User Guide

AWS Toolkit for VS Code

AWS Toolkit for VS Code: User Guide

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AWS Toolkit for Visual Studio Code

This is the user guide for the **AWS Toolkit for VS Code**. If you are looking for the **AWS Toolkit for Visual Studio**, see the *User Guide for the AWS Toolkit for Visual Studio*.

What is the AWS Toolkit for Visual Studio Code

The Toolkit for VS Code is an open-source extension for the Visual Studio Code (VS Code) editor. This extension makes it easier for developers to develop, debug locally, and deploy serverless applications that use Amazon Web Services (AWS).

Topics

- Getting Started with the AWS Toolkit for Visual Studio Code
- Working with AWS services and tools

Related information

Use the following resources to access the source code for the toolkit or view currently open issues.

- Source Code
- Issue Tracker

To learn more about the Visual Studio Code editor, visit https://code.visualstudio.com/.

Amazon Q Developer and Amazon CodeWhisperer

As of April 30th 2024, Amazon CodeWhisperer is now part of Amazon Q Developer, this includes inline code suggestions and Amazon Q Developer security scans. Download the Amazon Q Developer IDE extension from the VS Code Marketplace to get started.

For details about the Amazon Q Developer service, see the Amazon Q Developer User Guide. For detailed information about plans and pricing for Amazon Q, see the Amazon Q pricing guide.

Downloading the Toolkit for VS Code

You can download, install, and set up the AWS Toolkit for Visual Studio Code through the VS Code Marketplace in your IDE. For detailed instructions, see the Download and install section in the *Getting started* topic of this User Guide.

Downloading the Toolkit from the VS Code Marketplace

Alternatively, you can download the AWS Toolkit for Visual Studio Code installation files by navigating to the **VS Code Marketplace** from your web browser.

Additional IDE Toolkits from AWS

In addition to the AWS Toolkit for Visual Studio Code, AWS also offers IDE Toolkits for JetBrains and Visual Studio.

AWS Toolkit for JetBrains links

- Follow this link to Download the AWS Toolkit for JetBrains from the JetBrains Marketplace.
- To learn more about the AWS Toolkit for JetBrains, see the AWS Toolkit for JetBrains User Guide.

Toolkit for Visual Studio links

- Follow this link to Download the Toolkit for Visual Studio from the Visual Studio Marketplace.
- To learn more about the Toolkit for Visual Studio, see the Toolkit for Visual Studio User Guide.

Getting Started with the AWS Toolkit for Visual Studio Code

The AWS Toolkit for Visual Studio Code makes your AWS services and resources available, directly from your VS Code integrated development environment (IDE).

To get you started, the following topics describe how to set up, install, and configure the AWS Toolkit for Visual Studio Code.

Topics

Installing the AWS Toolkit for Visual Studio Code

Prerequisites

To get started working with AWS Toolkit for Visual Studio Code from VS Code, the following perquisites must be met. To learn more about accessing all of the AWS services and resources available from the AWS Toolkit for Visual Studio Code, see the the section called “Optional prerequisites” section of this guide.

- VS Code requires a Windows, macOS, or Linux operating system.
- The AWS Toolkit for Visual Studio Code requires you to work from VS Code version 1.73.0 or a later version.

For additional information about VS Code or to download the latest version of VS Code, see the VS Code downloads website.

Downloading and installing the AWS Toolkit for Visual Studio Code

You can download, install, and set up the AWS Toolkit for Visual Studio Code through the VS Code Marketplace in your IDE. Alternatively, you can download the AWS Toolkit for Visual Studio Code installation files by navigating to the VS Code Marketplace from your web browser.

Installing the AWS Toolkit for Visual Studio Code from the VS Code IDE Marketplace

1. Open the AWS Toolkit for Visual Studio Code extension in your VS Code IDE with the following link: Open the VS Code Marketplace.

   > **Note**
   >
   > If VS Code is not already running on your machine, this operation may take a few moments while VS Code is loading.

2. From the AWS Toolkit for Visual Studio Code extension in the VS Code Marketplace, choose **Install** to begin the installation process.
3. When prompted, choose to restart VS Code to complete the installation process.

Optional prerequisites

Before you can use certain features of the AWS Toolkit for Visual Studio Code, you must have the following:

- **Amazon Web Services (AWS) account**: An AWS account isn't a requirement to use the AWS Toolkit for Visual Studio Code, but functionality is significantly limited without it. To obtain an AWS account, go to the AWS home page. Choose **Create an AWS Account**, or **Complete Sign Up** (if you've visited the site before).
- **Code Development –** The relevant SDK for the language that you want to use. You can download from the following links, or use your favorite package manager:
  - .NET SDK: https://dotnet.microsoft.com/download
  - Node.js SDK: https://nodejs.org/en/download
  - Python SDK: https://www.python.org/downloads
  - Java SDK: https://aws.amazon.com/corretto/
  - Go SDK: https://golang.org/doc/install

- **AWS SAM CLI** – This is an AWS CLI tool that helps you develop, test, and analyze your serverless applications locally. This isn't required for installing the toolkit. However, we recommend that you install it (and Docker, described next) because it's required for any AWS Serverless Application Model (AWS SAM) functionality, such as Creating a new serverless application (local).

  For more information, see Installing the AWS SAM CLI in the *AWS Serverless Application Model Developer Guide*.
- **Docker** – The AWS SAM CLI requires this open-source software container platform. For more information and download instructions, see Docker.
- **Package Manager** – A package manager so you can download and share application code.
  - .NET: NuGet
  - Node.js: npm
  - Python: pip
  - Java: Gradle or Maven

Connecting to AWS

Most Amazon Web Services (AWS) resources are managed through an AWS account. An AWS account isn't required to use the AWS Toolkit for Visual Studio Code, however Toolkit functions are limited without a connection.

If you've previously set up an AWS account and authentication through another AWS service (such as the AWS Command Line Interface), then the AWS Toolkit for Visual Studio Code automatically detects your credentials.

Prerequisites

If you're new to AWS or haven't created an account, then there are 3 main steps to connect the AWS Toolkit for Visual Studio Code with your AWS account:

1. **Signing up for an AWS account**: You can sign up for an AWS account from the AWS sign up portal. For detailed information on setting up a new AWS account, see the Overview topic in the *AWS Setup User Guide*.
2. **Setting up authentication**: There are 3 primary methods to authenticate with your AWS account from the AWS Toolkit for Visual Studio Code. To learn more about each of these methods, see the Authentication and Access topic in this User Guide.

3. **Authenticating with AWS from the Toolkit**: You can connect with your AWS account from the Toolkit by completing the procedures in the following sections of this User Guide.

Opening the Sign In panel

Complete one of the following procedures to open the **AWS Toolkit Sign In** panel.

To open the AWS Toolkit Sign In panel from the AWS Explorer:

1. From the AWS Toolkit for Visual Studio Code, expand **EXPLORER**.
2. Expand the **More Actions...** menu by selecting the **...** icon.
3. From the **More Actions...** menu, choose **Connect to AWS** to open the **AWS Toolkit Sign In** panel.

To open the AWS Toolkit Sign In panel using the VS Code command pallet:

1. Open the command pallet by pressing **`Shift+Command+P`** (**`Ctrl+Shift+P`** Windows).
2. Enter **`AWS: Add a New Connection`** into the search field.
3. Select **`AWS: Add a New Connection`** to open the **AWS Toolkit Sign In** panel.

Connecting to AWS from the Toolkit

Authenticate and connect with SSO

To authenticate and connect with AWS using AWS AWS IAM Identity Center, complete the following procedure.

> **Note**
>
> Authentication with AWS Builder ID or IAM Identity Center launches the AWS authorization portal in your default web browser. Each time your credentials expire this process must be repeated to renew the connection between your AWS account and the AWS Toolkit for Visual Studio Code.

Authenticate and connect with AWS IAM Identity Center

1. From the **AWS Toolkit Sign In** panel, choose the **Workforce** tab, then select the **Continue** button to proceed.
2. From the **Sign in with IAM Identity Center** panel, enter the **Start URL** for your organization. This URL is provided to you by an admin or help desk at your company.
3. Select your AWS **Region** from the drop-down menu. This is the AWS region that hosts your identity directory.
4. Choose the **Continue** button and confirm that you want to open the **AWS Authorization request** website in your default web browser.
5. Follow the prompts in your default web browser, you're notified when the authorization process is complete, it's safe to close your browser, and return to VS Code.

Authenticate and connect with IAM Credentials

To authenticate and connect with AWS using IAM Credentials, complete the following procedure.

Authenticate and connect with IAM Credentials

1. From the **AWS Toolkit Sign In** panel, choose **IAM Credential**, then select the **Continue** button to proceed.
2. Enter the **`Profile Name`**, **`Access Key`**, and **`Secret Key`** of your AWS account in the provided fields, then choose the **Continue** button to add the profile to your config file and connect the Toolkit with your AWS account.
3. The Toolkit **AWS Explorer** updates to display your AWS services and resources when authentication is complete and a connection has been established.

Authentication for Amazon CodeCatalyst

To get started working with CodeCatalyst from the Toolkit, authenticate and connect with either your AWS Builder ID or IAM Identity Center credentials.

The following procedures describe how to authenticate and connect the Toolkit with your AWS account.

Authenticate and connect with an AWS Builder ID

1. From the **AWS Toolkit Sign In** panel, choose the **Workforce** tab, then select the **Continue** button to proceed.
2. At the top of the **Sign in with SSO** panel, choose the **Skip to sign-in** link.
3. Follow the prompts in your default web browser, you're notified when the authorization process is complete, it's safe to close your browser, and return to VS Code.

Authenticate and connect with IAM Identity Center

1. From the **AWS Toolkit Sign In** panel, choose the **Workforce** tab, then select the **Continue** button to proceed.
2. From the **Sign in with IAM Identity Center** panel, enter the **Start URL** for your organization. This URL is provided to you by an admin or help desk at your company.
3. Select your AWS **Region** from the drop-down menu. This is the AWS region that hosts your identity directory.
4. Choose the **Continue** button and confirm that you want to open the **AWS Authorization request** website in your default web browser.
5. Follow the prompts in your default web browser, you're notified when the authorization process is complete, it's safe to close your browser, and return to VS Code.

Changing AWS Regions

An AWS Region specifies where your AWS resources are managed. Your default AWS Region is detected when you connect to your AWS account from the AWS Toolkit for Visual Studio Code, automatically displaying in the **AWS Explorer**.

The following sections describe how to add or hide a Region from the **AWS Explorer**.

Adding a Region to the AWS Explorer

Complete the following procedure to add a Region to the AWS Explorer.

1. From VS Code, open the **Command Palette** by expanding **View** on the main menu and choosing **Command Palette**. Or use the following shortcut keys:

   - Windows and Linux – Press **`Ctrl+Shift+P`**.

- macOS – Press **Shift+Command+P**.

2. From the **Command Palette**, search for **`AWS: Show or Hide Regions`** and choose **AWS: Show or Hide Regions** to display a list of available Regions.
3. From the list, select the AWS Regions that you want to add to the **AWS Explorer**.
4. Choose the **OK** button to confirm your choices and update the **AWS Explorer**.

Hide a Region from the AWS Explorer

To hide a Region from the AWS Explorer view, complete the following procedure.

1. From the **AWS Explorer**, locate the AWS Region that you want to hide.
2. Open the context menu for (right-click) the Region you want to hide.
3. Choose **Show or Hide Regions** to open the **AWS: Show or Hide Regions** options in VS Code.
4. Deselect the Regions that you want to hide in the AWS Explorer view.

Configuring your toolchain

The AWS Toolkit for Visual Studio Code supports multiple languages across all the AWS services. The following sections describe how to configure your toolchain for different languages.

Configure a toolchain for .NET Core

1. Ensure that you have the AWS Toolkit for VS Code installed.
2. Install the C# extension. This extension enables VS Code to debug .NET Core applications.
3. Open an AWS Serverless Application Model (AWS SAM) application, or create one.
4. Open the folder that contains `template.yaml`.

Configure a toolchain for Node.js

1. Ensure that you have the AWS Toolkit for VS Code installed.
2. Open an AWS SAM application, or create one.
3. Open the folder that contains `template.yaml`.

> **Note**
>
> When debugging a TypeScript Lambda function directly from the source code (launch configuration has `"target": "code"`), the TypeScript compiler must be installed either globally or in your project's `package.json`.

Configure a toolchain for Python

1. Ensure that you have the AWS Toolkit for VS Code installed.
2. Install the Python extension for Visual Studio Code. This extension enables VS Code to debug Python applications.
3. Open an AWS SAM application, or create one.
4. Open the folder that contains `template.yaml`.
5. Open a terminal at the root of your application, and configure `virtualenv` by running `python -m venv ./.venv`.

   > **Note**
   >
   > You only need to configure `virtualenv` once per system.

6. Activate `virtualenv` by running one of the following:
   - Bash shell: `./.venv/Scripts/activate`
   - PowerShell: `./.venv/Scripts/Activate.ps1`

Configure a toolchain for Java

1. Ensure that you have the AWS Toolkit for VS Code installed.
2. Install the Java extension and Java 11. This extension enables VS Code to recognize Java functions.
3. Install the Java debugger extension. This extension enables VS Code to debug Java applications.
4. Open an AWS SAM application, or create one.

5. Open the folder that contains `template.yaml`.

Configure a toolchain for Go

1. Ensure that you have the AWS Toolkit for VS Code installed.
2. Go 1.14 or higher is required for debugging Go Lambda functions.
3. Install the Go extension.

> **Note**
>
> Version 0.25.0 or higher is required for debugging Go1.15+ runtimes.

4. Install Go tools using the command palette:

   a. From the command palette, choose `Go: Install/Update Tools`.

   b. From the set of check boxes, select `dlv` and `gopls`.
5. Open an AWS SAM application, or create one.
6. Open the folder that contains `template.yaml`.

Using Your toolchain

Once you have your toolchain set up, you can use it to run or debug the AWS SAM application.

Authentication and access for the AWS Toolkit for Visual Studio Code

You don't need to authenticate with AWS to start working with the AWS Toolkit for Visual Studio Code. However, most AWS resources are managed through an AWS account. To access all of the AWS Toolkit for Visual Studio Code services and features, you'll need to authenticate with AWS IAM Identity Center, AWS Builder ID or IAM credentials.

The following topics contain additional details about each credential type.

For details about how to connect to AWS in the AWS Toolkit for Visual Studio Code with your existing credentials, see the Connecting to AWS topic in this User Guide.

Topics

AWS IAM Identity Center

AWS IAM Identity Center is the recommended best practice for managing your AWS account authentication.

For detailed instructions on how to set up IAM Identity Center for Software Development Kits (SDKs), see the IAM Identity Center authentication section of the *AWS SDKs and Tools Reference Guide*.

For details on how to authenticate and connect the AWS toolkit with your existing IAM Identity Center credentials, see the Connect to AWS topic in this User Guide.

AWS IAM credentials

AWS IAM credentials authentication with your AWS account through locally stored access keys.

For details about how to authenticate and connect the AWS toolkit with your existing AWS IAM credentials, see the Connect to AWS topic in this User Guide.

The following sections describe how to set up IAM credentials to authenticate with your AWS account from the AWS Toolkit for Visual Studio Code.

⚠ **Important**

Before setting up IAM credentials to authenticate with your AWS account, note that:

- If you've already set IAM credentials through another AWS service (such as the AWS CLI), then the AWS Toolkit for Visual Studio Code automatically detects those credentials and makes them available in VS Code.
- AWS recommends using IAM Identity Center authentication. For additional information about AWS IAM best practices, see the Security best practice in IAM section of the AWS *Identity and Access Management* User Guide.
- To avoid security risks, don't use IAM users for authentication when developing purpose-built software or working with real data. Instead, use federation with an identity provider such as What is IAM Identity Center? in the *AWS IAM Identity Center User Guide*.

Creating an IAM user

Before you can set up the AWS Toolkit for Visual Studio Code to authenticate with your AWS account, you need to complete **Step 1: Create your IAM user** and **Step 2: Get your access keys** in the Authenticate using long-term credentials topic in the *AWS SDKs and Tools Reference Guide*.

ⓘ **Note**

Step 3: Update the shared credentials file in the *AWS SDKs and Tools Reference Guide* is optional.
If you complete Step 3, the AWS Toolkit for Visual Studio Code automatically detects your credentials during the the section called “Creating a shared credentials file from the AWS Toolkit for Visual Studio Code” located below.
If you haven't completed Step 3, the AWS Toolkit for Visual Studio Code walks you through the process of creating a `credentials file` as described in the the section called

"Creating a shared credentials file from the AWS Toolkit for Visual Studio Code" located below.

Creating a shared credentials file from the AWS Toolkit for Visual Studio Code

Your *shared config file* and *shared credentials file* store configuration and credential information for your AWS accounts. For more information about shared configuration and credentials, see the Where are configuration settings stored? section in the *AWS Command Line Interface User Guide*.

Creating a shared credentials file through the AWS Toolkit for Visual Studio Code

1. Open the command pallet by pressing **`Shift+Command+P`** (**`Ctrl+Shift+P`** Windows).
2. Enter **`AWS: Add a New Connection`** into the search field.
3. Select **`AWS: Add a New Connection`** to open the **AWS Toolkit Sign In** panel.
4. From the **AWS Toolkit Sign In** panel, choose **IAM Credential**, then select the **Continue** button to proceed.
5. Enter the **`Profile Name`**, **`Access Key`**, and **`Secret Key`** of your AWS account in the provided fields, then choose the **Continue** button to add the profile to your config file and connect the Toolkit with your AWS account.
6. The Toolkit **AWS Explorer** updates to display your AWS services and resources when authentication is complete and a connection has been established.

