

[sso-session my-sso]
sso_region = us-east-1
sso_start_url = https://provided-domain.awsapps.com/start
sso_registration_scopes = sso:account:access
```

**Important**
Your PowerShell session must have the following modules installed and imported so that SSO resolution can work:

- AWS.Tools.SSO
- AWS.Tools.SSOOIDC

If you don't have these modules, you will get an error similar to the following: "Assembly AWSSDK.SSOOIDC could not be found...".

Start an AWS access portal session

Before running commands that accesses AWS services, you need an active AWS access portal session for the Tools for Windows PowerShell to use IAM Identity Center authentication to resolve credentials. Depending on your configured session lengths, your access will eventually expire and the Tools for Windows PowerShell will encounter an authentication error. To sign in to the AWS access portal, run the following command in the AWS CLI.

```
aws sso login
```

Since you have a default profile setup, you do not need to call the command with a --profile option. If your SSO token provider configuration is using a named profile, the command is aws sso login --profile named-profile.
To test if you already have an active session, run the following AWS CLI command.

```bash
aws sts get-caller-identity
```

The response to this command should report the IAM Identity Center account and permission set configured in the shared config file.

**Note**
If you already have an active AWS access portal session and run `aws sso login`, you will not be required to provide credentials. The sign-in process might prompt you to allow the AWS CLI access to your data. Because the AWS CLI is built on top of the SDK for Python, permission messages may contain variations of the `botocore` name.

**Example**

The following is an example of how to use IAM Identity Center with the Tools for PowerShell. It assumes the following:

- You have enabled IAM Identity Center and configured it as described previously in this topic. The SSO properties are in the `[default]` profile.
- When you log in through the AWS CLI by using `aws sso login`, that user has at least read-only permissions for Amazon S3.
- Some S3 buckets are available for that user to view.

Use the following PowerShell commands to display a list of the S3 buckets:

```powershell
Install-Module AWS.Tools.Installer
Install-AWSToolsModule S3, SSO, SSOOIDC
# Since we're not invoking a cmdlet from these modules directly,
# we must import them explicitly
Import-Module AWS.Tools.SSO
Import-Module AWS.Tools.SSOOIDC
# AWS Tools for PowerShell doesn't support the SSO login flow yet, so login with the CLI
aws sso login
# Now we can invoke cmdlets using the SSO profile
Get-S3Bucket
```

**Additional information**

- For more options on authentication for the Tools for PowerShell, such as the use of profiles and environment variables, see the configuration chapter in the *AWS SDKs and Tools Reference Guide*.
- To learn more about best practices, see Security best practices in IAM in the *IAM User Guide*.
- To create short-term AWS credentials, see Temporary Security Credentials in the *IAM User Guide*.
- To learn about other credential providers, see Standardized credential providers in the *AWS SDKs and Tools Reference Guide*.

**Specify AWS Regions**

There are two ways to specify the AWS Region to use when running AWS Tools for PowerShell commands:
Specify AWS Regions

- Use the -Region common parameter on individual commands.
- Use the Set-DefaultAWSRegion command to set a default Region for all commands.

Many AWS cmdlets fail if the Tools for Windows PowerShell can't figure out what Region to use. Exceptions include cmdlets for Amazon S3 (p. 55), Amazon SES, and AWS Identity and Access Management, which automatically default to a global endpoint.

To specify the region for a single AWS command

Add the -Region parameter to your command, such as the following.

```
PS > Get-EC2Image -Region us-west-2
```

To set a default region for all AWS CLI commands in the current session

From the PowerShell command prompt, type the following command.

```
PS > Set-DefaultAWSRegion -Region us-west-2
```

**Note**
This setting persists only for the current session. To apply the setting to all of your PowerShell sessions, add this command to your PowerShell profile as you did for the Import-Module command.

To view the current default region for all AWS CLI commands

From the PowerShell command prompt, type the following command.

```
PS > Get-DefaultAWSRegion
```

<table>
<thead>
<tr>
<th>Region</th>
<th>Name</th>
<th>IsShellDefault</th>
</tr>
</thead>
<tbody>
<tr>
<td>us-west-2</td>
<td>US West (Oregon)</td>
<td>True</td>
</tr>
</tbody>
</table>

To clear the current default Region for all AWS CLI commands

From the PowerShell command prompt, type the following command.

```
PS > Clear-DefaultAWSRegion
```

To view a list of all available AWS Regions

From the PowerShell command prompt, type the following command. The third column in the sample output identifies which Region is the default for your current session.

```
PS > Get-AWSRegion
```

<table>
<thead>
<tr>
<th>Region</th>
<th>Name</th>
<th>IsShellDefault</th>
</tr>
</thead>
<tbody>
<tr>
<td>ap-east-1</td>
<td>Asia Pacific (Hong Kong)</td>
<td>False</td>
</tr>
<tr>
<td>ap-northeast-1</td>
<td>Asia Pacific (Tokyo)</td>
<td>False</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>us-east-2</td>
<td>US East (Ohio)</td>
<td>False</td>
</tr>
<tr>
<td>us-west-1</td>
<td>US West (N. California)</td>
<td>False</td>
</tr>
</tbody>
</table>
Specifying a Custom or Nonstandard Endpoint

Specify a custom endpoint as a URL by adding the `-EndpointUrl` common parameter to your Tools for Windows PowerShell command, in the following sample format.

```powershell
PS > Some-AWS-PowerShellCmdlet -EndpointUrl "custom endpoint URL" -Other -Parameters
```

The following is an example using the `Get-EC2Instance` cmdlet. The custom endpoint is in the us-west-2, or US West (Oregon) Region in this example, but you can use any other supported AWS Region, including regions that are not enumerated by `Get-AWSRegion`.

```powershell
PS > Get-EC2Instance -EndpointUrl "https://service-custom-url.us-west-2.amazonaws.com" -InstanceID "i-0555a30a2000000e1"
```

Configure federated identity with the AWS Tools for PowerShell

To let users in your organization access AWS resources, you must configure a standard and repeatable authentication method for purposes of security, auditability, compliance, and the capability to support role and account separation. Although it's common to provide users with the ability to access AWS APIs, without federated API access, you would also have to create AWS Identity and Access Management (IAM) users, which defeats the purpose of using federation. This topic describes SAML (Security Assertion Markup Language) support in the AWS Tools for PowerShell that eases your federated access solution.

SAML support in the AWS Tools for PowerShell lets you provide your users federated access to AWS services. SAML is an XML-based, open-standard format for transmitting user authentication and authorization data between services; in particular, between an identity provider (such as Active Directory Federation Services), and a service provider (such as AWS). For more information about SAML and how it works, see [SAML](https://en.wikipedia.org/wiki/Security_Assertion_Markup_Language) on Wikipedia, or [SAML Technical Specifications](https://docs.oasis-open.org/saml/v22.1/SAML2:v22.1-spec-os.pdf) at the Organization for the Advancement of Structured Information Standards (OASIS) website. SAML support in the AWS Tools for PowerShell is compatible with SAML 2.0.

Prerequisites

You must have the following in place before you try to use SAML support for the first time.

- A federated identity solution that is correctly integrated with your AWS account for console access by using only your organizational credentials. For more information about how to do this specifically for Active Directory Federation Services, see [About SAML 2.0 Federation](https://docs.aws.amazon.com/IAM/latest/UserGuide/samlofficial.html) in the IAM User Guide, and the blog post, [Enabling Federation to AWS Using Windows Active Directory, AD FS, and SAML 2.0](https://aws.amazon.com/blogs/security/enabling-federation-to-aws-using-windows-active-directory-ad-fs-and-saml-2-0/). Although the blog post covers AD FS 2.0, the steps are similar if you are running AD FS 3.0.
How an Identity-Federated User Gets Federated Access to AWS Service APIs

The following process describes, at a high level, how an Active Directory (AD) user is federated by AD FS to gain access to AWS resources.

1. The client on federated user's computer authenticates against AD FS.
2. If authentication succeeds, AD FS sends the user a SAML assertion.
3. The user’s client sends the SAML assertion to the AWS Security Token Service (STS) as part of a SAML federation request.
4. STS returns a SAML response that contains AWS temporary credentials for a role the user can assume.
5. The user accesses AWS service APIs by including those temporary credentials in request made by AWS Tools for PowerShell.
How SAML Support Works in the AWS Tools for PowerShell

This section describes how AWS Tools for PowerShell cmdlets enable configuration of SAML-based identity federation for users.

1. AWS Tools for PowerShell authenticates against AD FS by using the Windows user's current credentials, or interactively, when the user tries to run a cmdlet that requires credentials to call into AWS.

2. AD FS authenticates the user.

3. AD FS generates a SAML 2.0 authentication response that includes an assertion; the purpose of the assertion is to identify and provide information about the user. AWS Tools for PowerShell extracts the list of the user's authorized roles from the SAML assertion.

4. AWS Tools for PowerShell forwards the SAML request, including the requested role's Amazon Resource Names (ARN), to STS by making the `AssumeRoleWithSAMLRequest` API call.

5. If the SAML request is valid, STS returns a response that contains the AWS `AccessKeyId`, `SecretAccessKey`, and `SessionToken`. These credentials last for 3,600 seconds (1 hour).

6. The user now has valid credentials to work with any AWS service APIs that the user's role is authorized to access. AWS Tools for PowerShell automatically applies these credentials for any subsequent AWS API calls, and renews them automatically when they expire.

**Note**
When the credentials expire, and new credentials are required, AWS Tools for PowerShell automatically reauthenticates with AD FS, and obtains new credentials for a subsequent hour. For users of domain-joined accounts, this process occurs silently. For accounts that are not domain-joined, AWS Tools for PowerShell prompts users to enter their credentials before they can reauthenticate.
AWS Tools for PowerShell User Guide

How to Use the PowerShell SAML Configuration Cmdlets

AWS Tools for PowerShell includes two new cmdlets that provide SAML support.

- **Set-AWSSamlEndpoint** configures your AD FS endpoint, assigns a friendly name to the endpoint, and optionally describes the authentication type of the endpoint.

- **Set-AWSSamlRoleProfile** creates or edits a user account profile that you want to associate with an AD FS endpoint, identified by specifying the friendly name you provided to the `Set-AWSSamlEndpoint` cmdlet. Each role profile maps to a single role that a user is authorized to perform.

Just as with AWS credential profiles, you assign a friendly name to the role profile. You can use the same friendly name with the `Set-AWSCredential` cmdlet, or as the value of the `-ProfileName` parameter for any cmdlet that invokes AWS service APIs.

Open a new AWS Tools for PowerShell session. If you are running PowerShell 3.0 or newer, the AWS Tools for PowerShell module is automatically imported when you run any of its cmdlets. If you are running PowerShell 2.0, you must import the module manually by running the `Import-Module` cmdlet, as shown in the following example.

```
PS > Import-Module "C:\Program Files (x86)\AWS Tools\PowerShell\AWSPowerShell\AWSPowerShell.psd1"
```

### How to Run the Set-AWSSamlEndpoint and Set-AWSSamlRoleProfile Cmdlets

1. First, configure the endpoint settings for the AD FS system. The simplest way to do this is to store the endpoint in a variable, as shown in this step. Be sure to replace the placeholder account IDs and AD FS host name with your own account IDs and AD FS host name. Specify the AD FS host name in the `Endpoint` parameter.

```powershell
PS > $endpoint = "https://adfs.example.com/adfs/ls/IdpInitiatedSignOn.aspx?
loginToRp=urn:amazon:webservices"
```

2. To create the endpoint settings, run the `Set-AWSSamlEndpoint` cmdlet, specifying the correct value for the `AuthenticationType` parameter. Valid values include `Basic`, `Digest`, `Kerberos`, `Negotiate`, and `NTLM`. If you do not specify this parameter, the default value is `Kerberos`.

```powershell
PS > $epName = Set-AWSSamlEndpoint -Endpoint $endpoint -StoreAs ADFS-Demo -
AuthenticationType NTLM
```

The cmdlet returns the friendly name you assigned by using the `-StoreAs` parameter, so you can use it when you run `Set-AWSSamlRoleProfile` in the next line.

3. Now, run the `Set-AWSSamlRoleProfile` cmdlet to authenticate with the AD FS identity provider and get the set of roles (in the SAML assertion) that the user is authorized to perform.

The `Set-AWSSamlRoleProfile` cmdlet uses the returned set of roles to either prompt the user to select a role to associate with the specified profile, or validate that role data provided in parameters is present (if not, the user is prompted to choose). If the user is authorized for only one role, the cmdlet associates the role with the profile automatically, without prompting the user. There is no need to provide a credential to set up a profile for domain-joined usage.
PS > Set-AWSSamlRoleProfile -StoreAs SAMLDemoProfile -EndpointName $epName

Alternatively, for non-domain-joined accounts, you can provide Active Directory credentials, and then select an AWS role to which the user has access, as shown in the following line. This is useful if you have different Active Directory user accounts to differentiate roles within your organization (for example, administration functions).

PS > $credential = Get-Credential -Message "Enter the domain credentials for the endpoint"
PS > Set-AWSSamlRoleProfile -EndpointName $epName -NetworkCredential $credential -StoreAs SAMLDemoProfile

4. In either case, the Set-AWSSamlRoleProfile cmdlet prompts you to choose which role should be stored in the profile. The following example shows two available roles: ADFS-Dev, and ADFS-Production. The IAM roles are associated with your AD login credentials by the AD FS administrator.

Select Role
Select the role to be assumed when this profile is active

Alternatively, you can specify a role without the prompt, by entering the RoleARN, PrincipalARN, and optional NetworkCredential parameters. If the specified role is not listed in the assertion returned by authentication, the user is prompted to choose from available roles.

PS > $params = @(
    "NetworkCredential"=$credential,
    "PrincipalARN"="(arn:aws:iam::012345678912:saml-provider/ADFS)",
    "RoleARN"="(arn:aws:iam::012345678912:role/ADFS-Dev)"
)
PS > $epName | Set-AWSSamlRoleProfile $params -StoreAs SAMLDemoProfile1 -Verbose

5. You can create profiles for all roles in a single command by adding the StoreAllRoles parameter, as shown in the following code. Note that the role name is used as the profile name.

PS > Set-AWSSamlRoleProfile -EndpointName $epName -StoreAllRoles
ADFS-Dev
ADFS-Production

How to Use Role Profiles to Run Cmdlets that Require AWS Credentials

To run cmdlets that require AWS credentials, you can use role profiles defined in the AWS shared credential file. Provide the name of a role profile to Set-AWSCredential (or as the value for any ProfileName parameter in the AWS Tools for PowerShell) to get temporary AWS credentials automatically for the role that is described in the profile.

Although you use only one role profile at a time, you can switch between profiles within a shell session. The Set-AWSCredential cmdlet does not authenticate and get credentials when you run it by itself; the cmdlet records that you want to use a specified role profile. Until you run a cmdlet that requires AWS credentials, no authentication or request for credentials occurs.

You can now use the temporary AWS credentials that you obtained with the SAMLDemoProfile profile to work with AWS service APIs. The following sections show examples of how to use role profiles.
Example 1: Set a Default Role with Set-AWSCredential

This example sets a default role for an AWS Tools for PowerShell session by using Set-AWSCredential. Then, you can run cmdlets that require credentials, and are authorized by the specified role. This example lists all Amazon Elastic Compute Cloud instances in the US West (Oregon) Region that are associated with the profile you specified with the Set-AWSCredential cmdlet.

```
PS > Set-AWSCredential -ProfileName SAMLDemoProfile
PS > Get-EC2Instance -Region us-west-2 | Format-Table -Property Instances,GroupNames

<table>
<thead>
<tr>
<th>Instances</th>
<th>GroupNames</th>
</tr>
</thead>
<tbody>
<tr>
<td>TestInstance1</td>
<td>{default}</td>
</tr>
<tr>
<td>TestInstance2</td>
<td>{}</td>
</tr>
<tr>
<td>TestInstance3</td>
<td>{launch-wizard-6}</td>
</tr>
<tr>
<td>TestInstance4</td>
<td>{default}</td>
</tr>
<tr>
<td>TestInstance5</td>
<td>{}</td>
</tr>
<tr>
<td>TestInstance6</td>
<td>{AWS-OpsWorks-Default-Server}</td>
</tr>
</tbody>
</table>
```

Example 2: Change Role Profiles During a PowerShell Session

This example lists all available Amazon S3 buckets in the AWS account of the role associated with the SAMLDemoProfile profile. The example shows that although you might have been using another profile earlier in your AWS Tools for PowerShell session, you can change profiles by specifying a different value for the -ProfileName parameter with cmdlets that support it. This is a common task for administrators who manage Amazon S3 from the PowerShell command line.

