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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 (p. 19).

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

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

Maintenance and support for SDK major versions

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

- AWS SDKs and Tools Maintenance Policy
- AWS SDKs and Tools Version Support Matrix

AWS.Tools - A Modularized Version of AWS Tools for PowerShell
This version of AWS Tools for PowerShell is the recommended version for any computer running PowerShell in a production environment. Because it's modularized, you need to download and load only the modules for the services you want to use. This reduces download times, memory usage, and enables auto-importing of AWS.Tools cmdlets with 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`.


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

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

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

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

**AWSPowerShell - A Single-Module Version for Windows PowerShell**

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

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

- 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`.
This version of AWS Tools for PowerShell is compatible with and installable on only Windows computers that are running Windows PowerShell versions 2.0 through 5.1. It is not compatible with PowerShell Core 6.0 or later, or any other operating system (Linux or macOS). This version consists of a single, large module that contains support for all AWS services.

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

How to Use This Guide

The guide is divided into the following major sections.

Installing the AWS Tools for PowerShell (p. 4)

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

Getting Started with the AWS Tools for Windows PowerShell (p. 25)

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.

Using the AWS Tools for Windows PowerShell (p. 52)

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
- Prerequisites for Setting up the AWS Tools for PowerShell (p. 4)
- Installing the AWS Tools for PowerShell on Windows (p. 5)
- Installing AWS Tools for PowerShell on Linux or macOS (p. 12)
- Migrating from AWS Tools for PowerShell Version 3.3 to Version 4 (p. 19)
- AWS Account and Access Keys (p. 23)

Prerequisites for Setting up the AWS Tools for PowerShell

To use the AWS Tools for PowerShell, you must first complete the following steps.

1. Sign up for an AWS account.
   - If you don’t have an AWS account, see the following topic for complete instructions on how to sign up:

2. Create an IAM user.
   - After you sign up for your account, you must create users in the AWS Identity and Access Management (IAM) service. Each user has its own credentials and permissions. The credentials are used to authenticate the user making a request. The permissions determine which AWS resources and operations are authorized for that user.
   - Creating a user is outside the scope of this topic. But if you’re new to AWS, we recommend that you read the following:
     - To understand user credentials and best practices for managing them, see AWS Security Credentials in the Amazon Web Services General Reference.
     - For a step-by-step tutorial on creating a user with “administrator” permissions that you can use to run AWS Tools for PowerShell commands, see Creating Your First IAM Admin User and Group in the IAM User Guide.

3. Create an access key for your IAM user.
   - The AWS Tools for PowerShell require that each cmdlet is sent using appropriate security credentials. To do this, you typically must create an access key for each user that needs to use the AWS Tools for PowerShell cmdlets. An access key consists of an access key ID and secret access key. These are used to sign (encrypt for the purpose of authentication) programmatic requests that you make to AWS services. If you don’t have an access key, you can create it by using the IAM console at https://console.aws.amazon.com/iam/. As described in AWS Security Credentials, we recommend that you use access keys for IAM users instead of AWS root account access keys. IAM lets you securely control access to AWS services and resources in your AWS account.
As with any AWS operation, creating access keys requires that you have permissions to perform the related IAM actions. For more information, see Permissions for Administering IAM Identities in the IAM User Guide.

After you create the access key for your first user in the AWS console, you can use that user and its access key to run AWS Tools for PowerShell cmdlets to create access keys for your other users. The following example shows how to use the New-IAMAccessKey cmdlet to create an access key and secret key for an IAM user.

```
PS > New-IAMAccessKey -UserName alice
AccessKeyId     : AKIAIOSFODNN7EXAMPLE
CreateDate      : 9/4/19 12:46:18 PM
SecretAccessKey : wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY
Status          : Active
UserName        : alice
```

Save these credentials in a safe place. You need them to configure the AWS Tools for PowerShell credentials file later. For more information, see Using AWS Credentials (p. 25).

**Important**

The only time you can see the secret access key (the equivalent of a password) is when you create the access key. You cannot retrieve it later. If you lose the secret key, you must delete the access key/secret key pair and recreate them.

An IAM user can have only two access keys at any one time. If you attempt to create a third set, the New-IAMAccessKey cmdlet returns an error. To create another, you must first delete one of the existing two.

You can use the Remove-IAMAccessKey cmdlet to delete a set of credentials for an IAM user. You must specify both the UserName and the AccessKeyId.

```
PS > Remove-IAMAccessKey -UserName alice -AccessKeyId AKIAIOSFODNN7EXAMPLE
Confirm
Are you sure you want to perform this action?
Performing the operation "Remove-IAMAccessKey (DeleteAccessKey)" on target "AKIAIOSFODNN7EXAMPLE".
[Y] Yes  [A] Yes to All  [N] No  [L] No to All  [S] Suspend  [?] Help (default is "Y")?: y
PS >
```

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

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

- **AWS.Tools (p. 6)** - The modularized version of AWS Tools for PowerShell. Each AWS service is supported by its own individual, small module, with shared support modules AWS.Tools.Common and AWS.Tools.Installer.
- **AWSPowerShell.NetCore (p. 7)** - The single, large-module version of AWS Tools for PowerShell. All AWS services are supported by this single, large module.
- **AWSPowerShell (p. 8)** - 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**
Ensure that you meet the requirements listed in Prerequisites for Setting up the AWS Tools for PowerShell (p. 4).

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 module.** The `AWS.Tools.Installer` module simplifies the installation and update of other AWS.Tools modules. The `AWS.Tools.Installer` requires, automatically downloads and installs, an updated version of PowerShellGet. The `AWS.Tools.Installer` module and automatically keeps your module versions in sync. When you install or update to a newer version of one module, the cmdlets in the `AWS.Tools.Installer` automatically update all of your other AWS.Tools modules to the same version.
- **Downloading the modules from AWS.Tools.zip and extracting them in one of the module folders.** You can discover your module folders by printing the value of the `$Env:PSModulePath` variable.
- **Installing each service module from the PowerShell Gallery using the `Install-Module` cmdlet, as described in the following procedure.**

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

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

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

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

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

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

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

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

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

Installing module AWS.Tools.Common version 4.0.0.0
Installing module AWS.Tools.EC2 version 4.0.0.0
Installing module AWS.Tools.Glacier version 4.0.0.0
Installing module AWS.Tools.S3 version 4.0.0.0
Uninstalling AWS.Tools version 3.3.618.0
Uninstalling module AWS.Tools.Glacier
Uninstalling module AWS.Tools.S3
Uninstalling module AWS.Tools.SimpleNotificationService
Uninstalling module AWS.Tools.SQS
Uninstalling module AWS.Tools.Common

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

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

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

Install AWSPowerShell.NetCore on Windows

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

You can install AWSPowerShell.NetCore in one of two ways
AWS Tools for PowerShell User Guide

Install AWSPowerShell

- 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 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 three ways:

- Downloading the module from AWSPowerShell.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.
- Running the Tools for Windows PowerShell installer. This method of installing AWSPowerShell is deprecated and we recommend that you use Install-Module instead.
- 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.

   ```powershell
   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.