Note

In this example, assume that *`[Profile_Name]`* contains syntax errors and causes authentication to fail.

```
[Profile_Name]
xaws_access_key_id= AKIAI44QH8DHBEXAMPLE
xaws_secret_access_key= wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY
```

The following is an example of a log message that's generated in response to a failed authentication attempt.

```
2022-11-02 22:01:54 [ERROR]: Profile [Profile_Name] is not a valid Credential
 Profile: not supported by the Toolkit
2022-11-02 22:01:54 [WARN]: Shared Credentials Profile [Profile_Name] is not
 valid. It will not be used by the toolkit.
```

Add additional credential profiles

You can add multiple credentials to your configuration files. To do so, open the **Command Palette** and choose **AWS Toolkit Create Credentials Profile**. This will open the credentials file. On this page, you can add a new profile below your first profile, as shown in the following example:

```
# Amazon Web Services Credentials File used by AWS CLI, SDKs, and tools
# This file was created by the AWS Toolkit for Visual Studio Code extension.
#
# Your AWS credentials are represented by access keys associated with IAM users.
# For information about how to create and manage AWS access keys for a user, see:
# https://docs.aws.amazon.com/IAM/latest/UserGuide/id_credentials_access-keys.html
#
# This credential file can store multiple access keys by placing each one in a
# named "profile". For information about how to change the access keys in a
# profile or to add a new profile with a different access key, see:
# https://docs.aws.amazon.com/cli/latest/userguide/cli-config-files.html
#
[Profile1_Name]
# The access key and secret key pair identify your account and grant access to AWS.
aws_access_key_id = AKIAIOSFODNN7EXAMPLE
# Treat your secret key like a password. Never share your secret key with anyone. Do
# not post it in online forums, or store it in a source control system. If your secret
# key is ever disclosed, immediately use IAM to delete the access key and secret key
# and create a new key pair. Then, update this file with the replacement key details.
aws_secret_access_key = wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY
[Profile2_Name]
aws_access_key_id = AKIAI44QH8DHBEXAMPLE
aws_secret_access_key = je7MtGbClwBF/2Zp9Utk/h3yCo8nvbEXAMPLEKEY
```

AWS Builder ID for developers

An AWS Builder ID is an additional AWS account that is optional or required for certain AWS services. For detailed information about the AWS Builder ID authentication method, see the Sign in with AWS Builder ID topic in the *AWS Sign-in* User Guide.

For details about how to authenticate and connect the AWS toolkit with your existing AWS Builder ID, see the Connect to AWS topic in this User Guide.

Using an external credential process

You can configure the AWS Toolkit for Visual Studio Code for credential processes that aren't directly supported by AWS, by modifying your `shared config file`.

Modifying your `shared config file` for credential processes is the same for both the AWS Toolkit for Visual Studio Code and the AWS Command Line Interface. For detailed information about how to set up external credentials, see the Sourcing credentials with an external process topic in the *AWS Command Line Interface User Guide*.

Working with AWS services and tools

The AWS Toolkit for Visual Studio Code makes AWS services, tools, and resources available to you, directly in VS Code. The following is a list of guide topics covering each Toolkit for VS Code service and their features. Choose a service or tool for more information on what it does, how to set it up, and working with basic features.

Topics

Working with experimental features

Experimental features offer early access to features in the AWS Toolkit for Visual Studio Code before they're officially released.

> ⚠ **Warning**
>
> Because experimental features continue to be tested and updated, they may have usability issues. And experimental features may be removed from the AWS Toolkit for Visual Studio Code without notice.

You can enable experimental features for specific AWS services in the **AWS Toolkit** section of the **Settings** pane in your VS Code IDE.

1. To edit AWS settings in VS Code, choose **File**, **Preferences**, **Settings**.
2. In the **Settings** pane, expand **Extensions** and choose **AWS Toolkit**.
3. Under **AWS: Experiments**, select the checkboxes for the experimental features you want to access prior to release. If you want to switch off an experimental feature, clear the relevant checkbox.

Working with AWS Services in the AWS Explorer

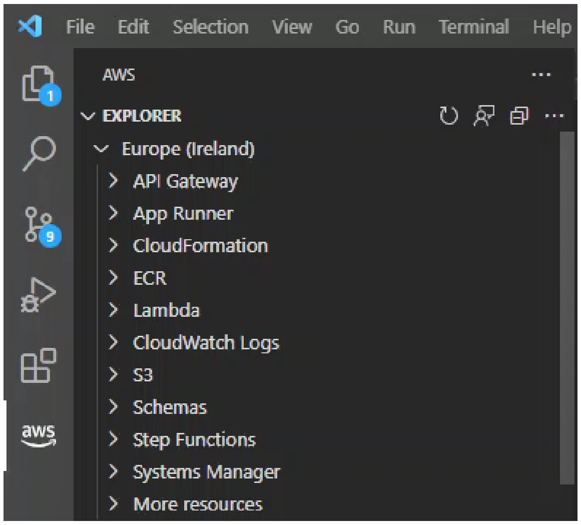
The **AWS Explorer** gives you a view of some of the AWS services that you can work with when using the AWS Toolkit for Visual Studio Code.

This section provides information about how to access and use the **AWS Explorer** in VS Code. It assumes that you've already installed and configured the Toolkit for VS Code on your system.

Some important points:

- If the toolkit is installed and configured correctly, you should see items in the **AWS Explorer**. To see the **AWS Explorer**, choose the **AWS** icon in the **Activity bar**.

  For example:



- Certain features require certain AWS permissions. For example, to see the AWS Lambda functions in your AWS account, the credentials you configured in Authentication and access must include at least read-only Lambda permissions. See the following topics for more information about the permissions that each feature needs.
- If you want to interact with AWS services that aren't immediately visible in the **AWS Explorer**, you can go to **More resources** and choose from hundreds of resources that can added to the interface.

  For example, you can choose **AWS Toolkit:CodeArtifact::Repository** from the selection of available resource types. After this resource type is added to **More resources**, you can expand the entry to view a list of resources that create different CodeArtifact repositories with their own properties and attributes. Moreover, you can describe the properties and attributes of resources in JSON-formatted templates, which can be saved to create new resources in the AWS Cloud.

Amazon CodeCatalyst for VS Code

What is Amazon CodeCatalyst?

Amazon CodeCatalyst is a cloud-based collaboration space for software development teams. Through the AWS Toolkit for Visual Studio Code, you can view and manage your CodeCatalyst resources directly from VS Code. You can also work directly in the cloud by using the AWS Toolkit to launch, Dev Environments virtual computing environments running VS Code. For more information about the CodeCatalyst service, see the Amazon CodeCatalyst User Guide.

The following topics describe how to connect VS Code with CodeCatalyst, and how to work with CodeCatalyst from the Toolkit for VS Code.

Topics

- Getting started with CodeCatalyst and the Toolkit for VS Code
- Working with Amazon CodeCatalyst resources in VS Code
- Working with the Toolkit in a Dev Environments
- Troubleshooting Amazon CodeCatalyst and VS Code

Getting started with CodeCatalyst and the Toolkit for VS Code

To get started working with CodeCatalyst in VS Code, follow these procedures.

Topics

- Creating a CodeCatalyst account
- Connecting the AWS Toolkit with CodeCatalyst

Creating a CodeCatalyst account

You must have active AWS Builder ID or AWS IAM Identity Center credentials to connect to CodeCatalyst from the Toolkit for VS Code. To learn more about AWS Builder ID, IAM Identity Center, and CodeCatalyst credentials, see the Setting up with CodeCatalyst section in the *CodeCatalyst* User Guide.

Connecting the AWS Toolkit with CodeCatalyst

To connect the AWS Toolkit with your CodeCatalyst account, see the Authentication for Amazon CodeCatalyst section in the *Connecting to AWS* topic of this User Guide.

Working with Amazon CodeCatalyst resources in VS Code

The following sections provide an overview of the Amazon CodeCatalyst resource management features that are available from the Toolkit for VS Code.

For more information about Dev Environments and how you can access them from CodeCatalyst, see the Dev Environments section in the *Amazon CodeCatalyst* User Guide.

The following sections describe how to create, open, and work with Dev Environments from VS Code.

Topics

Clone a repository

CodeCatalyst is a cloud-based service that requires you to be connected to the cloud to work on CodeCatalyst projects. If you prefer to work on a project locally, you can clone your CodeCatalyst repositories to your local machine and sync it with your CodeCatalyst project online, the next time that you're connected to the cloud.

To clone a repository from your CodeCatalyst account to VS Code with the AWS Toolkit, complete the following steps:

> **Note**
>
> If you are cloning a repository from a 3rd party service, you may be prompted to authenticate with that service's credentials.
> While the repository is being cloned, VS Code displays the progress in the **Cloning Repository** status window. After the repository is cloned, the **Would you like to open the cloned repository?** message appears.

1. From the Toolkit for VS Code, expand the **DEVELOPER TOOLS** explorer.
2. Expand **CodeCatalyst**, choose **Clone Repository**.
3. From the **Select a CodeCatalyst Repository** dialog, search for the repository that you want to clone, then select it to open the **Choose a folder to clone** dialog.
4. Choose **Select Repository Location** to close the prompt and begin cloning the repository.
5. From the dialog window, choose one of the following to complete the cloning process:

- To open your repository in your current VS Code window, choose **Open**.
- To open your repository in a new VS Code window, choose **Open in new window**.
- To complete the cloning process without opening your repository, close the dialog window.

Opening a Dev Environment

To open an existing Dev Environment in VS Code, complete the following steps.

> **Note**
>
> Selecting the Dev Environment starts the process to connect VS Code with CodeCatalyst by opening your Dev Environment. During this process, VS Code displays progress updates in a CodeCatalyst status window. The status window updates when the process is complete.
>
> - If the Dev Environment fails to open, the status updates with information about why the process failed and a link to open the process logs.
> - If the process is successful, your Dev Environment opens in a new window, from VS Code.

1. From the Toolkit for VS Code, expand the **DEVELOPER TOOLS** explorer.
2. Expand **CodeCatalyst** and choose **Open Dev Environment** to open the **Select a CodeCatalyst Dev Environment** dialog in VS Code.
3. From the **Select a CodeCatalyst Dev Environment** dialog, choose the **Dev Environment** that you want to open.

Creating a CodeCatalyst Dev Environment

To create a new Dev Environment, complete the following steps:

> **Note**
>
> When creating a new Dev Environment, observe the following:
>
> - AWS recommends that you specify an alias because it simplifies organization and improves search capabilities for Dev Environments.

- Dev Environments saves your work persistently. This means that your Dev Environment can be stopped without losing your work. Stopping your Dev Environment reduces the costs that are required to keep you Dev Environment up and running.
- **Storage** is the only setting that can't be changed after your Dev Environment has been created.
- VS Code displays the progress of your Dev Environment being created in a status window. After the Dev Environment is created, VS Code opens the Dev Environment in a new window and the **Do you trust the authors of the files in this folder?** prompt also appears. Agree to the terms and conditions to continue working in your Dev Environment.

1. From the Toolkit for VS Code, expand the **DEVELOPER TOOLS** explorer.
2. Expand **CodeCatalyst**, and choose the **Create Dev Environment** option to open the **Create a CodeCatalyst Dev Environment** menu in VS Code.
3. From the **Source Code** section, choose one of the following options:
   - **Use an existing CodeCatalyst Repository**: Creates a Dev Environment from an existing CodeCatalyst repository. You must select the CodeCatalyst **Project** and **Branch**.
   - **Create an empty Dev Environment**: Creates an empty Dev Environment.
4. (Optional) From the **Alias** section, enter an alternate name for your Dev Environment.
5. (Optional) From the **Dev Environments Configuration** section, change the following settings to meet your specific needs.
   - **Compute**: Choose **Edit Compute** to change the amount of processing power and RAM that's assigned to your system.
   - **Timeout**: Choose **Edit Timeout** to change the amount of system idle time allowed before your Dev Environment is stopped.
   - **Storage**: Choose **Edit Storage Size** to change the amount of storage space that's assigned to your system.
6. Choose **Create Dev Environment** to create your new cloud development environment.

Creating a Dev Environment from a third-party repository

You can create Dev Environments from a third-party repository by linking to the repository as a source.

Linking to a third-party repository as a source is handled at the project level in CodeCatalyst. For instructions and additional details on how to connect a third-party repository to your Dev Environment, see the Linking a source repository topic in the *Amazon CodeCatalyst* User Guide.

CodeCatalyst commands in VS Code

There are additional VS Code commands that are assigned to CodeCatalyst-related features that aren't displayed directly in the AWS Toolkit.

To view a list of commands that are assigned to CodeCatalyst from the command palette, complete the following steps:

1. From the Toolkit for VS Code, expand the **DEVELOPER TOOLS** explorer.
2. Choose **Show CodeCatalyst Commands** to open the **Command Palette** with a pre-populated search for `CodeCatalyst`.
3. Select a CodeCatalyst command from the list to activate it.

Working with the Toolkit in a Dev Environments

Dev Environments are virtual computing environments for Amazon CodeCatalyst. The following sections describe how to create, launch, and work from Dev Environments using the AWS Toolkit for Visual Studio Code.

For detailed information about Dev Environments, see the Dev Environments topic in the *Amazon CodeCatalyst* User Guide.

Configuring your Dev Environment with devfiles

The `devfile` specification is an open-standard format for YAML that can be used to define configurations for Dev Environments. Every Dev Environment has a devfile. If you create a Dev Environment without a repository or from a repository that doesn't contain a devfile, a default is applied to the source automatically. Devfiles can be updated from CodeCatalyst or your IDE. The processes to update a devfile in a local or remote instance of VS Code are identical, but if you update a devfile locally, you must push the updates to your source repository before the updates take effect.

For detailed information about configuring Dev Environments with devfiles, see the Configuring your Dev Environment topic in the *Amazon CodeCatalyst* User Guide.

The following procedure describes how to edit your devfile from a remote instance of the Toolkit while it's running in a Dev Environment.

> ⚠ **Important**
>
> If you edit the `Devfile` from VS Code, be aware of the following:
>
> - Changing the name of the devfile or the devfile component name replaces the contents of your root directory. All previous content is lost and unrecoverable.
> - If you create a Dev Environment without a devfile in the root folder or a Dev Environment that's not associated with a source repository, a devfile with default configuration settings is generated for your Dev Environment when you create it.
> - For instructions on how to define and configure your `Devfile`, see the Adding Commands documentation on the devfile.io website.

1. From the Toolkit for VS Code, expand the **DEVELOPER TOOLS** explorer.
2. Expand **CodeCatalyst** and choose **Open Devfile** to open `devfile.yaml` in a new editor window, within your current Dev Environment.
3. From the VS Code editor, update your devfile, then save your changes.
4. The next time you launch your Dev Environment, the configuration is updated to match the specifications that are defined in your `Devfile`.

Authenticating and connecting to AWS from your Dev Environment

To access all of your AWS resources from your Dev Environment, you must authenticate and connect your remote instance of the Toolkit with your AWS account. The remote instance of the Toolkit automatically authenticates with the credentials inherited from your local instance of the Toolkit when your Dev Environment is launched.

The procedures to update your credentials for a remote instance of the Toolkit are identical to the authentication experience in your local instance of the Toolkit. For detailed instructions on how to update credentials, authenticate, and connect to AWS from the Toolkit, see the Connecting to AWS section in the *Getting started* topic of this User Guide.

For additional information about each of the AWS authentication methods compatible with the AWS Toolkit for Visual Studio Code, see the Authentication and access topic in this User Guide.

Working with the Toolkit for VS Code in Dev Environments

After you open or create a Dev Environment in VS Code, you can work from the Toolkit for VS Code, similar to how you can from a local instance of VS Code. Dev Environments running VS Code are configured to automatically install the AWS Toolkit and connect with your AWS Builder ID.

Stopping a Dev Environment

To stop your current Dev Environment:

1. From the Toolkit for VS Code, expand the **DEVELOPER TOOLS** explorer.
2. Expand **CodeCatalyst** and choose **Stop Dev Environment**.
3. When prompted by VS Code, confirm that you want to stop your Dev Environment.
4. Your Dev Environment has successfully stopped when VS Code closes the remote connection and returns to a local development instance.

Opening Dev Environment settings

To open the settings for your current Dev Environment, complete the following steps:

> **Note**
>
> You can't change the amount of storage space assigned to your Dev Environment after it has been created.

1. From the Toolkit for VS Code, expand the **DEVELOPER TOOLS** explorer.
2. Expand **CodeCatalyst** and choose **Open Settings** to open the **Dev Environment Settings** view, for your current Dev Environment.
3. From the **Dev Environment Settings** view, the following sections contain options for your Dev Environment:

- **Alias**: View and change the **Alias** assigned to your Dev Environment.
- **Status**: View your current Dev Environment status, the project it's assigned to, and stop your environment.
- **Devfile**: View the name and location of the `Devfile` for your Dev Environment. Open your `Devfile` by choosing the **Open in Editor** button.
- **Compute Settings**: Change the size and default **Timeout Length** for your Dev Environment.

Troubleshooting Amazon CodeCatalyst and VS Code

The following topics address potential technical issues when working with Amazon CodeCatalyst and VS Code.

Topics

VS Code version

Your version of VS Code is expected to set up a handler for `vscode://` URIs on your system. Without this handler, you can't access all CodeCatalyst features from the AWS Toolkit. For example, you encounter an error when launching a Dev Environment from VS Code Insiders. This is because VS Code Insiders handles `vscode-insiders://` URIs and doesn't handle `vscode://` URIs.

Permissions for Amazon CodeCatalyst

The following are file permission requirements for working with CodeCatalyst from the AWS Toolkit for Visual Studio Code:

- Set your own access permissions for your `~/.ssh/config` file to `read` and `write`. Restrict `write` permissions for all other users.
- Set your access permissions for the `~/.ssh/id_dsa` and `~/.ssh/id_rsa` files to `read` only. Restrict `read`, `write` and `execute` permissions for all other users.
- Your `globals.context.globalStorageUri.fsPath` file must be in a writable location.

Connecting to a Dev Environment from the Toolkit for VS Code

If you receive the following error when attempting to connect to a Dev Environment from the AWS Toolkit for Visual Studio Code:

Your `~/.ssh/config` has an `aws-devenv-*` section that might be out of date.

- Choose the **Open config. . .** button to open your `~/.ssh/config` file in the VS Code **Editor**.
- From the **Editor**, select and delete the contents of the `Host aws-devenv-*` section.
- Save the changes you made to the `Host aws-devenv-*` of `~/.ssh/config`. Then, close the file.
- Reattempt to connect to a Dev Environment from the Toolkit for VS Code.

Working with Amazon API Gateway

You can browse and run remote API Gateway resources in your connected AWS account using the AWS Toolkit for Visual Studio Code.

> **Note**
>
> This feature does not support debugging.

To browse and run remote API Gateway resources

1. In the **AWS Explorer**, choose **API Gateway** to expand the menu. The remote API Gateway resources are listed.
2. Locate the API Gateway resource you want to invoke, open its context (right-click) menu, and then choose **Invoke on AWS**.
3. In the parameters form, specify the invoke parameters.
4. To run the remote API Gateway resource, choose **Invoke**. The results are deplayed in the **VS Code Output** view.