```
PS > Get-S3Bucket -ProfileName SAMLDemoProfile

<table>
<thead>
<tr>
<th>CreationDate</th>
<th>BucketName</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/25/2013 3:16:56 AM</td>
<td>mybucket1</td>
</tr>
<tr>
<td>4/15/2015 12:46:50 AM</td>
<td>mybucket2</td>
</tr>
<tr>
<td>4/15/2015 6:15:53 AM</td>
<td>mybucket3</td>
</tr>
<tr>
<td>1/12/2015 11:20:16 PM</td>
<td>mybucket4</td>
</tr>
</tbody>
</table>
```

Note that the Get-S3Bucket cmdlet specifies the name of the profile created by running the Set-AWSsamlRoleProfile cmdlet. This command could be useful if you had set a role profile earlier in your session (for example, by running the Set-AWSCredential cmdlet) and wanted to use a different role profile for the Get-S3Bucket cmdlet. The profile manager makes temporary credentials available to the Get-S3Bucket cmdlet. Although the credentials expire after 1 hour (a limit enforced by STS), AWS Tools for PowerShell automatically refreshes the credentials by requesting a new SAML assertion when the tool detects that the current credentials have expired.

For domain-joined users, this process occurs without interruption, because the current user's Windows identity is used during authentication. For non-domain-joined user accounts, AWS Tools for PowerShell shows a PowerShell credential prompt requesting the user password. The user provides credentials that are used to reauthenticate the user and get a new assertion.

Example 3: Get Instances in a Region

The following example lists all Amazon EC2 instances in the Asia Pacific (Sydney) Region that are associated with the account used by the ADFS-Production profile. This is a useful command for returning all Amazon EC2 instances in a region.
Additional Reading

For general information about how to implement federated API access, see How to Implement a General Solution for Federated API/CLI Access Using SAML 2.0.

For support questions or comments, visit the AWS Developer Forums for PowerShell Scripting or .NET Development.

Cmdlet discovery and aliases

This section shows you how to list services that are supported by the AWS Tools for PowerShell, how to show the set of cmdlets provided by the AWS Tools for PowerShell in support of those services, and how to find alternative cmdlet names (also called aliases) to access those services.

Cmdlet Discovery

All AWS service operations (or APIs) are documented in the API Reference Guide for each service. For example, see the IAM API Reference. There is, in most cases, a one-to-one correspondence between an AWS service API and an AWS PowerShell cmdlet. To get the cmdlet name that corresponds to an AWS service API name, run the AWS Get-AWSCmdletName cmdlet with the -ApiOperation parameter and the AWS service API name. For example, to get all possible cmdlet names that are based on any available DescribeInstances AWS service API, run the following command:

```
PS > Get-AWSCmdletName -ApiOperation DescribeInstances
```

The -ApiOperation parameter is the default parameter, so you can omit the parameter name. The following example is equivalent to the previous one:

```
PS > Get-AWSCmdletName DescribeInstances
```

If you know the names of both the API and the service, you can include the -Service parameter along with either the cmdlet noun prefix or part of the AWS service name. For example, the cmdlet noun prefix for Amazon EC2 is EC2. To get the cmdlet name that corresponds to the DescribeInstances API in the Amazon EC2 service, run one of the following commands. They are all result in the same output:
AWS Tools for PowerShell User Guide
Cmdlet Discovery

PS > Get-AWSCmdletName -ApiOperation DescribeInstances -Service EC2
PS > Get-AWSCmdletName -ApiOperation DescribeInstances -Service Compute
PS > Get-AWSCmdletName -ApiOperation DescribeInstances -Service "Compute Cloud"

<table>
<thead>
<tr>
<th>CmdletName</th>
<th>ServiceOperation</th>
<th>ServiceName</th>
<th>CmdletNounPrefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get-EC2Instance</td>
<td>DescribeInstances</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
</tbody>
</table>

Parameter values in these commands are case-insensitive.

If you do not know the name of either the desired AWS service API or the AWS service, you can use the -ApiOperation parameter, along with the pattern to match, and the -MatchWithRegex parameter. For example, to get all available cmdlet names that contain SecurityGroup, run the following command:

PS > Get-AWSCmdletName -ApiOperation SecurityGroup -MatchWithRegex

<table>
<thead>
<tr>
<th>CmdletName</th>
<th>ServiceOperation</th>
<th>ServiceName</th>
<th>CmdletNounPrefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approve-ECCacheSecurityGroupIngress</td>
<td>AuthorizeCacheSecurityGroupIngress</td>
<td>Amazon ElastiCache</td>
<td>EC</td>
</tr>
<tr>
<td>Get-ECCacheSecurityGroup</td>
<td>DescribeCacheSecurityGroups</td>
<td>Amazon ElastiCache</td>
<td>EC</td>
</tr>
<tr>
<td>New-ECCacheSecurityGroup</td>
<td>CreateCacheSecurityGroup</td>
<td>Amazon ElastiCache</td>
<td>EC</td>
</tr>
<tr>
<td>Remove-ECCacheSecurityGroup</td>
<td>DeleteCacheSecurityGroup</td>
<td>Amazon ElastiCache</td>
<td>EC</td>
</tr>
<tr>
<td>Revoke-ECCacheSecurityGroupIngress</td>
<td>RevokeCacheSecurityGroupIngress</td>
<td>Amazon ElastiCache</td>
<td>EC</td>
</tr>
<tr>
<td>Add-EC2SecurityGroupToClientVpnTargetNetwork</td>
<td>ApplySecurityGroupsToClientVpnTargetNetwork</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>Get-EC2SecurityGroup</td>
<td>DescribeSecurityGroups</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>Get-EC2SecurityGroupReference</td>
<td>DescribeSecurityGroupReferences</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>Get-EC2StaleSecurityGroup</td>
<td>DescribeStaleSecurityGroups</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>Grant-EC2SecurityGroupEgress</td>
<td>AuthorizeSecurityGroupEgress</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>New-EC2SecurityGroup</td>
<td>CreateSecurityGroup</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>Remove-EC2SecurityGroup</td>
<td>DeleteSecurityGroup</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>Revoke-EC2SecurityGroupEgress</td>
<td>RevokeSecurityGroupEgress</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>Revoke-EC2SecurityGroupIngress</td>
<td>RevokeSecurityGroupIngress</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>Update-EC2SecurityGroupRuleEgressDescription</td>
<td>UpdateSecurityGroupRuleDescriptionsEgress</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>Update-EC2SecurityGroupRuleIngressDescription</td>
<td>UpdateSecurityGroupRuleDescriptionsIngress</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>Edit-EFSMountTargetSecurityGroup</td>
<td>ModifyMountTargetSecurityGroups</td>
<td>Amazon Elastic File System</td>
<td>EFS</td>
</tr>
<tr>
<td>Get-EFSMountTargetSecurityGroup</td>
<td>DescribeMountTargetSecurityGroups</td>
<td>Amazon Elastic File System</td>
<td>EFS</td>
</tr>
<tr>
<td>Join-ELBSecurityGroupToLoadBalancer</td>
<td>ApplySecurityGroupsToLoadBalancer</td>
<td>Elastic Load Balancing</td>
<td>ELB</td>
</tr>
<tr>
<td>Set-ELBSecurityGroup</td>
<td>SetSecurityGroups</td>
<td>Elastic Load Balancing V2</td>
<td>ELB2</td>
</tr>
<tr>
<td>Enable-RDSDBSecurityGroupIngress</td>
<td>AuthorizeDBSecurityGroupIngress</td>
<td>Amazon Relational Database Service</td>
<td>RDS</td>
</tr>
</tbody>
</table>

32
If you know the name of the AWS service but not the AWS service API, include both the -MatchWithRegex parameter and the -Service parameter to scope the search down to a single service. For example, to get all cmdlet names that contain SecurityGroup in only the Amazon EC2 service, run the following command:

```powershell
PS > Get-AWSCmdletName -ApiOperation SecurityGroup -MatchWithRegex -Service EC2
```

If you know the name of the AWS Command Line Interface (AWS CLI) command, you can use the -AwsCliCommand parameter and the desired AWS CLI command name to get the name of the cmdlet that's based on the same API. For example, to get the cmdlet name that corresponds to the authorize-security-group-ingress AWS CLI command call in the Amazon EC2 service, run the following command:

```powershell
PS > Get-AWSCmdletName -AwsCliCommand "aws ec2 authorize-security-group-ingress"
```
The Get-AWSCmdletName cmdlet needs only enough of the AWS CLI command name to identify the service and the AWS API.

To get a list of all of the cmdlets in the Tools for PowerShell Core, run the PowerShell Get-Command cmdlet, as shown in the following example.

```
PS > Get-Command -Module AWSPowerShell.NetCore
```

You can run the same command with -Module AWSPowerShell to see the cmdlets in the AWS Tools for Windows PowerShell.

The Get-Command cmdlet generates the list of cmdlets in alphabetical order. Note that by default the list is sorted by PowerShell verb, rather than PowerShell noun.

To sort results by service instead, run the following command:

```
PS > Get-Command -Module AWSPowerShell.NetCore | Sort-Object Noun,Verb
```

To filter the cmdlets that are returned by the Get-Command cmdlet, pipe the output to the PowerShell Select-String cmdlet. For example, to view the set of cmdlets that work with AWS regions, run the following command:

```
PS > Get-Command -Module AWSPowerShell.NetCore | Select-String region
```

You can also find cmdlets for a specific service by filtering for the service prefix of cmdlet nouns. To see the list of available service prefixes, run Get-AWSPowerShellVersion -ListServiceVersionInfo. The following example returns cmdlets that support the Amazon CloudWatch Events service.

```
PS > Get-Command -Module AWSPowerShell.NetCore -Noun CWE*
```

<table>
<thead>
<tr>
<th>CommandType</th>
<th>Name</th>
<th>Version</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cmdlet</td>
<td>Add-CWEResourceTag</td>
<td>3.3.563.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AWSPowerShell.NetCore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cmdlet</td>
<td>Disable-CWEEventSource</td>
<td>3.3.563.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AWSPowerShell.NetCore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cmdlet</td>
<td>Disable-CWERule</td>
<td>3.3.563.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AWSPowerShell.NetCore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cmdlet</td>
<td>Enable-CWEEventSource</td>
<td>3.3.563.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AWSPowerShell.NetCore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cmdlet</td>
<td>Enable-CWERule</td>
<td>3.3.563.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AWSPowerShell.NetCore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cmdlet</td>
<td>Get-CWEEventBus</td>
<td>3.3.563.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AWSPowerShell.NetCore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cmdlet Naming and Aliases

The cmdlets in the AWS Tools for PowerShell for each service are based on the methods provided by the AWS SDK for the service. However, because of PowerShell's mandatory naming conventions, the name of a cmdlet might be different from the name of the API call or method on which it is based. For example, the `Get-EC2Instance` cmdlet is based on the Amazon EC2 `DescribeInstances` method.

In some cases, the cmdlet name may be similar to a method name, but it may actually perform a different function. For example, the Amazon S3 `GetObject` method retrieves an Amazon S3 object. However, the `Get-S3Object` cmdlet returns information about an Amazon S3 object rather than the object itself.
To get an S3 object with the AWS Tools for PowerShell, run the `Read-S3Object` cmdlet:

```powershell
PS > Read-S3Object -BucketName text-content -Key text-object.txt -file c:\tmp\text-object-download.txt
```

<table>
<thead>
<tr>
<th>Mode</th>
<th>LastWriteTime</th>
<th>Length</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>-a-----</td>
<td>11/5/2012 7:29 PM</td>
<td>20622</td>
<td>text-object-download.txt</td>
</tr>
</tbody>
</table>

**Note**

The cmdlet help for an AWS cmdlet provides the name of the AWS SDK API on which the cmdlet is based.

For more information about standard PowerShell verbs and their meanings, see [Approved Verbs for PowerShell Commands](#).

All AWS cmdlets that use the Remove verb – and the `Stop-EC2Instance` cmdlet when you add the `-Terminate` parameter – prompt for confirmation before proceeding. To bypass confirmation, add the `-Force` parameter to your command.

**Important**

AWS cmdlets do not support the `-WhatIf` switch.

## Aliases

Setup of the AWS Tools for PowerShell installs an aliases file that contains aliases for many of the AWS cmdlets. You might find these aliases to be more intuitive than the cmdlet names. For example, service names and AWS SDK method names replace PowerShell verbs and nouns in some aliases. An example is the `EC2-DescribeInstances` alias.

Other aliases use verbs that, though they do not follow standard PowerShell conventions, can be more descriptive of the actual operation. For example, the alias file maps the alias `Get-S3Content` to the cmdlet `Read-S3Object`.

```powershell
PS > Set-Alias -Name Get-S3Content -Value Read-S3Object
```

The aliases file is located in the AWS Tools for PowerShell installation directory. To load the aliases into your environment, `dot-source` the file. The following is a Windows-based example.

```powershell
PS > "C:\Program Files (x86)\AWS Tools\PowerShell\AWSPowershell\AWSAliases.ps1"
```

For a Linux or macOS shell, it might look like this:

```bash
. ~/.local/share/powershell/Modules/AWSPowerShell.NetCore/3.3.563.1/AWSAliases.ps1
```

To show all AWS Tools for PowerShell aliases, run the following command. This command uses the `?` alias for the PowerShell `Where-Object` cmdlet and the `Source` property to filter for only aliases that come from the `AWSPowerShell.NetCore` module.
To add your own aliases to this file, you might need to raise the value of PowerShell's `$MaximumAliasCount` preference variable to a value greater than 5500. The default value is 4096; you can raise it to a maximum of 32768. To do this, run the following.

```powershell
PS > $MaximumAliasCount = 32768
```

To verify that your change was successful, enter the variable name to show its current value.

```powershell
PS > $MaximumAliasCount
32768
```

### Pipelining and $AWSHistory

For AWS service calls that return collections, the objects within the collection are enumerated to the pipeline. Result objects that contain additional fields beyond the collection and which are not paging control fields have these fields added as Note properties for the calls. These Note properties are logged.
in the new $AWSHistory session variable, should you need to access this data. The $AWSHistory variable is described in the next section.

**Note**

In versions of the Tools for Windows PowerShell prior to v1.1, the collection object itself was emitted, which required the use of foreach {$_-getenumerator()} to continue pipelining.

**Examples**

The following example returns a list of AWS Regions and your Amazon EC2 machine images (AMIs) in each Region.

```powershell
PS > Get-AWSRegion | % { Echo $_.Name; Get-EC2Image -Owner self -Region $_ }
```

The following example stops all Amazon EC2 instances in the current default region.