```powershell
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.

```powershell
PS > Get-Module -ListAvailable
ModuleType Name                      ExportedCommands
---------- ----                      ----------------
Manifest   AppLocker                 {}
Manifest   BitsTransfer              {}
Manifest   PSDiagnostics             {}
```

9
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
```

You can also add the `-ListServiceVersionInfo` parameter to a `Get-AWSPowerShellVersion` command to see a list of the AWS services that are supported in the current version of the tools. If you use the modularized `AWS.Tools.*` option, only the modules that you currently have imported are displayed.

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

<table>
<thead>
<tr>
<th>Service</th>
<th>Noun Prefix</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWS AppStream</td>
<td>APS</td>
<td>2016-12-01</td>
</tr>
<tr>
<td>AWS Batch</td>
<td>BAT</td>
<td>2016-08-10</td>
</tr>
<tr>
<td>AWS Budgets</td>
<td>BGT</td>
<td>2016-10-20</td>
</tr>
<tr>
<td>AWS Certificate Manager</td>
<td>ACM</td>
<td>2015-12-08</td>
</tr>
<tr>
<td>AWS Cloud Directory</td>
<td>CDIR</td>
<td>2016-05-10</td>
</tr>
<tr>
<td>AWS Cloud HSM</td>
<td>HSM</td>
<td>2014-05-30</td>
</tr>
<tr>
<td>AWS CloudFormation</td>
<td>CFN</td>
<td>2010-05-15</td>
</tr>
<tr>
<td>AWS CloudTrail</td>
<td>CT</td>
<td>2013-11-01</td>
</tr>
<tr>
<td>AWS CodeBuild</td>
<td>CB</td>
<td>2016-10-06</td>
</tr>
<tr>
<td>AWS CodeCommit</td>
<td>CC</td>
<td>2015-04-13</td>
</tr>
<tr>
<td>AWS CodeDeploy</td>
<td>CD</td>
<td>2014-10-06</td>
</tr>
</tbody>
</table>
To determine the version of PowerShell that you are running, enter `$PSVersionTable` to view the contents of the `$PSVersionTable` automatic variable.

```markdown
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

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

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

This command updates all of the currently installed AWS.Tools modules and, after a successful update, removes other installed versions.

**Note**

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

#### Update the Tools for PowerShell Core

Run the `Get-AWSPowerShellVersion` cmdlet to determine the version that you are running, and compare that with the version of Tools for Windows PowerShell that is available on the PowerShell Gallery website. We suggest you check every two to three weeks. Support for new commands and AWS services is available only after you update to a version with that support.
Before you install a newer release of AWSPowerShell.NetCore, uninstall the existing module. Close any open PowerShell sessions before you uninstall the existing package. Run the following command to uninstall the package.

```
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 the `.msi` package installer:
  1. Download the most recent version of the MSI package from AWS Tools for Windows PowerShell. Compare the package version number in the MSI 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 by running the MSI package you downloaded.

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

**Installing AWS Tools for PowerShell on Linux or macOS**

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

**Overview of Setup**

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

- **AWS.Tools (p. 13)** – 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`. 
AWS Tools for PowerShell User Guide

Prerequisites

- **AWSPowerShell.NetCore (p. 15)** – The single, large-module version of AWS Tools for PowerShell. All AWS services are supported by this single, large module.

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

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

Prerequisites

Ensure that you meet the requirements listed on Prerequisites for Setting up the AWS Tools for PowerShell (p. 4).

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

- For a list of the supported Linux versions and for information about how to install PowerShell Core 6.0 or later on a Linux-based computer, see Installing PowerShell Core 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 a list of supported macOS versions and for information about how to install PowerShell Core 6.0 on macOS 10.12 or later, see Installing PowerShell Core 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. The `{AWS.Tools}.Installer` module simplifies the installation and update of other AWS.Tools modules. `{AWS.Tools}.Installer` requires, automatically downloads and installs, an updated version of PowerShellGet. The `{AWS.Tools}.Installer` module also automatically keeps your module versions in sync. When you install or update to a newer version of one module, the cmdlets in the `{AWS.Tools}.Installer` automatically update all of your other AWS.Tools modules to the same version.

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

- Installing each service module from the PowerShell Gallery using the `Install-Module` cmdlet, as described in the following procedure.

To install AWS.Tools on Linux or macOS using the Install-Module cmdlet

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

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

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

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

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

If you are notified that the repository is “untrusted”, 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.

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

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

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

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

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

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

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

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

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

**Install AWSPowerShell.NetCore on Linux or macOS**

To upgrade to a newer release of AWSPowerShell.NetCore, follow the instructions in Updating the AWS Tools for PowerShell on Linux or macOS (p. 18). 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

```powershell
PS > Get-Module -ListAvailable
Directory: /Users/username/.local/share/powershell/Modules

+-----------------+-----------------+-----------------+-----------------
| ModuleType       | Version         | Name            | PSEdition       |
+-----------------+-----------------+-----------------+-----------------|
| Binary          | 3.3.563.1       | AWS.Tools.Common | Desk            |
|                 |                 |                 | {Clear-AWSHistory, Set-AWSPowerShellHistoryConfiguration, Initialize-AWSDefaultConfiguration, Clear-AWSDefaultConfiguration} |
```

AWSPowerShell.NetCore

```powershell
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 (p. 25).

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

```
PS > Get-AWSPowerShellVersion
AWS 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.

```
PS > Get-AWSPowerShellVersion -ListServiceVersionInfo
AWS 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]

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<td>AWS CodeBuild</td>
<td>CB</td>
<td>2016-10-06</td>
</tr>
<tr>
<td>AWS CodeCommit</td>
<td>CC</td>
<td>2015-04-13</td>
</tr>
</tbody>
</table>

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

```
PS > $PSVersionTable
Name     Value
-------- --------
```
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Updating the AWS Tools for PowerShell on Linux or macOS

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

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

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

```
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**

- Getting Started with the AWS Tools for Windows PowerShell (p. 25)
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 : AWS Certificate Manager Private Certificate Authority
```

```
PS > Get-AWSService
Service : AlexaForBusiness
```
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 : "012345678901234567890123456789011111"
BucketName : mybucket
Key : file1.txt
LastModified : 9/30/2019 1:31:40 PM
Owner : Amazon.S3.Model.Owner
Size : 568
StorageClass : STANDARD

ETag : "012345678901234567890123456789022222"
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
```
More Consistent Limiting of the Number of Items in the Output

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

This behavior is removed from AWS.Tools.

This behavior is deprecated in AWSPowerShell.NetCore and AWSPowerShell, and will be removed from those versions in a future release.

If the underlying service API supports a MaxItems parameter, it's still available and functions as the API specifies. But it no longer has the added behavior of limiting the number of items returned in the output of the cmdlet.

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

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 (p. 20) 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.
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.
```
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`.

AWS Account and Access Keys

To access AWS, you will need to sign up for an AWS account. Access keys consist of an access key ID and secret access key, which are used to sign programmatic requests that you make to AWS. If you don't have access keys, you can create them by using the IAM console at https://console.aws.amazon.com/iam/. We recommend that you use IAM access keys instead of AWS root account access keys. IAM lets you securely control access to AWS services and resources in your AWS account.

Note
To create access keys, you must have permissions to perform the required IAM actions. For more information, see Granting IAM User Permission to Manage Password Policy and Credentials in the IAM User Guide.