Using AWS App Runner with AWS Toolkit for Visual Studio Code

AWS App Runner provides a fast, simple, and cost-effective way to deploy from source code or a container image directly to a scalable and secure web application in the AWS Cloud. Using it, you don't need to learn new technologies, decide which compute service to use, or know how to provision and configure AWS resources.

You can use AWS App Runner to create and manage services based on a *source image* or *source code*. If you use a source image, you can choose a public or private container image that's stored in an image repository. App Runner supports the following image repository providers:

- Amazon Elastic Container Registry (Amazon ECR): Stores private images in your AWS account.
- Amazon Elastic Container Registry Public (Amazon ECR Public): Stores publicly readable images.

If you choose the source code option, you can deploy from a source code repository that's maintained by a supported repository provider. Currently, App Runner supports GitHub as a source code repository provider.

Prerequisites

To interact with App Runner using the AWS Toolkit for Visual Studio Code requires the following:

- An AWS account
- A version of AWS Toolkit for Visual Studio Code that features AWS App Runner

In addition to those core requirements, make sure that all relevant IAM users have permissions to interact with the App Runner service. Also you need to obtain specific information about your service source such as the container image URI or the connection to the GitHub repository. You need this information when creating your App Runner service.

Configuring IAM permissions for App Runner

The easiest way to grant the permissions that are required for App Runner is to attach an existing AWS managed policy to the relevant AWS Identity and Access Management (IAM) entity, specifically a user or group. App Runner provides two managed policies that you can attach to your IAM users:

- `AWSAppRunnerFullAccess`: Allows users to perform all App Runner actions.
- `AWSAppRunnerReadOnlyAccess`: Allow users to list and view details about App Runner resources.

In addition, if you choose a private repository from the Amazon Elastic Container Registry (Amazon ECR) as the service source, you must create the following access role for your App Runner service:

- `AWSAppRunnerServicePolicyForECRAccess`: Allows App Runner to access Amazon Elastic Container Registry (Amazon ECR) images in your account.

You can create this role automatically when configuring your service instance with VS Code's **Command Palette**.

> **Note**
>
> The **AWSServiceRoleForAppRunner** service-linked role allows AWS App Runner to complete the following tasks:
>
> - Push logs to Amazon CloudWatch Logs log groups.
> - Create Amazon CloudWatch Events rules to subscribe to Amazon Elastic Container Registry (Amazon ECR) image push.
>
> You don't need to manually create the service-linked role. When you create an AWS App Runner in the AWS Management Console or by using API operations that are called by AWS Toolkit for Visual Studio Code, AWS App Runner creates this service-linked role for you.

For more information, see Identity and access management for App Runner in the *AWS App Runner Developer Guide*.

Obtaining service sources for App Runner

You can use AWS App Runner to deploy services from a source image or source code.

Source image

> If you're deploying from a source image, you can obtain a link to the repository for that image from a private or public AWS image registry.

- Amazon ECR private registry: Copy the URI for a private repository that uses the Amazon ECR console at https://console.aws.amazon.com/ecr/repositories.
- Amazon ECR public registry: Copy the URI for a public repository that uses the Amazon ECR Public Gallery at https://gallery.ecr.aws/.

> **Note**
>
> You can also obtain the URI for a private Amazon ECR repository directly from **AWS Explorer** in Toolkit for VS Code:
>
> - Open **AWS Explorer** and expand the **ECR** node to view the list of repositories for that AWS Region.
> - Right-click a repository and choose **Copy Repository URI** to copy the link to your clipboard.

You specify the URI for the image repository when configuring your service instance with VS Code's **Command Palette**

For more information, see App Runner service based on a source image in the *AWS App Runner Developer Guide*.

Source code

For your source code to be deployed to an AWS App Runner service, that code must be stored in a Git repository that's maintained by a supported repository provider. App Runner supports one source code repository provider: GitHub.

For information about setting up a GitHub repository, see the Getting started documentation on GitHub.

To deploy your source code to an App Runner service from a GitHub repository, App Runner establishes a connection to GitHub. If your repository is private (that is, it isn't publicly accessible on GitHub), you must provide App Runner with connection details.

> **Important**
>
> To create GitHub connections, you must use the App Runner console (https://console.aws.amazon.com/apprunner) to create a connection that links GitHub to AWS.

You can select the connections that are available on the **GitHub connections** page when configuring your service instance with VS Code's **Command Palette**.
For more information, see Managing App Runner connections in the *AWS App Runner Developer Guide*.

The App Runner service instance provides a managed runtime that allows your code to build and run. AWS App Runner currently supports the following runtimes:

- Python managed runtime
- Node.js managed runtime

As part of your service configuration, you provide information about how the App Runner service builds and starts your service. You can enter this information using the **Command Palette** or specify a YAML-formatted App Runner configuration file. Values in this file instruct App Runner how to build and start your service, and provide runtime context. This includes relevant network settings and environment variables. The configuration file is named `apprunner.yaml`. It's automatically added to root directory of your application’s repository.

Pricing

You're charged for the compute and memory resources that your application uses. In addition, if you automate your deployments, you also pay a set monthly fee for each application that covers all automated deployments for that month. If you opt to deploy from source code, you additionally pay a build fee for the amount of time that it takes App Runner to build a container from your source code.

For more information, see AWS App Runner Pricing.

Topics

- Creating App Runner services
- Managing App Runner services

Creating App Runner services

You can create an App Runner service in Toolkit for VS Code by using the **AWS Explorer** and VS Code's **Command Palette**. After you choose to create a service in a specific AWS Region, numbered steps provided by the **Command Palette** guide you through the process of configuring the service instance where your application runs.

Before creating an App Runner service, make sure that you've completed the prerequisites. This includes providing the relevant IAM permissions and confirming the specific source repository that you want to deploy.

To create an App Runner service

1. Open AWS Explorer, if it isn't already open.
2. Right-click the **App Runner** node and choose **Create Service**.

   The **Command Palette** displays.
3. For **Select a source code location type**, choose **ECR** or **Repository**.

   If you choose **ECR**, you specify a container image in a repository maintained by Amazon Elastic Container Registry. If you choose **Repository**, you specify a source code repository that's maintained by a supported repository provider. Currently, App Runner supports GitHub as a source code repository provider.

Deploying from ECR

1. For **Select or enter an image repository**, choose or enter the URL of the image repository that's maintained by your Amazon ECR private registry or the Amazon ECR Public Gallery.

   > **Note**
   >
   > If you specify a repository from the Amazon ECR Public Gallery, make sure that automatic deployments are turned off because App Runner doesn't support automatic deployments for an image in an ECR Public repository.
   > Automatic deployments are switched off by default, and this is indicated when the icon on the **Command Palette** header features a diagonal line through it. If you chose to switch on automatic deployments, a message informs you that this option can incur additional costs.

2. If the **Command Palette** step reports that **No tags found**, you need to go back a step to select a repository that contains a tagged container image.
3. If you're using an Amazon ECR private registry, you require the ECR access role, **AppRunnerECRAccessRole**, that allows App Runner to access Amazon Elastic Container Registry (Amazon ECR) images in your account. Choose the "+" icon on the **Command Palette** header to automatically create this role. (An access role isn't required if your image is stored in Amazon ECR Public, where images are publicly available.)
4. For **Port**, enter the IP port that's used by the service (Port `8000`, for example).
5. For **Configure environment variables**, you can specify a file that contains environment variables that are used to customize behavior in your service instance. Or you can skip this step.
6. For **Name your service**, enter a unique name without spaces and press **Enter**.
7. For **Select instance configuration**, choose a combination of CPU units and memory in GB for your service instance.

   When your service is being created, its status changes from **Creating** to **Running**.
8. After your service starts running, right-click it and choose **Copy Service URL**.
9. To access your deployed application, paste the copied URL into the address bar of your web browser.

Deploying from a remote repository

1. For **Select a connection**, choose a connection that links GitHub to AWS. The connections that are available for selection are listed on the **GitHub connections** page on the App Runner console.
2. For **Select a remote GitHub repository**, choose or enter a URL for the remote repository.

   Remote repositories that are already configured with Visual Studio Code's source control management (SCM) are available for selection. You can also paste a link to the repository if it's not listed.
3. For **Select a branch**, choose which Git branch of your source code that you want to deploy.
4. For **Choose configuration source**, specify how you want to define your runtime configuration.

If you choose **Use configuration file**, your service instance is configured by settings that are defined by the `apprunner.yaml` configuration file. This file is in the root directory of your application's repository.

If you choose **Configure all settings here**, use the **Command palette** to specify the following:

- **Runtime**: Choose **Python 3** or **Nodejs 12**.
- **Build command**: Enter the command to build your application in the runtime environment of your service instance.
- **Start command**: Enter the command to start your application in the runtime environment of your service instance.

5. For **Port**, enter the IP port that's used by the service (Port `8000`, for example).
6. For **Configure environment variables**, you can specify a file that contains environment variables that are used to customize behavior in your service instance. Or you can skip this step.
7. For **Name your service**, enter a unique name without spaces and press **Enter**.
8. For **Select instance configuration**, choose a combination of CPU units and memory in GB for your service instance.

   When your service is being created, its status changes from **Creating** to **Running**.
9. After your service starts running, right-click it and choose **Copy Service URL**.
10. To access your deployed application, paste the copied URL into the address bar of your web browser.

> **Note**
>
> If your attempt to create an App Runner service fails, the service shows a status of **Create failed** in **AWS Explorer**. For troubleshooting tips, see When service creation fails in the *App Runner Developer Guide*.

Managing App Runner services

After creating an App Runner service, you can manage it by using the AWS Explorer pane to carry out the following activities:

- Pausing and resuming App Runner services
- Deploying App Runner services
- Viewing logs streams for App Runner
- Deleting App Runner services

Pausing and resuming App Runner services

If you need to disable your web application temporarily and stop the code from running, you can pause your AWS App Runner service. App Runner reduces the compute capacity for the service to zero. When you're ready to run your application again, resume your App Runner service. App Runner provisions new compute capacity, deploys your application to it, and runs the application.

> ⚠ **Important**
>
> You're billed for App Runner only when it's running. Therefore, you can pause and resume your application as needed to manage costs. This is particularly helpful in development and testing scenarios.

To pause your App Runner service

1. Open AWS Explorer, if it isn't already open.
2. Expand **App Runner** to view the list of services.
3. Right-click your service and choose **Pause**.
4. In the dialog box that displays, choose **Confirm**.

   While the service is pausing, the service status changes from **Running** to **Pausing** and then to **Paused**.

To resume your App Runner service

1. Open AWS Explorer, if it isn't already open.
2. Expand **App Runner** to view the list of services.
3. Right-click your service and choose **Resume**.

   While the service is resuming, the service status changes from **Resuming** to **Running**.

Deploying App Runner services

If you choose the manual deployment option for your service, you need to explicitly initiate each deployment to your service.

1. Open AWS Explorer, if it isn't already open.
2. Expand **App Runner** to view the list of services.
3. Right-click your service and choose **Start Deployment**.
4. While your application is being deployed, the service status changes from **Deploying** to **Running**.
5. To confirm that your application is successfully deployed, right-click the same service and choose **Copy Service URL**.
6. To access your deployed web application, paste the copied URL into the address bar of your web browser.

Viewing logs streams for App Runner

Use CloudWatch Logs to monitor, store, and access your log streams for services such as App Runner. A log stream is a sequence of log events that share the same source.

1. Expand **App Runner** to view the list of service instances.
2. Expand a specific service instance to view the list of log groups. (A log group is a group of log streams that share the same retention, monitoring, and access control settings.)
3. Right-click a log group and choose **View Log Streams**.
4. From the **Command Palette**, choose a log stream from the group.

   The VS Code editor displays the list of log events that make up the stream. You can choose to load older or newer events into the editor.

Deleting App Runner services

> **Important**
>
> If you delete your App Runner service, it's permanently removed and your stored data is deleted. If you need to recreate the service, App Runner needs to fetch your source again and build it if it's a code repository. Your web application gets a new App Runner domain.

1. Open AWS Explorer, if it isn't already open.
2. Expand **App Runner** to view the list of services.
3. Right-click a service and choose **Delete Service**.
4. In the **Command Palette**, enter *delete* and then press **Enter** to confirm.

   The deleted service displays the **Deleting** status, and then the service disappears from the list.

AWS Application Composer

You can use the AWS Toolkit for Visual Studio Code to work with the AWS Application Composer service. AWS Application Composer is a visual builder for AWS applications that assists with designing your application architecture and visualizing your AWS CloudFormation infrastructure.

For detailed information about the AWS Application Composer service, see the AWS Application Composer User Guide.

The following topics describe how to work with AWS Application Composer from the AWS Toolkit for Visual Studio Code.

Topics

Working with AWS Application Composer from the Toolkit

AWS Application Composer for the AWS Toolkit for Visual Studio Code allows you to visually design applications through an interactive canvas. You can also use Application Composer to visualize and modify AWS CloudFormation and AWS Serverless Application Model (AWS SAM) templates. While working with Application Composer, your changes are stored persistently enabling you to switch seamlessly between editing files directly in the VS Code editor or using the interactive canvas.

For detailed information about the AWS Application Composer service, getting started information, and tutorials, see the AWS Application Composer service User Guide.

The following sections describe how to access the AWS Application Composer service from the AWS Toolkit for Visual Studio Code.

Accessing AWS Application Composer from the Toolkit

There are 3 main ways that you can access AWS Application Composer from the Toolkit.

Accessing AWS Application Composer from an existing template

1. From VS Code, open an existing template file in the VS Code editor.
2. From the **editor window**, click the AWS Application Composer button located in the upper right-hand corner of the editor window.
3. AWS Application Composer opens and visualizes your template file in the VS Code editor window.

Accessing AWS Application Composer from the context menu (right-click)

1. From VS Code right-click the template file you want to open with AWS Application Composer.
2. In the context menu, choose the **Open with App Composer** option.
3. AWS Application Composer opens and visualizes your template file in a new VS Code editor window.

Accessing AWS Application Composer from the Command Palette

1. From VS Code open the Command Palette by pressing **`Cmd + Shift + P`** or **`Ctrl + Shift + P`** (Windows)
2. In the search field, enter **`AWS Application Composer`** and choose **AWS Application Composer** when it populates in the results.
3. Choose the template file you want to open, AWS Application Composer opens and visualizes your template file in a new VS Code editor window.

AWS CDK for VS Code

This is prerelease documentation for a feature in preview release. It is subject to change.

The **AWS CDK service** enables you to work with AWS Cloud Development Kit (AWS CDK) applications, or *apps*. You can find detailed information about the AWS CDK in the AWS Cloud Development Kit (AWS CDK) Developer Guide.

AWS CDK apps are composed of building blocks known as *constructs*, which include definitions for your AWS CloudFormation stacks and the AWS resources within them. Using the **AWS CDK Explorer**, you can visualize the stacks and resources that are defined in AWS CDK constructs. This visualization is provided in a *tree view* in the Developer Tools pane within the Visual Studio Code (VS Code) editor.

This section provides information about how to access and use **AWS CDK** in the VS Code editor. It assumes that you've already installed and configured the Toolkit for VS Code for your local IDE.

Topics

Working with AWS CDK applications

This is prerelease documentation for a feature in preview release. It is subject to change.

Use the **AWS CDK Explorer** in the AWS Toolkit for VS Code to visualize and work with AWS CDK applications.

Prerequisites

- Be sure your system meets the the prerequisites specified in Installing the Toolkit for VS Code.
- Install the AWS CDK command line interface, as described in the first few sections of Getting Started with the AWS CDK in the *AWS Cloud Development Kit (AWS CDK) Developer Guide*.

⚠ **Important**

The AWS CDK version must be 1.17.0 or later. Use **`cdk --version`** on the command line to see what version you're running.

Visualize an AWS CDK application

Using the AWS Toolkit for VS Code AWS CDK Explorer, you can manage the stacks and resources that are stored in the CDK constructs of your apps. The AWS CDK Explorer displays your resources in a tree view using the information defined in the `tree.json` file, which is created when you run the **`cdk synth`** command. The `tree.json` file is located in an app's `cdk.out` directory, by default.

To get started using the Toolkit AWS CDK Explorer, you'll need to create a CDK application.

1. Complete the first several steps of the Hello World Tutorial located in the AWS CDK Developer Guide.

   ⚠ **Important**

   When you arrive at the turotial step **Deploying the Stack**, stop and return to this guide.

   ⓘ **Note**

   You can run the commands provided in the tutorial, for example, **`mkdir`** and **`cdk init`**, on an operating system command line or in a **Terminal** window inside the VS Code editor.

2. After you complete the required steps of the CDK tutorial, open the CDK content that you created in the VS Code editor.
3. From the AWS navigation pane, expand the **CDK (Preview)** heading. Your CDK applications and their associated resources are now displayed in the CDK Explorer tree view.

Important notes

- When you load CDK apps into the VS Code editor, you can load multiple folders at one time. Each folder can contain multiple CDK apps, as shown in the preceding image. The AWS CDK Explorer finds apps in the project root directory and its direct subdirectories.

- When you perform the first several steps of the tutorial, you might notice that the last command you execute is **`cdk synth`**, which generates the `tree.json` file. If you change aspects of a CDK app, for example, add more resources, you need to execute that command again to see the changes reflected in the tree view.

Perform other operations on an AWS CDK app

You can use the VS Code editor to perform other operations on a CDK app, just as you would by using the command line of your operating system or other tools. For example, you can update the code files in the editor and deploy the app by using a VS Code **Terminal** window.

To try out these types of actions, use the VS Code editor to continue the Hello World Tutorial in the *AWS CDK Developer Guide*. Be sure to perform the last step, **Destroying the App's Resources**, so that you don't incur unexpected costs to your AWS account.

Working with AWS CloudFormation stacks

The AWS Toolkit for Visual Studio Code provides support for AWS CloudFormation stacks. Using the Toolkit for VS Code, you can perform certain tasks with AWS CloudFormation stacks, such as deleting them.

Topics

Deleting an AWS CloudFormation stack

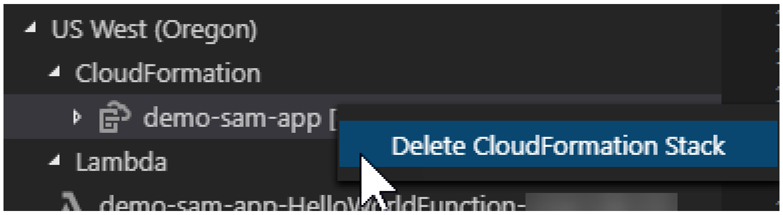
You can use the AWS Toolkit for Visual Studio Code to delete AWS CloudFormation stacks.