```powershell
PS > Get-EC2Instance | Stop-EC2Instance
```

Because collections enumerate to the pipeline, the output from a given cmdlet might be $null, a single object, or a collection. If it is a collection, you can use the .Count property to determine the size of the collection. However, the .Count property is not present when only a single object is emitted. If your script needs to determine, in a consistent way, how many objects were emitted, you can check the EmittedObjectsCount property of the last command value in $AWSHistory.

**$AWSHistory**

To better support pipelining, output from AWS cmdlets is not reshaped to include the service response and result instances as Note properties on the emitted collection object. Instead, for those calls that emit a single collection as output, the collection is now enumerated to the PowerShell pipeline. This means that the AWS SDK response and result data cannot exist in the pipe, because there is no containing collection object to which it can be attached.

Although most users probably won't need this data, it can be useful for diagnostic purposes, because you can see exactly what was sent to and received from the underlying AWS service calls made by the cmdlet.

Starting with version 1.1, this data and more is now available in a new shell variable named $AWSHistory. This variable maintains a record of AWS cmdlet invocations and the service responses that were received for each invocation. Optionally, this history can be configured to also record the service requests that each cmdlet made. Additional useful data, such as the overall execution time of the cmdlet, can also be obtained from each entry. For security reasons, requests and responses that contain sensitive data aren't recorded by default. However, the history can be configured to override this behavior if needed. For more information, see the Set-AWSHistoryConfiguration cmdlet shown below.

Each entry in the $AWSHistory.Commands list is of type AWSCmdletHistory. This type has the following useful members:

- **CmdletName**
  - Name of the cmdlet.
- **CmdletStart**
  - DateTime that the cmdlet was run.
- **CmdletEnd**
  - DateTime that the cmdlet finished all processing.
- **Requests**
  - If request recording is enabled, list of last service requests.
Responses

List of last service responses received.

LastServiceResponse

Helper to return the most recent service response.

LastServiceRequest

Helper to return the most recent service request, if available.

Note that the $AWSHistory variable is not created until an AWS cmdlet making a service call is used. It evaluates to $null until that time.

Note

Earlier versions of the Tools for Windows PowerShell emitted data related to service responses as Note properties on the returned object. These are now found on the response entries that are recorded for each invocation in the list.

Set-AWSHistoryConfiguration

A cmdlet invocation can hold zero or more service request and response entries. To limit memory impact, the $AWSHistory list keeps a record of only the last five cmdlet executions by default; and for each, the last five service responses (and if enabled, last five service requests). You can change these default limits by running the Set-AWSHistoryConfiguration cmdlet. It allows you to both control the size of the list, and whether service requests are also logged:

```
Set-AWSHistoryConfiguration -MaxCmdletHistory <value> -MaxServiceCallHistory <value> -RecordServiceRequests -IncludeSensitiveData
```

All parameters are optional.

The MaxCmdletHistory parameter sets the maximum number of cmdlets that can be tracked at any time. A value of 0 turns off recording of AWS cmdlet activity. The MaxServiceCallHistory parameter sets the maximum number of service responses (and/or requests) that are tracked for each cmdlet. The RecordServiceRequests parameter, if specified, turns on tracking of service requests for each cmdlet. The IncludeSensitiveData parameter, if specified, turns on tracking of service responses and requests (if tracked) that contain sensitive data for each cmdlet.

If run with no parameters, Set-AWSHistoryConfiguration simply turns off any prior request recording, leaving the current list sizes unchanged.

To clear all entries in the current history list, run the Clear-AWSHistory cmdlet.

$AWSHistory Examples

Enumerate the details of the AWS cmdlets that are being held in the list to the pipeline.

```
$AWSHistory.Commands
```

Access the details of the last AWS cmdlet that was run:

```
$AWSHistory.LastCommand
```

Access the details of the last service response received by the last AWS cmdlet that was run. If an AWS cmdlet is paging output, it may make multiple service calls to obtain either all data or the maximum amount of data (determined by parameters on the cmdlet).
Automobile Page-to-Completion for Operations that Return Multiple Pages

For service APIs that impose a default maximum object return count for a given call or that support pageable result sets, all cmdlets "page-to-completion" by default. Each cmdlet makes as many calls as necessary on your behalf to return the complete data set to the pipeline.

In the following example, which uses Get-S3Object, the $c variable contains S3Object instances for every key in the bucket test, potentially a very large data set.

```powershell
PS > $c = Get-S3Object -BucketName test
```

If you want to retain control of the amount of data returned, you can use parameters on the individual cmdlets (for example, MaxKey on Get-S3Object) or you can explicitly handle paging yourself by using a combination of paging parameters on the cmdlets, and data placed in the $AWSHistory variable to get the service's next token data. The following example uses the MaxKeys parameter to limit the number of S3Object instances returned to no more than the first 500 found in the bucket.

```powershell
PS > $c = Get-S3Object -BucketName test -MaxKey 500
```

To know if more data was available but not returned, use the $AWSHistory session variable entry that recorded the service calls made by the cmdlet.

If the following expression evaluates to $true, you can find the next marker for the next set of results using $AWSHistory.LastServiceResponse.NextMarker:

```powershell
$AWSHistory.LastServiceResponse -ne $null & $AWSHistory.LastServiceResponse.IsTruncated
```

To manually control paging with Get-S3Object, use a combination of the MaxKey and Marker parameters for the cmdlet and the IsTruncated/NextMarker notes on the last recorded response. In the following example, the variable $c contains up to a maximum of 500 S3Object instances for the next 500 objects that are found in the bucket after the start of the specified key prefix marker.

```powershell
PS > $c = Get-S3Object -BucketName test -MaxKey 500 -Marker $AWSHistory.LastServiceResponse.NextMarker
```

Credential and profile resolution

Credentials Search Order

When you run a command, AWS Tools for PowerShell searches for credentials in the following order. It stops when it finds usable credentials.
1. Literal credentials that are embedded as parameters in the command line.

   We strongly recommend using profiles instead of putting literal credentials in your command lines.

2. A specified profile name or profile location.
   - If you specify only a profile name, the command looks for the specified profile in the AWS SDK store
     and, if that does not exist, the specified profile from the AWS shared credentials file in the default
     location.
   - If you specify only a profile location, the command looks for the default profile from that
     credentials file.
   - If you specify both a name and a location, the command looks for the specified profile in that
     credentials file.

   If the specified profile or location is not found, the command throws an exception. Search proceeds to
   the following steps only if you did not specify a profile or location.

3. Credentials specified by the `-Credential` parameter.

4. The session profile, if one exists.

5. The default profile, in the following order:
   a. The default profile in the AWS SDK store.
   b. The default profile in the AWS shared credentials file.
   c. The AWS PS Default profile in the AWS SDK store.

6. If the command is running on an Amazon EC2 instance that is configured to use an IAM role, the EC2
   instance's temporary credentials accessed from the instance profile.

   For more information about using IAM roles for Amazon EC2 instances, see the AWS SDK for .NET.

If this search fails to locate the specified credentials, the command throws an exception.

Additional information about users and roles

In order to run Tools for PowerShell commands on AWS, you need to have some combination of users,
permission sets, and service roles that are appropriate for your tasks.

The specific users, permission sets, and service roles that you create, and the way in which you use them,
will depend on your requirements. The following is some additional information about why they might
be used and how to create them.

Users and permission sets

Although it's possible to use an IAM user account with long-term credentials to access AWS services,
this is no longer a best practice and should be avoided. Even during development, it is a best practice to
create users and permission sets in AWS IAM Identity Center and use temporary credentials provided by
an identity source.

For development, you can use the user that you created or were given in Configure tool
authentication (p. 21). If you have appropriate AWS Management Console permissions, you can also
create different permission sets with least privilege for that user or create new users specifically for
development projects, providing permission sets with least privilege. The course of action you choose, if
any, depends on your circumstances.

For more information about these users and permissions sets and how to create them, see
Authentication and access in the AWS SDKs and Tools Reference Guide and Getting started in the AWS
IAM Identity Center User Guide.
Service roles

You can set up an AWS service role to access AWS services on behalf of users. This type of access is appropriate if multiple people will be running your application remotely; for example, on an Amazon EC2 instance that you have created for this purpose.

The process for creating a service role varies depending on the situation, but is essentially the following.

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose Roles, and then choose Create role.
3. Choose AWS service, find and select EC2 (for example), and then choose the EC2 use case (for example).
4. Choose Next and select the appropriate policies for the AWS services that your application will use. 
   Warning
   Do NOT choose the AdministratorAccess policy because that policy enables read and write permissions to almost everything in your account.
5. Choose Next. Enter a Role name, Description, and any tags you want.
   You can find information about tags in Controlling access using AWS resource tags in the IAM User Guide.
6. Choose Create role.

You can find high-level information about IAM roles in IAM Identities (users, user groups, and roles) in the IAM User Guide. Find detailed information about roles in the IAM roles topic.

Using legacy credentials

The topics in this section provide information about using long-term or short-term credentials without using AWS IAM Identity Center.

Warning
To avoid security risks, don’t use IAM users for authentication when developing purpose-built software or working with real data. Instead, use federation with an identity provider such as AWS IAM Identity Center.

Note
The information in these topics is for circumstances where you need to obtain and manage short-term or long-term credentials manually. For additional information about short-term and long-term credentials, see Other ways to authenticate in the AWS SDKs and Tools Reference Guide.
For best security practices, use AWS IAM Identity Center, as described in Configure tool authentication (p. 21).

Important warnings and guidance for credentials

Warnings for credentials

- Do NOT use your account’s root credentials to access AWS resources. These credentials provide unrestricted account access and are difficult to revoke.
- Do NOT put literal access keys or credential information in your commands or scripts. If you do, you create a risk of accidentally exposing your credentials.
- Be aware that any credentials stored in the shared AWS credentials file, are stored in plaintext.
Additional guidance for securely managing credentials

For a general discussion of how to securely manage AWS credentials, see AWS security credentials in the AWS General Reference and Security best practices and use cases in the IAM User Guide. In addition to those discussions, consider the following:

- Create additional users, such as users in IAM Identity Center, and use their credentials instead of using your AWS root user credentials. Credentials for other users can be revoked if necessary or are temporary by nature. In addition, you can apply a policy to each user for access to only certain resources and actions and thereby take a stance of least-privilege permissions.

- Use IAM roles for tasks for Amazon Elastic Container Service (Amazon ECS) tasks.

- Use IAM roles (p. 49) for applications that are running on Amazon EC2 instances.

Topics
- Using AWS Credentials (p. 43)
- Shared Credentials in AWS Tools for PowerShell (p. 49)

Using AWS Credentials

Each AWS Tools for PowerShell command must include a set of AWS credentials, which are used to cryptographically sign the corresponding web service request. You can specify credentials per command, per session, or for all sessions.

Warning
To avoid security risks, don’t use IAM users for authentication when developing purpose-built software or working with real data. Instead, use federation with an identity provider such as AWS IAM Identity Center.

Note
The information in this topic is for circumstances where you need to obtain and manage short-term or long-term credentials manually. For additional information about short-term and long-term credentials, see Other ways to authenticate in the AWS SDKs and Tools Reference Guide. For best security practices, use AWS IAM Identity Center, as described in Configure tool authentication (p. 21).

As a best practice, to avoid exposing your credentials, do not put literal credentials in a command. Instead, create a profile for each set of credentials that you want to use, and store the profile in either of two credential stores. Specify the correct profile by name in your command, and the AWS Tools for PowerShell retrieves the associated credentials. For a general discussion of how to safely manage AWS credentials, see Best Practices for Managing AWS Access Keys in the Amazon Web Services General Reference.

Note
You need an AWS account to get credentials and use the AWS Tools for PowerShell. To create an AWS account, see Getting started: Are you a first-time AWS user? in the AWS Account Management Reference Guide.

Topics
- Credentials Store Locations (p. 44)
- Managing Profiles (p. 44)
- Specifying Credentials (p. 45)
- Credentials Search Order (p. 47)
• **Credential Handling in AWS Tools for PowerShell Core (p. 48)**

### Credentials Store Locations

The AWS Tools for PowerShell can use either of two credentials stores:

- The AWS SDK store, which encrypts your credentials and stores them in your home folder. In Windows, this store is located at: `C:\Users\username\AppData\Local\AWSToolkit\RegisteredAccounts.json`.

  The [AWS SDK for .NET](https://aws.amazon.com/sdk-for-net/) and [Toolkit for Visual Studio](https://aws.amazon.com/visualstudio/) can also use the AWS SDK store.

- The shared credentials file, which is also located in your home folder, but stores credentials as plain text.

  By default, the credentials file is stored here:
  - On Windows: `C:\Users\username\.aws\credentials`
  - On Mac/Linux: `~/.aws/credentials`

  The AWS SDKs and the AWS Command Line Interface can also use the credentials file. If you're running a script outside of your AWS user context, be sure that the file that contains your credentials is copied to a location where all user accounts (local system and user) can access your credentials.

### Managing Profiles

Profiles enable you to reference different sets of credentials with AWS Tools for PowerShell. You can use AWS Tools for PowerShell cmdlets to manage your profiles in the AWS SDK store. You can also manage profiles in the AWS SDK store by using the [Toolkit for Visual Studio](https://aws.amazon.com/visualstudio/) or programmatically by using the [AWS SDK for .NET](https://aws.amazon.com/sdk-for-net/). For directions about how to manage profiles in the credentials file, see [Best Practices for Managing AWS Access Keys](#).

#### Add a New profile

To add a new profile to the AWS SDK store, run the command `Set-AWSCredential`. It stores your access key and secret key in your default credentials file under the profile name you specify.

```
PS > Set-AWSCredential `  
    -AccessKey AKIA012345678EXAMPLE `  
    -SecretKey wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY `  
    -StoreAs MyNewProfile
```

- `-AccessKey`– The access key ID.
- `-SecretKey`– The secret key.
- `-StoreAs`– The profile name, which must be unique. To specify the default profile, use the name `default`.

#### Update a Profile

The AWS SDK store must be maintained manually. If you later change credentials on the service—for example, by using the [IAM console](https)—running a command with the locally stored credentials fails with the following error message:

The Access Key Id you provided does not exist in our records.
You can update a profile by repeating the `Set-AWSCredential` command for the profile, and passing it the new access and secret keys.

**List Profiles**

You can check the current list of names with the following command. In this example, a user named Shirley has access to three profiles that are all stored in the shared credentials file (`~/.aws/credentials`).

```
PS > Get-AWSCredential -ListProfileDetail

<table>
<thead>
<tr>
<th>ProfileName</th>
<th>StoreTypeName</th>
<th>ProfileLocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>default</td>
<td>SharedCredentialsFile</td>
<td>/Users/shirley/.aws/credentials</td>
</tr>
<tr>
<td>production</td>
<td>SharedCredentialsFile</td>
<td>/Users/shirley/.aws/credentials</td>
</tr>
<tr>
<td>test</td>
<td>SharedCredentialsFile</td>
<td>/Users/shirley/.aws/credentials</td>
</tr>
</tbody>
</table>
```

**Remove a Profile**

To remove a profile that you no longer require, use the following command.

```
PS > Remove-AWSCredentialProfile -ProfileName an-old-profile-I-do-not-need
```

The `-ProfileName` parameter specifies the profile that you want to delete.

The deprecated command `Clear-AWSCredential` is still available for backward compatibility, but `Remove-AWSCredentialProfile` is preferred.

**Specifying Credentials**

There are several ways to specify credentials. The preferred way is to identify a profile instead of incorporating literal credentials into your command line. AWS Tools for PowerShell locates the profile using a search order that is described in `Credentials Search Order (p. 47)`.

On Windows, AWS credentials stored in the AWS SDK store are encrypted with the logged-in Windows user identity. They cannot be decrypted by using another account, or used on a device that's different from the one on which they were originally created. To perform tasks that require the credentials of another user, such as a user account under which a scheduled task will run, set up a credential profile, as described in the preceding section, that you can use when you log in to the computer as that user. Log in as the task-performing user to complete the credential setup steps, and create a profile that works for that user. Then log out and log in again with your own credentials to set up the scheduled task.

**Note**

Use the `-ProfileName` common parameter to specify a profile. This parameter is equivalent to the `-StoredCredentials` parameter in earlier AWS Tools for PowerShell releases. For backward compatibility, `-StoredCredentials` is still supported.

**Default Profile (Recommended)**

All AWS SDKs and management tools can find your credentials automatically on your local computer if the credentials are stored in a profile named default. For example, if you have a profile named default on the local computer, you don't have to run either the `Initialize-AWSDefaultConfiguration` cmdlet or the `Set-AWSCredential` cmdlet. The tools automatically use the access and secret key data stored in that profile. To use an AWS Region other than your default Region (the results of `Get-DefaultAWSRegion`), you can run `Set-DefaultAWSRegion` and specify a Region.
If your profile is not named default, but you want to use it as the default profile for the current session, run `Set-AWSCredential` to set it as the default profile.

Although running `Initialize-AWSDefaultConfiguration` lets you specify a default profile for every PowerShell session, the cmdlet loads credentials from your custom-named profile, but overwrites the default profile with the named profile.

We recommend that you do not run `Initialize-AWSDefaultConfiguration` unless you are running a PowerShell session on an Amazon EC2 instance that was not launched with an instance profile, and you want to set up the credential profile manually. Note that the credential profile in this scenario would not contain credentials. The credential profile that results from running `Initialize-AWSDefaultConfiguration` on an EC2 instance doesn't directly store credentials, but instead points to instance metadata (that provides temporary credentials that automatically rotate). However, it does store the instance's Region. Another scenario that might require running `Initialize-AWSDefaultConfiguration` occurs if you want to run a call against a Region other than the Region in which the instance is running. Running that command permanently overrides the Region stored in the instance metadata.