To get your access key ID and secret access key

1. Open the IAM console at https://console.aws.amazon.com/iam/.
2. On the navigation menu, choose Users.
3. Choose your IAM user name (not the check box).
4. Open the Security credentials tab, and then choose Create access key.
5. To see the new access key, choose Show. Your credentials resemble the following:
   - Access key ID: AKIAIOSFODNN7EXAMPLE
   - Secret access key: wJalrXUtFEMI/K7MDENG/bPxrFicCYEXAMPLEKEY
6. To download the key pair, choose Download .csv file. Store the .csv file with keys in a secure location.

Important
- Keep the keys confidential to protect your AWS account, and never email them. Do not share them outside your organization, even if an inquiry appears to come from AWS or Amazon.com. No one who legitimately represents Amazon will ever ask you for your secret key.
• You can retrieve the secret access key *only* when you initially create the key pair. Like a password, you can't retrieve it later. If you lose it, you must create a new key pair.

**Related topics**

- **What Is IAM?** in the *IAM User Guide*.
- **AWS Security Credentials** in the *Amazon Web Services General Reference*. 
Getting Started with the AWS Tools for Windows PowerShell

This section describes fundamentals of using the Tools for Windows PowerShell. For example, it explains how to specify which credentials and AWS Region the Tools for Windows PowerShell should use when interacting with AWS. This section also provides guidance for using standard PowerShell cmdlets such as Get-Command to discover AWS cmdlets.

Topics
- Using AWS Credentials (p. 25)
- Shared Credentials in AWS Tools for PowerShell (p. 30)
- Specifying AWS Regions (p. 34)
- Cmdlet Discovery and Aliases (p. 35)
- Pipelining and $AWSHistory (p. 42)
- Configuring Federated Identity with the AWS Tools for PowerShell (p. 45)

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.

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. For information about how to sign up for an account, see AWS Account and Access Keys (p. 23).

Topics
- Credentials Store Locations (p. 25)
- Managing Profiles (p. 26)
- Specifying Credentials (p. 27)
- Credentials Search Order (p. 29)
- Credential Handling in AWS Tools for PowerShell Core (p. 29)

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.

```powershell
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 AWS 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`).

```powershell
PS > Get-AWSCredential -ListProfileDetail
```
### Specifying Credentials

There are several ways to specify credentials. The preferred way is to identify a profile instead of incorporating literal credentials into your command line. AWS Tools for PowerShell locates the profile using a search order that is described in **Credentials Search Order** (p. 29).

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
Specifying Credentials

AWS Tools for PowerShell User Guide

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 Specifying AWS Regions (p. 34). 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
Using an IAM Role with AWS Tools for PowerShell

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

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ExternalId</td>
<td>The user-defined external ID to be used when assuming a role, if required by the role. This is typically only required when you delegate access to your account to a third party. The third party must include the ExternalId as a parameter when assuming the assigned role. For more information, see How to Use an External ID When Granting Access to Your AWS Resources to a Third Party in the IAM User Guide.</td>
</tr>
<tr>
<td>MfaSerial</td>
<td>The MFA serial number to be used when assuming a role, if required by the role. For more information, see Using Multi-Factor Authentication (MFA) in AWS in the IAM User Guide.</td>
</tr>
<tr>
<td>RoleArn</td>
<td>The ARN of the role to assume for assume role credentials. For more information about creating and using roles, see IAM Roles in the IAM User Guide.</td>
</tr>
<tr>
<td>SourceProfile</td>
<td>The name of the source profile to be used by assume role credentials. The credentials found in this profile are used to assume the role specified by the RoleArn parameter.</td>
</tr>
</tbody>
</table>

Setup of profiles for assuming a role

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

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

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

<table>
<thead>
<tr>
<th>Credentials Type</th>
<th>Parameters you must use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic</strong></td>
<td>-AccessKey</td>
</tr>
<tr>
<td></td>
<td>-SecretKey</td>
</tr>
<tr>
<td><strong>Session:</strong></td>
<td>-AccessKey</td>
</tr>
<tr>
<td></td>
<td>-SecretKey</td>
</tr>
<tr>
<td></td>
<td>-SessionToken</td>
</tr>
<tr>
<td><strong>Role:</strong></td>
<td>-SourceProfile</td>
</tr>
<tr>
<td></td>
<td>-RoleArn</td>
</tr>
<tr>
<td></td>
<td>optional: -ExternalId</td>
</tr>
<tr>
<td></td>
<td>optional: -MfaSerial</td>
</tr>
</tbody>
</table>

**The ProfilesLocation Common Parameter**

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

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

**Save Credentials to a Credentials File**

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

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

**Displaying Your Credential Profiles**

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

```
PS > Get-AWSCredential -ListProfileDetail
```

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

**Removing Credential Profiles**

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

**Important Notes**

Only Initialize-AWSDefaultConfiguration, New-AWSCredential, and Set-AWSCredential support the parameters for role profiles. You cannot specify the role parameters directly on a command such as Get-S3Bucket -SourceProfile source_profile_name -RoleArn arn:aws:iam::999999999999:role/role_name. That does not work because service cmdlets do not directly support the SourceProfile or RoleArn parameters. Instead, you must store those parameters in a profile, then call the command with the -ProfileName parameter.
Specifying 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 (p. 54), Amazon SES, and AWS Identity and Access Management (IAM) (p. 59), 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.

```powershell
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.

```powershell
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.

```powershell
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.

```powershell
PS > Clear-DefaultAWSRegion
```

**To view a list of all available AWS Regions**

From the PowerShell command prompt, type the following command. Note that the third column identifies which Region is the default for your current session.

```powershell
PS > Get-AWSRegion
```

```
Region     Name                      IsShellDefault
------     ----                      --------------
ap-east-1  Asia Pacific (Hong Kong) False
```
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"
```

Cmdlet Discovery and Aliases

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

Cmdlet Discovery

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

```
PS > Get-AWSCmdletName -ApiOperation DescribeInstances
```
The `-ApiOperation` parameter is the default parameter, so you can omit the parameter name. The following example is equivalent to the previous one:

```powershell
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:

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

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:

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

<table>
<thead>
<tr>
<th>CmdletName</th>
<th>ServiceOperation</th>
<th>ServiceName</th>
<th>CmdletNounPrefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get-EC2Instance</td>
<td>DescribeInstances</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>Get-GMLInstance</td>
<td>DescribeInstances</td>
<td>Amazon GameLift Service</td>
<td>GML</td>
</tr>
<tr>
<td>Get-OPSInstance</td>
<td>DescribeInstances</td>
<td>AWS OpsWorks</td>
<td>OPS</td>
</tr>
<tr>
<td>Get-EC2Instance</td>
<td>DescribeInstances</td>
<td>Amazon Elastic Compute Cloud</td>
<td>EC2</td>
</tr>
<tr>
<td>Get-GMLInstance</td>
<td>DescribeInstances</td>
<td>Amazon GameLift Service</td>
<td>GML</td>
</tr>
<tr>
<td>Get-OPSInstance</td>
<td>DescribeInstances</td>
<td>AWS OpsWorks</td>
<td>OPS</td>
</tr>
<tr>
<td>Approve-ECCacheSecurityGroupIngress</td>
<td>AuthorizeCacheSecurityGroupIngress</td>
<td>EC</td>
<td></td>
</tr>
<tr>
<td>Get-ECCacheSecurityGroup</td>
<td>DescribeCacheSecurityGroups</td>
<td>EC</td>
<td></td>
</tr>
<tr>
<td>New-ECCacheSecurityGroup</td>
<td>CreateCacheSecurityGroup</td>
<td>EC</td>
<td></td>
</tr>
<tr>
<td>Remove-ECCacheSecurityGroup</td>
<td>DeleteCacheSecurityGroup</td>
<td>EC</td>
<td></td>
</tr>
<tr>
<td>Revoke-ECCacheSecurityGroupIngress</td>
<td>RevokeCacheSecurityGroupIngress</td>
<td>EC</td>
<td></td>
</tr>
<tr>
<td>Add-EC2SecurityGroupToClientVpnTargetNetwork</td>
<td>ApplySecurityGroupsToClientVpnTargetNetwork</td>
<td>EC2</td>
<td></td>
</tr>
<tr>
<td>Grant-EC2SecurityGroupEgress</td>
<td>AuthorizeSecurityGroupEgress</td>
<td>EC</td>
<td></td>
</tr>
<tr>
<td>Grant-EC2SecurityGroupIngress</td>
<td>AuthorizeSecurityGroupIngress</td>
<td>EC</td>
<td></td>
</tr>
<tr>
<td>New-EC2SecurityGroup</td>
<td>CreateSecurityGroup</td>
<td>EC</td>
<td></td>
</tr>
</tbody>
</table>
### Cmdlet Discovery