Prerequisites

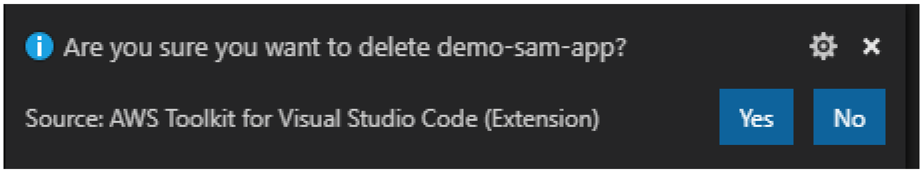
- Be sure your system meets the the prerequisites specified in Installing the Toolkit for VS Code.
- Ensure that the credentials you configured in Authentication and access include appropriate read/write access to the AWS CloudFormation service. If in the **AWS Explorer**, under **CloudFormation**, you see a message similar to "Error loading CloudFormation resources", check the permissions attached to those credentials. Changes that you make to permissions will take a few minutes to affect the **AWS Explorer** in VS Code.

Delete a CloudFormation stack

1. In the **AWS Explorer**, open the context menu of the AWS CloudFormation stack you want to delete.


US West (Oregon)
CloudFormation
demo-sam-app [
Delete CloudFormation Stack
Lambda
demo-sam-app-HelloWorldFunction-[redacted]

2. Choose **Delete CloudFormation Stack**.
3. In the message that appears, choose **Yes** to confirm the delete.



Are you sure you want to delete demo-sam-app?

Source: AWS Toolkit for Visual Studio Code (Extension)

After the stack is deleted, it's no longer listed in the **AWS Explorer**.

Create a AWS CloudFormation template using the AWS Toolkit for Visual Studio Code

The AWS Toolkit for Visual Studio Code can assist you in writing AWS CloudFormation and SAM templates.

Prerequisites

Toolkit for VS Code and credential prerequisites

- Before you can access the CloudFormation service from the Toolkit for VS Code, you need to meet the requirements outlined in the the userguide Installing the Toolkit for VS Code.
- The credentials you created in Authentication and access must include appropriate read/write access to the AWS CloudFormation service.

> **Note**
>
> If the **CloudFormation** service displays an **Error loading CloudFormation resources** message, check the permissions you've attached to those credentials. Also note that Changes made to permissions may take a few minutes to update in the **AWS Explorer**.

CloudFormation template prerequisites

- Install and enable the Redhat Developer YAML VS Code extension.
- You need to be connected to the internet when using the Redhat Developer YAML VS Code extension because it's used to download and cash JSON schemas on your machine.

Writing a CloudFormation template with YAML Schema Support

The toolkit uses YAML language support and JSON schemas to streamline the process of writing CloudFormation and SAM templates. Features like syntax validation and autocompletion not only make the process faster, but also help improve the quality of your template. When selecting a schema for your template, the following are recommended best practices.

CloudFormation template

- File has a .yaml or .yml extension.
- The file has a top-level `AWSTemplateFormatVersion` or **Resources** node.

SAM Template

- All of the criteria already described for CloudFormation
- The file has a top-level **Transform** node, containing a value that begins with `AWS::Serverless`.

The schema will be applied upon file modification. For example, a SAM Template schema will be applied after adding a serverless transform to a CloudFormation template and saving the file.

Syntax Validation

The YAML extension will automatically apply type validation to your template. This highlights entries with invalid types for a given property. If you hover over a highlighted entry, the extensions displays corrective actions.

Autocompletion

When adding new fields, enumerated values, or other resource types, you can initiate the YAML extension's autocompletion feature by typing **Ctrl + space**.

Working with CloudWatch Logs by using the AWS Toolkit for Visual Studio Code

Amazon CloudWatch Logs enables you to centralize the logs from all of your systems, applications, and AWS services that you use, in a single, highly scalable service. You can then easily view them, search them for specific error codes or patterns, filter them based on specific fields, or archive them securely for future analysis. For more information, see What Is Amazon CloudWatch Logs? in the *Amazon CloudWatch User Guide*.

The following topics describe how to use the AWS Toolkit for Visual Studio Code to work with CloudWatch Logs in an AWS account.

Topics

Viewing CloudWatch log groups and log streams by using the AWS Toolkit for Visual Studio Code

A *log stream* is a sequence of log events that share the same source. Each separate source of logs into CloudWatch Logs makes up a separate log stream.

A *log group* is a group of log streams that share the same retention, monitoring, and access control settings. You can define log groups and specify which streams to put into each group. There is no limit on the number of log streams that can belong to one log group.

For more information, see [Working with Log Groups and Log Streams](#) in the *Amazon CloudWatch User Guide*.

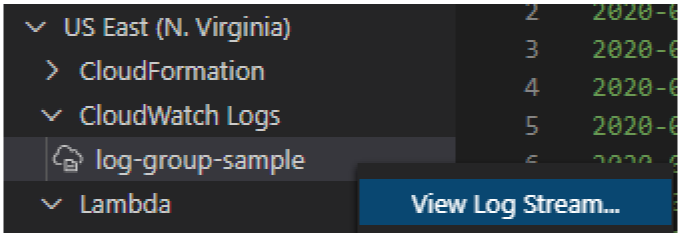
Topics

- [Viewing log groups and log streams with the CloudWatch Logs node](#)

Viewing log groups and log streams with the CloudWatch Logs node

1. In VS Code, choose **View**, **Explorer** to open AWS Explorer.
2. Click the **CloudWatch Logs** node to expand the list of log groups.

   The log groups for the current AWS Region are displayed under the **CloudWatch Logs** node.
3. To view the log streams in a log group, right-click the name of the log group, and then choose **View Log Stream**.

4. From the **Command Palette**, select a log stream from the group to view.

   > **Note**
   >
   > The **Command Palette** displays a timestamp for the last event in each stream.

   The [**Log Stream** editor](#) launches to display the stream's log events.

Working with CloudWatch log events in log streams by using the AWS Toolkit for Visual Studio Code

After you've opened the **Log Steam** editor, you can access the log events in each stream. Log events are records of activity recorded by the application or resource being monitored.

Topics

- Viewing and copying log stream information
- Save the contents of the log stream editor to a local file

Viewing and copying log stream information

When you open a log stream, the **Log Stream** editor displays that stream's sequence of log events.

1. To find a log stream to view, open the **Log Stream** editor (see Viewing CloudWatch log groups and log streams).

   Each line listing an event is timestamped to show when it was logged.

2. You can view and copy information about the stream's events using the following options:

   - View events by time: Display the latest and older log events by choosing **Load newer events** or **Load older events**.

     > **Note**
     >
     > The **Log Stream** editor initially loads a batch of the most recent 10,000 lines of log events or 1 MB of log data (whichever is smaller). If you choose **Load newer events**, the editor displays events that were logged after the last batch was loaded. If you choose **Load older events**, the editor displays a batch of events that occurred before those currently displayed.

   - Copy log events: Select the events to copy, then right-click and select **Copy** from the menu.
   - Copy the log stream's name: Right-click the tab of **Log Stream** editor and choose **Copy Log Stream Name**.

> **Note**
>
> You can also use the **Command Palette** to run **AWS Toolkit Copy Log Stream Name**.

Save the contents of the log stream editor to a local file

You can download the contents of the CloudWatch log stream editor to a `log` file on your local machine.

> **Note**
>
> With this option, you save to file only the log events that are currently displayed in the log stream editor. For example, if the total size of a log stream is 5MB and only 2MB is loaded in the editor, your saved file will also contain only 2MB of log data. To display more data to be saved, choose **Load newer events** or **Load older events** in the editor.

1. To find a log stream to copy, open the **Log Streams** editor (see Viewing CloudWatch log groups and log streams).
2. Choose the **Save** icon beside the tab displaying the log stream's name.

   > **Note**
   >
   > You can also use the **Command Palette** to run **AWS Toolkit Save Current Log Stream Content**.

3. Use the dialog box to select or create a download folder for the log file, and click **Save**.

Searching CloudWatch log groups

You can use Search Log Group to search all log streams in a log group.

For detailed information about the Amazon CloudWatch Logs service, see the Working with Log Groups and Log Streams topic in the *Amazon CloudWatch User Guide*.

Searching log groups from the VS Code Command Palette

To search log groups from the VS Code Command Palette, complete the following steps.

For detailed information about Amazon CloudWatch Logs filters and patterns, see the Filter and pattern syntax section in the *Amazon CloudWatch User Guide*.

1. From VS Code, open the **Command Palette** by pressing **`cmd+shift+p`** (windows: **`ctrl+shift+p`**).
2. From the Command Palette, enter the command **`AWS: Search Log Group`**, then select it to open the search log group dialog in VS Code and follow the prompts to continue.

> **Note**
>
> From the first prompt, you have the option to switch your AWS region before proceeding to the next steps.

3. From the **Select Log Group (1/3)** prompt, choose the log group you want to search.
4. From the **Select Time Filter (2/3)** prompt, choose the time filter to apply to your search.
5. From the **Search Log Group... (3/3)** prompt, enter your search pattern in the provided field, then press the **`Enter`** key to continue or the **ESC** key to cancel the search.
6. Your search results open in the VS Code editor, when the search is complete.

Searching log groups from the AWS Explorer

To search log groups from the AWS Toolkit for Visual Studio Code Explorer, complete the following steps.

1. From the AWS Toolkit for Visual Studio Code Explorer expand **CloudWatch**.
2. Open the context menu for (right-click) the Search Log Group you want to search, then choose **Search Log Group** to open the search prompt.
3. Follow the prompts by selecting a time frame to continue.
4. When prompted, enter your search pattern in the provided field, then press the **`Enter`** key to continue or the **ESC** key to cancel the search.
5. Your search results open in the VS Code editor when the search is complete.

Working with search log results

After completing a successful CloudWatch log group search, your search results open in the VS Code editor. The following procedures describe how to work with search log results.

> **Note**
>
> When viewing a single log stream, the following features are limited to the results in your currently-active log stream.

Saving your search log group results

To save your search log group results locally, complete the following steps.

1. From your search log group results, choose the **Save Log to File** icon button, located in the upper right-hand corner of the VS Code editor.
2. From the **Save As** prompt, specify the name and location you would like to save the file to.
3. Choosing **OK** saves the file to your local machine.

Changing the time range the time-range

To change the time range that is active in your search log group results, complete the following steps.

1. From your search log group results, choose the **Search by date...** icon button, located in the upper right-hand corner of the VS Code editor.
2. From the **Select Time Filter** prompt, choose a new time range for your search log results.
3. Your results are updated when the **Select Time Filter** prompt is closed.

Changing the search pattern

To change the search pattern that is active in your search log group results, complete the following steps.

1. From your search log group results, choose the **Search by Pattern...** icon button, located in the upper right-hand corner of VS Code editor.

2. From the **Search Log Group** prompt, enter the new search pattern in the provided field.
3. Press the **`Enter`** key to close the prompt and update your results with the new search pattern.

Working with Amazon Elastic Container Registry

Amazon Elastic Container Registry (Amazon ECR) is an AWS managed container-registry service that's secure, and scalable. Several Amazon ECR service functions are accessible from the Toolkit for VS Code Explorer.

- Creating a repository.
- Creating an AWS App Runner service for your repository or tagged image.
- Accessing image tag and repository URIs or ARNs.
- Deleting image tags and repositories.

You can also acces the full-range of Amazon ECR functions through the VS Code console by integrating the AWS CLI and other platforms, with VS Code.

For more information about Amazon ECR, see What is Amazon ECR? in the Amazon Elastic Container Registry User Guide.

Prerequisites

You need to complete these steps in order to access the Amazon ECR service from the VS Code Explorer.

Create an IAM user

Before you can access an AWS service, such as Amazon ECR, you must provide credentials. This is so that the service can determine if you have permission to access its resources. We don't recommend that you access AWS directly through the credentials for your root AWS account. Instead, use AWS Identity and Access Management (IAM) to create an IAM user and then add that user to an IAM group with administrative permissions. You can then access AWS using a special URL and the credentials for the IAM user.

If you signed up for AWS but didn't create an IAM user for yourself, you can create one by using the IAM console.

To create an administrator user, choose one of the following options.

Choose one way to manage your administrator	To	By	You can also
In IAM Identity Center (Recommended)	Use short-term credentials to access AWS. This aligns with the security best practices . For information about best practices , see Security best practices in IAM in the *IAM User Guide*.	Following the instructions in Getting started in the *AWS IAM Identity Center User Guide*.	Configure programmatic access by Configuring the AWS CLI to use AWS IAM Identity Center in the *AWS Command Line Interface User Guide*.
In IAM (Not recommended)	Use long-term credentials to access AWS.	Following the instructions in Creating your first IAM admin user and user group in the *IAM User Guide*.	Configure programmatic access by Managing access keys for IAM users in the *IAM User Guide*.

To sign in as this new IAM user, sign out of the AWS console, then use the following URL. In the following URL, where *your_aws_account_id* is your AWS account number without the hyphens (for example, if your AWS account number is `1234-5678-9012`, your AWS account ID is `123456789012`):

```
https://your_aws_account_id.signin.aws.amazon.com/console/
```

Enter the IAM user name and password that you just created. When you're signed in, the navigation bar displays "*your_user_name @ your_aws_account_id*".

If you don't want the URL for your sign-in page to contain your AWS account ID, you can create an account alias. From the IAM dashboard, choose **Customize** and enter an **Account Alias**. This can be your company name. For more information, see Your AWS account ID and its alias in the IAM User Guide.

To sign in after you create an account alias, use the following URL:

```
https://your_account_alias.signin.aws.amazon.com/console/
```

To verify the sign-in link for IAM users for your account, open the IAM console and check under **IAM users sign-in link** on the dashboard.

For more information about IAM, see the AWS Identity and Access Management User Guide.

Install and configure Docker

You can install and configure Docker by selecting your preferred operating system from the Install Docker Engine user guide and following the instructions.

Install and configure AWS CLI version 2

Install and configure AWS CLI version 2 by selecting your preferred operating system from the Installing, updating, and uninstalling the AWS CLI version 2 user guide.

Topics

Working with the Amazon Elastic Container Registry service in VS Code

You can access the Amazon Elastic Container Registry (Amazon ECR) service directly from the AWS Explorer in VS Code and use it to push a program image to an Amazon ECR repository. To get started, you need to do these steps:

1. Create a Dockerfile that contains the information necessary to build an image.
2. Build an image from that Dockerfile and tag the image for processing.
3. Create a repository inside your Amazon ECR instance.
4. Push the tagged image to your repository.

Sections

- Prerequisites
- 1. Creating a Dockerfile
- 2 . Build your image from your Dockerfile
- 3. Create a new repository
- 4. Push, pull, and delete images

Prerequisites

Before you can use the Amazon ECR service feature of the Toolkit for VS Code, you must meet these prerequisites.

1. Creating a Dockerfile

Docker uses a file called a Dockerfile to define an image that can be pushed and stored on a remote repository. Before you can upload an image to an ECR repository, you must create a Dockerfile and then build an image from that Dockerfile.

Creating a Dockerfile

1. Use the Toolkit for VS Code explorer to navigate to the directory where you want to store your Dockerfile.
2. Create a new file that's called **Dockerfile**.

> **Note**
>
> VS Code could prompt you to select a file type or file extension. If this occurs, select **plaintext**. Vs Code has a "dockerfile" extension. However, we don't recommend you use it. This is because the extension might cause conflicts with certain versions of Docker or other associated applications.

Edit your Dockerfile using VS Code

If your Dockerfile has a file extension, open the context (right-click) menu for the file and remove the file extension.

After the file extension is removed from your Dockerfile:

1. Open the empty Dockerfile directly in VS Code.

2. Copy the contents of the following example into your Dockerfile:

   Example Dockerfile image template

   ```
   FROM ubuntu:18.04

   # Install dependencies
   RUN apt-get update && \
    apt-get -y install apache2

   # Install apache and write hello world message
   RUN echo 'Hello World!' > /var/www/html/index.html

   # Configure apache
   RUN echo '. /etc/apache2/envvars' > /root/run_apache.sh && \
    echo 'mkdir -p /var/run/apache2' >> /root/run_apache.sh && \
    echo 'mkdir -p /var/lock/apache2' >> /root/run_apache.sh && \
    echo '/usr/sbin/apache2 -D FOREGROUND' >> /root/run_apache.sh && \
    chmod 755 /root/run_apache.sh

   EXPOSE 80

   CMD /root/run_apache.sh
   ```

   This is a Dockerfile that uses an Ubuntu 18.04 image. The **RUN** instructions update the package caches. Install software packages for the web server, and then write the "Hello World!" content to the document root of the web server. The **EXPOSE** instruction exposes port 80 on the container, and the **CMD** instruction starts the web server.

3. Save your Dockerfile.

   > ⚠ **Important**
   >
   > Make sure that your Dockerfile doesn't have an extension attached to the name. A Dockerfile with extensions might cause conflicts with certain versions of Docker or other associated applications.

2 . Build your image from your Dockerfile

The Dockerfile that you created contains the information necessary to build an image for a program. Before you can push that image to your Amazon ECR instance, you must first build the image.

Build an image from your Dockerfile

1. Use the Docker CLI or a CLI that's integrated with your instance of Docker to navigate into the directory that contains your Dockerfile.
2. Run the **Docker build** command to build the image that's defined in your Dockerfile.

   ```
             docker build -t hello-world .
   ```

3. Run the **Docker images** command to verify that the image was created correctly.

   ```
   docker images --filter reference=hello-world
   ```

   Example example output:

   ```
   REPOSITORY          TAG                 IMAGE ID            CREATED
    SIZE
   hello-world         latest              e9ffedc8c286        4 minutes ago
    241MB
   ```

4. > **Note**
   >
   > This step isn't necessary to create or push your image, but you can see how the program image works when it's run.

   To run the newly built image use the **Docker run** command.

   ```
   docker run -t -i -p 80:80 hello-world
   ```

The **-p** option that's specified in the preceding example maps the exposed **port 80** on the container to **port 80** of the host system. If you're running Docker locally, navigate to http://localhost:80 using your web browser. If the program ran correctly, a "Hello World!" statement is displayed.

For more information about the **Docker run** command, see Docker run reference on the Docker website.