```powershell
PS > Initialize-AWSDefaultConfiguration -ProfileName MyProfileName -Region us-west-2
```

**Note**
The default credentials are included in the AWS SDK store under the default profile name. The command overwrites any existing profile with that name.

If your EC2 instance was launched with an instance profile, PowerShell automatically gets the AWS credentials and Region information from the instance profile. You don't need to run `Initialize-AWSDefaultConfiguration`. Running the `Initialize-AWSDefaultConfiguration` cmdlet on an EC2 instance launched with an instance profile isn't necessary, because it uses the same instance profile data that PowerShell already uses by default.

**Session Profile**

Use `Set-AWSCredential` to specify a default profile for a particular session. This profile overrides any default profile for the duration of the session. We recommend this if you want to use a custom-named profile in your session instead of the current default profile.

```powershell
PS > Set-AWSCredential -ProfileName MyProfileName
```

**Note**
In versions of the Tools for Windows PowerShell that are earlier than 1.1, the `Set-AWSCredential` cmdlet did not work correctly, and would overwrite the profile specified by 'MyProfileName'. We recommend using a more recent version of the Tools for Windows PowerShell.

**Command Profile**

On individual commands, you can add the `-ProfileName` parameter to specify a profile that applies to only that one command. This profile overrides any default or session profiles, as shown in the following example.

```powershell
PS > Get-EC2Instance -ProfileName MyProfileName
```

**Note**
When you specify a default or session profile, you can also add a `-Region` parameter to override a default or session Region. For more information, see [Specify AWS Regions](p. 23). The following example specifies a default profile and Region.
By default, the AWS shared credentials file is assumed to be in the user's home folder (C:\Users \username\.aws on Windows, or ~/.aws on Linux). To specify a credentials file in a different location, include the -ProfileLocation parameter and specify the credentials file path. The following example specifies a non-default credentials file for a specific command.

```powershell
PS > Initialize-AWSDefaultConfiguration -ProfileName MyProfileName -Region us-west-2
```

**Note**

If you are running a PowerShell script during a time that you are not normally signed in to AWS—for example, you are running a PowerShell script as a scheduled task outside of your normal work hours—add the -ProfileLocation parameter when you specify the profile that you want to use, and set the value to the path of the file that stores your credentials. To be certain that your AWS Tools for PowerShell script runs with the correct account credentials, you should add the -ProfileLocation parameter whenever your script runs in a context or process that does not use an AWS account. You can also copy your credentials file to a location that is accessible to the local system or other account that your scripts use to perform tasks.

### Credentials Search Order

When you run a command, AWS Tools for PowerShell searches for credentials in the following order. It stops when it finds usable credentials.

1. Literal credentials that are embedded as parameters in the command line.

   We strongly recommend using profiles instead of putting literal credentials in your command lines.

2. A specified profile name or profile location.
   - If you specify only a profile name, the command looks for the specified profile in the AWS SDK store and, if that does not exist, the specified profile from the AWS shared credentials file in the default location.
   - If you specify only a profile location, the command looks for the default profile from that credentials file.
   - If you specify both a name and a location, the command looks for the specified profile in that credentials file.

   If the specified profile or location is not found, the command throws an exception. Search proceeds to the following steps only if you did not specify a profile or location.

3. Credentials specified by the -Credential parameter.

4. The session profile, if one exists.

5. The default profile, in the following order:
   - The default profile in the AWS SDK store.
   - The default profile in the AWS shared credentials file.
   - The AWS PS Default profile in the AWS SDK store.

6. If the command is running on an Amazon EC2 instance that is configured to use an IAM role, the EC2 instance's temporary credentials accessed from the instance profile.

   For more information about using IAM roles for Amazon EC2 instances, see the [AWS SDK for .NET](https://docs.aws.amazon.com/sdk-for-net/v3/developer-guide/dg_powershell.html).

If this search fails to locate the specified credentials, the command throws an exception.
Credential Handling in AWS Tools for PowerShell Core

Cmdlets in AWS Tools for PowerShell Core accept AWS access and secret keys or the names of credential profiles when they run, similarly to the AWS Tools for Windows PowerShell. When they run on Windows, both modules have access to the AWS SDK for .NET credential store file (stored in the per-user AppData \Local\AWSToolkit\RegisteredAccounts.json file).

This file stores your keys in encrypted format, and cannot be used on a different computer. It is the first file that the AWS Tools for PowerShell searches for a credential profile, and is also the file where the AWS Tools for PowerShell stores credential profiles. For more information about the AWS SDK for .NET credential store file, see Configuring AWS Credentials. The Tools for Windows PowerShell module does not currently support writing credentials to other files or locations.

Both modules can read profiles from the AWS shared credentials file that is used by other AWS SDKs and the AWS CLI. On Windows, the default location for this file is C:\Users\<userid>\.aws\credentials. On non-Windows platforms, this file is stored at ~/.aws/credentials. The -ProfileLocation parameter can be used to point to a non-default file name or file location.

The SDK credential store holds your credentials in encrypted form by using Windows cryptographic APIs. These APIs are not available on other platforms, so the AWS Tools for PowerShell Core module uses the AWS shared credentials file exclusively, and supports writing new credential profiles to the shared credential file.

The following example scripts that use the Set-AWSCredential cmdlet show the options for handling credential profiles on Windows with either the AWSPowerShell or AWSPowerShell.NetCore modules.

```
# Writes a new (or updates existing) profile with name "myProfileName"
# in the encrypted SDK store file
Set-AWSCredential -AccessKey akey -SecretKey skey -StoreAs myProfileName

# Checks the encrypted SDK credential store for the profile and then
# falls back to the shared credentials file in the default location
Set-AWSCredential -ProfileName myProfileName

# Bypasses the encrypted SDK credential store and attempts to load the
# profile from the ini-format credentials file "mycredentials" in the
# folder C:\MyCustomPath
Set-AWSCredential -ProfileName myProfileName -ProfileLocation C:\MyCustomPath\mycredentials
```

The following examples show the behavior of the AWSPowerShell.NetCore module on the Linux or macOS operating systems.

```
# Writes a new (or updates existing) profile with name "myProfileName"
# in the default shared credentials file ~/.aws/credentials
Set-AWSCredential -AccessKey akey -SecretKey skey -StoreAs myProfileName

# Writes a new (or updates existing) profile with name "myProfileName"
# into an ini-format credentials file "~/.mycustompath/mycredentials"
Set-AWSCredential -AccessKey akey -SecretKey skey -StoreAs myProfileName -ProfileLocation ~/.mycustompath/mycredentials

# Reads the default shared credential file looking for the profile "myProfileName"
Set-AWSCredential -ProfileName myProfileName
```
Shared Credentials in AWS Tools for PowerShell

The Tools for Windows PowerShell support the use of the AWS shared credentials file, similarly to the AWS CLI and other AWS SDKs. The Tools for Windows PowerShell now support reading and writing of basic, session, and assume role credential profiles to both the .NET credentials file and the AWS shared credential file. This functionality is enabled by a new Amazon.Runtime.CredentialManagement namespace.

Warning
To avoid security risks, don’t use IAM users for authentication when developing purpose-built software or working with real data. Instead, use federation with an identity provider such as AWS IAM Identity Center.

Note
The information in this topic is for circumstances where you need to obtain and manage short-term or long-term credentials manually. For additional information about short-term and long-term credentials, see Other ways to authenticate in the AWS SDKs and Tools Reference Guide. For best security practices, use AWS IAM Identity Center, as described in Configure tool authentication (p. 21).

The new profile types and access to the AWS shared credential file are supported by the following parameters that have been added to the credentials-related cmdlets, Initialize-AWSDefaultConfiguration, New-AWSCredential, and Set-AWSCredential. In service cmdlets, you can refer to your profiles by adding the common parameter, -ProfileName.

Using an IAM Role with AWS Tools for PowerShell

The AWS shared credential file enables additional types of access. For example, you can access your AWS resources by using an IAM role instead of the long term credentials of an IAM user. To do this, you must have a standard profile that has permissions to assume the role. When you tell the AWS Tools for PowerShell to use a profile that specified a role, the AWS Tools for PowerShell looks up the profile identified by the SourceProfile parameter. Those credentials are used to request temporary credentials for the role specified by the RoleArn parameter. You can optionally require the use of an multi-factor authentication (MFA) device or an ExternalId code when the role is assumed by a third party.

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ExternalId</td>
<td>The user-defined external ID to be used when assuming a role, if required by the role. This is typically only required when you delegate access to your account to a third party. The third party must include the ExternalId as a parameter when assuming the assigned role. For more information, see How to Use an External ID When Granting Access to Your AWS Resources to a Third Party in the IAM User Guide.</td>
</tr>
<tr>
<td>MfaSerial</td>
<td>The MFA serial number to be used when assuming a role, if required by the role. For more information, see Using Multi-Factor Authentication (MFA) in AWS in the IAM User Guide.</td>
</tr>
</tbody>
</table>
Shared Credentials

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RoleArn</td>
<td>The ARN of the role to assume for assume role credentials. For more information about creating and using roles, see <a href="https://docs.aws.amazon.com/iam/userguide">IAM Roles</a> in the <a href="https">IAM User Guide</a>.</td>
</tr>
<tr>
<td>SourceProfile</td>
<td>The name of the source profile to be used by assume role credentials. The credentials found in this profile are used to assume the role specified by the RoleArn parameter.</td>
</tr>
</tbody>
</table>

**Setup of profiles for assuming a role**

The following is an example showing how to set up a source profile that enables directly assuming an IAM role.

The first command creates a source profile that is referenced by the role profile. The second command creates the role profile that which role to assume. The third command shows the credentials for the role profile.

```powershell
PS > Set-AWSCredential -StoreAs my_source_profile -AccessKey access_key_id -SecretKey secret_key
PS > Set-AWSCredential -StoreAs my_role_profile -SourceProfile my_source_profile -RoleArn arn:aws:iam::123456789012:role/role-i-want-to-assume
PS > Get-AWSCredential -ProfileName my_role_profile
```

<table>
<thead>
<tr>
<th>SourceCredentials</th>
<th>RoleArn</th>
</tr>
</thead>
<tbody>
<tr>
<td>RoleSessionName</td>
<td>Options</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------</td>
</tr>
<tr>
<td>Amazon.Runtime.BasicAWSCredentials</td>
<td>arn:aws:iam::123456789012:role/role-i-want-to-assume</td>
</tr>
<tr>
<td>aws-dotnet-sdk-session-636238288466144357</td>
<td>Amazon.Runtime.AssumeRoleAWSCredentialsOptions</td>
</tr>
</tbody>
</table>

To use this role profile with the Tools for Windows PowerShell service cmdlets, add the `-ProfileName` common parameter to the command to reference the role profile. The following example uses the role profile defined in the previous example to access the `Get-S3Bucket` cmdlet. AWS Tools for PowerShell looks up the credentials in `my_source_profile`, uses those credentials to call AssumeRole on behalf of the user, and then uses those temporary role credentials to call Get-S3Bucket.

```powershell
PS > Get-S3Bucket -ProfileName my_role_profile
```

<table>
<thead>
<tr>
<th>CreationDate</th>
<th>BucketName</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/27/2017 8:57:53 AM</td>
<td>4ba3578c-f88f-4d8b-b95f-92a8858dac58-bucket1</td>
</tr>
<tr>
<td>2/27/2017 10:44:37 AM</td>
<td>2091a504-66a9-4d69-8981-aaf812a02c3-bucket2</td>
</tr>
</tbody>
</table>

**Using the Credential Profile Types**

To set a credential profile type, understand which parameters provide the information required by the profile type.

<table>
<thead>
<tr>
<th>Credentials Type</th>
<th>Parameters you must use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>-AccessKey</td>
</tr>
<tr>
<td></td>
<td>-SecretKey</td>
</tr>
</tbody>
</table>
### Shared Credentials

<table>
<thead>
<tr>
<th>Credentials Type</th>
<th>Parameters you must use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Session:</strong></td>
<td>-AccessKey</td>
</tr>
<tr>
<td>These are the short term credentials for an IAM role that you retrieve manually, such as by directly calling the Use-STSRole cmdlet.</td>
<td>-SecretKey -SessionToken</td>
</tr>
<tr>
<td><strong>Role:</strong></td>
<td>-SourceProfile</td>
</tr>
<tr>
<td>These are are short term credentials for an IAM role that AWS Tools for PowerShell retrieve for you.</td>
<td>-RoleArn optional: -ExternalId optional: -MfaSerial</td>
</tr>
</tbody>
</table>

### The ProfilesLocation Common Parameter

You can use `-ProfileLocation` to write to the shared credential file as well as instruct a cmdlet to read from the credential file. Adding the `-ProfileLocation` parameter controls whether Tools for Windows PowerShell uses the shared credential file or the .NET credential file. The following table describes how the parameter works in Tools for Windows PowerShell.

<table>
<thead>
<tr>
<th>Profile Location Value</th>
<th>Profile Resolution Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>null (not set) or empty</td>
<td>First, search the .NET credential file for a profile with the specified name. If the profile isn't found, search the AWS shared credentials file at <em>(user's home directory)</em>.aws\credentials.</td>
</tr>
<tr>
<td>The path to a file in the AWS shared credential file format</td>
<td>Search only the specified file for a profile with the given name.</td>
</tr>
</tbody>
</table>

### Save Credentials to a Credentials File

To write and save credentials to one of the two credential files, run the `Set-AWSCredential` cmdlet. The following example shows how to do this. The first command uses `Set-AWSCredential` with `-ProfileLocation` to add access and secret keys to a profile specified by the `-ProfileName` parameter. In the second line, run the `Get-Content` cmdlet to display the contents of the credentials file.

```
PS > Set-AWSCredential -ProfileLocation C:\Users\auser\aws\credentials -ProfileName basic_profile -AccessKey access_key2 -SecretKey secret_key2
PS > Get-Content C:\Users\auser\aws\credentials
aws_access_key_id=access_key2
aws_secret_access_key=secret_key2
```

### Displaying Your Credential Profiles

Run the `Get-AWSCredential` cmdlet and add the `-ListProfileDetail` parameter to return credential file types and locations, and a list of profile names.
PS > Get-AWSCredential -ListProfileDetail

<table>
<thead>
<tr>
<th>ProfileName</th>
<th>StoreTypeName</th>
<th>ProfileLocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>source_profile</td>
<td>NetSDKCredentialsFile</td>
<td></td>
</tr>
<tr>
<td>assume_role_profile</td>
<td>NetSDKCredentialsFile</td>
<td></td>
</tr>
<tr>
<td>basic_profile</td>
<td>SharedCredentialsFile</td>
<td>C:\Users\auser\aws\credentials</td>
</tr>
</tbody>
</table>

Removing Credential Profiles

To remove credential profiles, run the new Remove-AWSCredentialProfile cmdlet. Clear-AWSCredential is deprecated, but still available for backward compatibility.

Important Notes

Only Initialize-AWSDefaultConfiguration, New-AWSCredential, and Set-AWSCredential support the parameters for role profiles. You cannot specify the role parameters directly on a command such as Get-S3Bucket -SourceProfile source_profile_name -RoleArn arn:aws:iam::999999999999:role/role_name. That does not work because service cmdlets do not directly support the SourceProfile or RoleArn parameters. Instead, you must store those parameters in a profile, then call the command with the -ProfileName parameter.
Work with AWS services in the AWS Tools for PowerShell

This section provides examples of using the AWS Tools for PowerShell to access AWS services. These examples help demonstrate how to use the cmdlets to perform actual AWS tasks.

PowerShell File Concatenation Encoding

Some cmdlets in the AWS Tools for PowerShell edit existing files or records that you have in AWS. An example is `Edit-R53ResourceRecordSet`, which calls the `ChangeResourceRecordSets` API for Amazon Route 53.

When you edit or concatenate files in PowerShell 5.1 or older releases, PowerShell encodes the output in UTF-16, not UTF-8. This can add unwanted characters and create results that are not valid. A hexadecimal editor can reveal the unwanted characters.

To avoid converting file output to UTF-16, you can pipe your command into PowerShell's `Out-File` cmdlet and specify UTF-8 encoding, as shown in the following example:

```powershell
PS > "some file concatenation command" | Out-File filename.txt -Encoding utf8
```

If you are running AWS CLI commands from within the PowerShell console, the same behavior applies. You can pipe the output of an AWS CLI command into `Out-File` in the PowerShell console. Other cmdlets, such as `Export-Csv` or `Export-Clixml`, also have an Encoding parameter. For a complete list of cmdlets that have an Encoding parameter, and that allow you to correct the encoding of the output of a concatenated file, run the following command:

```powershell
PS > Get-Command -ParameterName "Encoding"
```

**Note**

PowerShell 6.0 and newer, including PowerShell Core, automatically retains UTF-8 encoding for concatenated file output.

Returned Objects for the PowerShell Tools

To make AWS Tools for PowerShell more useful in a native PowerShell environment, the object returned by a AWS Tools for PowerShell cmdlet is a .NET object, not the JSON text object that is typically returned from the corresponding API in the AWS SDK. For example, `Get-S3Bucket` emits a `Buckets` collection, not an Amazon S3 JSON response object. The `Buckets` collection can be placed in the PowerShell pipeline and interacted with in appropriate ways. Similarly, `Get-EC2Instance` emits a `Reservation` .NET object collection, not a `DescribeEC2Instances` JSON result object. This behavior is by design and enables the AWS Tools for PowerShell experience to be more consistent with idiomatic PowerShell.

The actual service responses are available for you if you need them. They are stored as note properties on the returned objects. For API actions that support paging by using `NextToken` fields, these are also attached as note properties.
Amazon EC2 (p. 59)

This section walks through the steps required to launch an Amazon EC2 instance including how to:

- Retrieve a list of Amazon Machine Images (AMIs).
- Create a key pair for SSH authentication.
- Create and configure an Amazon EC2 security group.
- Launch the instance and retrieve information about it.

Amazon S3 (p. 55)

The section walks through the steps required to create a static website hosted in Amazon S3. It demonstrates how to:

- Create and delete Amazon S3 buckets.
- Upload files to an Amazon S3 bucket as objects.
- Delete objects from an Amazon S3 bucket.
- Designate an Amazon S3 bucket as a website.

AWS Lambda and AWS Tools for PowerShell (p. 69)

This section provides a brief overview of the AWS Lambda Tools for PowerShell module and describes the required steps for setting up the module.

Amazon SNS and Amazon SQS (p. 70)

This section walks through the steps required to subscribe an Amazon SQS queue to an Amazon SNS topic. It demonstrates how to:

- Create an Amazon SNS topic.
- Create an Amazon SQS queue.
- Subscribe the queue to the topic.
- Send a message to the topic.
- Receive the message from the queue.

CloudWatch (p. 73)

This section provides an example of how to publish custom data to CloudWatch.

- Publish a Custom Metric to Your CloudWatch Dashboard.

See Also

- Get started with the AWS Tools for Windows PowerShell (p. 21)
Amazon S3 and Tools for Windows PowerShell

In this section, we create a static website using the AWS Tools for Windows PowerShell using Amazon S3 and CloudFront. In the process, we demonstrate a number of common tasks with these services. This walkthrough is modeled after the Getting Started Guide for Host a Static Website, which describes a similar process using the AWS Management Console.

The commands shown here assume that you have set default credentials and a default region for your PowerShell session. Therefore, credentials and regions are not included in the invocation of the cmdlets.

**Note**
There is currently no Amazon S3 API for renaming a bucket or object, and therefore, no single Tools for Windows PowerShell cmdlet for performing this task. To rename an object in S3, we recommend that you copy the object to one with a new name, by running the Copy-S3Object cmdlet, and then delete the original object by running the Remove-S3Object cmdlet.

**See also**

- Work with AWS services in the AWS Tools for PowerShell (p. 53)
- Hosting a Static Website on Amazon S3
- Amazon S3 Console

**Create an Amazon S3 Bucket, Verify Its Region, and Optionally Remove It**

Use the New-S3Bucket cmdlet to create a new Amazon S3 bucket. The following examples creates a bucket named website-example. The name of the bucket must be unique across all regions. The example creates the bucket in the us-west-1 region.

```
PS > New-S3Bucket -BucketName website-example -Region us-west-2
```

<table>
<thead>
<tr>
<th>CreationDate</th>
<th>BucketName</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-----------</td>
</tr>
</tbody>
</table>

AWS Tools for PowerShell User Guide

Topics

- Amazon S3 and Tools for Windows PowerShell (p. 55)
- Amazon EC2 and Tools for Windows PowerShell (p. 59)
- AWS Lambda and AWS Tools for PowerShell (p. 69)
- Amazon SQS, Amazon SNS and Tools for Windows PowerShell (p. 70)
- CloudWatch from the AWS Tools for Windows PowerShell (p. 73)
- Using the ClientConfig parameter in cmdlets (p. 74)
You can verify the region in which the bucket is located using the Get-S3BucketLocation cmdlet.

```
PS > Get-S3BucketLocation -BucketName website-example
Value
-----
us-west-2
```

When you're done with this tutorial, you can use the following line to remove this bucket. We suggest that you leave this bucket in place as we use it in subsequent examples.

```
PS > Remove-S3Bucket -BucketName website-example
```

Note that the bucket removal process can take some time to finish. If you try to re-create a same-named bucket immediately, the New-S3Bucket cmdlet can fail until the old one is completely gone.

**See Also**

- [Work with AWS services in the AWS Tools for PowerShell](p. 53)
- [Put Bucket](Amazon S3 Service Reference)
- [AWS PowerShell Regions for Amazon S3](Amazon S3 Service Reference)

### Configure an Amazon S3 Bucket as a Website and Enable Logging

Use the Write-S3BucketWebsite cmdlet to configure an Amazon S3 bucket as a static website. The following example specifies a name of index.html for the default content web page and a name of error.html for the default error web page. Note that this cmdlet does not create those pages. They need to be **uploaded as Amazon S3 objects**.

```
PS > Write-S3BucketWebsite -BucketName website-example -
  WebsiteConfiguration_IndexDocumentSuffix index.html -WebsiteConfiguration_ErrorDocument
  error.html
RequestId      : A1813E27995FFDDDD
AmazonId2      : T7hlDOeLqA5Q2XfTe8j2q3SLoP3/SXwhUU3RyJBGHU/LnC+CIWLeGgP0MY24xAll
ResponseStream :
Headers        : {x-amz-id-2, x-amz-request-id, Content-Length, Date...}
Metadata       : {}
ResponseXml    :
```

**See Also**

- [Work with AWS services in the AWS Tools for PowerShell](p. 53)
- [Put Bucket Website](Amazon S3 API Reference)
- [Put Bucket ACL](Amazon S3 API Reference)

### Upload Objects to an Amazon S3 Bucket

Use the Write-S3Object cmdlet to upload files from your local file system to an Amazon S3 bucket as objects. The example below creates and uploads two simple HTML files to an Amazon S3 bucket, and
verifies the existence of the uploaded objects. The -File parameter to Write-S3Object specifies the name of the file in the local file system. The -Key parameter specifies the name that the corresponding object will have in Amazon S3.

Amazon infers the content-type of the objects from the file extensions, in this case, ".html".

```
PS > # Create the two files using here-strings and the Set-Content cmdlet
PS > $index_html = @"<html>
PS > <body>
PS > <p>Hello, World!</p>
PS > </body>
PS > </html>"
PS > $index_html | Set-Content index.html
PS > $error_html = @"<html>
PS > <body>
PS > <p>This is an error page.</p>
PS > </body>
PS > </html>"
PS > $error_html | Set-Content error.html
PS > # Upload the files to Amazon S3 using a foreach loop
PS > foreach ($f in "index.html", "error.html") {
PS >     Write-S3Object -BucketName website-example -File $f -Key $f -CannedACLName public-read
PS > }
PS > # Verify that the files were uploaded
PS > Get-S3BucketWebsite -BucketName website-example

<table>
<thead>
<tr>
<th>IndexDocumentSuffix</th>
<th>ErrorDocument</th>
</tr>
</thead>
<tbody>
<tr>
<td>index.html</td>
<td>error.html</td>
</tr>
</tbody>
</table>
```

Canned ACL Options

The values for specifying canned ACLs with the Tools for Windows PowerShell are the same as those used by the AWS SDK for .NET. Note, however, that these are different from the values used by the Amazon S3Put Object action. The Tools for Windows PowerShell support the following canned ACLs:

- NoACL
- private
- public-read
- public-read-write
- aws-exec-read
- authenticated-read
- bucket-owner-read
- bucket-owner-full-control
- log-delivery-write

For more information about these canned ACL settings, see [Access Control List Overview](#).
Note Regarding Multipart Upload

If you use the Amazon S3 API to upload a file that is larger than 5 GB in size, you need to use multipart upload. However, the `Write-S3Object` cmdlet provided by the Tools for Windows PowerShell can transparently handle file uploads that are greater than 5 GB.

Test the Website

At this point, you can test the website by navigating to it using a browser. URLs for static websites hosted in Amazon S3 follow a standard format.

```
http://<bucket-name>.s3-website-<region>.amazonaws.com
```

For example:

```
http://website-example.s3-website-us-west-1.amazonaws.com
```

See Also

- Work with AWS services in the AWS Tools for PowerShell (p. 53)
- Put Object (Amazon S3 API Reference)
- Canned ACLs (Amazon S3 API Reference)

Delete Amazon S3 Objects and Buckets

This section describes how to delete the website that you created in preceding sections. You can simply delete the objects for the HTML files, and then delete the Amazon S3 bucket for the site.

First, run the `Remove-S3Object` cmdlet to delete the objects for the HTML files from the Amazon S3 bucket.

```
PS > foreach ( $obj in "index.html", "error.html" ) {
    >> Remove-S3Object -BucketName website-example -Key $obj
    >>
    >> IsDeleteMarker
    >>------------------
    >> False
```

The False response is an expected artifact of the way that Amazon S3 processes the request. In this context, it does not indicate an issue.

Now you can run the `Remove-S3Bucket` cmdlet to delete the now-empty Amazon S3 bucket for the site.

```
PS > Remove-S3Bucket -BucketName website-example
```

In 1.1 and newer versions of the AWS Tools for PowerShell, you can add the `-DeleteBucketContent` parameter to `Remove-S3Bucket`, which first deletes all objects and object versions in the specified
bucket before trying to remove the bucket itself. Depending on the number of objects or object versions in the bucket, this operation can take a substantial amount of time. In versions of the Tools for Windows PowerShell older than 1.1, the bucket had to be empty before Remove-S3Bucket could delete it.

**Note**
Unless you add the `-Force` parameter, AWS Tools for PowerShell prompts you for confirmation before the cmdlet runs.

**See Also**
- [Work with AWS services in the AWS Tools for PowerShell](p. 53)
- [Delete Object (Amazon S3 API Reference)]
- [DeleteBucket (Amazon S3 API Reference)]

### Upload In-Line Text Content to Amazon S3

The Write-S3Object cmdlet supports the ability to upload in-line text content to Amazon S3. Using the `-Content` parameter (alias `-Text`), you can specify text-based content that should be uploaded to Amazon S3 without needing to place it into a file first. The parameter accepts simple one-line strings as well as here strings that contain multiple lines.

```
PS > # Specifying content in-line, single line text:
PS > write-s3object mybucket -key myobject.txt -content "file content"

PS > # Specifying content in-line, multi-line text: (note final newline needed to end in-line here-string)
PS > write-s3object mybucket -key myobject.txt -content @
>> line 1
>> line 2
>> line 3
>> @

PS > # Specifying content from a variable: (note final newline needed to end in-line here-string)
PS > $x = @"line 1
line 2
line 3"

PS > write-s3object mybucket -key myobject.txt -content $x
```

### Amazon EC2 and Tools for Windows PowerShell

You can perform common tasks related to Amazon EC2 using the AWS Tools for PowerShell.

The example commands shown here assume that you have set default credentials and a default region for your PowerShell session. Therefore, we don't include credentials or region when we invoke the cmdlets. For more information, see [Get started with the AWS Tools for Windows PowerShell](p. 21).

**Topics**
- [Creating a Key Pair](p. 60)
- [Create a Security Group Using Windows PowerShell](p. 61)
- [Find an Amazon Machine Image Using Windows PowerShell](p. 64)
**AWS Tools for PowerShell User Guide**

**Create a Key Pair**

- **Launch an Amazon EC2 Instance Using Windows PowerShell** (p. 66)

### Creating a Key Pair

The following `New-EC2KeyPair` example creates a key pair and stores it in the PowerShell variable `$myPSKeyPair`

```powershell
$myPSKeyPair = New-EC2KeyPair -KeyName myPSKeyPair
```

Pipe the key pair object into the `Get-Member` cmdlet to see the object's structure.

```powershell
$myPSKeyPair | Get-Member
```

<table>
<thead>
<tr>
<th>TypeName: Amazon.EC2.Model.KeyPair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Equals</td>
</tr>
<tr>
<td>GetHashCode</td>
</tr>
<tr>
<td>GetType</td>
</tr>
<tr>
<td>ToString</td>
</tr>
<tr>
<td>KeyFingerprint</td>
</tr>
<tr>
<td>KeyMaterial</td>
</tr>
<tr>
<td>KeyName</td>
</tr>
</tbody>
</table>

Pipe the key pair object into the `Format-List` cmdlet to view values of the `KeyName`, `KeyFingerprint`, and `KeyMaterial` members. (The output has been truncated for readability.)

```powershell
$myPSKeyPair | Format-List KeyName, KeyFingerprint, KeyMaterial
```

<table>
<thead>
<tr>
<th>KeyName</th>
<th>KeyFingerprint</th>
<th>KeyMaterial</th>
</tr>
</thead>
</table>
| myPSKeyPair | 09:06:70:8e:26:b6:e7:ef:8f:fe:4a:1d:bc:9c:6a:11:ac:ad:3c | -----BEGIN RSA PRIVATE KEY----- MIIeogIBAAKCAQEAkK+ANYUS9c7nINjYaCn6KYj/D016djinFoQe... Mz6btoxCpC7E7ehIwySU8nouA59xb1917+Vd74n9N9kmNcMa/Pu... Zyn4Ve0Q511/MpkrRogRq0801RigTeV5yc31v0RFFPu0Kz4kcm... w3Jg8dksW8n8p10pX7V5sRC02Kg11bejQvBFGis0QK9bm4XBIe... daxdIAkQMcDdmDthR1/WMV8I1Te521L5b7qGa+FDC5SbSntBa3h... iuksGkcvWcFqKmLmHRh0dPb+OdFs2tjH2fMPMVhA9tT8ebDKEF... 3neeHzqPSz3JtOodbBxcL3j7g53 SummitWbnB+7DNW0jizCZULCi0... GG1lfegB85k5jGk1k7zeEvQ7K6s+DHc1DeM2Wa7KFRZuCuUX7jssC... x090abXMz3oSTNU6p1ZyrEq0q3wK+k/BSwbnINwfltwm3EY... 1BX9X08WFX/A8VLIrTTlelRkMkNcEgYEAwltkV1pOJAhF97p7ZFEV... vvVsPaF0eV9bk9gphx269P850XZKokwCagDMaYyasW0boUnNu1/... lmRwX7KTeQ7Wl13OLgXHA1QNMKip9c4739vVc3t/TFPf8wvf88c... 63gN6ks2FKHZX1t628gbewUd5eZ05S1p4VUv3v6c8/qa+e5c... KXyghN164pMv+V4xFxKzHdLAdy0Khc9T9GB9++VMSG5TrD15YjI... gYALE17mijKpHWAeS0hiemwSvmKjypzOst5JsFStERa1jETDH... YAtnI438dRypP91BEOv89nW7fIkj8g51l/00c+cj86S5g1LAfndWGR... 9R9hkIn5m5Mic9RcDbyyJYwKBgBvXPMG5D0abh4HkvtUepe1BuJTD... AnEBM1cX15Ut7BFK1upUihZis5QDwhdgk/0k5SmWh1ZGWikJSVizBF... dckBr/V7VKVRMtx11VF7KB7KV1x13xC5E/B2+YdZEpWCoCAoGAC/Cd... TT1d5N6opG0xAc3QJzwqoa92MwcQ59f4bFrc67emkw0ZAAwSswVwR... xS02duuy7/smTwWwskEDWKS5iToMv/TVYaQdzc0ajwieNbr17c... ----END RSA PRIVATE KEY-----

The `KeyMaterial` member stores the private key for the key pair. The public key is stored in AWS. You can't retrieve the public key from AWS, but you can verify the public key by comparing the `KeyFingerprint` for the private key to that returned from AWS for the public key.
Viewing the Fingerprint of Your Key Pair

You can use the `Get-EC2KeyPair` cmdlet to view the fingerprint for your key pair.

