User Guide

AWS Tools for PowerShell

AWS Tools for PowerShell: User Guide

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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.

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

- `AWS.Tools`
- AWSPowerShell.NetCore
- AWSPowerShell

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, in most cases, 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 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

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

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

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
- Installing AWS Tools for PowerShell on Linux or macOS
- Migrating from AWS Tools for PowerShell Version 3.3 to Version 4

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`** - 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** - The single, large-module version of AWS Tools for PowerShell. All AWS services are supported by this single, large module.

  > **Note**
  >
  > Be aware that the single module might be too large to use with AWS Lambda functions. Instead, use the modularized version shown above.

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

  This method is described in the procedure that follows.
- 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` cmdlet.

To install `AWS.Tools` on Windows using the `AWS.Tools.Installer` module

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.

```
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.

```
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 Amazon EC2 and Amazon S3 modules. 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.

```
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, the previous 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. For example, the following command installs the IAM module to the `%ProgramFiles%\WindowsPowerShell\Modules` folder that is accessible by all users.

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

To install other modules, run similar commands with the appropriate module names, as found in the PowerShell Gallery.

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.ps1
 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.ps1'
    + CategoryInfo          : NotSpecified: (:) [], PSSecurityException
    + FullyQualifiedErrorId : RuntimeException
```

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:
- Logging from log4net, Apache License
[http://logging.apache.org/log4net/license.html]
```

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
...

Service                          Noun Prefix Module Name                      SDK

 Assembly
```

```
 Version
-------                             ----------- -----------
 -----------
Alexa For Business                  ALXB        AWS.Tools.AlexaForBusiness
 3.7.0.11
Amplify Backend                     AMPB        AWS.Tools.AmplifyBackend
 3.7.0.11
Amazon API Gateway                  AG          AWS.Tools.APIGateway
 3.7.0.11
Amazon API Gateway Management API   AGM         AWS.Tools.ApiGatewayManagementApi
 3.7.0.11
Amazon API Gateway V2               AG2         AWS.Tools.ApiGatewayV2
 3.7.0.11
Amazon Appflow                      AF          AWS.Tools.Appflow
 3.7.1.4
Amazon Route 53                     R53         AWS.Tools.Route53
 3.7.0.12
Amazon Route 53 Domains             R53D        AWS.Tools.Route53Domains
 3.7.0.11
Amazon Route 53 Resolver            R53R        AWS.Tools.Route53Resolver
 3.7.1.5
Amazon Simple Storage Service (S3) S3           AWS.Tools.S3
 3.7.0.13
...
```

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

```
PS > $PSVersionTable

Name                           Value
----                           -----
PSVersion                      6.2.2
PSEdition                      Core
GitCommitId                    6.2.2
OS                             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
Platform                       Unix
PSCompatibleVersions           {1.0, 2.0, 3.0, 4.0…}
PSRemotingProtocolVersion      2.3
SerializationVersion           1.1.0.1
WSManStackVersion              3.0
```

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` modules

To update 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/) 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.

```
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.

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.

```
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`** – 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** – The single, large-module version of AWS Tools for PowerShell. All AWS services are supported by this single, large module.

> **Note**
>
> Be aware that the single module might be too large to use with AWS Lambda functions. Instead, use the modularized version shown above.

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 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 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 on the Microsoft PowerShell website.

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

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

  This method is described in the procedure that follows.
- 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.

To install `AWS.Tools` on Linux or macOS using the `AWS.Tools.Installer` module

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

   ```
   $ 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.

   ```
   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.

```
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 Amazon EC2 and Amazon S3 modules. 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.

```
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 the repository as a trusted source. Use the command `Get-PSRepository -Name PSGallery` for more information about this `PSRepository`.

The previous command installs modules into the default directories on your system. The actual directories depend on your operating system distribution and version and on the version of PowerShell you installed. For example, if you installed PowerShell 7 on a RHEL-like system, the default modules are most likely located in `/opt/microsoft/powershell/7/Modules` (or `$PSHOME/Modules`) and user modules are most likely located in `~/.local/share/powershell/Modules`. For more information, see Install PowerShell on Linux on the Microsoft PowerShell website. To see where modules are installed, run the following command:

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

To install other modules, run similar commands with the appropriate module names, as found in the PowerShell Gallery.

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. 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 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

ModuleType Version    Name                                PSEdition ExportedCommands
---------- -------    ----                                --------- ----------------
Binary     3.3.563.1  AWS.Tools.Common                    Desk      {Clear-
AWSHistory, Set-AWSHistoryConfiguration, Initialize-AWSDefaultConfiguration, Clear-
AWSDefaultConfigurat…
```

AWSPowerShell.NetCore

```
PS > Get-Module -ListAvailable

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

ModuleType Version    Name                                ExportedCommands
---------- -------    ----                                ----------------
Binary     3.3.563.1  AWSPowerShell.NetCore
```

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 AWSPowerShell.NetCore` 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.

> **Note**
>
> In earlier (before 3.3.96.0) releases of the AWS Tools for PowerShell, this cmdlet was named `Initialize-AWSDefaults`.

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.

```
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.

```
PS > $PSVersionTable
Name                           Value
----                           -----
PSVersion                      6.2.2
PSEdition                      Core
GitCommitId                    6.2.2
```

```
OS                              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
Platform                        Unix
PSCompatibleVersions            {1.0, 2.0, 3.0, 4.0…}
PSRemotingProtocolVersion       2.3
SerializationVersion            1.1.0.1
WSManStackVersion               3.0
```

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` modules

To update 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, 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
- Work with AWS services in the AWS Tools for PowerShell

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
  i-0123456789abcdefg
  i-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

ETag : "01234567890123456789012345678901111"
BucketName : mybucket
Key : file1.txt
LastModified : 9/30/2019 1:31:40 PM
Owner : Amazon.S3.Model.Owner
Size : 568
StorageClass : STANDARD

ETag : "01234567890123456789012345678902222"
BucketName : mybucket
Key : file2.txt
LastModified : 7/15/2019 9:36:54 AM
Owner : Amazon.S3.Model.Owner
Size : 392
StorageClass : STANDARD
```

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

```
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.

```
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.

```
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-Object` cmdlet and specify the `-First` *n* parameter, where *n* is the maximum number of items to include in the final output.

```
PS > Get-S3ObjectV2 -BucketName BUCKET_NAME -Select S3Objects.Key | select -first 2
file1.txt
file2.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.

```
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.

```
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.

```
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 Manadatory 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.

```
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. For example, they explain how to specify which credentials and AWS Region 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
- Specify AWS Regions
- Configure federated identity with the AWS Tools for PowerShell
- Cmdlet discovery and aliases
- Pipelining and $AWSHistory
- Credential and profile resolution
- Additional information about users and roles
- Using legacy credentials

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
2. Configure the Tools for PowerShell to use IAM Identity Center.
3. Start an AWS access portal session

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.

> **Note**
>
> Starting with version 4.1.538 of the Tools for PowerShell, the recommended method to configure SSO credentials and start an AWS access portal session is to use the `Initialize-AWSSSOConfiguration` and `Invoke-AWSSSOLogin` cmdlets, as described in this topic. If you don't have access to that version of the Tools for PowerShell (or later) or can't use those cmdlets, you can still perform these tasks by using the AWS CLI. To find out how, see Use the AWS CLI for portal login.

The following procedure updates the shared AWS `config` file with SSO information that the Tools for PowerShell uses to obtain temporary credentials. As a consequence of this procedure, an AWS access portal session is also started. If the shared `config` file already has SSO information and you just want to know how to start an access portal session using the Tools for PowerShell, see the next section in this topic, Start an AWS access portal session.

1. If you haven't already done so, open PowerShell and install the AWS Tools for PowerShell as appropriate for your operating system and environment, including the common cmdlets. For information about how to do this, see Installing the AWS Tools for PowerShell.

   For example, if installing the modularized version of the Tools for PowerShell on Windows, you would most likely run commands similar to the following:

```
Install-Module -Name AWS.Tools.Installer
Install-AWSToolsModule AWS.Tools.Common
```

2. Run the following command. Replace the example property values with values from your IAM Identity Center configuration. For information about these properties and how to find them, see IAM Identity Center credential provider settings in the *AWS SDKs and Tools Reference Guide*.