3. Create a new repository

To upload your image into your Amazon ECR instance, create a new repository where it can be stored in.

Create a new Amazon ECR repository

1. From the VS Code **Activity Bar**, choose the **AWS Toolkit icon**.
2. Expand the **AWS Explorer** menu.
3. Locate the default AWS Region that's associated with your AWS account. Then, select it to see a list of the services that are through the Toolkit for VS Code.
4. Choose the **ECR +** option to begin the **Create new repository** process.
5. Follow the prompts to complete the process.
6. After it's complete, you can access your new repository from the **ECR** section of the AWS Explorer menu.

4. Push, pull, and delete images

After you built an image from your Dockerfile and created a repository, you can push your image into your Amazon ECR repository. Additionally, using the AWS Explorer with Docker and the AWS CLI, you can do the following:

- Pull an image from your repository.
- Delete an image that's stored in your repository.
- Delete your repository.

Authenticate Docker with your default registry

Authentication is required to exchange data between Amazon ECR and Docker instances. To authenticate Docker with your registry:

1. Open a command line operating system that's connected to your instance of AWS CLI.
2. Use the **get-login-password** method to authenticate to your private ECR registry.

   ```
   aws ecr get-login-password --region region | docker login --username AWS --
   password-stdin AWS_account_id.dkr.ecr.region.amazonaws.com
   ```

   > ⚠ **Important**
   >
   > In the preceding command, you must update both the **`region`** and the **`AWS_account_id`** to the information that's specific to your AWS account.

Tag and push an image to your repository

After you authenticated Docker with your instance of AWS, push an image to your repository.

1. Use the **Docker images** command to view the images that you stored locally and identify the one you would like to tag.

   ```
   docker images
   ```

   Example example output:

   ```
   REPOSITORY          TAG                 IMAGE ID            CREATED
    SIZE
   hello-world         latest              e9ffedc8c286        4 minutes ago
    241MB
   ```

2. Tag your image with the **Docker tag** command.

   ```
   docker tag hello-world:latest AWS_account_id.dkr.ecr.region.amazonaws.com/hello-
   world:latest
   ```

3. Push the tagged image to your repository with the **Docker tag** command.

   ```
   docker push AWS_account_id.dkr.ecr.region.amazonaws.com/hello-world:latest
   ```

   Example example output:

   ```
   The push refers to a repository [AWS_account_id.dkr.ecr.region.amazonaws.com/hello-
   world] (len: 1)
   e9ae3c220b23: Pushed
   a6785352b25c: Pushed
   0998bf8fb9e9: Pushed
   0a85502c06c9: Pushed
   latest: digest:
    sha256:215d7e4121b30157d8839e81c4e0912606fca105775bb0636b95aed25f52c89b size: 6774
   ```

After your tagged image has been successfully uploaded to your repository, it's visible in the AWS Explorer menu.

Pull an image from Amazon ECR

- You can pull an image to your local instance of **Docker tag** command.

  ```
  docker pull AWS_account_id.dkr.ecr.region.amazonaws.com/hello-world:latest
  ```

  Example example output:

  ```
  The push refers to a repository [AWS_account_id.dkr.ecr.region.amazonaws.com/hello-
  world] (len: 1)
  e9ae3c220b23: Pushed
  a6785352b25c: Pushed
  0998bf8fb9e9: Pushed
  0a85502c06c9: Pushed
  latest: digest:
   sha256:215d7e4121b30157d8839e81c4e0912606fca105775bb0636b95aed25f52c89b size: 6774
  ```

Delete an image from your Amazon ECR repository

There are two methods for deleting an image from VS Code. The first method is to use the AWS Explorer.

1. From the AWS Explorer, expand the **ECR**menu
2. Expand the repository that you want to delete an image from
3. Choose the image tag associated with the image that you wish to delete, by opening the context menu (right-click)
4. Choose the **Delete Tag...** option to delete all stored images associated with that tag

Delete an image using the AWS CLI

- You can also delete an image from your repository with the **AWS ecr batch-delete-image** command.

```
AWS ecr batch-delete-image \
      --repository-name hello-world \
      --image-ids imageTag=latest
```

Example example output:

```

{
    "failures": [],
    "imageIds": [
        {
            "imageTag": "latest",
            "imageDigest":
 "sha256:215d7e4121b30157d8839e81c4e0912606fca105775bb0636b95aed25f52c89b"
        }
    ]
}
```

Delete a repository from your Amazon ECR instance

There are two methods for deleting a repository from VS Code. The first method is to use the AWS Explorer.

1. From the AWS Explorer, expand the **ECR** menu
2. Choose the repository that you want to delete by opening the context (right-click) menu
3. Choose the **Delete Repository...** option to the chosen repository

Delete an Amazon ECR repository from the AWS CLI

- You can delete a repository with the **AWS ecr delete-repository** command.

> **Note**
>
> By default, you can't delete a repository that contains images. However, the **--force** flag allows this.

```
        AWS ecr delete-repository \
      --repository-name hello-world \
      --force
```

Example example output:

```
{
    "failures": [],
    "imageIds": [
        {
            "imageTag": "latest",
            "imageDigest":
 "sha256:215d7e4121b30157d8839e81c4e0912606fca105775bb0636b95aed25f52c89b"
        }
    ]
}
```

Working with Amazon Elastic Container Service

The AWS Toolkit for Visual Studio Code provides some support for Amazon Elastic Container Service (Amazon ECS). The Toolkit for VS Code assists you in certain Amazon ECS-related work, such as creating task definitions.

Topics

- Using IntelliSense for Amazon ECS task-definition files
- Amazon Elastic Container Service Exec in AWS Toolkit for Visual Studio Code

Using IntelliSense for Amazon ECS task-definition files

One of the things that you might do when working with Amazon Elastic Container Service (Amazon ECS) is to create task definitions, as described in Creating a Task Definition from the *Amazon Elastic Container Service Developer Guide*. When you install the AWS Toolkit for Visual Studio Code, the installation includes IntelliSense functionality for Amazon ECS task-definition files.

Prerequisites

- Be sure your system meets the prerequisites specified in Installing the Toolkit for VS Code.

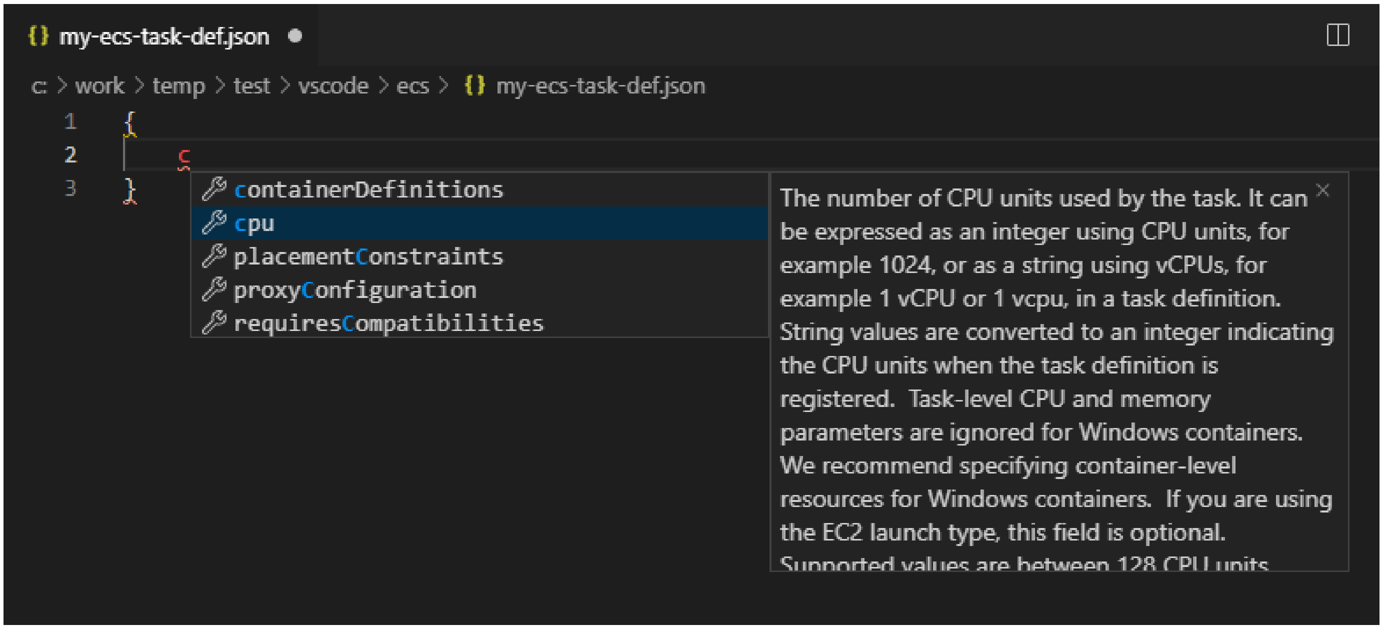
Use IntelliSense in Amazon ECS task-definition files

The following example shows you how you can take advantage of IntelliSense in Amazon ECS task-definition files.

1. Create a JSON file for your Amazon ECS task definition. The file's name must have `ecs-task-def.json` at the end, but can have additional characters at the beginning.

   For this example, create a file named `my-ecs-task-def.json`

2. Open the file in a VS Code editor and enter the initial curly braces.
3. Enter the letter "c" as if you wanted to add `cpu` to the definition. Observe the IntelliSense dialog that opens, which is similar to the following.


my-ecs-task-def.json
c: > work > temp > test > vscode > ecs > my-ecs-task-def.json

```
{
    c
}
```

The number of CPU units used by the task. It can be expressed as an integer using CPU units, for example 1024, or as a string using vCPUs, for example 1 vCPU or 1 vcpu, in a task definition. String values are converted to an integer indicating the CPU units when the task definition is registered. Task-level CPU and memory parameters are ignored for Windows containers. We recommend specifying container-level resources for Windows containers. If you are using the EC2 launch type, this field is optional. Supported values are between 128 CPU units

Amazon Elastic Container Service Exec in AWS Toolkit for Visual Studio Code

You can issue single commands in an Amazon Elastic Container Service (Amazon ECS) container with the AWS Toolkit for Visual Studio Code, using the Amazon ECS Exec feature.

> **Important**
>
> Enabling and Disabling Amazon ECS Exec changes the state of resources in your AWS account. This includes stopping and restarting the service. Altering the state of resources while the Amazon ECS Exec is enabled can lead to unpredictable results. For more information about Amazon ECS, see the developer guide Using Amazon ECS Exec for Debugging.

Amazon ECS Exec prerequisites

Before you can use the Amazon ECS Exec feature, there are some prerequisite conditions that need to be met.

Amazon ECS requirements

Depending on whether your tasks are hosted on Amazon EC2 or AWS Fargate (Fargate), Amazon ECS Exec has different version requirements.

- If you're using Amazon EC2, you must use an Amazon ECS optimized AMI that was released after January 20th, 2021, with an agent version of 1.50.2 or greater. Additional information is available for you in the developer guide Amazon ECS optimized AMIs.
- If you're using AWS Fargate, you must use platform version 1.4.0 or higher. Additional information about Fargate requirements is available to you in the developer guide AWS Fargate platform versions.

AWS account configuration and IAM permissions

To use the Amazon ECS Exec feature, you need to have an existing Amazon ECS cluster associated with your AWS account. Amazon ECS Exec uses Systems Manager to establish a connection with the containers on your cluster and requires specific Task IAM Role Permissions to communicate with the SSM service.

You can find IAM role and policy information, specific to Amazon ECS Exec, in the IAM permissions required for ECS Exec developer guide.

Working with the Amazon ECS Exec

You can enable or disable the Amazon ECS Exec directly from the AWS Explorer in the Toolkit for VS Code. When you have enabled Amazon ECS Exec, you can choose containers from the Amazon ECS menu and then run commands against them.

Enabling Amazon ECS Exec

1. From the AWS Explorer, locate and expand the Amazon ECS menu.
2. Expand the cluster with the service that you want to modify.
3. Open the context menu for (right-click) the service and choose **Enable Command Execution**.

> ⚠ **Important**
>
> This will start a new deployment of your Service and may take a few minutes. For more information, see the note at the beginning of this section.

Disabling Amazon ECS Exec

1. From the AWS Explorer, locate and expand the Amazon ECS menu.
2. Expand the cluster that houses the service you want.
3. Open the context menu for (right-click) the service and choose **Disable Command Execution**.

> ⚠ **Important**
>
> This will start a new deployment of your Service and may take a few minutes. For more information, see the note at the beginning of this section.)

Running commands against a Container

To run commands against a container using the AWS Explorer, Amazon ECS Exec must be enabled. If it's not enabled, see the **Enabling ECS Exec** procedure in this section.

1. From the AWS Explorer, locate and expand the Amazon ECS menu.
2. Expand the cluster that houses the service you want.
3. Expand the service to list the associated containers.
4. Open the context menu for (right-click) the container and choose **Run Command in Container**.
5. A **prompt** will open with a list of running Tasks, choose the **Task ARN** that you want.

   > ⓘ **Note**
   >
   > If only one Task is running for that Service, it will be auto-selected and this step will be skipped.

6. When prompted, type the command that you want to run and press **Enter** to process.

Working with Amazon EventBridge

The AWS Toolkit for Visual Studio Code (VS Code) provides support for Amazon EventBridge. Using the Toolkit for VS Code, you can work with certain aspects of EventBridge, such as schemas.

Topics

- Working with Amazon EventBridge Schemas

Working with Amazon EventBridge Schemas

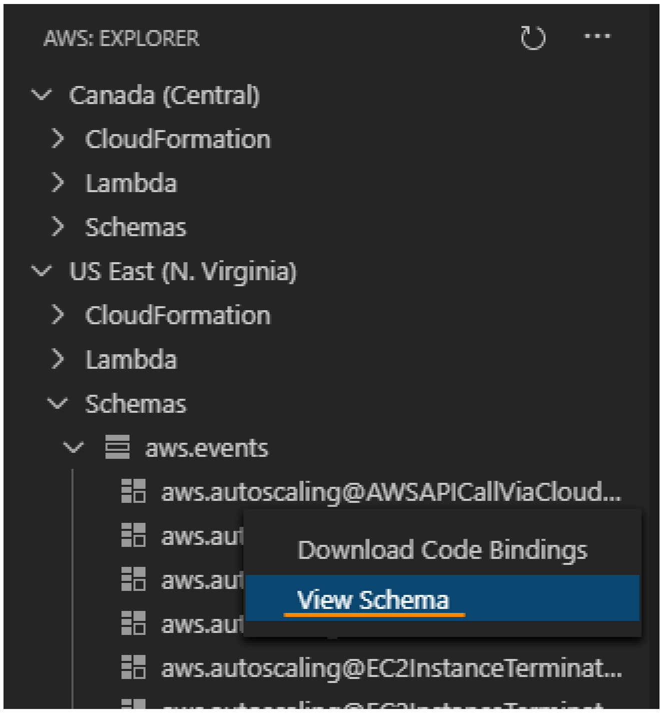
You can use the AWS Toolkit for Visual Studio Code (VS Code) to perform various operations on Amazon EventBridge schemas.

Prerequisites

- Be sure your system meets the prerequisites specified in Installing the Toolkit for VS Code.
- The EventBridge schema you want to work with must be available in your AWS account. If it isn't, create or upload it. See Amazon EventBridge Schemas in the Amazon EventBridge User Guide.

View an Available Schema

1. In the **AWS Explorer**, expand **Schemas**.
2. Expand the name of the registry that contains the schema you want to view. For example, many of the schemas that AWS supplies are in the **aws.events** registry.
3. To view a schema in the editor, open the context menu of the schema, and then choose **View Schema**.



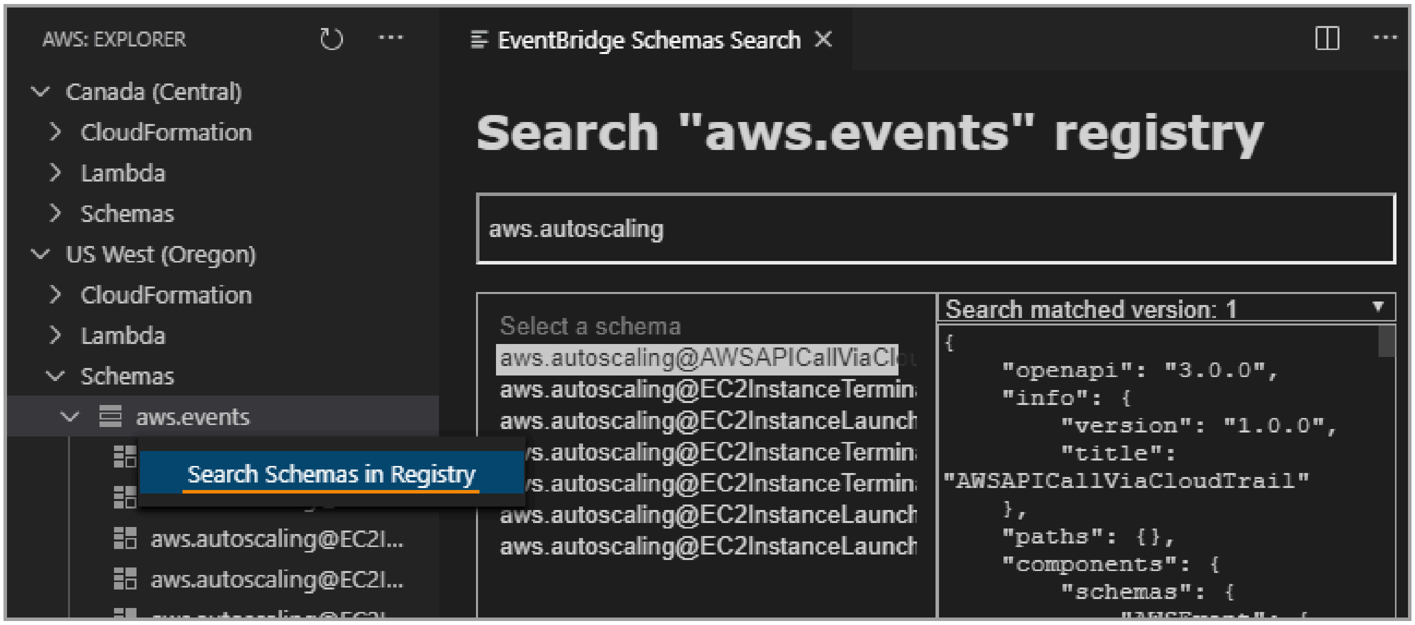
Find an Available Schema

In the **AWS Explorer**, do one or more of the following:

- Begin typing the title of the schema you want to find. The **AWS Explorer** highlights the schema titles that contain a match. (A registry must be expanded for you to see the highlighted titles.)