<table>
<thead>
<tr>
<th>Command Name</th>
<th>ServiceOperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove-EC2SecurityGroup</td>
<td>DeleteSecurityGroup</td>
</tr>
<tr>
<td>Revoke-EC2SecurityGroupEgress</td>
<td>RevokeSecurityGroupEgress</td>
</tr>
<tr>
<td>Revoke-EC2SecurityGroupIngress</td>
<td>RevokeSecurityGroupIngress</td>
</tr>
<tr>
<td>Update-EC2SecurityGroupRuleEgressDescription</td>
<td>UpdateSecurityGroupRuleDescriptionsEgress</td>
</tr>
<tr>
<td>Update-EC2SecurityGroupRuleIngressDescription</td>
<td>UpdateSecurityGroupRuleDescriptionsIngress</td>
</tr>
<tr>
<td>Edit-EFSMountTargetSecurityGroup</td>
<td>ModifyMountTargetSecurityGroups</td>
</tr>
<tr>
<td>Get-EFSMountTargetSecurityGroup</td>
<td>DescribeMountTargetSecurityGroups</td>
</tr>
<tr>
<td>Join-ELBSecurityGroupToLoadBalancer</td>
<td>ApplySecurityGroupsToLoadBalancer</td>
</tr>
<tr>
<td>Set-ELBSecurityGroup</td>
<td>SetSecurityGroups</td>
</tr>
<tr>
<td>Get-EMLInputSecurityGroup</td>
<td>ListInputSecurityGroups</td>
</tr>
<tr>
<td>Add-RDSDBSecurityGroupIngress</td>
<td>AuthorizeDBSecurityGroupIngress</td>
</tr>
<tr>
<td>Get-RDSDBSecurityGroup</td>
<td>DescribeDBSecurityGroups</td>
</tr>
<tr>
<td>New-RDSDBSecurityGroup</td>
<td>CreateDBSecurityGroup</td>
</tr>
<tr>
<td>Remove-RDSDBSecurityGroup</td>
<td>DeleteDBSecurityGroup</td>
</tr>
<tr>
<td>Revoke-RDSDBSecurityGroupIngress</td>
<td>RevokeDBSecurityGroupIngress</td>
</tr>
<tr>
<td>Approve-RSClusterSecurityGroupIngress</td>
<td>AuthorizeClusterSecurityGroupIngress</td>
</tr>
<tr>
<td>Amazon Redshift</td>
<td>DescribeClusterSecurityGroups</td>
</tr>
<tr>
<td>Get-RSClusterSecurityGroup</td>
<td>CreateClusterSecurityGroup</td>
</tr>
<tr>
<td>New-RSClusterSecurityGroup</td>
<td>DeleteClusterSecurityGroup</td>
</tr>
<tr>
<td>Remove-RSClusterSecurityGroup</td>
<td>RevokeClusterSecurityGroupIngress</td>
</tr>
<tr>
<td>Revoke-RSClusterSecurityGroupIngress</td>
<td></td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>CmdletName</th>
<th>OperationName</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add-EC2SecurityGroupToClientVpnTargetNetwork</td>
<td>ApplySecurityGroupsToClientVpnTargetNetwork</td>
</tr>
<tr>
<td>Get-EC2SecurityGroup</td>
<td>DescribeSecurityGroups</td>
</tr>
</tbody>
</table>

37
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:

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

The `Get-AWSCmdletName` cmdlet needs only enough of the AWS CLI command name to identify the
service and the AWS API.

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

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

You can run the same command with `-Module AWSPowerShell.NetCore` 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:

```
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:

```
Select-String region
```
You can also find cmdlets for a specific service by filtering for the service prefix of cmdlet nouns. To see the list of available service prefixes, run Get-AWSPowerShellVersion -ListServiceVersionInfo.

The following example returns cmdlets that support the Amazon CloudWatch Events service.

```powershell
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-CWEResourceTag                              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 EC2 `DescribeInstances` method.

In some cases, the cmdlet name may be similar to a method name, but it may actually perform a different function. For example, the Amazon S3 `GetObject` method retrieves an Amazon S3 object. However, the `Get-S3Object` cmdlet returns information about an Amazon S3 object rather than the object itself.

```powershell
PS > Get-S3Object -BucketName text-content -Key aws-tech-docs
ETag         : "df000002a0fe0000f3c000004EXAMPLE"
BucketName   : text-content
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:

```powershell
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"
```

<table>
<thead>
<tr>
<th>CommandType</th>
<th>Name</th>
<th>Version</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alias</td>
<td>Add-ASInstances</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Add-CTTag</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Add-DPTags</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Add-DSIPRoutes</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Add-ELBTags</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Add-EMRTag</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Add-ESTag</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Add-MLTag</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Clear-AWSCredentials</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Clear-AWSDefaults</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Dismount-ASInstances</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Edit-EC2Hosts</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Edit-RSClusterIamRoles</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Enable-ORGAllFeatures</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Find-CTEvents</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-ASACases</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-ASAccountLimits</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-ASCommunications</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-ASServices</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-ASSeverityLevels</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-ASATrustedAdvisorRefreshStatuses</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-ASATrustedAdvisorChecks</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-ASATrustedAdvisorCheckSummaries</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-ASLifecycleHooks</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-ASLifecycleHookTypes</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-AWSCredentials</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-CDApplications</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-CDDeployments</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
<tr>
<td>Alias</td>
<td>Get-CFCloudFrontOriginAccessIds</td>
<td>3.3.343.0</td>
<td>AWSPowerShell</td>
</tr>
</tbody>
</table>
To add your own aliases to this file, you might need to raise the value of PowerShell's 
#MaximumAliasCount preference variable to a value greater than 5500. The default value is 4096; you 
can raise it to a maximum of 32768. To do this, run the following.