```
$params = @{
  ProfileName = 'my-sso-profile'
  AccountId = '111122223333'
  RoleName = 'SamplePermissionSet'
  SessionName = 'my-sso-session'
  StartUrl = 'https://provided-domain.awsapps.com/start'
  SSORegion = 'us-west-2'
  RegistrationScopes = 'sso:account:access'
};
Initialize-AWSSSOConfiguration @params
```

   Alternatively, you can simply use the cmdlet by itself, `Initialize-AWSSSOConfiguration`, and the Tools for PowerShell prompts you for the property values.

   Considerations for certain property values:

   - If you simply followed the instructions to enable and configure IAM Identity Center, the value for `-RoleName` might be `PowerUserAccess`. But if you created an IAM Identity Center permission set specifically for PowerShell work, use that instead.
   - Be sure to use the AWS Region where you have configured IAM Identity Center.

3. At this point, the shared AWS `config` file contains a profile called `my-sso-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 shows the profile that was created by using the command shown above. Some of the property values and their order might be different in your actual profile.

The profile's `sso-session` property refers to the section named `my-sso-session`, which contains settings to initiate an AWS access portal session.

```
[profile my-sso-profile]
sso_account_id=111122223333
sso_role_name=SamplePermissionSet
sso_session=my-sso-session

[sso-session my-sso-session]
sso_region=us-west-2
sso_registration_scopes=sso:account:access
sso_start_url=https://provided-domain.awsapps.com/start/
```

4. If you already have an active AWS access portal session, the Tools for PowerShell informs you that you are already logged in.

   If that's not the case, the Tools for PowerShell attempts to automatically open the SSO authorization page in your default web browser. Follow the prompts in your browser, which might include an SSO authorization code, username and password, and permission to access AWS IAM Identity Center accounts and permission sets.

   The Tools for PowerShell informs you that SSO login was successful.

Start an AWS access portal session

Before running commands that accesses AWS services, you need an active AWS access portal session so that the Tools for PowerShell can use IAM Identity Center authentication to resolve credentials. To sign in to the AWS access portal, run the following command in PowerShell, where `-ProfileName my-sso-profile` is the name of the profile that was created in the shared `config` file when you followed the procedure in the previous section of this topic.

```
Invoke-AWSSSOLogin -ProfileName my-sso-profile
```

If you already have an active AWS access portal session, the Tools for PowerShell informs you that you are already logged in.

If that's not the case, the Tools for PowerShell attempts to automatically open the SSO authorization page in your default web browser. Follow the prompts in your browser, which might

include an SSO authorization code, username and password, and permission to access AWS IAM Identity Center accounts and permission sets.

The Tools for PowerShell informs you that SSO login was successful.

To test if you already have an active session, run the following command after installing or importing the `AWS.Tools.SecurityToken` module as needed.

```
Get-STSCallerIdentity -ProfileName my-sso-profile
```

The response to the `Get-STSCallerIdentity` cmdlet reports the IAM Identity Center account and permission set configured in the shared `config` file.

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 `my-sso-profile` profile, which was configured earlier in this topic.
- When you log in through the `Initialize-AWSSSOConfiguration` or `Invoke-AWSSSOLogin` cmdlets, the user has at least read-only permissions for Amazon S3.
- Some S3 buckets are available for that user to view.

Install or import the `AWS.Tools.S3` module as needed and then use the following PowerShell command to display a list of the S3 buckets.

```
Get-S3Bucket -ProfileName my-sso-profile
```

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*.
- Some commands require an AWS Region to be specified. There are a number of ways to do so, including the `-Region` cmdlet option, the `[default]` profile, and the `AWS_REGION` environment variable. For more information, see Specify AWS Regions in this guide and AWS Region 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*.

Topics

- Use the AWS CLI for portal login

Use the AWS CLI for portal login

Starting with version 4.1.538 of the Tools for PowerShell, the recommended method to configure SSO credentials and start an AWS access portal session is to use the `Initialize-AWSSSOConfiguration` and `Invoke-AWSSSOLogin` cmdlets, as described in Configure tool authentication with AWS. If you don't have access to that version of the Tools for PowerShell (or later) or can't use those cmdlets, you can still perform these tasks by using the AWS CLI.

Configure the Tools for PowerShell to use IAM Identity Center through the AWS CLI.

If you haven't already done so, be sure to Enable and configure IAM Identity Center before you proceed.

Information about how to configure the Tools for PowerShell to use IAM Identity Center through the AWS CLI 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 an 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're using an older version of the Tools for PowerShell and 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 so that the Tools for Windows PowerShell can 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 are using the `[default]` profile, you do not need to call the command with the `--profile` option. If your SSO token provider configuration is using a named profile, the command is `aws sso login --profile named-profile` instead. For more information about named profiles, see the Profiles section in the *AWS SDKs and Tools Reference Guide*.

To test if you already have an active session, run the following AWS CLI command (with the same consideration for named profile):

```
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:

```
Install-Module AWS.Tools.Installer
Install-AWSToolsModule S3
# And if using an older version of the AWS Tools for PowerShell:
Install-AWSToolsModule SSO, SSOOIDC

# In older versions of the AWS Tools for PowerShell, we're not invoking a cmdlet from
 these modules directly,
# so we must import them explicitly:
Import-Module AWS.Tools.SSO
Import-Module AWS.Tools.SSOOIDC

# Older versions of the AWS Tools for PowerShell don't support the SSO login flow, so
 login with the CLI
aws sso login

# Now we can invoke cmdlets using the SSO profile
Get-S3Bucket
```

As mentioned above, since you are using the `[default]` profile, you do not need to call the `Get-S3Bucket` cmdlet with the `-ProfileName` option. If your SSO token provider configuration is using a named profile, the command is `Get-S3Bucket -ProfileName` *`named-profile`*. For more information about named profiles, see the Profiles section in the *AWS SDKs and Tools Reference Guide*.

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*.
- Some commands require an AWS Region to be specified. There are a number of ways to do so, including the `-Region` cmdlet option, the `[default]` profile, and the `AWS_REGION` environment variable. For more information, see Specify AWS Regions in this guide and AWS Region 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:

- 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, 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

Region    Name            IsShellDefault
------    ----            --------------
```

```
us-west-2 US West (Oregon) True
```

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

Region         Name                      IsShellDefault
------         ----                      --------------
ap-east-1      Asia Pacific (Hong Kong)  False
ap-northeast-1 Asia Pacific (Tokyo)      False
...
us-east-2      US East (Ohio)            False
us-west-1      US West (N. California)   False
us-west-2      US West (Oregon)          True
...
```

> **Note**
>
> Some Regions might be supported but not included in the output of the `Get-AWSRegion` cmdlet. For example, this is sometimes true of Regions that are not yet global. If you're not able to specify a Region by adding the `-Region` parameter to a command, try specifying the Region in a custom endpoint instead, as shown in the following section.