```powershell
PS > Get-EC2KeyPair -KeyName myPSKeyPair | format-list KeyName, KeyFingerprint
KeyName        : myPSKeyPair
```

Storing Your Private Key

To store the private key to a file, pipe the `KeyFingerMaterial` member to the `Out-File` cmdlet.

```powershell
PS > $myPSKeyPair.KeyMaterial | Out-File -Encoding ascii myPSKeyPair.pem
```

You must specify `-Encoding ascii` when writing the private key to a file. Otherwise, tools such as `openssl` might not be able to read the file correctly. You can verify that the format of the resulting file is correct by using a command such as the following:

```powershell
PS > openssl rsa -check < myPSKeyPair.pem
```

(The `openssl` tool is not included with the AWS Tools for PowerShell or the AWS SDK for .NET.)

Removing Your Key Pair

You need your key pair to launch and connect to an instance. When you are done using a key pair, you can remove it. To remove the public key from AWS, use the `Remove-EC2KeyPair` cmdlet. When prompted, press Enter to remove the key pair.

```powershell
PS > Remove-EC2KeyPair -KeyName myPSKeyPair
Confirm
Performing the operation "Remove-EC2KeyPair (DeleteKeyPair)" on target "myPSKeyPair".
[Y] Yes  [A] Yes to All  [N] No  [L] No to All  [S] Suspend  [?] Help (default is "Y"):
```

The variable, `$myPSKeyPair`, still exists in the current PowerShell session and still contains the key pair information. The `myPSKeyPair.pem` file also exists. However, the private key is no longer valid because the public key for the key pair is no longer stored in AWS.

Create a Security Group Using Windows PowerShell

You can use the AWS Tools for PowerShell to create and configure a security group. When you create a security group, you specify whether it is for EC2-Classic or EC2-VPC. The response is the ID of the security group.

If you need to connect to your instance, you must configure the security group to allow SSH traffic (Linux) or RDP traffic (Windows).

Topics
- Prerequisites (p. 62)
- Creating a Security Group for EC2-Classic (p. 62)
- Creating a Security Group for EC2-VPC (p. 63)
Prerequisites

You need the public IP address of your computer, in CIDR notation. You can get the public IP address of your local computer using a service. For example, Amazon provides the following service: 
http://checkip.amazonaws.com/ or https://checkip.amazonaws.com/. To locate another service that provides your IP address, use the search phrase "what is my IP address". If you are connecting through an ISP or from behind your firewall without a static IP address, you need to find the range of IP addresses that can be used by your client computers.

Warning
If you specify 0.0.0.0/0, you are enabling traffic from any IP addresses in the world. For the SSH and RDP protocols, consider this acceptable for a short time in a test environment, but it's unsafe for production environments. In production, be sure to authorize access only from the appropriate individual IP address or range of addresses.

Creating a Security Group for EC2-Classic

Warning
We are retiring EC2-Classic on August 15, 2022. We recommend that you migrate from EC2-Classic to a VPC. For more information, see Migrate from EC2-Classic to a VPC in the Amazon EC2 User Guide for Linux Instances or the Amazon EC2 User Guide for Windows Instances. Also see the blog post EC2-Classic Networking is Retiring – Here's How to Prepare.

The following example uses the New-EC2SecurityGroup cmdlet to create a security group for EC2-Classic.

```
PS > New-EC2SecurityGroup -GroupName myPSSecurityGroup -GroupDescription "EC2-Classic from PowerShell"
sg-0a346530123456789
```

To view the initial configuration of the security group, use the Get-EC2SecurityGroup cmdlet.

```
PS > Get-EC2SecurityGroup -GroupNames myPSSecurityGroup
Description       : EC2-Classic from PowerShell
GroupId           : sg-0a346530123456789
GroupName         : myPSSecurityGroup
IpPermissions     : {}
IpPermissionsEgress: {Amazon.EC2.Model.IpPermission}
OwnerId           : 123456789012
Tags              : {}
VpcId             : vpc-9668ddef
```

To configure the security group to allow inbound traffic on TCP port 22 (SSH) and TCP port 3389, use the Grant-EC2SecurityGroupIngress cmdlet. For example, the following example script shows how you could enable SSH traffic from a single IP address, 203.0.113.25/32.

```
$cidrBlocks = New-Object 'collections.generic.list[string]'
$cidrBlocks.add("203.0.113.25/32")
$ipPermissions = New-Object Amazon.EC2.Model.IpPermission
$ipPermissions.IpProtocol = "tcp"
$ipPermissions.FromPort = 22
$ipPermissions.ToPort = 22
$ipPermissions.IpRanges = $cidrBlocks
Grant-EC2SecurityGroupIngress -GroupName myPSSecurityGroup -IpPermissions $ipPermissions
```

To verify the security group was updated, run the Get-EC2SecurityGroup cmdlet again. Note that you can't specify an outbound rule for EC2-Classic.
Create a Security Group

PS > Get-EC2SecurityGroup -GroupNames myPSSecurityGroup

To view the security group rule, use the IpPermissions property.

PS > (Get-EC2SecurityGroup -GroupNames myPSSecurityGroup).IpPermissions

Creating a Security Group for EC2-VPC

The following New-EC2SecurityGroup example adds the -VpcId parameter to create a security group for the specified VPC.

PS > $groupid = New-EC2SecurityGroup -VpcId "vpc-da0013b3" -GroupName "myPSSecurityGroup" -GroupDescription "EC2-VPC from PowerShell"

To define the permissions for inbound traffic on TCP port 22 (SSH) and TCP port 3389, use the New-Object cmdlet. The following example script defines permissions for TCP ports 22 and 3389 from a single IP address, 203.0.113.25/32.

$ip1 = new-object Amazon.EC2.Model.IpPermission
$ip1.IpProtocol = "tcp"
$ip1.FromPort = 22
$ip1.ToPort = 22
$ip1.IpRanges.Add("203.0.113.25/32")

$ip2 = new-object Amazon.EC2.Model.IpPermission
$ip2.IpProtocol = "tcp"
$ip2.FromPort = 3389
$ip2.ToPort = 3389
$ip2.IpRanges.Add("203.0.113.25/32")
Grant-EC2SecurityGroupIngress -GroupId $groupid -IpPermissions @( $ip1, $ip2 )

To verify the security group has been updated, use the Get-EC2SecurityGroup cmdlet again.

```powershell
PS > Get-EC2SecurityGroup -GroupIds sg-5d293231
```

<table>
<thead>
<tr>
<th>OwnerId</th>
<th>123456789012</th>
</tr>
</thead>
<tbody>
<tr>
<td>GroupName</td>
<td>myPSSecurityGroup</td>
</tr>
<tr>
<td>GroupId</td>
<td>sg-5d293231</td>
</tr>
<tr>
<td>Description</td>
<td>EC2-VPC from PowerShell</td>
</tr>
<tr>
<td>IpPermissions</td>
<td>{Amazon.EC2.Model.IpPermission}</td>
</tr>
<tr>
<td>IpPermissionsEgress</td>
<td>{Amazon.EC2.Model.IpPermission}</td>
</tr>
<tr>
<td>VpcId</td>
<td>vpc-da0013b3</td>
</tr>
<tr>
<td>Tags</td>
<td>{}</td>
</tr>
</tbody>
</table>

To view the inbound rules, you can retrieve the IpPermissions property from the collection object returned by the previous command.

```powershell
PS > (Get-EC2SecurityGroup -GroupIds sg-5d293231).IpPermissions
```

<table>
<thead>
<tr>
<th>IpProtocol</th>
<th>tcp</th>
</tr>
</thead>
<tbody>
<tr>
<td>FromPort</td>
<td>22</td>
</tr>
<tr>
<td>ToPort</td>
<td>22</td>
</tr>
<tr>
<td>UserIdGroupPairs</td>
<td>{}</td>
</tr>
<tr>
<td>IpRanges</td>
<td>{203.0.113.25/32}</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IpProtocol</th>
<th>tcp</th>
</tr>
</thead>
<tbody>
<tr>
<td>FromPort</td>
<td>3389</td>
</tr>
<tr>
<td>ToPort</td>
<td>3389</td>
</tr>
<tr>
<td>UserIdGroupPairs</td>
<td>{}</td>
</tr>
<tr>
<td>IpRanges</td>
<td>{203.0.113.25/32}</td>
</tr>
</tbody>
</table>

Find an Amazon Machine Image Using Windows PowerShell

When you launch an Amazon EC2 instance, you specify an Amazon Machine Image (AMI) to serve as a template for the instance. However, the IDs for the AWS Windows AMIs change frequently because AWS provides new AMIs with the latest updates and security enhancements. You can use the Get-EC2Image and Get-EC2ImageByName cmdlets to find the current Windows AMIs and get their IDs.

**Topics**

- [Get-EC2Image](p. 64)
- [Get-EC2ImageByName](p. 65)

### Get-EC2Image

The Get-EC2Image cmdlet retrieves a list of AMIs that you can use.

Use the -Owner parameter with the array value amazon, self so that Get-EC2Image retrieves only AMIs that belong to Amazon or to you. In this context, you refers to the user whose credentials you used to invoke the cmdlet.

```powershell
PS > Get-EC2Image -Owner amazon, self
```

You can scope the results using the -Filter parameter. To specify the filter, create an object of type Amazon.EC2.Model.Filter. For example, use the following filter to display only Windows AMIs.
$platform_values = New-Object 'collections.generic.list[string]'
$platform_values.add("windows")
$filter_platform = New-Object Amazon.EC2.Model.Filter -Property @{Name = "platform"; Values = $platform_values}
Get-EC2Image -Owner amazon, self -Filter $filter_platform

The following is an example of one of the AMIs returned by the cmdlet; the actual output of the previous command provides information for many AMIs.

<table>
<thead>
<tr>
<th>Architecture</th>
<th>x86_64</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlockDeviceMappings</td>
<td>{/dev/sda1, xvdca, xvdcb, xvdcc...}</td>
</tr>
<tr>
<td>CreationDate</td>
<td>2019-06-12T10:41:31.000Z</td>
</tr>
<tr>
<td>Description</td>
<td>Microsoft Windows Server 2019 Full Locale English with SQL Web 2017 AMI provided by Amazon</td>
</tr>
<tr>
<td>EnaSupport</td>
<td>True</td>
</tr>
<tr>
<td>Hypervisor</td>
<td>xen</td>
</tr>
<tr>
<td>ImageId</td>
<td>ami-000226b77608d973b</td>
</tr>
<tr>
<td>ImageOwnerAlias</td>
<td>amazon</td>
</tr>
<tr>
<td>ImageType</td>
<td>machine</td>
</tr>
<tr>
<td>KernelId</td>
<td></td>
</tr>
<tr>
<td>OwnerId</td>
<td>801119661308</td>
</tr>
<tr>
<td>Platform</td>
<td>Windows</td>
</tr>
<tr>
<td>ProductCodes</td>
<td>{}</td>
</tr>
<tr>
<td>Public</td>
<td>True</td>
</tr>
<tr>
<td>RamdiskId</td>
<td></td>
</tr>
<tr>
<td>RootDeviceName</td>
<td>/dev/sda1</td>
</tr>
<tr>
<td>RootDeviceType</td>
<td>ebs</td>
</tr>
<tr>
<td>SriovNetSupport</td>
<td>simple</td>
</tr>
<tr>
<td>State</td>
<td>available</td>
</tr>
<tr>
<td>StateReason</td>
<td></td>
</tr>
<tr>
<td>Tags</td>
<td>{}</td>
</tr>
<tr>
<td>VirtualizationType</td>
<td>hvm</td>
</tr>
</tbody>
</table>

**Get-EC2ImageByName**

The Get-EC2ImageByName cmdlet enables you to filter the list of AWS Windows AMIs based on the type of server configuration you are interested in.

When run with no parameters, as follows, the cmdlet emits the complete set of current filter names:

PS > Get-EC2ImageByName

WINDOWS_2016_BASE
WINDOWS_2016_NANO
WINDOWS_2016_CORE
WINDOWS_2016_CONTAINER
WINDOWS_2016_SQL_SERVER_ENTERPRISE_2016
WINDOWS_2016_SQL_SERVER_STANDARD_2016
WINDOWS_2016_SQL_SERVER_WEB_2016
WINDOWS_2016_SQL_SERVER_EXPRESS_2016
WINDOWS_2012R2_BASE
WINDOWS_2012R2_CORE
WINDOWS_2012R2_SQL_SERVER_EXPRESS_2016
WINDOWS_2012R2_SQL_SERVER_STANDARD_2016
WINDOWS_2012R2_SQL_SERVER_WEB_2016
WINDOWS_2012R2_SQL_SERVER_EXPRESS_2014
WINDOWS_2012R2_SQL_SERVER_STANDARD_2014
WINDOWS_2012R2_SQL_SERVER_WEB_2014
WINDOWS_2012_BASE
WINDOWS_2012_SQL_SERVER_EXPRESS_2014
Launch an Amazon EC2 Instance Using Windows PowerShell

To launch an Amazon EC2 instance, you need the key pair and security group that you created in the previous sections. You also need the ID of an Amazon Machine Image (AMI). For more information, see the following documentation:

- Creating a Key Pair (p. 60)
- Create a Security Group Using Windows PowerShell (p. 61)
• Find an Amazon Machine Image Using Windows PowerShell (p. 64)

**Important**
If you launch an instance that is not within the Free Tier, you are billed after you launch the instance and charged for the time that the instance is running even if it remains idle.

**Topics**
• Launching an Instance in EC2-Classic (p. 67)
• Launching an Instance in a VPC (p. 68)
• Launching a Spot Instance in a VPC (p. 69)

**Launching an Instance in EC2-Classic**

**Warning**
We are retiring EC2-Classic on August 15, 2022. We recommend that you migrate from EC2-Classic to a VPC. For more information, see **Migrate from EC2-Classic to a VPC** in the Amazon EC2 User Guide for Linux Instances or the Amazon EC2 User Guide for Windows Instances. Also see the blog post **EC2-Classic Networking is Retiring – Here’s How to Prepare**.

The following command creates and launches a single `t1.micro` instance.

```
PS > New-EC2Instance -ImageId ami-c49c0dac `  
  -MinCount 1 `  
  -MaxCount 1 `  
  -KeyName myPSKeyPair `  
  -SecurityGroups myPSSecurityGroup `  
  -InstanceType t1.micro
```

```
ReservationId   : r-b70a0ef1
OwnerId         : 123456789012
RequesterId     :
Groups          : {myPSSecurityGroup}
GroupName       : {myPSSecurityGroup}
Instances       : {}
```

Your instance is in the pending state initially, but is in the running state after a few minutes. To view information about your instance, use the `Get-EC2Instance` cmdlet. If you have more than one instance, you can filter the results on the reservation ID using the `Filter` parameter. First, create an object of type `Amazon.EC2.Model.Filter`. Next, call `Get-EC2Instance` that uses the filter, and then displays the `Instances` property.

```
PS > $reservation = New-Object 'collections.generic.list[string]'
PS > $reservation.add("r-5caa4371")
PS > $filter_reservation = New-Object Amazon.EC2.Model.Filter -Property @{Name =  
  "reservation-id"; Values = $reservation}
PS > (Get-EC2Instance -Filter $filter_reservation).Instances
```

```
AmiLaunchIndex        : 0
Architecture          : x86_64
BlockDeviceMappings   : {/dev/sda1}
ClientToken           :
EbsOptimized          : False
Hypervisor            : xen
IamInstanceProfile    :
ImageId               : ami-c49c0dac
InstanceId            : i-5203422c
InstanceLifecycle     :
InstanceType          : t1.micro
```
Launching an Instance in a VPC

The following command creates a single m1.small instance in the specified private subnet. The security group must be valid for the specified subnet.