```powershell
PS > #MaximumAliasCount = 32768
```

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

```powershell
PS > #MaximumAliasCount
32768
```

## Pipelining and $AWSHistory

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

**Note**

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

**Examples**

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

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

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

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

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

### $AWSHistory

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

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

Starting with version 1.1, this data and more is now available in a new shell variable named `$AWSHistory`. This variable maintains a record of AWS cmdlet invocations and the service responses that were received for each invocation. Optionally, this history can be configured to also record the service requests that each cmdlet made. Additional useful data, such as the overall execution time of the cmdlet, can also be obtained from each entry.

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:

```powershell
PS > Set-AWSHistoryConfiguration -MaxCmdletHistory <value> -MaxServiceCallHistory <value> -RecordServiceRequests
```
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. All parameters are optional.

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.

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

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

```powershell
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).

```powershell
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.

```powershell
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.

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

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

```powershell
PS > $c = Get-S3Object -BucketName test -MaxKey 500
```
To know if more data was available but not returned, use the $AWSHistory session variable entry that recorded the service calls made by the cmdlet.

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

```
$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
```

### Configuring 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 re-authenticates 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 re-authenticate.

## 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.

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

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

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

   ```powershell
   ```

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

   ```powershell
   $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.

   ```powershell
   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).

   ```powershell
   $credential = Get-Credential -Message "Enter the domain credentials for the endpoint"
   ```
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.

```
$credential = Get-Credential
$epName = "http://example.com/SAML";
$credential = Get-Credential
$credential

Set-AWSSamlRoleProfile -EndpointName $epName -NetworkCredential $credential -StoreAs SAMLDemoProfile
```

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

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

```
$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.

```
Set-AWSSamlRoleProfile -EndpointName $epName -StoreAllRoles
```

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.

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

Instances                                                   GroupNames
---------                                                   ----------
49

49
Example 2: Change Role Profiles During a PowerShell Session

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

```
PS > Get-S3Bucket -ProfileName SAMLDemoProfile
```

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

Note that the Get-S3Bucket cmdlet specifies the name of the profile created by running the Set-AWSSamlRoleProfile cmdlet. This command could be useful if you had set a role profile earlier in your session (for example, by running the Set-AWSCredential cmdlet) and wanted to use a different role profile for the Get-S3Bucket cmdlet. The profile manager makes temporary credentials available to the Get-S3Bucket cmdlet.

Although the credentials expire after 1 hour (a limit enforced by STS), AWS Tools for PowerShell automatically refreshes the credentials by requesting a new SAML assertion when the tool detects that the current credentials have expired.

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

Example 3: Get Instances in a Region

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

```
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}}
```

<table>
<thead>
<tr>
<th>InstanceType</th>
<th>Servername</th>
</tr>
</thead>
<tbody>
<tr>
<td>t2.small</td>
<td>DC2</td>
</tr>
<tr>
<td>t1.micro</td>
<td>NAT1</td>
</tr>
<tr>
<td>t1.micro</td>
<td>RDGW1</td>
</tr>
<tr>
<td>t1.micro</td>
<td>RDGW2</td>
</tr>
<tr>
<td>t1.micro</td>
<td>NAT2</td>
</tr>
<tr>
<td>t2.small</td>
<td>DC1</td>
</tr>
<tr>
<td>t2.micro</td>
<td>BUILD</td>
</tr>
</tbody>
</table>
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.
Using the AWS Tools for Windows PowerShell

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:

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

**Note**

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

## Returned Objects for the PowerShell Tools

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

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

### Amazon EC2 (p. 61)

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

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

### Amazon S3 (p. 54)

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 Identity and Access Management (p. 59)

This section demonstrates basic operations in AWS Identity and Access Management (IAM) including how to:

- Create an IAM group.
• Create an IAM user.
• Add an IAM user to an IAM group.
• Specify a policy for an IAM user.
• Set a password and credentials for an IAM user.

AWS Lambda and Lambda Tools for PowerShell (p. 71)

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

Amazon SNS and Amazon SQS (p. 72)

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

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

CloudWatch (p. 75)

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

• Publish a Custom Metric to Your CloudWatch Dashboard.

See Also

• Getting Started with the AWS Tools for Windows PowerShell (p. 25)

Amazon S3 and Tools for Windows PowerShell

Topics

• See Also (p. 54)
• Create an Amazon S3 Bucket, Verify Its Region, and Optionally Remove It (p. 55)
• Configure an Amazon S3 Bucket as a Website and Enable Logging (p. 56)
• Upload Objects to an Amazon S3 Bucket (p. 56)
• Delete Amazon S3 Objects and Buckets (p. 58)
• Upload In-Line Text Content to Amazon S3 (p. 58)
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

- Using the AWS Tools for Windows PowerShell (p. 52)
- Hosting a Static Website on Amazon S3
- Amazon S3 Console

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

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

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

<table>
<thead>
<tr>
<th>CreationDate</th>
<th>BucketName</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/16/19 8:45:38 PM</td>
<td>website-example</td>
</tr>
</tbody>
</table>

You can verify the region in which the bucket is located using the `Get-S3BucketLocation` cmdlet.

```powershell
PS > Get-S3BucketLocation -BucketName website-example
```

<table>
<thead>
<tr>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>us-west-2</td>
</tr>
</tbody>
</table>

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.

```powershell
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

- Using the AWS Tools for Windows PowerShell (p. 52)
- Put Bucket (Amazon S3 Service Reference)
Configure an Amazon S3 Bucket as a Website and Enable Logging

Use the `Write-S3BucketWebsite` cmdlet to configure an Amazon S3 bucket as a static website. The following example specifies a name of `index.html` for the default content web page and a name of `error.html` for the default error web page. Note that this cmdlet does not create those pages. They need to be uploaded as Amazon S3 objects (p. 56).

```powershell
PS > Write-S3BucketWebsite -BucketName website-example -
    WebsiteConfiguration_IndexDocumentSuffix index.html -WebsiteConfiguration_ErrorDocument error.html
RequestId      : A1813E27995FFDDD
AmazonId2      : T7hlDOeLqA5Q2XfTe8j2q3SLoP3/5XwhUU38yJBGHU/LnC+CIWLeGp0MY24xAll
ResponseStream :
Headers        : {x-amz-id-2, x-amz-request-id, Content-Length, Date...}
Metadata       : {}
ResponseXml    :
```

See Also

- Using the AWS Tools for Windows PowerShell (p. 52)
- 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".

```powershell
PS > # Create the two files using here-strings and the Set-Content cmdlet
PS > $index_html = @""n
PS > >> <html>
PS > >> <body>
PS > >> <p>
PS > >>   Hello, World!
PS > >> </p>
PS > >> </body>
PS > >> </html>
PS > @"
PS >
PS > $index_html | Set-Content index.html
PS > $error_html = @""n
PS > >> <html>
PS > >> <body>
PS > >> <p>
PS > >>   This is an error page.
PS > >> </p>
PS > >> </body>
```
Upload Objects to an Amazon S3 Bucket

```powershell
>> $error_html | Set-Content error.html
>> # Upload the files to Amazon S3 using a foreach loop
>> foreach ($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

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

_Canned ACL Options_

The values for specifying canned ACLs with the Tools for Windows PowerShell are the same as those used by the AWS SDK for .NET. Note, however, that these are different from the values used by the Amazon 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](awsdocs.amazonaws.com).

_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_

- Using the AWS Tools for Windows PowerShell (p. 52)
- Put Object (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.