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.

```
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`.

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

Additional information

For additional information about AWS Regions, see AWS Region in the *AWS SDKs and Tools Reference Guide*.

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 on Wikipedia, or SAML Technical Specifications 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.

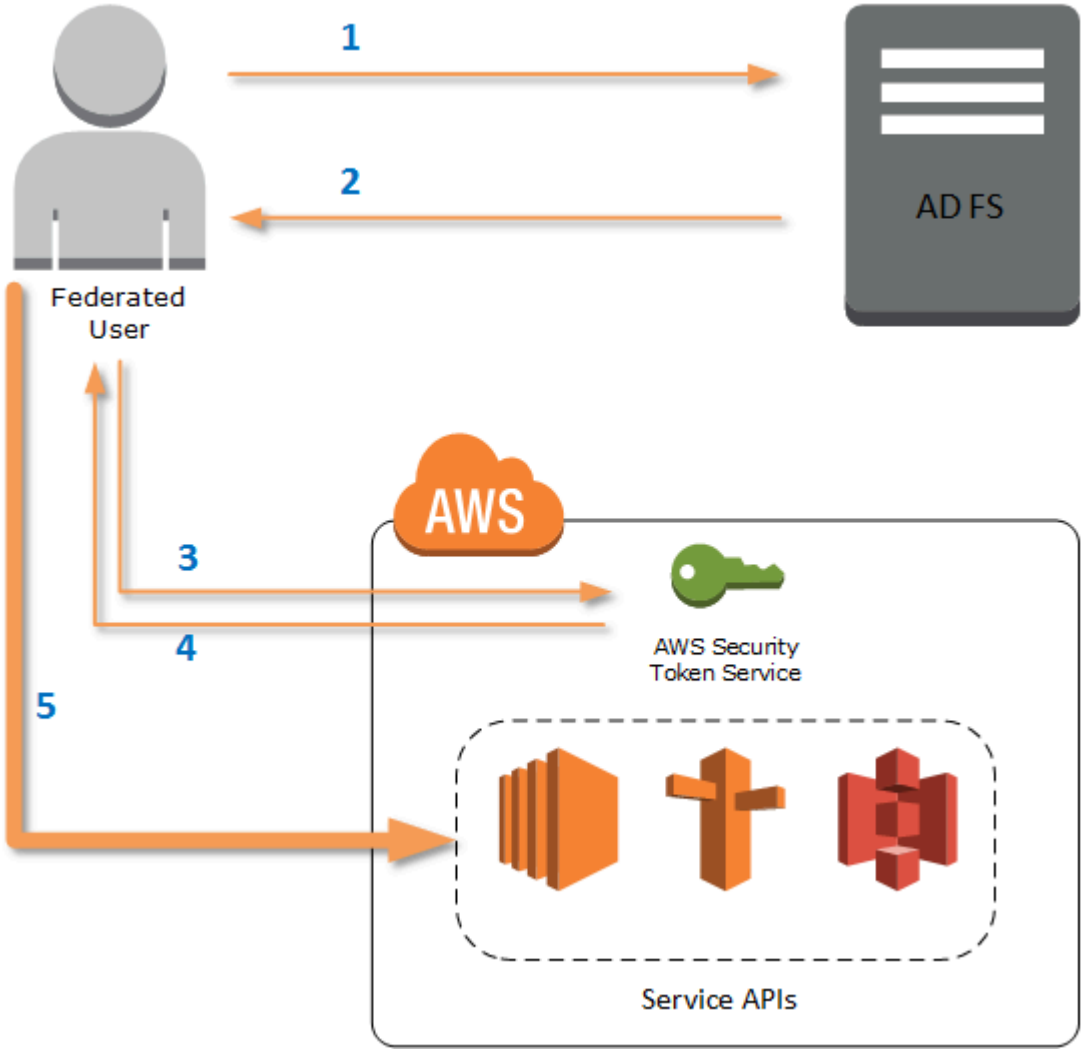
- A federated identity solution that is correctly integrated with your AWS account for console access by using only your organizational credentials. For more information about how to do this specifically for Active Directory Federation Services, see About SAML 2.0 Federation in the *IAM*

User Guide, and the blog post, [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.

- Version 3.1.31.0 or newer of the AWS Tools for PowerShell installed on your local workstation.

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.

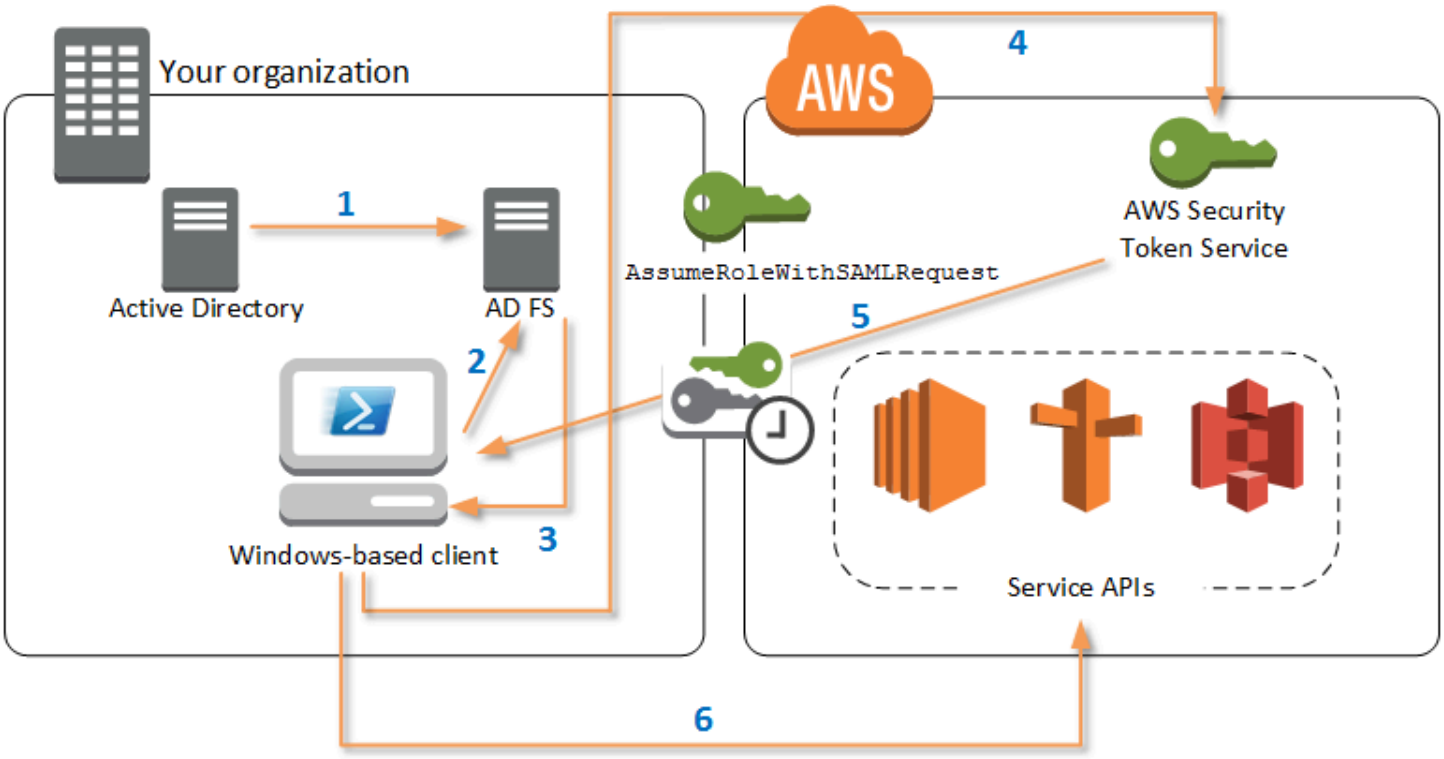


1. The client on federated user's computer authenticates against AD FS.
2. If authentication succeeds, AD FS sends the user a SAML assertion.

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.

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.

   ```
   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.