```powershell
PS > New-EC2Instance -ImageId ami-c49c0dac -MinCount 1 -MaxCount 1 -KeyName myPSKeyPair -SecurityGroupId sg-5d293231 -InstanceType m1.small -SubnetId subnet-d60013bf

ReservationId : r-b70a0ef1
OwnerId : 123456789012
RequesterId : 
Groups : {}
Instances : {}
```

Your instance is in the pending state initially, but is in the running state after a few minutes. To view information about your instance, use the Get-EC2Instance cmdlet. If you have more than one instance, you can filter the results on the reservation ID using the Filter parameter. First, create an object of type Amazon.EC2.Model.Filter. Next, call Get-EC2Instance that uses the filter, and then displays the Instances property.

```powershell
PS > $reservation = New-Object 'collections.generic.list[string]'
PS > $reservation.add("r-b70a0ef1")
PS > $filter_reservation = New-Object Amazon.EC2.Model.Filter -Property @{Name = "reservation-id"; Values = $reservation}
PS > (Get-EC2Instance -Filter $filter_reservation).Instances
```

AmiLaunchIndex : 0
Architecture : x86_64
BlockDeviceMappings : {/dev/sda1}
ClientToken : 
EbsOptimized : False 
Hypervisor : xen 
IamInstanceProfile : 
ImageId : ami-c49c0dac 
InstanceId : i-5203422c 
InstanceLifecycle : 
InstanceType : m1.small 
KernelId : 
KeyName : myPSKeyPair 
LaunchTime : 12/2/2018 3:38:52 PM 
Monitoring : Amazon.EC2.Model.Monitoring 
NetworkInterfaces : {} 
Placement : Amazon.EC2.Model.Placement 
Platform : Windows 
PrivateDnsName : 
PrivateIpAddress : 10.25.1.11 
ProductCodes : {} 
PublicDnsName : 
PublicIpAddress : 198.51.100.245 
RamdiskId : 
RootDeviceName : /dev/sda1 
RootDeviceType : ebs 
SecurityGroups : {myPSSecurityGroup} 
SourceDestCheck : True 
SpotInstanceRequestId : 
SriovNetSupport : 
State : Amazon.EC2.Model.InstanceState 
StateReason : 
StateTransitionReason : 
SubnetId : subnet-d60013bf 
Tags : {} 
VirtualizationType : hvm 
VpcId : vpc-a01106c2

Launching a Spot Instance in a VPC

The following example script requests a Spot Instance in the specified subnet. The security group must be one you created for the VPC that contains the specified subnet.

```powershell
$interface1 = New-Object Amazon.EC2.Model.InstanceNetworkInterfaceSpecification
$interface1.DeviceIndex = 0 
$interface1.SubnetId = "subnet-b61f49f0"
$interface1.PrivateIpAddress = "10.0.1.5"
$interface1.Groups.Add("sg-5d293231")
Request-EC2SpotInstance -SpotPrice 0.007 -InstanceCount 1 -Type one-time -LaunchSpecification_ImageId ami-7527031c -LaunchSpecification_InstanceType m1.small -Region us-west-2 -LaunchSpecification_NetworkInterfaces $interface1
```

AWS Lambda and AWS Tools for PowerShell

By using the AWSLambdaPSCore module, you can develop AWS Lambda functions in PowerShell Core 6.0 using the .NET Core 2.1 runtime. PowerShell developers can manage AWS resources and write automation scripts in the PowerShell environment by using Lambda. PowerShell support in Lambda lets you run PowerShell scripts or functions in response to any Lambda event, such as an Amazon S3 event.
or Amazon CloudWatch scheduled event. The AWSLambdaPSCore module is a separate AWS module for PowerShell; it is not part of the AWS Tools for PowerShell, nor does installing the AWSLambdaPSCore module install the AWS Tools for PowerShell.

After you install the AWSLambdaPSCore module, you can use any available PowerShell cmdlets—or develop your own—to author serverless functions. The AWS Lambda Tools for PowerShell module includes project templates for PowerShell-based serverless applications, and tools to publish projects to AWS.

AWSLambdaPSCore module support is available in all regions that support Lambda. For more information about supported regions, see the AWS region table.

Prerequisites

The following steps are required before you can install and use the AWSLambdaPSCore module. For more detail about these steps, see Setting Up a PowerShell Development Environment in the AWS Lambda Developer Guide.

- Install the correct release of PowerShell – Lambda's support for PowerShell is based on the cross-platform PowerShell Core 6.0 release. You can develop PowerShell Lambda functions on Windows, Linux, or Mac. If you don't have at least this release of PowerShell installed, instructions are available on the Microsoft PowerShell documentation website.
- Install the .NET Core 2.1 SDK – Because PowerShell Core is based on .NET Core, the Lambda support for PowerShell uses the same .NET Core 2.1 Lambda runtime for both .NET Core and PowerShell Lambda functions. The Lambda PowerShell publishing cmdlets use the .NET Core 2.1 SDK to create the Lambda deployment package. The .NET Core 2.1 SDK is available from the Microsoft Download Center. Be sure to install the SDK, not the Runtime.

Install the AWSLambdaPSCore Module

After completing the prerequisites, you are ready to install the AWSLambdaPSCore module. Run the following command in a PowerShell Core session.

```
PS> Install-Module AWSLambdaPSCore -Scope CurrentUser
```

You are ready to start developing Lambda functions in PowerShell. For more information about how to get started, see Programming Model for Authoring Lambda Functions in PowerShell in the AWS Lambda Developer Guide.

See Also

- Announcing Lambda Support for PowerShell Core on the AWS Developer Blog
- AWSLambdaPSCore module on the PowerShell Gallery website
- Setting Up a PowerShell Development Environment
- AWS Lambda Tools for Powershell on GitHub
- AWS Lambda Console

Amazon SQS, Amazon SNS and Tools for Windows PowerShell

This section provides examples that show how to:
• Create an Amazon SQS queue and get queue ARN (Amazon Resource Name).
• Create an Amazon SNS topic.
• Give permissions to the SNS topic so that it can send messages to the queue.
• Subscribe the queue to the SNS topic
• Give IAM users or AWS accounts permissions to publish to the SNS topic and read messages from the SQS queue.
• Verify results by publishing a message to the topic and reading the message from the queue.

Create an Amazon SQS queue and get queue ARN

The following command creates an SQS queue in your default region. The output shows the URL of the new queue.

```powershell
PS > New-SQSQueue -QueueName myQueue
https://sqs.us-west-2.amazonaws.com/123456789012/myQueue
```

The following command retrieves the ARN of the queue.

```powershell
PS > Get-SQSQueueAttribute -QueueUrl https://sqs.us-west-2.amazonaws.com/123456789012/myQueue -AttributeName QueueArn
... QueueARN : arn:aws:sqs:us-west-2:123456789012:myQueue
```

Create an Amazon SNS topic

The following command creates an SNS topic in your default region, and returns the ARN of the new topic.

```powershell
PS > New-SNSTopic -Name myTopic
```

Give permissions to the SNS topic

The following example script creates both an SQS queue and an SNS topic, and grants permissions to the SNS topic so that it can send messages to the SQS queue:

```powershell
# create the queue and topic to be associated
$qurl = New-SQSQueue -QueueName "myQueue"
$topicArn = New-SNSTopic -Name "myTopic"

# get the queue ARN to inject into the policy; it will be returned
# in the output's QueueARN member but we need to put it into a variable
# so text expansion in the policy string takes effect
$queueArn = (Get-SQSQueueAttribute -QueueUrl $qurl -AttributeNames "QueueArn").QueueARN

# construct the policy and inject arns
$policy = @"{
  "Version": "2012-10-17",
  "Statement": {
    "Effect": "Allow",
    "Principal": "*",
    "Action": "SQS:SendMessage",
    "Resource": "$queueArn",
  }
}"
```

**Note:** The above script is a template and may require adjustments based on specific use cases.
Subscribe the queue to the SNS topic

The following command subscribes the queue myQueue to the SNS topic myTopic, and returns the Subscription ID:

```powershell
```

Give permissions

The following command grants permission to perform the sns:Publish action on the topic myTopic:

```powershell
```

The following command grants permission to perform the sqs:ReceiveMessage and sqs:DeleteMessage actions on the queue myQueue:

```powershell
PS > Add-SQSPermission ' -QueueUrl https://sqs.us-west-2.amazonaws.com/123456789012/myQueue ' -AWSAccountId "123456789012" ' -Label queue-permission ' -ActionName SendMessage, ReceiveMessage
```

Verify results

The following command tests your new queue and topic by publishing a message to the SNS topic myTopic and returns the MessageId.

```powershell
```

The following command retrieves the message from the SQS queue myQueue and displays it.

```powershell
CloudWatch from the AWS Tools for Windows PowerShell

This section shows an example of how to use the Tools for Windows PowerShell to publish custom metric data to CloudWatch.

This example assumes that you have set default credentials and a default region for your PowerShell session.

### Publish a Custom Metric to Your CloudWatch Dashboard

The following PowerShell code initializes an CloudWatch MetricDatum object and posts it to the service. You can see the result of this operation by navigating to the CloudWatch console.

```powershell
$dat = New-Object Amazon.CloudWatch.Model.MetricDatum
$dat.Timestamp = (Get-Date).ToUniversalTime()
$dat.MetricName = "New Posts"
$dat.Unit = "Count"
$dat.Value = "0.50"
Write-CWMetricData -Namespace "Usage Metrics" -MetricData $dat
```

Note the following:

- The date-time information that you use to initialize $dat.Timestamp must be in Universal Time (UTC).

---

73
The value that you use to initialize $dat.Value can be either a string value enclosed in quotes, or a numeric value (no quotes). The example shows a string value.

See Also

- **Work with AWS services in the AWS Tools for PowerShell** (p. 53)
- **AmazonCloudWatchClient.PutMetricData** (.NET SDK Reference)
- **MetricDatum** (Service API Reference)
- **Amazon CloudWatch Console**

Using the ClientConfig parameter in cmdlets

The ClientConfig parameter can be used to specify certain configuration settings when you connect to a service. Most of the possible properties of this parameter are defined in the Amazon.Runtime.ClientConfig class, which is inherited into the APIs for AWS services. For an example of simple inheritance, see the Amazon.Keyspaces.AmazonKeyspacesConfig class. In addition, some services define additional properties that are appropriate only for that service. For an example of additional properties that have been defined, see the Amazon.S3.AmazonS3Config class, specifically the ForcePathStyle property.

### Using the ClientConfig parameter

To use the ClientConfig parameter, you can specify it on the command line as a ClientConfig object or use PowerShell splatting to pass a collection of parameter values to a command as a unit. These methods are shown in the following examples. The examples assume that the AWS.Tools.S3 module has been installed and imported, and that you have a [default] credentials profile with appropriate permissions.

#### Defining a ClientConfig object

```powershell
$s3Config = New-Object -TypeName Amazon.S3.AmazonS3Config
$s3Config.ForcePathStyle = $true
$s3Config.Timeout = [TimeSpan]::FromMilliseconds(150000)
Get-S3Object -BucketName <BUCKET_NAME> -ClientConfig $s3Config
```

#### Adding ClientConfig properties by using PowerShell splatting

```powershell
$params=@{
    ClientConfig=@{
        ForcePathStyle=$true
        Timeout=[TimeSpan]::FromMilliseconds(150000)
    }
    BucketName="<BUCKET_NAME>"
}
Get-S3Object @params
```

#### Using an undefined property

When using PowerShell splatting, if you specify a ClientConfig property that doesn't exist, the AWS Tools for PowerShell doesn't detect the error until runtime, at which time it returns an exception. Modifying the example from above:
Specifying the AWS Region

You can use the ClientConfig parameter to set the AWS Region for the command. The Region is set through the RegionEndpoint property. The AWS Tools for PowerShell calculates the Region to use according to the following precedence:

1. The -Region parameter
2. The Region passed in the ClientConfig parameter
3. The PowerShell session state
4. The shared AWS config file
5. The environment variables
6. The Amazon EC2 instance metadata, if enabled.

```powershell
$params=@{
    ClientConfig=@{
        ForcePathStyle=$true
        UndefinedProperty="Value"
        Timeout=[TimeSpan]::FromMilliseconds(150000)
    }
    BucketName="<BUCKET_NAME>"
}
Get-S3Object @params
```

This example produces an exception similar to the following:

```
Cannot bind parameter 'ClientConfig'. Cannot create object of type "Amazon.S3.AmazonS3Config". The UndefinedProperty property was not found for the Amazon.S3.AmazonS3Config object.
```
Security for this AWS Product or Service

Cloud security at Amazon Web Services (AWS) is the highest priority. As an AWS customer, you benefit from a data center and network architecture that is built to meet the requirements of the most security-sensitive organizations. Security is a shared responsibility between AWS and you. The Shared Responsibility Model describes this as Security of the Cloud and Security in the Cloud.

Security of the Cloud – AWS is responsible for protecting the infrastructure that runs all of the services offered in the AWS Cloud and providing you with services that you can use securely. Our security responsibility is the highest priority at AWS, and the effectiveness of our security is regularly tested and verified by third-party auditors as part of the AWS Compliance Programs.

Security in the Cloud – Your responsibility is determined by the AWS service you are using, and other factors including the sensitivity of your data, your organization's requirements, and applicable laws and regulations.

This AWS product or service follows the shared responsibility model through the specific Amazon Web Services (AWS) services it supports. For AWS service security information, see the AWS service security documentation page and AWS services that are in scope of AWS compliance efforts by compliance program.

Topics
- Data protection in this AWS product or service (p. 76)
- Identity and Access Management (p. 77)
- Compliance Validation for this AWS Product or Service (p. 83)
- Enforcing a minimum TLS version in the Tools for PowerShell (p. 84)

Data protection in this AWS product or service

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

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

- Use multi-factor authentication (MFA) with each account.
- Use SSL/TLS to communicate with AWS resources. We require TLS 1.2 and recommend TLS 1.3.
- Set up API and user activity logging with AWS CloudTrail.
- Use AWS encryption solutions, along with all default security controls within AWS services.
• Use advanced managed security services such as Amazon Macie, which assists in discovering and securing sensitive data that is stored in Amazon S3.
• If you require FIPS 140-2 validated cryptographic modules when accessing AWS through a command line interface or an API, use a FIPS endpoint. For more information about the available FIPS endpoints, see Federal Information Processing Standard (FIPS) 140-2.

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

Data encryption

A key feature of any secure service is that information is encrypted when it is not being actively used.

Encryption at Rest

The AWS Tools for PowerShell does not itself store any customer data other than the credentials it needs to interact with the AWS services on the user’s behalf.

If you use the AWS Tools for PowerShell to invoke an AWS service that transmits customer data to your local computer for storage, then refer to the Security & Compliance chapter in that service's User Guide for information on how that data is stored, protected, and encrypted.

Encryption in Transit

By default, all data transmitted from the client computer running the AWS Tools for PowerShell and AWS service endpoints is encrypted by sending everything through an HTTPS/TLS connection.

You don't need to do anything to enable the use of HTTPS/TLS. It is always enabled.

Identity and Access Management

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

Topics
• Audience (p. 77)
• Authenticating with identities (p. 78)
• Managing access using policies (p. 80)
• How AWS services work with IAM (p. 82)
• Troubleshooting AWS identity and access (p. 82)

Audience

How you use AWS Identity and Access Management (IAM) differs, depending on the work that you do in AWS.
Service user – If you use AWS services to do your job, then your administrator provides you with the credentials and permissions that you need. As you use more AWS features to do your work, you might need additional permissions. Understanding how access is managed can help you request the right permissions from your administrator. If you cannot access a feature in AWS, see Troubleshooting AWS identity and access (p. 82) or the user guide of the AWS service you are using.

Service administrator – If you're in charge of AWS resources at your company, you probably have full access to AWS. It's your job to determine which AWS features and resources your service users should access. You must then submit requests to your IAM administrator to change the permissions of your service users. Review the information on this page to understand the basic concepts of IAM. To learn more about how your company can use IAM with AWS, see the user guide of the AWS service you are using.

IAM administrator – If you're an IAM administrator, you might want to learn details about how you can write policies to manage access to AWS. To view example AWS identity-based policies that you can use in IAM, see the user guide of the AWS service you are using.

Authenticating with identities

Authentication is how you sign in to AWS using your identity credentials. You must be authenticated (signed in to AWS) as the AWS account root user, as an IAM user, or by assuming an IAM role.