```powershell
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.

```powershell
PS > Remove-S3Bucket -BucketName website-example
RequestId : E480ED92A2EC703D
AmazonId2 : k6tqaqC1nMkoeyWbu7XUx1/UDA49Bld6dflN0Ls1mYNPHjbc8/Myvm6AGbWcc2P
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

- Using the AWS Tools for Windows PowerShell (p. 52)
- 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.
IAM and Tools for Windows PowerShell

This section describes some common tasks related to AWS Identity and Access Management (IAM) and how to perform them using the AWS Tools for Windows PowerShell.

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.

Topics

• Create New IAM Users and Groups (p. 59)
• Set an IAM Policy for an IAM User (p. 60)
• Set an Initial Password for an IAM User (p. 61)

Create New IAM Users and Groups

This section describes how to create a new IAM group and a new IAM user and then add the user to the group.

First, use the `New-IAMGroup` cmdlet to create the group. Although we've included it here, the `–Path` parameter is optional.

```
PS > New-IAMGroup -Path "/ps-created-groups/" -GroupName "powerUsers"
```

Next, use the `New-IAMUser` cmdlet to create the user. Similar to the preceding example, the `–Path` parameter is optional.

```
PS > New-IAMUser -Path "/ps-created-users/" -UserName "myNewUser"
```
Finally, use the `Add-IAMUserToGroup` cmdlet to add the user to the group.

```
PS > Add-IAMUserToGroup -UserName myNewUser -GroupName powerUsers
```

To verify that the `powerUsers` group contains the `myNewUser`, use the `Get-IAMGroup` cmdlet.

```
PS > Get-IAMGroup -GroupName powerUsers
```

You can also view IAM users and groups with the AWS Management Console

- [http://console.aws.amazon.com/iam/home?#s=Users](http://console.aws.amazon.com/iam/home?#s=Users) [Users View]
- [http://console.aws.amazon.com/iam/home?#s=Groups](http://console.aws.amazon.com/iam/home?#s=Groups) [Groups View]

**See Also**

- Using the AWS Tools for Windows PowerShell (p. 52)
- Adding a New User to Your AWS Account (IAM User Guide)

**Set an IAM Policy for an IAM User**

The following commands show how to assign an IAM policy to an IAM user. The policy specified below provides the user with "Power User Access". This policy is identical to the `Power User Access` policy template provided in the IAM console. The name for the policy shown below follows the naming convention used for IAM policy templates such as the template for `Power User Access`. The convention is `<template name>+<user name>+<date stamp>`

```
<template name>+<user name>+<date stamp>
```

In order to specify the policy document, we use a PowerShell here-string. We assign the contents of the here-string to a variable and then use the variable as a parameter value in `Write-IAMUserPolicy`.

```
PS > $policyDoc = "
>> { >>  "Version": "2012-10-17",
>>  "Statement": [ >>    { >>      "Effect": "Allow",
>>      "NotAction": "iam:*",
```
Set an Initial Password for an IAM User

The following example demonstrates how to use the `New-IAMLoginProfile` cmdlet to set an initial password for an IAM user. For more information about character limits and recommendations for passwords, see Password Policy Options in the IAM User Guide.

```
PS > New-IAMLoginProfile -UserName myNewUser -Password "&!123!&"
```

<table>
<thead>
<tr>
<th>UserName</th>
<th>CreateDate</th>
</tr>
</thead>
<tbody>
<tr>
<td>myNewUser</td>
<td>11/20/2012 4:23:05 PM</td>
</tr>
</tbody>
</table>

Use the `Update-IAMLoginProfile` cmdlet to change the password for an IAM user.

See Also

- Using the AWS Tools for Windows PowerShell (p. 52)
- Managing Passwords
- CreateLoginProfile

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 Getting Started with the AWS Tools for Windows PowerShell (p. 25).

Topics

- Creating a Key Pair (p. 62)
- Create a Security Group Using Windows PowerShell (p. 63)
- Find an Amazon Machine Image Using Windows PowerShell (p. 66)
Creating a Key Pair

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

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

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

```powershell
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.)

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

-----BEGIN RSA PRIVATE KEY-----
MIIEogIBAAKCAQEAkK+ANYUS9c7niNjYfaCn6KYj/D0l6djeFoQE...Mz6btocxPC+iEMHhlySUPhnuA5Xbel917h+V/k4hN99McNcPa/Mu...Zyn4Ve0q51l/MkpRogHqOBoigTeV5Yc3lvoORFpU0Oz4kgcm...w3Jy8gdKhwNpOpx7VY3sRC02Kg3bejQVBFQIsQ9Bhvmt4XBeie...dxKIAQMCUdmdBDzhR1/YMV8t1e5DiLLbq7G+DbsS5NhBa3hi...iuakGkcvWFqkLmHR0dpB+0/FFShZjHZdp8Pm9a978EdskBF...35rNnEq2fsaA3JXooobC3xLpJg5JSUyWb0+sDNYHojJZCuULCR...GDLfFG95KjG1k7E2VQ7k6s+DHcrlDeMN9w7KPNR2uCu7j7sC...x908abWMr3o37NU6pl1YRQEQ0JoR0W+k+85WhbWfzLt6m9mTE...1B9X9X6F/K/A8VLHrTielrKmLEkNECqYEAwtkV1p0JAPhzh972FeV...vvVsPaFOVbb99qhx2699Pb0X2KwCagDMMAVvsvWobuLnNu/...lmWilx7Ke0q7W1j3LoGqXHAIQNkUp9c4tB3g9Vc3/fPf86vWfJ8c...63g6Nkr2PKHXX1E62Bgbwud3e2O5S1p4Vu6vCtc8c/qa+e5...KXgy9n164pMv+V4XFx2h2lAdY0Khcc97GB9++VMSGSwTr15Y7jd...yTALIE7mjzEpmHWA5e0hemw5VmKqy3p20tSjEs5R8AJl1fTD...hAtn14d8ry9F917BOVon3WfFjKx58g1/00c+j8665gi1AfndWGR...9R9w1km5BMdC5RcRcDy0yuyxKbgEkOnGGSDoah4hkrwU8epIBUkD...AnERm1CXi5UT7BfKinpUhi51s9jshkHk/hO57WHhZGW9j8j9sC...dKbr/TVKVRMti31VF87kk1VlxxXc5/B8+YzEzEYoCfz06GAC/F...TP2l56opgCOAxQSwqQzoga92MwcS09f4b6e7b6ekw0ZASwSPVW...x3O2duuy7/smTmWsvwEwRw51muxoMV/7VYaqdzOajwieNbrl7c...-----END RSA PRIVATE KEY-----
```

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

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

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

```
KeyName        : myPSKeyPair
```

Storing Your Private Key

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

```powershell
Remove-EC2KeyPair -KeyName myPSKeyPair
```

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

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

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

Removing Your Key Pair

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

```powershell
Remove-EC2KeyPair -KeyName myPSKeyPair
```

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

Create a Security Group Using Windows PowerShell

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

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

Topics

- Prerequisites (p. 64)
- Creating a Security Group for EC2-Classic (p. 64)
- Creating a Security Group for EC2-VPC (p. 65)
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

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

```powershell
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.

```powershell
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.

```powershell
#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.

```powershell
PS > Get-EC2SecurityGroup -GroupNames myPSSecurityGroup

OwnerId : 123456789012
GroupName : myPSSecurityGroup
```
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 $groupid
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.