   ```
   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
   [1] 1 - ADFS-Dev  [2] 2 - ADFS-Production  [?] Help (default is "1"):
   ```

   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 a 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

Instances                                                       GroupNames
---------                                                       ----------
{TestInstance1}                                                 {default}
{TestInstance2}                                                 {}
{TestInstance3}                                                 {launch-wizard-6}
{TestInstance4}                                                 {default}
{TestInstance5}                                                 {}
{TestInstance6}                                                 {AWS-OpsWorks-Default-
Server}
```

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

CreationDate                                                    BucketName
------------                                                    ----------
7/25/2013 3:16:56 AM                                            mybucket1
4/15/2015 12:46:50 AM                                           mybucket2
4/15/2015 6:15:53 AM                                            mybucket3
1/12/2015 11:20:16 PM                                           mybucket4
```

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.

```
PS > (Get-Ec2Instance -ProfileName ADFS-Production -Region ap-southeast-2).Instances |
 Select InstanceType, @{Name="Servername";Expression={$_.tags | where key -eq "Name" |
 Select Value -Expand Value}}

 InstanceType                                                    Servername
 ------------                                                    ----------
 t2.small                                                        DC2
 t1.micro                                                        NAT1
 t1.micro                                                        RDGW1
 t1.micro                                                        RDGW2
 t1.micro                                                        NAT2
```

```
t2.small                                                    DC1
t2.micro                                                    BUILD
```

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

CmdletName        ServiceOperation    ServiceName                    CmdletNounPrefix
----------        ----------------    -----------                    ----------------
Get-EC2Instance   DescribeInstances   Amazon Elastic Compute Cloud   EC2
Get-GMLInstance   DescribeInstances   Amazon GameLift Service        GML
```

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:

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

CmdletName        ServiceOperation    ServiceName                    CmdletNounPrefix
----------        ----------------    -----------                    ----------------
Get-EC2Instance   DescribeInstances   Amazon Elastic Compute Cloud   EC2
```

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

CmdletName                                  ServiceOperation
   ServiceName                         CmdletNounPrefix
----------                                  ----------------
   -----------                         ----------------
Approve-ECCacheSecurityGroupIngress         AuthorizeCacheSecurityGroupIngress
   Amazon ElastiCache                  EC
Get-ECCacheSecurityGroup                    DescribeCacheSecurityGroups
   Amazon ElastiCache                  EC
New-ECCacheSecurityGroup                    CreateCacheSecurityGroup
   Amazon ElastiCache                  EC
Remove-ECCacheSecurityGroup                 DeleteCacheSecurityGroup
   Amazon ElastiCache                  EC
Revoke-ECCacheSecurityGroupIngress          RevokeCacheSecurityGroupIngress
   Amazon ElastiCache                  EC
Add-EC2SecurityGroupToClientVpnTargetNetwrk
 ApplySecurityGroupsToClientVpnTargetNetwork Amazon Elastic Compute Cloud       EC2
Get-EC2SecurityGroup                        DescribeSecurityGroups
   Amazon Elastic Compute Cloud       EC2
```

```
Get-EC2SecurityGroupReference                   DescribeSecurityGroupReferences
   Amazon Elastic Compute Cloud       EC2
Get-EC2StaleSecurityGroup                       DescribeStaleSecurityGroups
   Amazon Elastic Compute Cloud       EC2
Grant-EC2SecurityGroupEgress                    AuthorizeSecurityGroupEgress
   Amazon Elastic Compute Cloud       EC2
Grant-EC2SecurityGroupIngress                   AuthorizeSecurityGroupIngress
   Amazon Elastic Compute Cloud       EC2
New-EC2SecurityGroup                            CreateSecurityGroup
   Amazon Elastic Compute Cloud       EC2
Remove-EC2SecurityGroup                         DeleteSecurityGroup
   Amazon Elastic Compute Cloud       EC2
Revoke-EC2SecurityGroupEgress                   RevokeSecurityGroupEgress
   Amazon Elastic Compute Cloud       EC2
Revoke-EC2SecurityGroupIngress                  RevokeSecurityGroupIngress
   Amazon Elastic Compute Cloud       EC2
Update-EC2SecurityGroupRuleEgressDescription  UpdateSecurityGroupRuleDescriptionsEgress
   Amazon Elastic Compute Cloud       EC2
Update-EC2SecurityGroupRuleIngressDescription
 UpdateSecurityGroupRuleDescriptionsIngress  Amazon Elastic Compute Cloud       EC2
Edit-EFSMountTargetSecurityGroup                ModifyMountTargetSecurityGroups
   Amazon Elastic File System         EFS
Get-EFSMountTargetSecurityGroup                 DescribeMountTargetSecurityGroups
   Amazon Elastic File System         EFS
Join-ELBSecurityGroupToLoadBalancer             ApplySecurityGroupsToLoadBalancer
   Elastic Load Balancing             ELB
Set-ELB2SecurityGroup                           SetSecurityGroups
   Elastic Load Balancing V2          ELB2
Enable-RDSDBSecurityGroupIngress                AuthorizeDBSecurityGroupIngress
   Amazon Relational Database Service RDS
Get-RDSDBSecurityGroup                          DescribeDBSecurityGroups
   Amazon Relational Database Service RDS
New-RDSDBSecurityGroup                          CreateDBSecurityGroup
   Amazon Relational Database Service RDS
Remove-RDSDBSecurityGroup                       DeleteDBSecurityGroup
   Amazon Relational Database Service RDS
Revoke-RDSDBSecurityGroupIngress                RevokeDBSecurityGroupIngress
   Amazon Relational Database Service RDS
Approve-RSClusterSecurityGroupIngress           AuthorizeClusterSecurityGroupIngress
   Amazon Redshift                    RS
Get-RSClusterSecurityGroup                      DescribeClusterSecurityGroups
   Amazon Redshift                    RS
New-RSClusterSecurityGroup                      CreateClusterSecurityGroup
   Amazon Redshift                    RS
```

```
Remove-RSClusterSecurityGroup                  DeleteClusterSecurityGroup
   Amazon Redshift                     RS
Revoke-RSClusterSecurityGroupIngress           RevokeClusterSecurityGroupIngress
   Amazon Redshift                     RS
```

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

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

CmdletName                                     ServiceOperation
   ServiceName                   CmdletNounPrefix
----------                                     ----------------
   -----------                   ----------------
Add-EC2SecurityGroupToClientVpnTargetNetwrk
 ApplySecurityGroupsToClientVpnTargetNetwork Amazon Elastic Compute Cloud EC2
Get-EC2SecurityGroup                           DescribeSecurityGroups
   Amazon Elastic Compute Cloud EC2
Get-EC2SecurityGroupReference                  DescribeSecurityGroupReferences
   Amazon Elastic Compute Cloud EC2
Get-EC2StaleSecurityGroup                      DescribeStaleSecurityGroups
   Amazon Elastic Compute Cloud EC2
Grant-EC2SecurityGroupEgress                   AuthorizeSecurityGroupEgress
   Amazon Elastic Compute Cloud EC2
Grant-EC2SecurityGroupIngress                  AuthorizeSecurityGroupIngress
   Amazon Elastic Compute Cloud EC2
New-EC2SecurityGroup                           CreateSecurityGroup
   Amazon Elastic Compute Cloud EC2
Remove-EC2SecurityGroup                        DeleteSecurityGroup
   Amazon Elastic Compute Cloud EC2
Revoke-EC2SecurityGroupEgress                  RevokeSecurityGroupEgress
   Amazon Elastic Compute Cloud EC2
Revoke-EC2SecurityGroupIngress                 RevokeSecurityGroupIngress
   Amazon Elastic Compute Cloud EC2
Update-EC2SecurityGroupRuleEgressDescription  UpdateSecurityGroupRuleDescriptionsEgress
   Amazon Elastic Compute Cloud EC2
Update-EC2SecurityGroupRuleIngressDescription
 UpdateSecurityGroupRuleDescriptionsIngress  Amazon Elastic Compute Cloud 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:

```
PS > Get-AWSCmdletName -AwsCliCommand "aws ec2 authorize-security-group-ingress"

CmdletName                    ServiceOperation              ServiceName
  CmdletNounPrefix
----------                    ----------------              -----------
  ----------------
Grant-EC2SecurityGroupIngress AuthorizeSecurityGroupIngress Amazon Elastic Compute
 Cloud EC2
```

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

Clear-DefaultAWSRegion
```

```
Copy-HSM2BackupToRegion
Get-AWSRegion
Get-DefaultAWSRegion
Get-EC2Region
Get-LSRegionList
Get-RDSSourceRegion
Set-DefaultAWSRegion
```