- Open the context menu for **Schemas**, and then choose **Search Schemas**. Or expand **Schemas**, open the context menu for the registry that contains the schema you want to find, and then choose **Search Schemas in Registry**. In the **EventBridge Schemas Search** dialog box, begin typing the title of the schema you want to find. The dialog box displays the schema titles that contain a match.

  To display the schema in the dialog box, select the title of the schema.


AWS: EXPLORER
Canada (Central)
CloudFormation
Lambda
Schemas
US West (Oregon)
CloudFormation
Lambda
Schemas
aws.events
Search Schemas in Registry
aws.autoscaling@EC2I...
aws.autoscaling@EC2I...
EventBridge Schemas Search
Search "aws.events" registry
aws.autoscaling
Select a schema
aws.autoscaling@AWSAPICallViaCl
aws.autoscaling@EC2InstanceTermin
aws.autoscaling@EC2InstanceLaunch
s.autoscaling@EC2InstanceTermin
s.autoscaling@EC2InstanceTermin
aws.autoscaling@EC2InstanceLaunch
aws.autoscaling@EC2InstanceLaunch
Search matched version: 1

```
{
    "openapi": "3.0.0",
    "info": {
        "version": "1.0.0",
        "title":
"AWSAPICallViaCloudTrail"
    },
    "paths": {},
    "components": {
        "schemas": {
```

Generate Code for an Available Schema

1. In the **AWS Explorer**, expand **Schemas**.
2. Expand the name of the registry that contains the schema you want to generate code for.
3. Right-click the title of the schema, and then choose **Download code bindings**.
4. In the resulting wizard pages, choose the following:
   - The **Version** of the schema

- The code binding language
- The workspace folder where you want to store the generated code on your local development machine

AWS IAM Access Analyzer

You can run AWS Identity and Access Management (IAM) Access Analyzer policy checks on your IAM policies authored in AWS CloudFormation templates, Terraform plans, and JSON policy documents, using the IAM Access Analyzer in the AWS Toolkit for Visual Studio Code.

IAM Access Analyzer policy checks include policy validation and custom policy checks. Policy validation helps validate your IAM policies according to the standards detailed in the Grammar of the IAM JSON policy language and AWS Security best practices in IAM topics, located in the *AWS Identity and Access Management* User Guide. Your policy validation findings include security warnings, errors, general warnings, and policy suggestions.

You can also run custom policy checks for new access, based on your security standards. A charge is associated with each custom policy check for new access. For detailed information about pricing, see the AWS IAM Access Analyzer pricing site. For details about IAM Access Analyzer policy checks, see the Checks for validating policies topic in the *AWS Identity and Access Management* User Guide.

The following topics describe how to work with IAM Access Analyzer policy checks in the AWS Toolkit for Visual Studio Code.

Topics

Working with AWS IAM Access Analyzer

The following sections describe how to perform IAM policy validation and custom policy checks in the AWS Toolkit for Visual Studio Code. For additional details, see the following topics in the AWS Identity and Access Management User Guide: IAM Access Analyzer policy validation and IAM Access Analyzer custom policy checks.

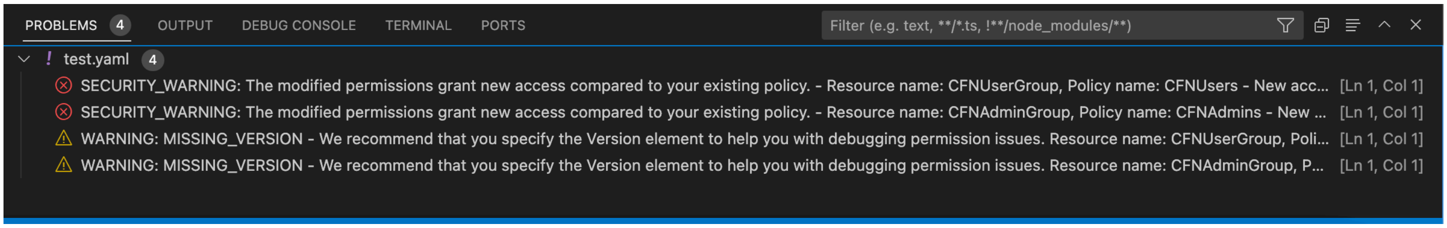
Prerequisites

The following prerequisites must be met before you can work with IAM Access Analyzer policy checks from the Toolkit.

- Install Python version 3.6 or later.
- Install either the IAM Policy Validator for AWS CloudFormation or the IAM Policy Validator for Terraform that is required by Python CLI tools and specified in the IAM Policy Checks window.
- Configure your AWS Role credentials.

IAM Access Analyzer policy checks

You can perform policy checks for AWS CloudFormation templates, Terraform plans, and JSON Policy documents, using the AWS Toolkit for Visual Studio Code. Your check findings are viewable in the VS Code **Problems Panel**. The following image shows the VS Code **Problems Panel**.



```
test.yaml 4
SECURITY_WARNING: The modified permissions grant new access compared to your existing policy. - Resource name: CFNUserGroup, Policy name: CFNUsers - New acc... [Ln 1, Col 1]
SECURITY_WARNING: The modified permissions grant new access compared to your existing policy. - Resource name: CFNAdminGroup, Policy name: CFNAdmins - New ... [Ln 1, Col 1]
WARNING: MISSING_VERSION - We recommend that you specify the Version element to help you with debugging permission issues. Resource name: CFNUserGroup, Poli... [Ln 1, Col 1]
WARNING: MISSING_VERSION - We recommend that you specify the Version element to help you with debugging permission issues. Resource name: CFNAdminGroup, P... [Ln 1, Col 1]
```

IAM Access Analyzer provides 3 types of checks:

- Validate Policy
- CheckAccessNotGranted
- CheckNoNewAccess

The following sections describe how to run each type of check.

> **Note**
>
> Configure your AWS Role credentials prior to running any type of check. Supported files include the following document types: AWS CloudFormation templates, Terraform plans, and JSON Policy documents

Running Validate Policy

The Validate Policy check, also known as policy validation, validates your policy against IAM policy grammar and AWS best practices. For additional information, see the Grammar of the IAM JSON policy language and AWS Security best practices in IAM topics, located in the *AWS Identity and Access Management* User Guide.

1. From VS Code, open a supported file that contains AWS IAM Policies, in the VS Code editor.
2. To open IAM Access Analyzer policy checks, open the VS Code Command Pallete by pressing **`CRTL+Shift+P`**, search for **`IAM Policy Checks`**, then click to open the **IAM Policy Checks** pane in the VS Code editor.
3. From the **IAM Policy Checks** pane, select your document type from the drop-down menu.
4. From the **Validate Policies** section, choose the **Run Policy Validation** button to run the Validate Policy check.
5. From the **Problems Panel** in VS Code, review your policy check findings.
6. Update your policy and repeat this procedure, re-running the Validate Policy check until your policy check findings no longer display security warnings or errors.

Running CheckAccessNotGranted

CheckAccessNotGranted is a custom policy check to verify that specific IAM actions are not allowed by your policy.

> **Note**
>
> A charge is associated with each custom policy check. For details about custom policy check pricing, see the AWS IAM Access Analyzer pricing guide.

1. From VS Code, open a supported file that contains AWS IAM Policies, in the VS Code editor.
2. To open IAM Access Analyzer policy checks, open the VS Code Command Pallete by pressing **`CRTL+Shift+P`**, search for **`IAM Policy Checks`**, then click to open the **IAM Policy Checks** pane in the VS Code editor.
3. From the **IAM Policy Checks** pane, select your document type from the drop-down menu.
4. From the **Custom Policy Checks** section, select **CheckAccessNotGranted**.
5. In the text-input field, enter a comma-separated list of actions. Alternatively, you can provide a file path that points to a list of actions.

> **Note**
>
> The file path is typically provided by your administrator or security team, and can be a system file path or an Amazon S3 bucket URI. To use an Amazon S3 bucket URI, your current role must have access to the Amazon S3 bucket.

6. Choose the **Run Custom Policy Check** button.
7. From the **Problems Panel** in VS Code, review your policy check findings. Custom policy checks return a `PASS` or `FAIL` result.
8. Update your policy and repeat this procedure, re-running the CheckAccessNotGranted check until it returns `PASS`.

Running CheckNoNewAccess

CheckNoNewAccess is a custom policy check to verify whether your policy grants new access compared to a reference policy.

> **Note**
>
> A charge is associated with each custom policy check. For details about custom policy check pricing, see the AWS IAM Access Analyzer pricing guide.

1. From VS Code, open a supported file that contains AWS IAM Policies, in the VS Code editor.
2. To open IAM Access Analyzer policy checks, open the VS Code Command Pallete by pressing **`CRTL+Shift+P`**, search for **`IAM Policy Checks`**, then click to open the **IAM Policy Checks** pane in the VS Code editor.
3. From the **IAM Policy Checks** pane, select your document type from the drop-down menu.
4. From the **Custom Policy Checks** section, select **CheckNoNewAccess**.
5. Input a reference JSON policy document. Alternatively, you can provide a file path that references a JSON policy document.

> **Note**
>
> The file path is typically provided by your administrator or security team, and can be a system file path or an Amazon S3 bucket URI. To use an Amazon S3 bucket URI, your current role must have access to the Amazon S3 bucket.

6. Select the **Reference Policy Type** that matches the type of your reference document.
7. Choose the **Run Custom Policy Check** button.
8. From the **Problems Panel** in VS Code, review your policy check findings. Custom policy checks return a `PASS` or `FAIL` result.
9. Update your policy and repeat this procedure, re-running the CheckNoNewAccess check until it returns `PASS`.

Working with AWS IoT in AWS Toolkit for Visual Studio Code

AWS IoT in AWS Toolkit for Visual Studio Code allows you to interact with the AWS IoT service, while minimizing interruptions to your work flow in VS Code. This user guide is intended to help you get started using the AWS IoT service features that are available in the AWS Toolkit for Visual Studio Code. For additional information about the AWS IoT service, see the developer guide What is AWS IoT?

AWS IoT prerequisites

To get started using AWS IoT from Toolkit for VS Code, make sure your AWS account and VS Code meet the requirements in these guides:

- For AWS account requirements and AWS user permissions specific to the AWS IoT service, see the Getting Started with AWS IoT Core developer guide.
- For Toolkit for VS Code specific requirements, see the Setting up the Toolkit for VS Code user guide.

AWS IoT Things

AWS IoT connects devices to AWS cloud services and resources. You can connect your devices to AWS IoT by using objects called **things**. A thing is a representation of a specific device or logical entity. It can be a physical device or sensor (for example, a light bulb or a switch on a wall). For additional information about AWS IoT things, see the developer guide Managing devices with AWS IoT.

Managing AWS IoT things

The Toolkit for VS Code has several features that make your AWS IoT thing management more efficient. These are ways that you can use the VS Code toolkit to manage your AWS IoT things:

- Create a thing
- Attach a certificate to a thing
- Detach a certificate from a thing
- Delete a thing

To create a thing

1. From the AWS Explorer, expand the **IoT** service heading, and context-select (right-click) **Things**.
2. Choose **Create Thing** from the context-menu to open a dialog box.
3. Follow the prompt by entering a name for your IoT thing into the **Thing Name** field.
4. When this is complete, a **thing icon** followed by the name you specified will be visible in the **Thing** section.

To attach a certificate to a thing

1. From the AWS Explorer, expand the **IoT** service section.
2. Under the **Things** subsection, locate the **thing** where you are attaching the certificate.
3. Context-select (right-click) the **thing** and choose **Attach Certificate** from the context-menu, to open an input selector with a list of your certificates.
4. From the list, choose the **certificate ID** that corresponds to the certificate you want to attach to your thing.
5. When this is complete, your certificate is accessible in the AWS explorer, as an item of the thing that you attached it to.

To detach a certificate from a thing

1. From the AWS Explorer, expand the **IoT** service section
2. In the **Things** subsection, locate the **thing** that you want to detach a certificate from.
3. Context-select (right-click) the **thing** and choose **Detach Certificate** from the context-menu.
4. When this is complete, the detached certificate will no longer display under that thing in the AWS Explorer, but it will still be accessible from the **Certificates** subsection.

To delete a thing

1. From the AWS Explorer, expand the **IoT** service section.
2. In the **Things** subsection, locate the **thing** you want to delete.
3. Context-select (right-click) the thing and choose **Delete Thing** from the context-menu to delete it.
4. When this is complete, the deleted thing will no longer be available from the **Things** subsection.

> **Note**
>
> Note: You can only delete a thing that doesn't have a certificate attached to it.

AWS IoT certificates

Certificates are a common way to create a secure connection between your AWS IoT services and devices. X.509 certificates are digital certificates that use the X.509 public key infrastructure standard to associate a public key with an identity contained in a certificate. For additional information about AWS IoT certificates, see the developer guide Authentication (IoT).

Managing certificates

The VS Code toolkit offers a variety of ways for you to manage your AWS IoT certificates, directly from the AWS Explorer.

- Create a certificate
- Change a certificate status

- Attach a policy to a certificate
- Delete a certificate

To create an AWS IoT certificate

An X.509 certificate can be used to connect with your instance of AWS IoT.

1. From the AWS Explorer, expand the **IoT** service section, and context-select (right-click) **Certificates**.
2. Choose **Create Certificate** from the context-menu to open a dialog box.
3. Select a directory in your local file system to save your RSA key pair and X.509 certificate.

   > **Note**
   >
   > - The default file names contain the certificate ID as a prefix.
   > - Only the X.509 certificate is stored with your AWS account, through the AWS IoT service.
   > - Your RSA key pair can only be issued once, save them to a secure location in your file system when you're prompted.
   > - If either the certificate or the key pair can't be saved to your file system at this time, then the AWS Toolkit deletes the certificate from your AWS account.

To modify a certificate status

The status of an individual certificate is displayed next to its ID in the AWS Explorer and can be set to: active, inactive, or revoked.

> **Note**
>
> - Your certificate needs an **active** status before you can use it to connect your device to your AWS IoT service.
> - An **inactive** certificate can be activated, whether it has been deactivated previously or is inactive by default.

- A certificate that has been **revoked** can't be reactivated.

1. From the AWS Explorer, expand the **IoT** service section.
2. In the **Certificates** subsection, locate the certificate you want to modify.
3. Context-select (right-click) the certificate to open a context menu that displays the status change options available for that certificate.

- If a certificate has the status **inactive**, choose **activate** to change the status to **active**.
- If a certificate has the status **active**, choose **deactivate** to change the status to **inactive**.
- If a certificate has either an **active** or **inactive** status, choose **revoke** to change the status to **revoked**.

Note

Each of these status-changing actions are also available if you select a certificate that is attached to a thing while it's displayed in the **Things** subsection.

To attach an IoT policy to a certificate

1. From the AWS Explorer, expand the **IoT** service section.
2. In the **Certificates** subsection, locate the certificate you want to modify.
3. Context-select (right-click) the certificate and choose **Attach Policy** from the context menu, to open an input selector with a list of your available policies.
4. Choose the policy you want to attach to the certificate.
5. When this is complete, the policy you selected will be added to the certificate as a sub-menu item.

To detach an IoT policy from a certificate

1. From the AWS Explorer, expand the **IoT** service section.
2. In the **Certificates** subsection, locate the certificate you want to modify.

3. Expand the certificate and locate the policy you want to detach.
4. Context-select (right-click) the policy and choose **Detach** from the context menu.
5. When this is complete, the policy will no longer be an item that is accessible from your certificate, but it will be available from the **Policy** subsection.

To delete a certificate

1. From the AWS Explorer, expand the **IoT** service heading.
2. In the **Certificates** subsection, locate the certificate you want to delete.
3. Context-select (right-click) the certificate and choose **Delete Certificate** from the context menu.

   > **Note**
   >
   > You can't delete a certificate if it's attached to a thing or has an active status. You can delete a certificate that has attached policies.

AWS IoT policies

AWS IoT Core policies are defined through JSON documents, each containing one or more policy statements. Policies define how AWS IoT, AWS, and your device can interact with each other. For more information about how to create a policy document, see the developer guide IoT Polices.

> **Note**
>
> Named policies are versioned so you can roll them back. In The AWS Explorer, your IoT polices are listed under the **Policies** subsection, in the IoT service. You can view policy versions by expanding a policy. The default version is denoted by an asterisk.

Managing policies

The Toolkit for VS Code offers several ways for you to manage your AWS IoT service policies. These are ways that you can manage or modify your policies directly from the AWS Explorer in VS Code:

- Create a policy

- Upload a new policy version
- Edit a policy version
- Change the policy version defualt
- Change the policy version defualt

To create an AWS IoT policy

> **Note**
>
> You can create a new policy from the AWS Explorer, but the JSON document that defines the policy must already exist in your file system.

1. From the AWS Explorer, expand the **IoT** service section.
2. Context-select (right-click) the **Policies** subsection and choose **Create Policy from Document**, to open the **Policy Name** input field.
3. Enter a name and follow the prompts to open a dialog asking you to select a JSON document from your file system.
4. Choose the JSON file that contains your policy definitions, the policy will be available in the AWS explorer when this is complete.

To upload a new AWS IoT policy version

A new version of a policy can be created by uploading a JSON document to the policy.

> **Note**
>
> The new JSON document must be present on your file system to create a new version using the AWS Explorer.

1. From the AWS Explorer, expand the **IoT** service section.
2. Expand the **Policies** subsection to view your AWS IoT policies

3. Context-select (right-click) the policy that you want to update and choose **Create new version from Document**.
4. When the dialog opens, choose the JSON file that contains the updates to your policy definitions.
5. The new version will be accessible from your policy in the AWS Explorer.

To edit an AWS IoT policy version

A policy document can be opened and edited using VS Code. When you are finished editing the document, you can save it to your file system. Then, you can upload it to your AWS IoT service from the AWS Explorer.

1. From the AWS Explorer, expand the **IoT** service section.
2. Expand the **Policies** subsection and locate the policy you want to update.**Create Policy from Document** to open the **Policy Name** input field.
3. Expand the policy that you want to update and then Context-select (right-click) the policy version that you want to edit.
4. Choose **View** from the context-menu to open the policy version in VS Code
5. When the policy document is opened, make and save the changes you want.