You can sign in to AWS as a federated identity by using credentials provided through an identity source. AWS IAM Identity Center (IAM Identity Center) users, your company's single sign-on authentication, and your Google or Facebook credentials are examples of federated identities. When you sign in as a federated identity, your administrator previously set up identity federation using IAM roles. When you access AWS by using federation, you are indirectly assuming a role.

Depending on the type of user you are, you can sign in to the AWS Management Console or the AWS access portal. For more information about signing in to AWS, see How to sign in to your AWS account in the AWS Sign-In User Guide.

If you access AWS programmatically, AWS provides a software development kit (SDK) and a command line interface (CLI) to cryptographically sign your requests by using your credentials. If you don't use AWS tools, you must sign requests yourself. For more information about using the recommended method to sign requests yourself, see Signing AWS API requests in the IAM User Guide.

Regardless of the authentication method that you use, you might be required to provide additional security information. For example, AWS recommends that you use multi-factor authentication (MFA) to increase the security of your account. To learn more, see Multi-factor authentication in the AWS IAM Identity Center User Guide and Using multi-factor authentication (MFA) in AWS in the IAM User Guide.

AWS account root user

When you create an AWS account, you begin with one sign-in identity that has complete access to all AWS services and resources in the account. This identity is called the AWS account root user and is accessed by signing in with the email address and password that you used to create the account. We strongly recommend that you don't use the root user for your everyday tasks. Safeguard your root user credentials and use them to perform the tasks that only the root user can perform. For the complete list of tasks that require you to sign in as the root user, see Tasks that require root user credentials in the IAM User Guide.

Federated identity

As a best practice, require human users, including users that require administrator access, to use federation with an identity provider to access AWS services by using temporary credentials.
A **federated identity** is a user from your enterprise user directory, a web identity provider, the AWS Directory Service, the Identity Center directory, or any user that accesses AWS services by using credentials provided through an identity source. When federated identities access AWS accounts, they assume roles, and the roles provide temporary credentials.

For centralized access management, we recommend that you use AWS IAM Identity Center. You can create users and groups in IAM Identity Center, or you can connect and synchronize to a set of users and groups in your own identity source for use across all your AWS accounts and applications. For information about IAM Identity Center, see [What is IAM Identity Center?](aws iam identity center user guide) in the *AWS IAM Identity Center User Guide*.

### IAM users and groups

An **IAM user** is an identity within your AWS account that has specific permissions for a single person or application. Where possible, we recommend relying on temporary credentials instead of creating IAM users who have long-term credentials such as passwords and access keys. However, if you have specific use cases that require long-term credentials with IAM users, we recommend that you rotate access keys. For more information, see [Rotate access keys regularly for use cases that require long-term credentials](iam user guide) in the *IAM User Guide*.

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

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

### IAM roles

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

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

- **Federated user access** – To assign permissions to a federated identity, you create a role and define permissions for the role. When a federated identity authenticates, the identity is associated with the role and is granted the permissions that are defined by the role. For information about roles for federation, see [Creating a role for a third-party Identity Provider](iam user guide) in the *IAM User Guide*. If you use IAM Identity Center, you configure a permission set. To control what your identities can access after they authenticate, IAM Identity Center correlates the permission set to a role in IAM. For information about permissions sets, see [Permission sets](aws iam identity center user guide) in the *AWS IAM Identity Center User Guide*.

- **Temporary IAM user permissions** – An IAM user or role can assume an IAM role to temporarily take on different permissions for a specific task.

- **Cross-account access** – You can use an IAM role to allow someone (a trusted principal) in a different account to access resources in your account. Roles are the primary way to grant cross-account access. However, with some AWS services, you can attach a policy directly to a resource (instead of using a role as a proxy). To learn the difference between roles and resource-based policies for cross-account access, see [How IAM roles differ from resource-based policies](iam user guide) in the *IAM User Guide*.

- **Cross-service access** – Some AWS services use features in other AWS services. For example, when you make a call in a service, it's common for that service to run applications in Amazon EC2 or store objects.
in Amazon S3. A service might do this using the calling principal's permissions, using a service role, or using a service-linked role.

- **Principal permissions** – When you use an IAM user or role to perform actions in AWS, you are considered a principal. Policies grant permissions to a principal. When you use some services, you might perform an action that then triggers another action in a different service. In this case, you must have permissions to perform both actions. To see whether an action requires additional dependent actions in a policy, see Actions, resources, and condition keys for AWS services in the Service Authorization Reference.

- **Service role** – A service role is an IAM role that a service assumes to perform actions on your behalf. An IAM administrator can create, modify, and delete a service role from within IAM. For more information, see Creating a role to delegate permissions to an AWS service in the IAM User Guide.

- **Service-linked role** – A service-linked role is a type of service role that is linked to an AWS service. The service can assume the role to perform an action on your behalf. Service-linked roles appear in your AWS account and are owned by the service. An IAM administrator can view, but not edit the permissions for service-linked roles.

- **Applications running on Amazon EC2** – You can use an IAM role to manage temporary credentials for applications that are running on an EC2 instance and making AWS CLI or AWS API requests. This is preferable to storing access keys within the EC2 instance. To assign an AWS role to an EC2 instance and make it available to all of its applications, you create an instance profile that is attached to the instance. An instance profile contains the role and enables programs that are running on the EC2 instance to get temporary credentials. For more information, see Using an IAM role to grant permissions to applications running on Amazon EC2 instances in the IAM User Guide.

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

### Managing access using policies

You control access in AWS by creating policies and attaching them to AWS identities or resources. A policy is an object in AWS that, when associated with an identity or resource, defines their permissions. AWS evaluates these policies when a principal (user, root user, or role session) makes a request. Permissions in the policies determine whether the request is allowed or denied. Most policies are stored in AWS as JSON documents. For more information about the structure and contents of JSON policy documents, see Overview of JSON policies in the IAM User Guide.

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

By default, users and roles have no permissions. To grant users permission to perform actions on the resources that they need, an IAM administrator can create IAM policies. The administrator can then add the IAM policies to roles, and users can assume the roles.

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

### Identity-based policies

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

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

Resource-based policies

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

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

Access control lists (ACLs)

Access control lists (ACLs) control which principals (account members, users, or roles) have permissions to access a resource. ACLs are similar to resource-based policies, although they do not use the JSON policy document format.

Amazon S3, AWS WAF, and Amazon VPC are examples of services that support ACLs. To learn more about ACLs, see Access control list (ACL) overview in the Amazon Simple Storage Service Developer Guide.

Other policy types

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

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

- Service control policies (SCPs) – SCPs are JSON policies that specify the maximum permissions for an organization or organizational unit (OU) in AWS Organizations. AWS Organizations is a service for grouping and centrally managing multiple AWS accounts that your business owns. If you enable all features in an organization, then you can apply service control policies (SCPs) to any or all of your accounts. The SCP limits permissions for entities in member accounts, including each AWS account root user. For more information about Organizations and SCPs, see How SCPs work in the AWS Organizations User Guide.

- Session policies – Session policies are advanced policies that you pass as a parameter when you programmatically create a temporary session for a role or federated user. The resulting session's permissions are the intersection of the user or role's identity-based policies and the session policies. Permissions can also come from a resource-based policy. An explicit deny in any of these policies overrides the allow. For more information, see Session policies in the IAM User Guide.

Multiple policy types

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

To get a high-level view of how AWS services work with most IAM features, see [AWS services that work with IAM](#) in the [IAM User Guide](#).

To learn how to use a specific AWS service with IAM, see the security section of the relevant service's User Guide.

Troubleshooting AWS identity and access

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

**Topics**

- I am not authorized to perform an action in AWS (p. 82)
- I am not authorized to perform iam:PassRole (p. 82)
- I want to allow people outside of my AWS account to access my AWS resources (p. 83)

**I am not authorized to perform an action in AWS**

If you receive an error that you're not authorized to perform an action, your policies must be updated to allow you to perform the action.

The following example error occurs when the mateojackson IAM user tries to use the console to view details about a fictional `my-example-widget` resource but doesn't have the fictional `awes:GetWidget` permissions.

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

In this case, the policy for the mateojackson user must be updated to allow access to the `my-example-widget` resource by using the `awes:GetWidget` action.

If you need help, contact your AWS administrator. Your administrator is the person who provided you with your sign-in credentials.

**I am not authorized to perform iam:PassRole**

If you receive an error that you're not authorized to perform the `iam:PassRole` action, your policies must be updated to allow you to pass a role to AWS.

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

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

```
User: arn:aws:iam::123456789012:user/marymajor is not authorized to perform: iam:PassRole
```

In this case, Mary's policies must be updated to allow her to perform the `iam:PassRole` action.

If you need help, contact your AWS administrator. Your administrator is the person who provided you with your sign-in credentials.
I want to allow people outside of my AWS account to access my AWS resources

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

To learn more, consult the following:

- To learn whether AWS supports these features, see How AWS services work with IAM (p. 82).
- To learn how to provide access to your resources across AWS accounts that you own, see Providing access to an IAM user in another AWS account that you own in the IAM User Guide.
- To learn how to provide access to your resources to third-party AWS accounts, see Providing access to AWS accounts owned by third parties in the IAM User Guide.
- To learn how to provide access through identity federation, see Providing access to externally authenticated users (identity federation) in the IAM User Guide.
- To learn the difference between using roles and resource-based policies for cross-account access, see How IAM roles differ from resource-based policies in the IAM User Guide.

Compliance Validation for this AWS Product or Service

To learn whether an AWS service is within the scope of specific compliance programs, see AWS services in Scope by Compliance Program and choose the compliance program that you are interested in. For general information, see AWS Compliance Programs.

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

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

- Security and Compliance Quick Start Guides – These deployment guides discuss architectural considerations and provide steps for deploying baseline environments on AWS that are security and compliance focused.
- Architecting for HIPAA Security and Compliance on Amazon Web Services – This whitepaper describes how companies can use AWS to create HIPAA-eligible applications.

  Note
  Not all AWS services are HIPAA eligible. For more information, see the HIPAA Eligible Services Reference.

- AWS Compliance Resources – This collection of workbooks and guides might apply to your industry and location.
- Evaluating Resources with Rules in the AWS Config Developer Guide – The AWS Config service assesses how well your resource configurations comply with internal practices, industry guidelines, and regulations.
- AWS Security Hub – This AWS service provides a comprehensive view of your security state within AWS. Security Hub uses security controls to evaluate your AWS resources and to check your compliance against security industry standards and best practices. For a list of supported services and controls, see Security Hub controls reference.
• **AWS Audit Manager** – This AWS service helps you continuously audit your AWS usage to simplify how you manage risk and compliance with regulations and industry standards.

This AWS product or service follows the **shared responsibility model** through the specific Amazon Web Services (AWS) services it supports. For AWS service security information, see the [AWS service security documentation page](#) and [AWS services that are in scope of AWS compliance efforts by compliance program](#).

## Enforcing a minimum TLS version in the Tools for PowerShell

To increase security when communicating with AWS services, you should configure the Tools for PowerShell to use the appropriate TLS version. For information about how to do this, see [Enforcing a minimum TLS version](#) in the [AWS SDK for .NET Developer Guide](#).
### Document history

This topic describes significant changes to the documentation for the AWS Tools for PowerShell.

We also update the documentation periodically in response to customer feedback. To send feedback about a topic, use the feedback buttons next to "Did this page help you?" located at the bottom of each page.

For additional information about changes and updates to the AWS Tools for PowerShell, see the release notes.

<table>
<thead>
<tr>
<th>Change</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Included more IAM best practices updates (p. 85)</td>
<td>Updated guide to align with the IAM best practices. For more information, see Security best practices in IAM.</td>
<td>October 12, 2023</td>
</tr>
<tr>
<td>Installing on Windows (p. 4)</td>
<td>Removed information about installing the Tools for Windows PowerShell by using the MSI, which has been deprecated.</td>
<td>September 25, 2023</td>
</tr>
<tr>
<td>IAM best practices updates (p. 85)</td>
<td>Updated guide to align with the IAM best practices. For more information, see Security best practices in IAM.</td>
<td>September 8, 2023</td>
</tr>
<tr>
<td>Pipelining and $AWSHistory (p. 37)</td>
<td>Added the IncludeSensitiveData parameter to the Set-AWSHistoryConfiguration cmdlet.</td>
<td>March 9, 2023</td>
</tr>
<tr>
<td>Using the ClientConfig parameter in cmdlets (p. 74)</td>
<td>Added information about support for the ClientConfig parameter.</td>
<td>October 28, 2022</td>
</tr>
<tr>
<td>Launch an Amazon EC2 Instance Using Windows PowerShell (p. 66)</td>
<td>Added notes about retiring EC2-Classic.</td>
<td>July 26, 2022</td>
</tr>
<tr>
<td>AWS Tools for PowerShell Version 4 (p. 85)</td>
<td>Added information about version 4, including installation instructions for both Windows and Linux/macOS, and a migration topic that describes the differences from version 3 and introduces new features.</td>
<td>November 21, 2019</td>
</tr>
<tr>
<td>AWS Tools for PowerShell 3.3.563 (p. 85)</td>
<td>Added information about how to install and use the preview version of the AWS.Tools.Common module. This new module breaks apart the older monolithic package.</td>
<td>October 18, 2019</td>
</tr>
<tr>
<td><strong>AWS Tools for Windows PowerShell</strong></td>
<td>Added information to the Using the AWS Tools for PowerShell section introducing the AWS Lambda Tools for PowerShell for PowerShell Core developers to build AWS Lambda functions.</td>
<td>September 11, 2018</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>AWS Tools for Windows PowerShell 3.1.31.0 (p. 85)</strong></td>
<td>Added information to the Getting Started section about new cmdlets that use Security Assertion Markup Language (SAML) to support configuring federated identity for users.</td>
<td>December 1, 2015</td>
</tr>
<tr>
<td><strong>AWS Tools for Windows PowerShell 2.3.19 (p. 85)</strong></td>
<td>Added information to the Cmdlets Discovery and Aliases section about the new <code>Get-AWSCmdletName</code> cmdlet that can help users more easily find their desired AWS cmdlets.</td>
<td>February 5, 2015</td>
</tr>
<tr>
<td><strong>AWS Tools for Windows PowerShell 1.1.1.0 (p. 85)</strong></td>
<td>Collection output from cmdlets is always enumerated to the PowerShell pipeline. Automatic support for pageable service calls. New <code>$AWSHistory</code> shell variable collects service responses and optionally service requests. AWSRegion instances use Region field instead of SystemName to aid pipelining. Remove-S3Bucket supports a <code>-DeleteObjects</code> switch option. Fixed usability issue with Set-AWSCredentials. Initialize-AWSDefaults reports from where it obtained credentials and region data. Stop-EC2Instance accepts Amazon.EC2.Model.Reservation instances as input. Generic <code>&lt;T&gt;</code> parameter types replaced with array types (<code>[T]</code>). Cmdlets that delete or terminate resources prompt for confirmation prior to deletion. Write-S3Object supports in-line text content to upload to Amazon S3.</td>
<td>May 15, 2013</td>
</tr>
</tbody>
</table>
The install location of the Tools for Windows PowerShell module has changed so that environments using Windows PowerShell version 3 can take advantage of auto-loading. The module and supporting files are now installed to an AWSPowerShell subfolder beneath AWS ToolsPowerShell. Files from previous versions that exist in the AWS ToolsPowerShell folder are automatically removed by the installer. The PSMODULEPATH for Windows PowerShell (all versions) is updated in this release to contain the parent folder of the module (AWS ToolsPowerShell). For systems with Windows PowerShell version 2, the Start Menu shortcut is updated to import the module from the new location and then run Initialize-AWSDefaults. For systems with Windows PowerShell version 3, the Start Menu shortcut is updated to remove the Import-Module command, leaving just Initialize-AWSDefaults. If you edited your PowerShell profile to perform an Import-Module of the AWSPowerShell.psd1 file, you will need to update it to point to the file's new location (or, if using PowerShell version 3, remove the Import-Module statement as it is no longer needed). As a result of these changes, the Tools for Windows PowerShell module is now listed as an available module when executing Get-Module -ListAvailable. In addition, for users of Windows PowerShell version 3, the execution of any cmdlet exported by the module will automatically load the module in the current PowerShell shell without needing to use Import-Module first. This enables interactive
use of the cmdlets on a system with an execution policy that disallows script execution.

| AWS Tools for Windows PowerShell 1.0.0.0 (p. 85) | Initial release | December 6, 2012 |