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 -Noun CWE*

CommandType     Name                                               Version    Source
-----------     ----                                               -------    ------
Cmdlet          Add-CWEResourceTag                                 3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Disable-CWEEventSource                             3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Disable-CWERule                                    3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Enable-CWEEventSource                              3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Enable-CWERule                                     3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Get-CWEEventBus                                    3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Get-CWEEventBusList                                3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Get-CWEEventSource                                 3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Get-CWEEventSourceList                             3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Get-CWEPartnerEventSource                          3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Get-CWEPartnerEventSourceAccountList               3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Get-CWEPartnerEventSourceList                      3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Get-CWEResourceTag                                 3.3.563.1
 AWSPowerShell.NetCore
```

```
Cmdlet          Get-CWERule                                     3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Get-CWERuleDetail                               3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Get-CWERuleNamesByTarget                        3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Get-CWETargetsByRule                            3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          New-CWEEventBus                                 3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          New-CWEPartnerEventSource                       3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Remove-CWEEventBus                              3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Remove-CWEPartnerEventSource                    3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Remove-CWEPermission                            3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Remove-CWEResourceTag                           3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Remove-CWERule                                  3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Remove-CWETarget                                3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Test-CWEEventPattern                            3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Write-CWEEvent                                  3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Write-CWEPartnerEvent                           3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Write-CWEPermission                             3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Write-CWERule                                   3.3.563.1
 AWSPowerShell.NetCore
Cmdlet          Write-CWETarget                                 3.3.563.1
 AWSPowerShell.NetCore
```

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 `EC2DescribeInstances` 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 `S3GetObject` method retrieves an Amazon S3 object. However, the `Get-S3Object` cmdlet returns *information* about an Amazon S3 object rather than the object itself.

```
PS > Get-S3Object -BucketName text-content -Key aws-tech-docs

ETag         : "df000002a0fe0000f3c000004EXAMPLE"
BucketName   : aws-tech-docs
Key          : javascript/frameset.js
LastModified : 6/13/2011 1:24:18 PM
Owner        : Amazon.S3.Model.Owner
Size         : 512
StorageClass : STANDARD
```

To get an S3 object with the AWS Tools for PowerShell, run the `Read-S3Object` cmdlet:

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

Mode          LastWriteTime            Length Name
----          -------------            ------ ----
-a---         11/5/2012   7:29 PM      20622  text-object-download.text
```

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`.

```
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.

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

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

```
. ~/.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.

```
PS > Get-Alias | ? Source -like "AWSPowerShell.NetCore"

CommandType     Name                                               Version    Source
-----------     ----                                               -------    ------
Alias           Add-ASInstances                                    3.3.343.0
 AWSPowerShell
Alias           Add-CTTag                                          3.3.343.0
 AWSPowerShell
```

```
Alias           Add-DPTags                                      3.3.343.0
 AWSPowerShell
Alias           Add-DSIpRoutes                                  3.3.343.0
 AWSPowerShell
Alias           Add-ELBTags                                     3.3.343.0
 AWSPowerShell
Alias           Add-EMRTag                                      3.3.343.0
 AWSPowerShell
Alias           Add-ESTag                                       3.3.343.0
 AWSPowerShell
Alias           Add-MLTag                                       3.3.343.0
 AWSPowerShell
Alias           Clear-AWSCredentials                            3.3.343.0
 AWSPowerShell
Alias           Clear-AWSDefaults                               3.3.343.0
 AWSPowerShell
Alias           Dismount-ASInstances                            3.3.343.0
 AWSPowerShell
Alias           Edit-EC2Hosts                                   3.3.343.0
 AWSPowerShell
Alias           Edit-RSClusterIamRoles                          3.3.343.0
 AWSPowerShell
Alias           Enable-ORGAllFeatures                           3.3.343.0
 AWSPowerShell
Alias           Find-CTEvents                                   3.3.343.0
 AWSPowerShell
Alias           Get-ASACases                                    3.3.343.0
 AWSPowerShell
Alias           Get-ASAccountLimits                             3.3.343.0
 AWSPowerShell
Alias           Get-ASACommunications                           3.3.343.0
 AWSPowerShell
Alias           Get-ASAServices                                 3.3.343.0
 AWSPowerShell
Alias           Get-ASASeverityLevels                           3.3.343.0
 AWSPowerShell
Alias           Get-ASATrustedAdvisorCheckRefreshStatuses       3.3.343.0
 AWSPowerShell
Alias           Get-ASATrustedAdvisorChecks                     3.3.343.0
 AWSPowerShell
Alias           Get-ASATrustedAdvisorCheckSummaries             3.3.343.0
 AWSPowerShell
Alias           Get-ASLifecycleHooks                            3.3.343.0
 AWSPowerShell
```

```
Alias           Get-ASLifecycleHookTypes                        3.3.343.0
 AWSPowerShell
Alias           Get-AWSCredentials                              3.3.343.0
 AWSPowerShell
Alias           Get-CDApplications                              3.3.343.0
 AWSPowerShell
Alias           Get-CDDeployments                               3.3.343.0
 AWSPowerShell
Alias           Get-CFCloudFrontOriginAccessIdentities          3.3.343.0
 AWSPowerShell
Alias           Get-CFDistributions                             3.3.343.0
 AWSPowerShell
Alias           Get-CFGConfigRules                              3.3.343.0
 AWSPowerShell
Alias           Get-CFGConfigurationRecorders                   3.3.343.0
 AWSPowerShell
Alias           Get-CFGDeliveryChannels                         3.3.343.0
 AWSPowerShell
Alias           Get-CFInvalidations                             3.3.343.0
 AWSPowerShell
Alias           Get-CFNAccountLimits                            3.3.343.0
 AWSPowerShell
Alias           Get-CFNStackEvents                              3.3.343.0
 AWSPowerShell

...
```

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.

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

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

```
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.

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

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

```
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:

```
PS > 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.

```
PS > $AWSHistory.Commands
```

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

```
PS > $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).

```
PS > $AWSHistory.LastServiceResponse
```

Access the details of the last request made (again, a cmdlet may make more than one request if it is paging on the user's behalf). Yields $null unless service request tracing is enabled.

```
PS > $AWSHistory.LastServiceRequest
```

Automatic 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.

```
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.

```
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`:

```
$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.

```
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. 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.

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 for applications that are running on Amazon EC2 instances.

Topics

- Using AWS Credentials
- Shared Credentials in AWS Tools for PowerShell

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.

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
- Managing Profiles
- Specifying Credentials
- Credentials Search Order
- Credential Handling in AWS Tools for PowerShell Core

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 and Toolkit for Visual Studio 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 or programmatically by using the AWS 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 AKIA0123456787EXAMPLE `
                -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—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

ProfileName  StoreTypeName         ProfileLocation
-----------  -------------         ---------------
default      SharedCredentialsFile /Users/shirley/.aws/credentials
production   SharedCredentialsFile /Users/shirley/.aws/credentials
test         SharedCredentialsFile /Users/shirley/.aws/credentials
```

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.

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.

```
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.

```
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.

```
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. The following example specifies a default profile and Region.

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

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.

```
PS > Get-EC2Instance -ProfileName MyProfileName -ProfileLocation C:
\aws_service_credentials\credentials
```

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:

   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.

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

# Reads the specified credential file looking for the profile "myProfileName"

Set-AWSCredential -ProfileName myProfileName -ProfileLocation ~/mycustompath/
mycredentials
```

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.

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.

Parameter Name	Description
ExternalId	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

Parameter Name	Description
	AWS Resources to a Third Party in the *IAM User Guide*.
MfaSerial	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*.
RoleArn	The ARN of the role to assume for assume role credentials. For more information about creating and using roles, see IAM Roles in the *IAM User Guide*.
SourceProfile	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.

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.