> **Note**
>
> At this point, the changes you made to the policy are only saved to your local file system. To update the version and track it with the AWS Explorer, repeat the steps described in the Upload a new policy version procedure.

To select a new policy version default

1. From the AWS Explorer, expand the **IoT** service section.
2. Expand the **Policies** subsection and locate the policy you want to update.
3. Expand the policy that you want to update and then Context-select (right-click) the policy version that you want to set and choose **Set as Default**.
4. When this is complete, the new default version you selected will have a star located next it.

To delete policies

> **Note**
>
> Before you can delete a policy or a policy version, there are conditions that need to be met.
>
> - You can't delete a policy if it's attached to a certificate.
> - You can't delete a policy if it has any non-default versions.
> - You can't delete the default version of a policy unless a new default version is selected, or the entire policy is deleted.
> - Before you can delete an entire policy, all of the non-default version of that policy must be deleted first.

1. From the AWS Explorer, expand the **IoT** service section.
2. Expand the **Policies** subsection and locate the policy you want to update.
3. Expand the policy that you want to update and then Context-select (right-click) the policy version that you want delete and choose **Delete**.
4. When a version is deleted, it will no longer be visible from the Explorer.
5. When the only version left for a policy is the default, then you can context-select (right-click) the parent policy and choose **Delete** to delete it.

Working with AWS Lambda Functions

The AWS Toolkit for Visual Studio Code provides support for AWS Lambda functions. Using the Toolkit for VS Code, you can author code for Lambda functions that are part of serverless applications. In addition, you can invoke Lambda functions either locally or on AWS.

Lambda is a fully managed compute service that runs your code in response to events generated by custom code or from various AWS services, such as Amazon Simple Storage Service (Amazon S3), Amazon DynamoDB, Amazon Kinesis, Amazon Simple Notification Service (Amazon SNS), and Amazon Cognito.

Topics

- Interacting with Remote Lambda Functions

Interacting with Remote Lambda Functions

Using the Toolkit for VS Code, you can interact with AWS Lambda functions in various ways, as described later in this topic.

For more information about Lambda, see the AWS Lambda Developer Guide.

> **Note**
>
> If you have already created Lambda functions by using the AWS Management Console or in some other way, you can invoke them from the Toolkit. To create a new function (using VS Code) that you can deploy to AWS Lambda, you must first create a serverless application.

Topics

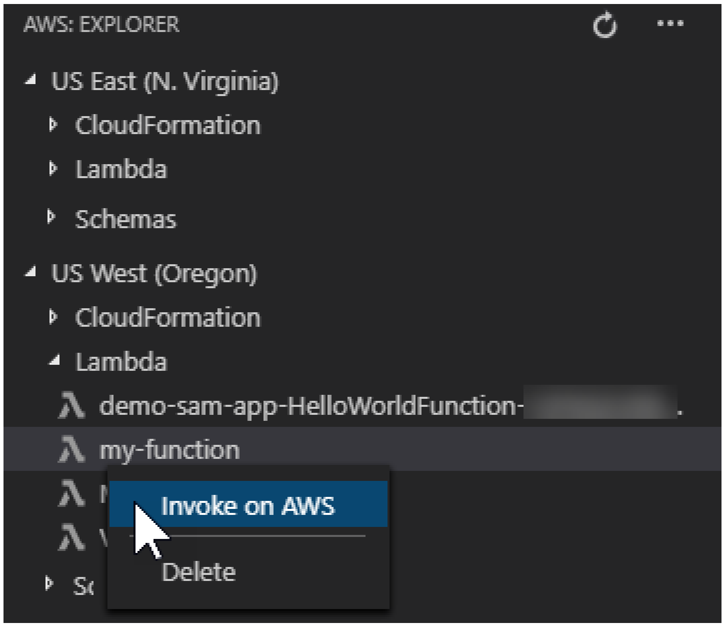
Prerequisites

- Be sure your system meets the the prerequisites specified in Installing the Toolkit for VS Code.
- Ensure that the credentials you configured in Authentication and access include appropriate read/write access to the AWS Lambda service. If in the **AWS Explorer**, under **Lambda**, you see a message similar to "Error loading Lambda resources", check the permissions attached to those credentials. Changes that you make to permissions will take a few minutes to affect the **AWS Explorer** in VS Code.

Invoke a Lambda Function

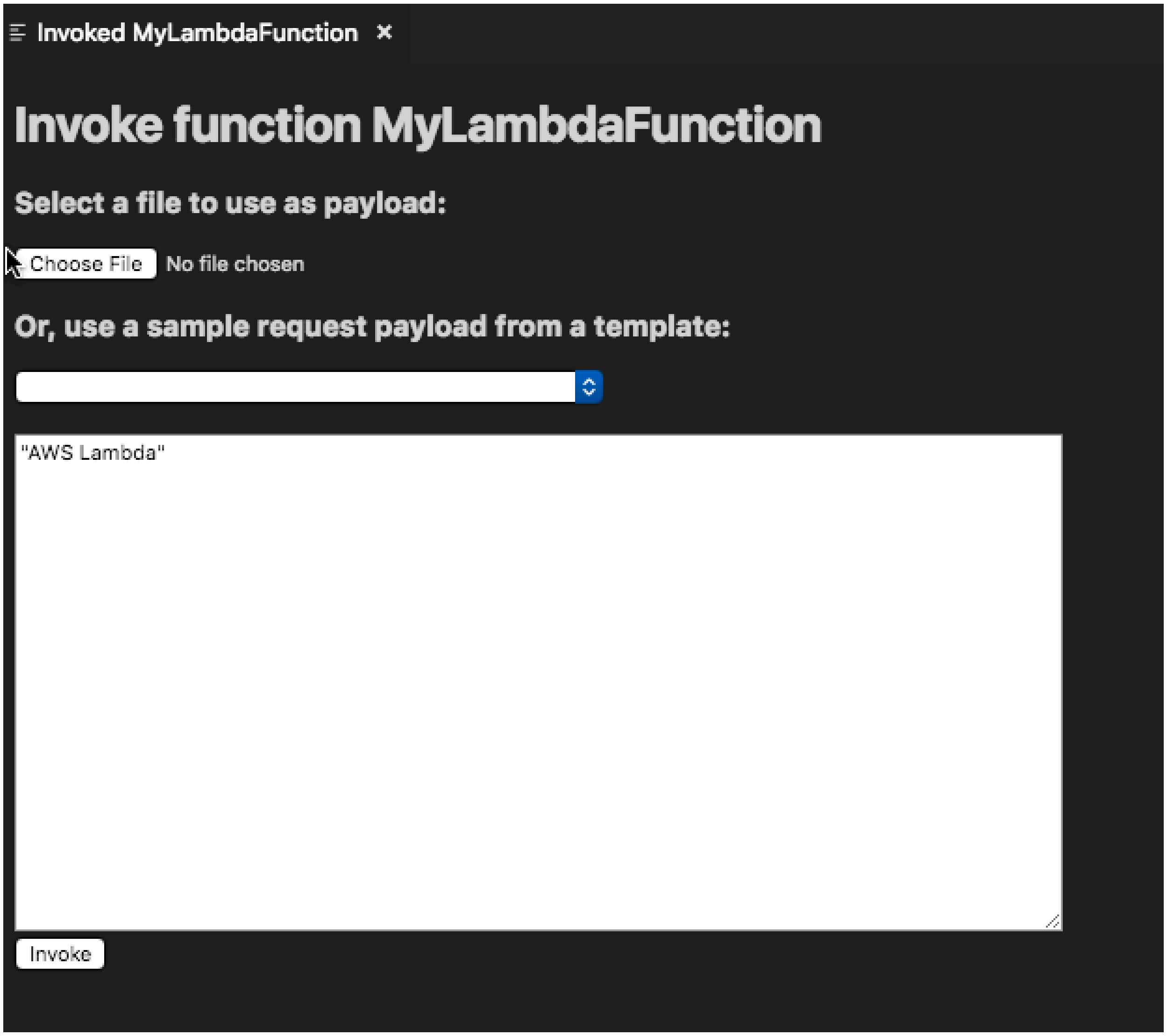
You can invoke a Lambda function on AWS from the Toolkit for VS Code.

1. In the **AWS Explorer**, choose the name of the Lambda function you want to invoke, and then open its context menu.



2. Choose **Invoke on AWS**.

3. In the invoke window that opens, enter the input that your Lambda function needs. The Lambda function might, for example, require a string as an input, as shown in the text box.



Invoke function MyLambdaFunction

Select a file to use as payload:

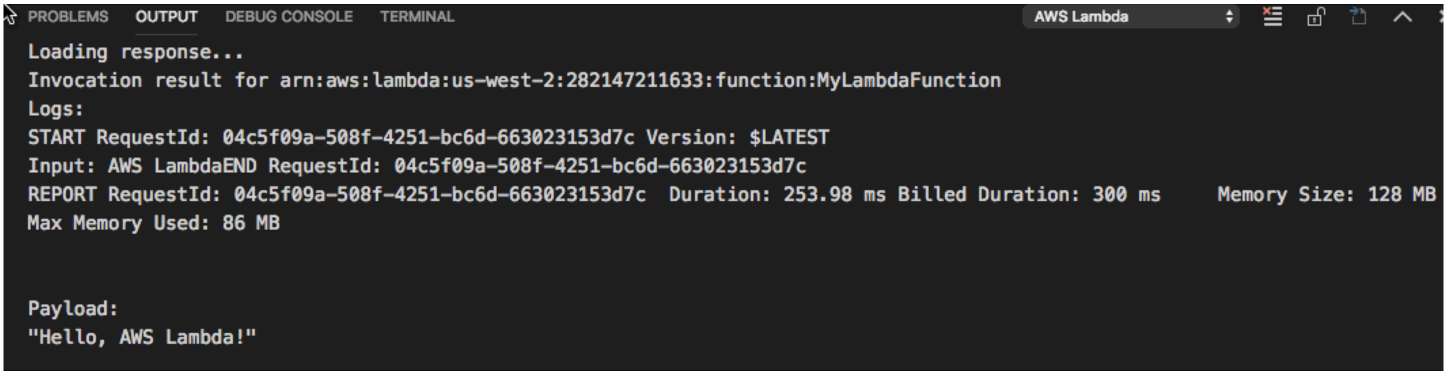
Choose File No file chosen

Or, use a sample request payload from a template:

"AWS Lambda"

Invoke

You'll see the output of the Lambda function just like you would for any other project using VS Code.



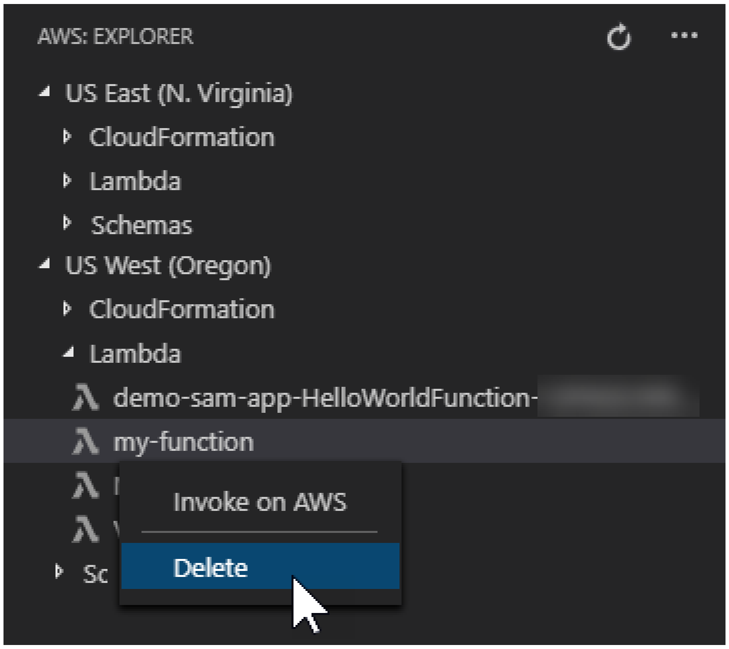
```
Loading response...
Invocation result for arn:aws:lambda:us-west-2:282147211633:function:MyLambdaFunction
Logs:
START RequestId: 04c5f09a-508f-4251-bc6d-663023153d7c Version: $LATEST
Input: AWS LambdaEND RequestId: 04c5f09a-508f-4251-bc6d-663023153d7c
REPORT RequestId: 04c5f09a-508f-4251-bc6d-663023153d7c  Duration: 253.98 ms Billed Duration: 300 ms    Memory Size: 128 MB
Max Memory Used: 86 MB


Payload:
"Hello, AWS Lambda!"
```

Delete a Lambda Function

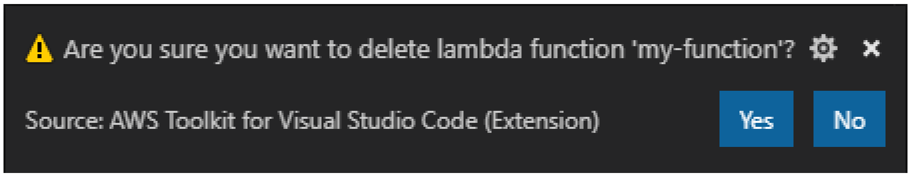
You can also delete a Lambda function using the same context menu.

> ⚠ **Warning**
>
> Do not use this procedure to delete Lambda functions that are associated with AWS CloudFormation (for example, the Lambda function that was created when creating a serverless application earlier in this guide). These functions must be deleted through the AWS CloudFormation stack.

1. In the **AWS Explorer**, choose the name of the Lambda function you want to delete, and then open its context menu.



2. Choose **Delete**.
3. In the message that appears, choose **Yes** to confirm the delete.


⚠ Are you sure you want to delete lambda function 'my-function'?

Source: AWS Toolkit for Visual Studio Code (Extension)

After the function is deleted, it's no longer listed in the **AWS Explorer**.

Import a Lambda Function

You can import code from a remote Lambda funcion into your VS Code workspace for editing and debugging.

> **Note**
>
> The toolkit only supports importing Lambda functions using supported Node.js and Python runtimes.

1. In the **AWS Explorer**, choose the name of the Lambda function you want to import, then open its context menu.
2. Choose **Import...**
3. Choose a folder to import the Lambda code to. Folders outside the current workspace will be added to your current workspace.
4. After download, the Toolkit adds the code to your workspace and opens the file containing the Lambda handler code. The Toolkit also creates a *launch configuration*, which appears in the VS Code run panel so you can locally run and debug the Lambda function using AWS Serverless Application Model. For more information about using AWS SAM, see the section called "Running and debugging a serverless application from template (local)".

Upload a Lambda Function

You can update existing Lambda functions with local code. Updating code in this way does not use the AWS SAM CLI for deployment and does not create an AWS CloudFormation stack. This functionality can upload a Lambda function with any runtime supported by Lambda.

> **Warning**
>
> The toolkit can't check whether your code works. Make sure the code works before updating production Lambda functions.

1. In the **AWS Explorer**, choose the name of the Lambda function you want to import, then open its context menu.

2. Choose **Upload Lambda...**
3. Choose from the three options for uploading your Lambda function. The options include:

   Upload a premade .zip archive

   - Choose **Zip Archive** from the Quick Pick menu.
   - Choose a .zip file from your file system and confirm the upload with the modal dialog. This uploads the .zip file as is and immediately updates the Lambda following deployment.

   Upload a directory as is

   - Choose **Directory** from the Quick Pick menu.
   - Choose a directory from your file system.
   - Choose **No** when prompted to build the directory, then confirm the upload with the modal dialog. This uploads the directory as is and immediately updates the Lambda following deployment.

   Build and upload a directory

   > **Note**
   >
   > This requires the AWS SAM CLI.

   - Choose **Directory** from the Quick Pick menu.
   - Choose a directory from your file system.
   - Choose **Yes** when prompted to build the directory, then confirm the upload with the modal dialog. This builds the code in the directory using the AWS SAM CLI `sam build` command and immediately updates the Lambda following deployment.

     > **Note**
     >
     > The toolkit will warn you if it can't detect a matching handler prior to upload. If you wish to change the handler tied to the Lambda function, you can do so through the AWS Management Console or the AWS CLI.

Amazon Redshift in the Toolkit for VS Code

Amazon Redshift is a fully managed, petabyte-scale data warehouse service in the cloud. For detailed information about the Amazon Redshift service, see the Amazon Redshift User Guides table of contents.

The following topics desribe how to work with Amazon Redshift from the AWS Toolkit for Visual Studio Code.

Topics

Working with Amazon Redshift from the Toolkit for VS Code

The following sections describe how to get started working with Amazon Redshift from the AWS Toolkit for Visual Studio Code.

For detailed information about the Amazon Redshift service, see the Amazon Redshift User Guide topics.

Getting started

Before you start working with Amazon Redshift from the AWS Toolkit for Visual Studio Code, the following requirements must be met.

1. You're connected to your AWS account(s) from the Toolkit. For additional information about connecting to your AWS account from the Toolkit, see the Connecting to AWS topic in this User Guide.
2. You've created a provisioned or serverless data warehouse.

If you've not yet created an Amazon Redshift Serverless or an Amazon Redshift provisioned cluster, the following procedures describe how to create a data warehouse with a sample dataset, from the AWS Console.

Creating a provisioned data warehouse

For additional details on creating an Amazon Redshift provisioned cluster data warehouse, see the Create a sample Amazon Redshift cluster topic in the *Amazon Redshift getting started* User Guide.

1. From your preferred internet browser, sign into the AWS Management Console and open the Amazon Redshift console at https://console.aws.amazon.com/redshift/.
2. From the Amazon Redshift console, choose **Provisioned Clusters dashboard**.
3. From the **Provisioned Clusters dashboard**, choose the **Create cluster** button to open the **Create cluster** pane.
4. Complete the required fields in the **Cluster configuration** section.
5. In the **Sample data** section, select the **Load sample data** box to load the sample dataset **`Tickit`** into the default database **`Dev`** with the **`public`** schema.
6. In the **Database configurations** section, input values for the **Admin user name** and **Admin user password** fields.
7. Choose **Create cluster** to create your provisioned data warehouse.

Creating a serverless data warehouse

For additional details on creating an Amazon Redshift Serverless data warehouse, see the Creating a data warehouse with Amazon Redshift Serverless section in the *Amazon Redshift getting started* User Guide.