---

GroupID             : sg-0a346530123456789
Description         : EC2-Classic from PowerShell
IpPermissions       : {Amazon.EC2.Model.IpPermission}
IpPermissionsEgress : {}
VpcId               :
Tags                : {}}
Find an Amazon Machine Image Using Windows PowerShell

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

Topics
- Get-EC2Image (p. 66)
- Get-EC2ImageByName (p. 67)

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.

```powershell
$platform_values = New-Object 'collections.generic.list[string]' $platform_values.add("windows")
```
Find an AMI

```powershell
$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
ImageOwnerAlias     : amazon
ImageType           : machine
KernelId            :
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
```
To narrow the set of images returned, specify one or more filter names using the `Names` parameter.

```
PS > Get-EC2ImageByName -Names WINDOWS_2016_CORE
```

<table>
<thead>
<tr>
<th>Architecture</th>
<th>x86_64</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlockDeviceMappings</td>
<td>{/dev/sda1, xvdca, xvdcb, xvdcc...}</td>
</tr>
<tr>
<td>CreationDate</td>
<td>2019-08-16T09:36:09.000Z</td>
</tr>
<tr>
<td>Description</td>
<td>Microsoft Windows Server 2016 Core Locale English AMI provided by Amazon</td>
</tr>
<tr>
<td>EnaSupport</td>
<td>True</td>
</tr>
<tr>
<td>Hypervisor</td>
<td>xen</td>
</tr>
<tr>
<td>ImageId</td>
<td>ami-06f2a2afca06f15fc</td>
</tr>
<tr>
<td>ImageLocation</td>
<td>amazon/Windows_Server-2016-English-Core-Base-2019.08.16</td>
</tr>
<tr>
<td>ImageOwnerAlias</td>
<td>amazon</td>
</tr>
<tr>
<td>ImageType</td>
<td>machine</td>
</tr>
<tr>
<td>KernelId</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Windows_Server-2016-English-Core-Base-2019.08.16</td>
</tr>
<tr>
<td>OwnerId</td>
<td>801119661308</td>
</tr>
<tr>
<td>Platform</td>
<td>Windows</td>
</tr>
<tr>
<td>ProductCodes</td>
<td>{}</td>
</tr>
<tr>
<td>Public</td>
<td>True</td>
</tr>
<tr>
<td>RamdiskId</td>
<td></td>
</tr>
<tr>
<td>RootDeviceName</td>
<td>/dev/sda1</td>
</tr>
<tr>
<td>RootDeviceType</td>
<td>ebs</td>
</tr>
<tr>
<td>SrovNetSupport</td>
<td>simple</td>
</tr>
<tr>
<td>State</td>
<td>available</td>
</tr>
<tr>
<td>StateReason</td>
<td></td>
</tr>
<tr>
<td>Tags</td>
<td></td>
</tr>
<tr>
<td>VirtualizationType</td>
<td>hvm</td>
</tr>
</tbody>
</table>

Launch an Amazon EC2 Instance Using Windows PowerShell

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

- Creating a Key Pair (p. 62)
- Create a Security Group Using Windows PowerShell (p. 63)
- Find an Amazon Machine Image Using Windows PowerShell (p. 66)
Important
If you launch an instance that is not within the Free Tier, you are billed after you launch the instance and charged for the time that the instance is running even if it remains idle.

Topics
• Launching an Instance in EC2-Classic (p. 69)
• Launching an Instance in a VPC (p. 70)
• Launching a Spot Instance in a VPC (p. 71)

Launching an Instance in EC2-Classic

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
```

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AmiLaunchIndex</td>
<td>0</td>
</tr>
<tr>
<td>Architecture</td>
<td>x86_64</td>
</tr>
<tr>
<td>BlockDeviceMappings</td>
<td>{/dev/sda1}</td>
</tr>
<tr>
<td>ClientToken</td>
<td></td>
</tr>
<tr>
<td>EbsOptimized</td>
<td>False</td>
</tr>
<tr>
<td>Hypervisor</td>
<td>xen</td>
</tr>
<tr>
<td>IamInstanceProfile</td>
<td></td>
</tr>
<tr>
<td>ImageId</td>
<td>ami-c49c0dac</td>
</tr>
<tr>
<td>InstanceId</td>
<td>i-5203422c</td>
</tr>
<tr>
<td>InstanceLifecycle</td>
<td></td>
</tr>
<tr>
<td>InstanceType</td>
<td>t1.micro</td>
</tr>
<tr>
<td>KernelId</td>
<td></td>
</tr>
<tr>
<td>KeyName</td>
<td>myPSKeyPair</td>
</tr>
<tr>
<td>LaunchTime</td>
<td>12/2/2018 3:38:52 PM</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Amazon.EC2.Model.Monitoring</td>
</tr>
<tr>
<td>NetworkInterfaces</td>
<td>{}</td>
</tr>
<tr>
<td>Placement</td>
<td>Amazon.EC2.Model.Placement</td>
</tr>
<tr>
<td>Platform</td>
<td>Windows</td>
</tr>
<tr>
<td>PrivateDnsName</td>
<td></td>
</tr>
<tr>
<td>PrivateIpAddress</td>
<td>10.25.1.11</td>
</tr>
<tr>
<td>ProductCodes</td>
<td>{}</td>
</tr>
</tbody>
</table>
Launching an Instance in a VPC

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

```powershell
PS > New-EC2Instance `  -ImageId ami-c49c0dac `  -MinCount 1 -MaxCount 1 `  -KeyName myPSKeyPair `  -SecurityGroupId sg-5d293331 `  -InstanceType m1.small `  -SubnetId subnet-d60013bf
```

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

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

```powershell
AmiLaunchIndex : 0
Architecture     : x86_64
BlockDeviceMappings : {/dev/sdal}
ClientToken     : 
EbsOptimized    : False
Hypervisor      : xen
IamInstanceProfile : 
ImageId         : ami-c49c0dac
InstanceId      : i-5203422c
InstanceLifecycle : 
InstanceType    : m1.small
KernelId       : 
KeyName        : myPSKeyPair
```
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_InstanceId 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.
AWS Lambda PowerShell 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 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.
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
```

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:

```powershell
PS > Connect-SNSNotification
   -Protocol SQS
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`

```powershell
PS > Add-SNSPermission
   -Label ps-cmdlet-topic
   -AWSAccountIds 123456789012
   -ActionNames publish
```

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

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

Verify results

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

```powershell
PS > Publish-SNSMessage
   -Message "Have A Nice Day!"
728180b6-f62b-49d5-b4d3-3824bb2e77f4
```

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