```
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

SourceCredentials                 RoleArn
 RoleSessionName                         Options
-----------------                 -------
 ---------------                         -------
```

```
Amazon.Runtime.BasicAWSCredentials arn:aws:iam::123456789012:role/
role-i-want-to-assume aws-dotnet-sdk-session-636238288466144357
 Amazon.Runtime.AssumeRoleAWSCredentialsOptions
```

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`.

```
PS > Get-S3Bucket -ProfileName my_role_profile

CreationDate           BucketName
------------           ----------
2/27/2017 8:57:53 AM   4ba3578c-f88f-4d8b-b95f-92a8858dac58-bucket1
2/27/2017 10:44:37 AM  2091a504-66a9-4d69-8981-aaef812a02c3-bucket2
```

Using the Credential Profile Types

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

Credentials Type	Parameters you must use

Basic
 	
These are the long term credentials for an IAM user
	`-AccessKey`
	
	`-SecretKey`

Session:
 	
These are the short term credentials for an IAM role that you retrieve manually, such as by directly calling the Use-STSRole cmdlet.
	`-AccessKey`
	
	`-SecretKey`
	
	`-SessionToken`

Role:	`-SourceProfile`
	
	`-RoleArn`

Credentials Type	Parameters you must use
These are are short term credentials for an IAM role that AWS Tools for PowerShell retrieve for you.	optional: `-ExternalId` optional: `-MfaSerial`

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.

Profile Location Value	Profile Resolution Behavior
null (not set) or empty	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 *(user's home directory)* `\.aws \credentials .`
The path to a file in the AWS shared credentia l file format	Search only the specified file for a profile with the given name.

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

ProfileName                    StoreTypeName         ProfileLocation
-----------                    -------------         ---------------
source_profile                 NetSDKCredentialsFile
assume_role_profile            NetSDKCredentialsFile
basic_profile                  SharedCredentialsFile C:\Users\auser\.aws\credentials
```

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. These examples rely on cmdlets that the Tools for PowerShell provides. To see what cmdlets are available, see the AWS Tools for PowerShell Cmdlet Reference.

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:

```
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:

```
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

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

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

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

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

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

Topics

- Amazon S3 and Tools for Windows PowerShell
- Amazon EC2 and Tools for Windows PowerShell
- AWS Lambda and AWS Tools for PowerShell
- Amazon SQS, Amazon SNS and Tools for Windows PowerShell
- CloudWatch from the AWS Tools for Windows PowerShell

- Using the ClientConfig parameter in cmdlets

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
- Hosting a Static Website on Amazon S3
- Amazon S3 Console

Topics

- Create an Amazon S3 Bucket, Verify Its Region, and Optionally Remove It
- Configure an Amazon S3 Bucket as a Website and Enable Logging
- Upload Objects to an Amazon S3 Bucket
- Delete Amazon S3 Objects and Buckets
- Upload In-Line Text Content to Amazon S3

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

CreationDate         BucketName
------------         ----------
8/16/19 8:45:38 PM   website-example
```

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
- Put Bucket (Amazon S3 Service Reference)
- AWS PowerShell Regions for Amazon S3

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      : A1813E27995FFDDD
AmazonId2      : T7hlDOeLqA5Q2XfTe8j2q3SLoP3/5XwhUU3RyJBGHU/LnC+CIWLeGgP0MY24xAlI
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
- 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>
>>   <body>
>>     <p>
```

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

IndexDocumentSuffix                                          ErrorDocument
-------------------                                          -------------
index.html                                                   error.html
```

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 S3`Put 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
- 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

RequestId      : E480ED92A2EC703D
AmazonId2      : k6tqaqC1nMkoeYwbuJXUx1/UDa49BJd6dfLN0Ls1mWYNPHjbc8/Nyvm6AGbWcc2P
ResponseStream :
Headers        : {x-amz-id-2, x-amz-request-id, Date, Server}
Metadata       : {}
ResponseXml    :
```

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
- 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.

Topics

- Creating a Key Pair
- Create a Security Group Using Windows PowerShell
- Find an Amazon Machine Image Using Windows PowerShell
- Launch an Amazon EC2 Instance Using Windows PowerShell

Creating a Key Pair

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

```
PS > $myPSKeyPair = New-EC2KeyPair -KeyName myPSKeyPair
```

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

```
PS > $myPSKeyPair | Get-Member

     TypeName: Amazon.EC2.Model.KeyPair

  Name                MemberType   Definition
  ----                ----------   ----------
  Equals              Method       bool Equals(System.Object obj)
  GetHashCode         Method       int GetHashCode()
  GetType             Method       type GetType()
  ToString            Method       string ToString()
  KeyFingerprint      Property     System.String KeyFingerprint {get;set;}
  KeyMaterial         Property     System.String KeyMaterial {get;set;}
  KeyName             Property     System.String KeyName {get;set;}
```

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.)

```
PS > $myPSKeyPair | Format-List KeyName, KeyFingerprint, KeyMaterial

  KeyName        : myPSKeyPair
  KeyFingerprint : 09:06:70:8e:26:b6:e7:ef:8f:fe:4a:1d:bc:9c:6a:63:11:ac:ad:3c
  KeyMaterial    : ----BEGIN RSA PRIVATE KEY----
                   MIIEogIBAAKCAQEAkK+ANYUS9c7niNjYfaCn6KYj/D0I6djnFoQE...
                   Mz6btoxPcE7EMeH1wySUp8nouAS9xbl9l7+VkD74bN9KmNcPa/Mu...
                   Zyn4vVe0Q5il/MpkrRogHqOB0rigeTeV5Yc3lvO0RFFPu0Kz4kcm...
                   w3Jg8dKsWn0plOpX7V3sRC02KgJIbejQUvBFGi5OQK9bm4tXBIeC...
```

```
                    daxKIAQMtDUdmBDrhR1/YMv8itFe5DiLLbq7Ga+FDcS85NstBa3h...
                    iuskGkcvgWkcFQkLmRHRoDpPb+OdFsZtjHZDpMVFmA9tT8EdbkEF...
                    3SrNeqZPsxJJIxOodb3CxLJpg75JU5kyWnb0+sDNVHoJiZCULCr0...
                    GGlLfEgB95KjGIk7zEv2Q7K6s+DHclrDeMZWa7KFNRZuCuX7jssC...
                    xO98abxMr3o3TNU6p1ZYRJEQ0oJr0W+kc+/8SWb8NIwfLtwhmJEy...
                    1BX9X8WFX/A8VLHrT1elrKmLkNECgYEAwltkV1pOJAFhz9p7ZFEv...
                    vvVsPaF0Ev9bk9pqhx269PB5Ox2KokwCagDMMaYvasWobuLmNu/1...
                    lmwRx7KTeQ7W1J3OLgxHA1QNMkip9c4Tb3q9vVc3t/fPf8vwfJ8C...
                    63g6N6rk2FkHZX1E62BgbewUd3eZOS05Ip4VUdvtGcuc8/qa+e5C...
                    KXgyt9nl64pMv+VaXfXkZhdLAdY0Khc9TGB9++VMSG5TrD15YJId...
                    gYALEI7m1jJKpHWAEs0hiemw5VmKyIZpzGstSJsFStERlAjiETDH...
                    YAtnI4J8dRyP9I7BOVOn3wNfIjk85gi1/0Oc+j8S65giLAfndWGR...
                    9R9wIkm5BMUcSRRcDy0yuwKBgEbkOnGGSD0ah4HkvrUkepIbUDTD...
                    AnEBM1cXI5UT7BfKInpUihZi59QhgdK/hkOSmWhlZGWikJ5VizBf...
                    drkBr/vTKVRMTi3lVFB7KkIV1xJxC5E/BZ+YdZEpWoCZAoGAC/Cd...
                    TTld5N6opgOXAcQJwzqoGa9ZMwc5Q9f4bfRc67emkw0ZAAwSsvWR...
                    x3O2duuy7/smTwWwskEWRK5IrUxoMv/VVYaqdzcOajwieNrblr7c...
                    -----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.

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

  KeyName        : myPSKeyPair
  KeyFingerprint : 09:06:70:8e:26:b6:e7:ef:8f:fe:4a:1d:bc:9c:6a:63:11:ac:ad:3c
```

Storing Your Private Key

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

```
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:

```
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.

```
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
- Creating a Security Group for EC2-Classic
- Creating a Security Group for EC2-VPC

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, you might 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`.