```powershell
Attributes : {}
Body : {
   "Type" : "Notification",
   "MessageId" : "491c687d-b78d-5c48-b7a0-3d8d769ee91b",
   "Message" : "Have A Nice Day!",
   "Timestamp" : "2019-09-09T21:06:27.201Z",
   "SignatureVersion" : "1",
   "Signature" : "l1E17A2+XOuJZnwJlgcXz4c4KPLXZxbx0ENIirelhIu3Y oxKumz5+9tJkFmns1ZoQvKkXExfFzC5yW6b1YuB6yRmZiO3hUSEN3ayv2WQiQT1vyLPmM7VEQORm+6lIpFCSvyukGkReV70jJWHMhCN
+qTE2ld2RPlFoegKwGagTsPSTW0V3dDbLlf7EozZ0qniXTUteps28Swx01X3O6u9i9qBFt0ekJFZNjP6Avu05hIkb4yoRs1HkbLVy0a8Y19lWp7a7EoWAbNo2hC5E70
```
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 a 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

- Using the AWS Tools for Windows PowerShell (p. 52)
See Also

- AmazonCloudWatchClient.PutMetricData (.NET SDK Reference)
- MetricDatum (Service API Reference)
- Amazon CloudWatch Console
Security in the AWS Tools for PowerShell

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

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

- **Security of the cloud** – AWS is responsible for protecting the infrastructure that runs AWS services in the AWS Cloud. AWS also provides you with services that you can use securely. Third-party auditors regularly test and verify the effectiveness of our security as part of the AWS Compliance Programs. To learn about the compliance programs that apply to AWS Tools for PowerShell, see [AWS Services in Scope by Compliance Program](#).

- **Security in the cloud** – Your responsibility is determined by the AWS service that you use. You are also responsible for other factors including the sensitivity of your data, your company’s requirements, and applicable laws and regulations.

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

**Topics**

- Data Protection in the AWS Tools for PowerShell (p. 77)
- Identity and Access Management for the AWS Tools for PowerShell (p. 78)
- Compliance Validation for the AWS Tools for PowerShell (p. 79)

Data Protection in the AWS Tools for PowerShell

The AWS Tools for PowerShell conforms to the AWS shared responsibility model, which includes regulations and guidelines for data protection. AWS is responsible for protecting the global infrastructure that runs all the AWS services. AWS maintains control over data hosted on this infrastructure, including the security configuration controls for handling customer content and personal data. AWS customers and APN partners, acting either as data controllers or data processors, are responsible for any personal data that they put in the AWS Cloud.

For data protection purposes, we recommend that you protect AWS account credentials and set up individual user accounts with AWS Identity and Access Management (IAM), so that 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.
- Set up API and user activity logging with AWS CloudTrail.
- Use AWS encryption solutions, along with all default security controls within AWS services.
- Use advanced managed security services such as Amazon Macie, which assists in discovering and securing personal data that is stored in Amazon S3.

We strongly recommend that you never put sensitive identifying information, such as your customers' account numbers, into free-form fields such as a Name field. This includes when you work with the AWS Tools for PowerShell or other AWS services using the console, API, or AWS SDKs. Any data that you enter into the AWS Tools for PowerShell or other services might get picked up for inclusion in diagnostic logs. When you provide a URL to an external server, don't include credentials information in the URL to validate your request to that server.

For more information about data protection, see the AWS Shared Responsibility Model and GDPR blog post on the AWS Security Blog.

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 for the AWS Tools for PowerShell

The AWS Tools for PowerShell uses the same IAM users and roles that you use to access your AWS resources and their services with the AWS Management Console. The policies that grant permissions are also the same because the AWS Tools for PowerShell calls the same API operations that are used by the service console. For more information, see the "Identity and Access Management" section in the "Security" chapter for the AWS service that you want to use.

The only major difference is how you authenticate when using a standard IAM user and long-term credentials. Although an IAM user requires a password to access an AWS service's console, that same IAM user requires an access key instead of a password to perform the same operations using the AWS Tools for PowerShell. All other short-term credentials are used in the same way they are used with the console.

The credentials used by the AWS Tools for PowerShell are typically stored in plaintext files and are not encrypted. However, you do have an option to use the encrypted .NET SDK credential store when you run on Windows.

- The $HOME/.aws/credentials file stores long-term credentials required to access your AWS resources. These include your access key ID and secret access key.
Mitigation of Risk

- We strongly recommend that you configure your file system permissions on the `$HOME/.aws` folder and its child folders and files to restrict access to only authorized users.
- Use roles with temporary credentials wherever possible to reduce the opportunity for damage if the credentials are compromised. Use long-term credentials only to request and refresh short-term role credentials.

Compliance Validation for the AWS Tools for PowerShell

Third-party auditors assess the security and compliance of AWS services as part of multiple AWS compliance programs. Using the AWS Tools for PowerShell to access a service does not alter that service's compliance.

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

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

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

- **Security and Compliance Quick Start Guides** – These deployment guides discuss architectural considerations and provide steps for deploying security- and compliance-focused baseline environments on AWS.
- **Architecting for HIPAA Security and Compliance Whitepaper** – This whitepaper describes how companies can use AWS to create HIPAA-compliant applications.
- **AWS Compliance Resources** – This collection of workbooks and guides might apply to your industry and location.
- **Evaluating Resources with Rules** in the AWS Config Developer Guide – The AWS Config service assesses how well your resource configurations comply with internal practices, industry guidelines, and regulations.
- **AWS Security Hub** – This AWS service provides a comprehensive view of your security state within AWS that helps you check your compliance with security industry standards and best practices.
## Document History

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

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

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

<table>
<thead>
<tr>
<th>AWS Tools for PowerShell</th>
<th>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.</th>
<th>November 21, 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWS Tools for PowerShell 3.3.563 (p. 80)</td>
<td>Added information about how to install and use the preview version of the AWS.Tools.Common module. This new module breaks apart the older monolithic package into one shared module and one module per AWS service.</td>
<td>October 18, 2019</td>
</tr>
<tr>
<td>AWS Tools for PowerShell 3.3.343.0 (p. 80)</td>
<td>Added information to the Using the AWS Tools for PowerShell section introducing the AWS Lambda Tools for PowerShell for PowerShell Core developers to build AWS Lambda functions.</td>
<td>September 11, 2018</td>
</tr>
<tr>
<td>AWS Tools for Windows PowerShell 3.1.31.0 (p. 80)</td>
<td>Added information to the Getting Started section about new cmdlets that use Security Assertion Markup Language (SAML) to support configuring federated identity for users.</td>
<td>December 1, 2015</td>
</tr>
<tr>
<td>AWS Tools for Windows PowerShell 2.3.19 (p. 80)</td>
<td>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.</td>
<td>February 5, 2015</td>
</tr>
<tr>
<td>AWS Tools for Windows PowerShell 1.1.1.0 (p. 80)</td>
<td>Collection output from cmdlets is always enumerated to the PowerShell pipeline. Automatic support for pageable service calls. New $AWSHistory</td>
<td>May 15, 2013</td>
</tr>
</tbody>
</table>
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.
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 \texttt{AWSPowerShell} subfolder beneath \texttt{AWS ToolsPowerShell}. Files from previous versions that exist in the \texttt{AWS ToolsPowerShell} folder are automatically removed by the installer. The \texttt{PSModulePath} for Windows PowerShell (all versions) is updated in this release to contain the parent folder of the module (\texttt{AWS ToolsPowerShell}).

For systems with Windows PowerShell version 2, the Start Menu shortcut \texttt{Windows PowerShell for AWS} is updated to import the module from the new location and then run \texttt{Initialize-AWSDefaults}. For systems with Windows PowerShell version 3, the Start Menu shortcut \texttt{Windows PowerShell for AWS} is updated to remove the \texttt{Import-Module} command, leaving just \texttt{Initialize-AWSDefaults}. If you edited your PowerShell profile to perform an \texttt{Import-Module} of the \texttt{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 \texttt{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 \texttt{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 \texttt{Import-Module} first. This enables interactive use of the cmdlets on a system.
with an execution policy that disallows script execution.