```
PS > Get-EC2SecurityGroup -GroupNames myPSSecurityGroup

OwnerId             : 123456789012
GroupName           : myPSSecurityGroup
GroupId             : sg-0a346530123456789
Description         : EC2-Classic from PowerShell
IpPermissions       : {Amazon.EC2.Model.IpPermission}
IpPermissionsEgress : {}
VpcId               :
Tags                : {}
```

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

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

IpProtocol       : tcp
FromPort         : 22
```

```
ToPort           : 22
UserIdGroupPairs : {}
IpRanges         : {203.0.113.25/32}
```

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 view the initial configuration of the security group, use the `Get-EC2SecurityGroup` cmdlet. By default, the security group for a VPC contains a rule that allows all outbound traffic. Notice that you can't reference a security group for EC2-VPC by name.

```
PS > Get-EC2SecurityGroup -GroupId sg-5d293231

OwnerId             : 123456789012
GroupName           : myPSSecurityGroup
GroupId             : sg-5d293231
Description         : EC2-VPC from PowerShell
IpPermissions       : {}
IpPermissionsEgress : {Amazon.EC2.Model.IpPermission}
VpcId               : vpc-da0013b3
Tags                : {}
```

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.

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

OwnerId             : 123456789012
GroupName           : myPSSecurityGroup
GroupId             : sg-5d293231
Description         : EC2-VPC from PowerShell
IpPermissions       : {Amazon.EC2.Model.IpPermission}
IpPermissionsEgress : {Amazon.EC2.Model.IpPermission}
VpcId               : vpc-da0013b3
Tags                : {}
```

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

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

IpProtocol       : tcp
FromPort         : 22
ToPort           : 22
UserIdGroupPairs : {}
IpRanges         : {203.0.113.25/32}

IpProtocol       : tcp
FromPort         : 3389
ToPort           : 3389
UserIdGroupPairs : {}
IpRanges         : {203.0.113.25/32}
```

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
- Get-EC2ImageByName

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.

```
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.

```
Architecture        : x86_64
BlockDeviceMappings : {/dev/sda1, xvdca, xvdcb, xvdcc…}
CreationDate        : 2019-06-12T10:41:31.000Z
Description         : Microsoft Windows Server 2019 Full Locale English with SQL Web
 2017 AMI provided by Amazon
EnaSupport          : True
Hypervisor          : xen
ImageId             : ami-000226b77608d973b
ImageLocation       : amazon/Windows_Server-2019-English-Full-SQL_2017_Web-2019.06.12
ImageOwnerAlias     : amazon
ImageType           : machine
KernelId            :
```

```
Name                : Windows_Server-2019-English-Full-SQL_2017_Web-2019.06.12
OwnerId             : 801119661308
Platform            : Windows
ProductCodes        : {}
Public              : True
RamdiskId           :
RootDeviceName      : /dev/sda1
RootDeviceType      : ebs
SriovNetSupport     : simple
State               : available
StateReason         :
Tags                : {}
VirtualizationType  : hvm
```

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
WINDOWS_2012_SQL_SERVER_STANDARD_2014
```

```
WINDOWS_2012_SQL_SERVER_WEB_2014
WINDOWS_2012_SQL_SERVER_EXPRESS_2012
WINDOWS_2012_SQL_SERVER_STANDARD_2012
WINDOWS_2012_SQL_SERVER_WEB_2012
WINDOWS_2012_SQL_SERVER_EXPRESS_2008
WINDOWS_2012_SQL_SERVER_STANDARD_2008
WINDOWS_2012_SQL_SERVER_WEB_2008
WINDOWS_2008R2_BASE
WINDOWS_2008R2_SQL_SERVER_EXPRESS_2012
WINDOWS_2008R2_SQL_SERVER_STANDARD_2012
WINDOWS_2008R2_SQL_SERVER_WEB_2012
WINDOWS_2008R2_SQL_SERVER_EXPRESS_2008
WINDOWS_2008R2_SQL_SERVER_STANDARD_2008
WINDOWS_2008R2_SQL_SERVER_WEB_2008
WINDOWS_2008RTM_BASE
WINDOWS_2008RTM_SQL_SERVER_EXPRESS_2008
WINDOWS_2008RTM_SQL_SERVER_STANDARD_2008
WINDOWS_2008_BEANSTALK_IIS75
WINDOWS_2012_BEANSTALK_IIS8
VPC_NAT
```

To narrow the set of images returned, specify one or more filter names using the `Names` parameter.

```
PS > Get-EC2ImageByName -Names WINDOWS_2016_CORE

Architecture        : x86_64
BlockDeviceMappings : {/dev/sda1, xvdca, xvdcb, xvdcc…}
CreationDate        : 2019-08-16T09:36:09.000Z
Description         : Microsoft Windows Server 2016 Core Locale English AMI provided by
 Amazon
EnaSupport          : True
Hypervisor          : xen
ImageId             : ami-06f2a2afca06f15fc
ImageLocation       : amazon/Windows_Server-2016-English-Core-Base-2019.08.16
ImageOwnerAlias     : amazon
ImageType           : machine
KernelId            :
Name                : Windows_Server-2016-English-Core-Base-2019.08.16
OwnerId             : 801119661308
Platform            : Windows
ProductCodes        : {}
Public              : True
RamdiskId           :
```

```
RootDeviceName      : /dev/sda1
RootDeviceType      : ebs
SriovNetSupport     : simple
State               : available
StateReason         :
Tags                : {}
VirtualizationType  : hvm
```

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
- Create a Security Group Using Windows PowerShell
- Find an Amazon Machine Image Using Windows PowerShell

> **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
- Launching an Instance in a VPC
- Launching a Spot Instance in a VPC

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
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              :
Tags                  : {}
VirtualizationType    : hvm
VpcId                 :
```

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.

```
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          : {}
GroupName       : {}
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-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.

```
$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.

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

The following command retrieves the ARN of the queue.

```
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.

```
PS > New-SNSTopic -Name myTopic
arn:aws:sns:us-west-2:123456789012: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:

```
# 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
$qarn = (Get-SQSQueueAttribute -QueueUrl $qurl -AttributeNames "QueueArn").QueueARN

# construct the policy and inject arns
$policy = @"
{
    "Version": "2012-10-17",
    "Statement": {
        "Effect": "Allow",
        "Principal": "*",
        "Action": "SQS:SendMessage",
        "Resource": "$qarn",
        "Condition": { "ArnEquals": { "aws:SourceArn": "$topicarn" } }
    }
}
"@

# set the policy
Set-SQSQueueAttribute -QueueUrl $qurl -Attribute @{ Policy=$policy }
```

Subscribe the queue to the SNS topic

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

```
PS > Connect-SNSNotification `
    -TopicARN arn:aws:sns:us-west-2:123456789012:myTopic `
    -Protocol SQS `
    -Endpoint arn:aws:sqs:us-west-2:123456789012:myQueue
arn:aws:sns:us-west-2:123456789012:myTopic:f8ff77c6-e719-4d70-8e5c-a54d41feb754
```

Give permissions

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

```
PS > Add-SNSPermission `
    -TopicArn arn:aws:sns:us-west-2:123456789012:myTopic `
    -Label ps-cmdlet-topic `
    -AWSAccountIds 123456789012 `
    -ActionNames publish
```

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

```
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`.

```
PS > Publish-SNSMessage `
    -TopicArn arn:aws:sns:us-west-2:123456789012:myTopic `
    -Message "Have A Nice Day!"
```

```
728180b6-f62b-49d5-b4d3-3824bb2e77f4
```

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

```
PS > Receive-SQSMessage -QueueUrl https://sqs.us-west-2.amazonaws.com/123456789012/
myQueue

Attributes             : {}
Body                   : {
                           "Type" : "Notification",
                           "MessageId" : "491c687d-b78d-5c48-b7a0-3d8d769ee91b",
                           "TopicArn" : "arn:aws:sns:us-west-2:123456789012:myTopic",
                           "Message" : "Have A Nice Day!",
                           "Timestamp" : "2019-09-09T21:06:27.201Z",
                           "SignatureVersion" : "1",
                           "Signature" :
 "llE17A2+XOuJZnw3TlgcXz4C4KPLXZxbxoEMIirelhl3u/oxkWmz5+9tJKFMns1ZOqQvKxk
+ExfEZcD5yWt6biVuBb8pyRmZ1bO3hUENl3ayv2WQiQT1vpLpM7VEQN5m+hLIiPFcs
                         vyuGkJReV7lOJWPHnCN
+qTE2lId2RPkFOeGtLGawTsSPTWEvJdDbLlf7E0zZ0q1niXTUtpsZ8Swx01X3QO6u9i9qBFt0ekJFZNJp6Avu05hIklb4yo
y0a8Yl9lWp7a7EoWaBn0zhCESe7o
                         kZC6ncBJWphX7KCGVYD0qhVf/5VDgBuv9w8T+higJyvr3WbaSvg==",
                           "SigningCertURL" : "https://sns.us-west-2.amazonaws.com/
SimpleNotificationService-6aad65c2f9911b05cd53efda11f913f9.pem",
                           "UnsubscribeURL" :
                         "https://sns.us-west-2.amazonaws.com/?
Action=Unsubscribe&SubscriptionArn=arn:aws:sns:us-west-2:123456789012:myTopic:22b77de7-
a216-4000-9a23-bf465744ca84"
                         }
MD5OfBody              : 5b5ee4f073e9c618eda3718b594fa257
MD5OfMessageAttributes :
MessageAttributes      : {}
MessageId              : 728180b6-f62b-49d5-b4d3-3824bb2e77f4
ReceiptHandle          :
 AQEB2vvk1e5cOKFjeIWJticabkc664yuDEjhucnIOqdVUmie7bX7GiJbl7F0enABUgaI2XjEcNPxixhVc/
wfsAJZLNHnl8SlbQa0R/kD+Saqa4OIvfj8x3M4Oh1yM1cVKpYmhAzsYrAwAD5g5FvxNBD6zs
                         +HmXdkax2Wd+9AxrHlQZV5ur1MoByKWWbDbsqoYJTJquCclOgWIak/sBx/
daBRMTiVQ4GHsrQWMVHtNC14q7Jy/0L2dkmb4dzJfJq0VbFSX1G+u/lrSLpgae+Dfux646y8yFiPFzY4ua4mCF/
SVUn63Spy
                         sHN12776axknhg3j9K/Xwj54DixdsegnrKoLx+ctI
+0jzAetBR66Q1VhIoJAq7s0a2MseyOeM/Jjucg6Sr9VUnTWVhV8ErXmotoiEg==
```

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.

```
$dat = New-Object Amazon.CloudWatch.Model.MetricDatum
$dat.Timestamp = (Get-Date).ToUniversalTime()
$dat.MetricName = "New Posts"
$dat.Unit = "Count"
$dat.Value = ".50"
Write-CWMetricData -Namespace "Usage Metrics" -MetricData $dat
```

Note the following:

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

```
$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

```
$params=@{
    ClientConfig=@{
        ForcePathStyle=$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:

```
$params=@{
    ClientConfig=@{
        ForcePathStyle=$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.
```

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.

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
- Identity and Access Management
- Compliance Validation for this AWS Product or Service
- Enforcing a minimum TLS version in the Tools for PowerShell

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. You are also responsible for 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
- Authenticating with identities
- Managing access using policies
- How AWS services work with IAM
- Troubleshooting AWS identity and access

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 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? 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 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) in the *IAM User Guide*.

IAM roles

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

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

- **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 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 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 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.
  - **Forward access sessions (FAS)** – When you use an IAM user or role to perform actions in AWS, you are considered a principal. When you use some services, you might perform an action that then initiates another action in a different service. FAS uses the permissions of the principal calling an AWS service, combined with the requesting AWS service to make requests to downstream services. FAS requests are only made when a service receives a request that requires interactions with other AWS services or resources to complete. In this case, you must

have permissions to perform both actions. For policy details when making FAS requests, see Forward access sessions.

- **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
- I am not authorized to perform iam:PassRole
- I want to allow people outside of my AWS account to access my AWS resources

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.
- 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.
- AWS Customer Compliance Guides – Understand the shared responsibility model through the lens of compliance. The guides summarize the best practices for securing AWS services and map the guidance to security controls across multiple frameworks (including National Institute of Standards and Technology (NIST), Payment Card Industry Security Standards Council (PCI), and International Organization for Standardization (ISO)).
- 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.

Cmdlet reference for the Tools for PowerShell

The Tools for PowerShell provides cmdlets that you can use to access AWS services. To see what cmdlets are available, see the AWS Tools for PowerShell Cmdlet Reference.

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.

Change	Description	Date
Configure tool authentication with AWS	Added information about support for SSO in the AWS Tools for PowerShell.	March 15, 2024
Cmdlet reference for the Tools for PowerShell	Added section with a link to the Tools for PowerShell cmdlet reference.	November 17, 2023
Included more IAM best practices updates	Updated guide to align with the IAM best practices . For more information, see Security best practices in IAM.	October 12, 2023
Installing on Windows	Removed information about installing the Tools for Windows PowerShell by using the MSI, which has been deprecated.	September 25, 2023
IAM best practices updates	Updated guide to align with the IAM best practices . For more information, see Security best practices in IAM.	September 8, 2023
Pipelining and $AWSHistory	Added the `IncludeSensitiveData` parameter	March 9, 2023

	to the `Set-AWSHistoryConfiguration` cmdlet.	
Using the ClientConfig parameter in cmdlets	Added information about support for the ClientConfig parameter.	October 28, 2022
Launch an Amazon EC2 Instance Using Windows PowerShell	Added notes about retiring EC2-Classic.	July 26, 2022
AWS Tools for PowerShell Version 4	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.	November 21, 2019
AWS Tools for PowerShell 3.3.563	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 into one shared module and one module per AWS service.	October 18, 2019
AWS Tools for PowerShell 3.3.343.0	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.	September 11, 2018

AWS Tools for Windows PowerShell 3.1.31.0	Added information to the Getting Started section about new cmdlets that use Security Assertion Markup Language (SAML) to support configuring federated identity for users.	December 1, 2015
AWS Tools for Windows PowerShell 2.3.19	Added information to the Cmdlets Discovery and Aliases section about the new `Get-AWSCmdletName` cmdlet that can help users more easily find their desired AWS cmdlets.	February 5, 2015

AWS Tools for Windows PowerShell 1.1.1.0	Collection output from cmdlets is always enumerated to the PowerShell pipeline. Automatic support for pageable service calls. New $AWSHistory shell variable collects service responses and optionally service requests. AWSRegion instances use Region field instead of SystemName to aid pipelining. Remove-S3Bucket supports a -DeleteObjects 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 List<T> parameter types replaced with array types (T[]). Cmdlets that delete or terminate resources prompt for confirmation prior to deletion. Write-S3Object supports in-line text content to upload to Amazon S3.	May 15, 2013

AWS Tools for Windows PowerShell 1.0.1.0	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-Mo`	December 21, 2012

	dule 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	Initial release	December 6, 2012