1. From your preferred internet browser, sign into the AWS Management Console and open the Amazon Redshift console at https://console.aws.amazon.com/redshift/.
2. From the Amazon Redshift console, choose the **Try Amazon Redshift Serverless** button to open the **Get started with Amazon Redshift Serverless** pane.
3. In the **Configurations** section, choose the **Use default settings** radial.
4. At the bottom of the **Get started with Amazon Redshift Serverless** pane, choose **Save configuration** to create a serverless data warehouse with default workgroup, namespace, credential, and encryption settings.

Connecting to a data warehouse from the Toolkit

There are 3 methods to connect to a database from the Toolkit:

- **Database user name and password**
- **AWS Secrets Manager**
- **Temporary credentials**

To connect to a database located on an existing provisioned cluster or serverless data warehouse from the Toolkit, complete the following steps.

> ⚠ **Important**
>
> If you've completed the steps in the *Prerequisites* section of this User Guide topic and your data warehouse is not visible in the Toolkit explorer, make sure that you're working from the correct AWS region in the explorer.

Connecting to your data warehouse with the Database user name and password method

1. From the Toolkit explorer, expand the AWS Region where your data warehouse exists.
2. Expand **Redshift** and choose your data warehouse to open the **Select a Connection Type** dialog in VS Code.
3. From the **Select a Connection Type** dialog, choose **Database user name and password** and provide the information required by each of the prompts.
4. Your available databases, tables, and schemas are visible in the Toolkit explorer when the Toolkit connects to your data warehouse and the procedure is complete.

Connecting to your data warehouse with AWS Secrets Manager

> ⓘ **Note**
>
> This procedure requires an AWS secrets manager database secret to complete. For instructions on how to set up a database secret, see the Create an AWS Secrets Manager database secret in the *AWS Secrets Manager* User Guide.

1. From the Toolkit explorer, expand the AWS Region where your data warehouse exists.
2. Expand **Redshift** and choose your data warehouse to open the **Select a Connection Type** dialog in VS Code.
3. From the **Select a Connection Type** dialog, choose **Secrets Manager** and provide the information required by each of the prompts.
4. Your available databases, tables, and schemas are visible in the Toolkit explorer when the Toolkit connects to your data warehouse and the procedure is complete.

Connecting to your data warehouse with Temporary credentials

1. From the Toolkit explorer, expand the AWS region where your data warehouse exists.
2. Expand **Redshift** and choose your data warehouse to open the **Select a Connection Type** dialog in VS Code.
3. From the **Select a Connection Type** dialog, choose **Temporary credentials** and provide the information required by each of the prompts.
4. Your available databases, tables, and schemas are visible in the Toolkit explorer when the Toolkit connects to your data warehouse and the procedure is complete.

Editing the connection to your data warehouse

You can edit the connection to your data warehouse to change which database to connect to.

1. From the Toolkit explorer, expand the AWS Region where your data warehouse exists.
2. Expand **Redshift**, right-click the data warehouse you are connected to, choose **Edit connection**, and provide the name of the database you want to connect to.
3. Your available databases, tables, and schemas are visible in the Toolkit explorer when the Toolkit connects to your data warehouse and the procedure is complete.

Deleting the connection to your data warehouse

1. From the Toolkit explorer, expand the AWS Region where your data warehouse exists.
2. Expand **Redshift**, right-click the data warehouse with the connection you want to delete, and choose **Delete connection**. Doing so removes the available databases, tables, and schemas from the Toolkit explorer.
3. To reconnect to your data warehouse, choose **Click to connect** and provide the information required by each of the prompts. By default, reconnecting uses the previous method of authentication to connect to the data warehouse. To use a different method, choose the back arrow in the dialog until you reach the authentication prompt.

Running SQL Statements

The following procedures describe how to create and run SQL statements in your database from the AWS Toolkit for Visual Studio Code.

Note

To complete the steps in each of the following procedures, you must first complete the section *Connecting to a data warehouse from the Toolkit*, located in this User Guide topic.

1. From the Toolkit explorer, expand **Redshift**, then expand that data warehouse that contains the database you want to query.
2. Choose **Create-Notebook** to specify a file name and location to store your notebook locally, then choose **OK** to open the notebook in your VS Code editor.
3. From the VS Code editor, input the SQL statements you want stored in this notebook.
4. Choose the **Run All** button to run the SQL statements you entered.
5. The output for your SQL statements is displayed below the statements that you entered.

Adding Markdown to a notebook

1. From your notebook in the VS Code editor, choose the **Markdown** button to add a Markdown cell to your notebook.
2. Input your Markdown into the provided cell.
3. The Markdown cell can be edited using the editor tools located in the upper-right corner of the Markdown cell.

Adding code to a notebook

1. From your notebook in the VS Code editor, choose the **Code** button to add a Code cell to your notebook.
2. Input your code into the provided cell.
3. You can choose to run your code above or below the Code cell by selecting the appropriate button from the cell editor tools, located in the upper-right corner of the Code cell.

Working with Amazon S3

Amazon Simple Storage Service (Amazon S3) is a scalable data-storage service. The AWS Toolkit for Visual Studio Code allows you to manage your Amazon S3 objects and resources directly from VS Code.

For detailed information about the Amazon S3 service, see the Amazon S3 User Guide.

The following topics describe how to work with Amazon S3 objects and resources from the AWS Toolkit for Visual Studio Code.

Topics

- Working with Amazon S3 resources
- Working with Amazon S3 objects

Working with Amazon S3 resources

You can use Amazon S3 from the AWS Toolkit for Visual Studio Code to view, manage, and edit your Amazon S3 buckets and other resources.

The following sections desribe how to work with Amazon S3 resources from the AWS Toolkit for Visual Studio Code. For information about working with Amazon S3 objects, such as folders and files, from the AWS Toolkit for Visual Studio Code, see the Working with S3 objects topic in this User Guide.

Creating an Amazon S3 bucket

1. From the Toolkit explorer, open the context (right-click) menu for the **S3** service, and choose **Create Bucket...**. Alternatively, choose the **Create Bucket** icon to open the **Create Bucket** dialog box.
2. In the **Bucket Name** field, enter a valid name for the bucket.

   Press **Enter** to create the bucket and close the dialog box. Your new bucket is then displayed under the S3 service in the toolkit.

   > **Note**
   >
   > Since Amazon S3 allows your bucket to be used as a URL that can be accessed publicly, the bucket name that you choose must be globally unique. If another account already created a bucket with the name that you want to use, you must use a different name. If you can't create a new bucket, check the **AWS Toolkit Logs** in the **Output** tab. If you attempt to use an invalid bucket name, a `BucketAlreadyExists` error occurs. For more information, see Bucket restrictions and limitations in the **Amazon Simple Storage Service User Guide**.

Adding a folder to an Amazon S3 bucket

You can organize the contents of an S3 bucket by grouping your objects into folders. You can also create folders within folders.

1. From the Toolkit explorer, expand the **S3** service to view a list of your S3 resources.
2. Choose the **Create Folder icon** to open the **Create Folder** dialog box. Or, open the context (right-click) menu for a bucket or folder, and then choose **Create Folder**.
3. Enter a value into the **Folder Name** field and press **Enter** to create the folder and close the dialog box. Your new folder is displayed under the corresponding S3 resource in the toolkit menu.

Deleting an Amazon S3 bucket

When you delete an S3 bucket, you also delete the folders and objects that it contains. So, when you attempt to delete a bucket, you're asked to confirm that you want to delete it.

1. From the toolkit main menu, expand the **Amazon S3** service to view a list of your S3 resources.
2. Open the context (right-click) menu for a bucket or folder, then choose **Delete S3 Bucket**.
3. When you’re prompted, enter the bucket's name into the text field, and then press **Enter** to delete the bucket and close the confirmation prompt.

> **Note**
>
> If your bucket contains objects, it’s emptied before it's deleted. If you attempt to delete a large number of resources or objects at one time, it can take some time for them to be deleted. After they're deleted, you receive a notification that says that they're successfully deleted.

Working with Amazon S3 objects

Your files, folders, and any other data that's stored in an S3 resource bucket are known as S3 objects.

The following sections describe how to work with Amazon S3 objects from the AWS Toolkit for Visual Studio Code. For details on working with Amazon S3 resources, such as S3 buckets, from the AWS Toolkit for Visual Studio Code, see the Working with S3 resources topic in this User Guide.

Object pagination

If you're working with a large number of Amazon S3 objects and folders, pagination allows you to specify the number of items that you want to display on a page.

1. Navigate to the VS Code **Activity Bar** and choose **Extensions**.
2. From the AWS Toolkit extension, choose the settings icon, and then choose **Extension Settings**.
3. On the **Settings** page, scroll down to the **AWS > S3: Max Items Per Page** setting.
4. Change the default value to the number of S3 items that you want to be displayed before "load more" is displayed.

   > **Note**
   >
   > Valid values include any number between 3 and 1000. This setting applies only to the number of objects or folders displayed at one time. All the buckets you created are displayed at once. By default, you can create up to 100 buckets in each of your AWS accounts.

5. Close the **Settings** page to confirm your changes.

You can also update the settings in a JSON-formatted file by choosing the **Open Settings (JSON)** icon in the upper right of the **Settings** page.

Uploading and downloading Amazon S3 objects

You can upload locally-stored files to your Amazon S3 buckets or download remote Amazon S3 objects to your local system, from the AWS Toolkit for Visual Studio Code.

Upload a file using the Toolkit

1. From the Toolkit explorer, expand the **Amazon S3** service to view a list of your S3 resources.
2. Choose the **Upload File icon** that's located next to a bucket or folder to open the **Upload File dialog**. Or you can open the context (right-click) menu and choose **Upload File**.

> **Note**
>
> To upload a file to the object's parent folder or resource, open the context (right-click) menu for any S3 object and choose **Upload to Parent**.

3. Use your system's file manager to select a file, then choose **Upload File** to close the dialog and upload the file.

Upload a file using the Command Palette

You can use the Toolkit interface or the **Command Palette** to upload a file to a bucket.

1. To select a file for upload, choose that file's tab in VS Code.
2. Press **Ctrl+Shift+P** to display the **Command Palette**.
3. In the **Command Palette**, enter the phrase `upload file` to display a list of recommended commands.
4. Choose the **AWS: Upload File** command to open the **AWS: Upload File** dialog.
5. When prompted, choose the file you want to upload, then choose the bucket you want to upload that file to.
6. Confirm your upload to close the dialog and begin the upload process. When the upload is complete, the object displays in the toolkit menu with metadata that includes the object size, last modification date, and path.

Downloading an Amazon S3 object

1. From the Toolkit explorer, expand the **S3** service.
2. From a bucket or folder, open the context (right-click) menu for an object that you want to download. Then, choose **Download As** to open the Download As dialog box. Or, alternatively, choose the **Download As** icon near the object.
3. Using your system's file manager, choose a destination folder, enter a file name, and then choose **Download** to close the dialog and start the download.

Editing remote objects

You can use the AWS Toolkit for Visual Studio Code to edit your Amazon S3 objects that are stored in your remote Amazon S3 resources.

1. From the Toolkit explorer, expand the **S3** service.
2. Expand the S3 resource that contains the file that you want to edit.
3. To edit the file, choose the **pencil icon (Edit File)**.
4. To edit a file that's open in read-only mode, view the file in the VS Code editor, then choose the **pencil icon** located on the upper-right hand corner of the UI.

Note

- If you restart or exit VS Code, your IDE disconnects from your S3 resources. If any remote S3 files are being edited when you disconnect, the edit stops. You must restart VS Code and reopen the edit tab to resume the edit.
- The **Edit File** button is in the upper-right hand corner of the UI. It's only visible when you're actively viewing a read-only file in the VS Code editor.
- Non-text files can't be opened in a read-only mode. They always open in edit-mode.
- You can't toggle back to read-only mode from edit-only mode, only the other way around.

Copying the path of an Amazon S3 object

The following procedure describes how to copy the path of an Amazon S3 object from the AWS Toolkit for Visual Studio Code.

1. From the Toolkit explorer, expand the **S3** service.
2. Expand the resource bucket that contains the object you want to copy the path for.
3. Open the context (right-click) menu for the object that you want to copy the path for, then choose **Copy Path** to copy the object path to your local clipboard.

Generating a presigned URL for an Amazon S3 object

You can share private Amazon S3 objects with others by granting time-limited permissions for downloads through the presigned URL feature. For more information, see Sharing an object with a presigned URL.

1. From the Toolkit explorer, expand the **S3** service.
2. From a bucket or folder, open the context (right-click) menu for an object that you want to share. Then, choose **Generate Presigned URL** to open the **Command palette**.
3. From the **Command Palette**, enter the number of minutes that the URL can be used to access your object. Then, choose **Enter** to confirm and close the dialog.
4. After the presigned URL is generated, the VS Code **Status Bar** displays the presigned URL for the object that has been copied to your local **clipboard**.

Deleting an Amazon S3 object

If an object is in a non-versioned bucket, you can permanently delete it. For buckets that have versioning enabled, a delete request doesn't permanently delete that object. Instead, Amazon S3 inserts a delete marker in the bucket. For more information, see Deleting object versions.

1. From the Toolkit explorer, expand the **S3** service to view a list of your S3 resources.
2. Open the context (right-click) menu for an object you want to delete, then choose **Delete** to open the confirmation dialog.
3. Choose **Delete. . .** to confirm that you want to delete the S3 object. Then, close the dialog.

Working with serverless applications

The AWS Toolkit for Visual Studio Code provides support for AWS Serverless Application. The following topics describe how to get started creating and working with AWS Serverless Application Model (AWS SAM) applications, from the AWS Toolkit for Visual Studio Code.

Topics

- Configuration options for debugging serverless applications
- Troubleshooting serverless applications

Getting Started with serverless applications

The following sections describe how to get started creating an AWS Serverless Application from the AWS Toolkit for Visual Studio Code, using AWS Serverless Application Model (AWS SAM) and AWS CloudFormation stacks.

Prerequisites

Before you can create or work with an AWS Serverless Application, the following prerequisites must be completed.

> **Note**
>
> The following operations may require you to exit or restart VS Code before the changes are complete.

- Install the AWS SAM command line interface (CLI). For additional information and instructions on how to install the AWS SAM CLI, see the Installing the AWS SAM CLI topic in this *AWS Serverless Application Model User Guide*.
- From your AWS config file, identify your default AWS Region. For more information on your config file, see the Configuration and credential file settings topic in the *AWS Command Line Interface User Guide*.
- Install your language SDK and configure your toolchain. For additional information on how to configure your toolchain from the AWS Toolkit for Visual Studio Code see the configure your toolchain topic in this User Guide.
- Install the YAML language support extension from the VS Code marketplace. This is required for the CodeLens feature of AWS SAM template files are accessible. For additional information about CodeLens, see the CodeLens section in the VS Code documentation

IAM permissions for serverless applications

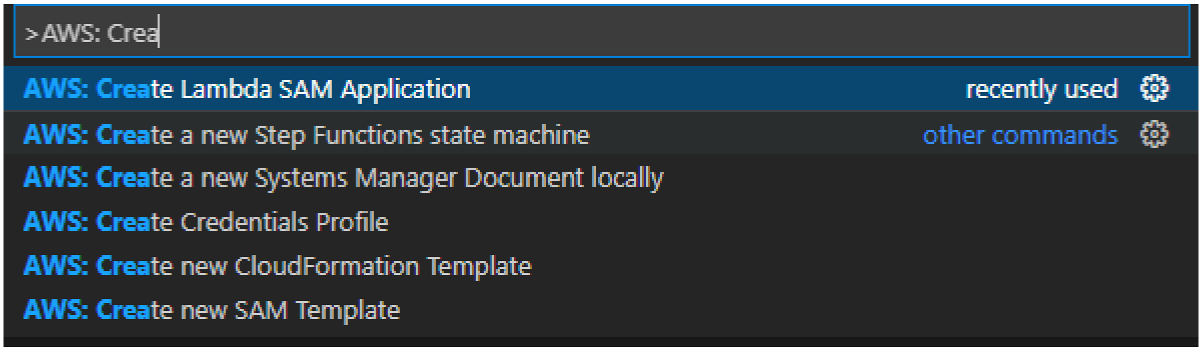
In the Toolkit for VS Code you must have a credentials profile that contains the AWS Identity and Access Management (IAM) permissions necessary to deploy and run serverless applications. You must have appropriate read/write access to the following services: AWS CloudFormation, IAM, Lambda, Amazon API Gateway, Amazon Simple Storage Service (Amazon S3), and Amazon Elastic Container Registry (Amazon ECR).

For additional information about setting up authentication required to deploy and run serverless applications, see the Managing resource access and permissions in the *AWS Serverless Application Model Developer Guide*. For information on how to set up your credentials, see the AWS IAM credentials in this User Guide.

Creating a new serverless application (local)

This procedure shows how to create a serverless application with the Toolkit for VS Code by using AWS SAM. The output of this procedure is a local directory on your development host containing a sample serverless application, which you can build, locally test, modify, and deploy to the AWS Cloud.

1. To open the **Command Palette**, choose **View**, **Command Palette**, and then enter **AWS**.
2. Choose **AWS Toolkit Create Lambda SAM Application**.


>AWS: Crea
AWS: Create Lambda SAM Application
recently used
AWS: Create a new Step Functions state machine
other commands
AWS: Create a new Systems Manager Document locally
AWS: Create Credentials Profile
AWS: Create new CloudFormation Template
AWS: Create new SAM Template

Note

If the AWS SAM CLI isn't installed, you get an error in the lower-right corner of the VS Code editor. If this happens, verify that you've met all the assumptions and prerequisites.

3. Choose the runtime for your AWS SAM application.

Note

If you select one of the runtimes with "(Image)", your application is package type `Image`. If you select one of the runtimes without "(Image)", your application is type

Zip. For more information about the difference between Image and Zip package types, see Lambda deployment packages in the *AWS Lambda Developer Guide*.

4. Depending on the runtime you select, you may be asked to select a dependency manager and a runtime architecture for your SAM application.

   Dependency Manager

   Choose between **Gradle** or **Maven**.

   > **Note**
   >
   > This choice of build automation tools is available only for Java runtimes.

   Architecture

   Choose between **x86_64** or **arm64**.

   The option to run your serverless application in an ARM64-based emulated environment instead of the default x86_64-based environment is available for the following runtimes:

   - nodejs12.x (ZIP and image)
   - nodejs14.x (ZIP and image)
   - python3.8 (ZIP and image)
   - python3.9 (ZIP and image)
   - python3.10 (ZIP and image)
   - python3.11 (ZIP and image)
   - python3.12 (ZIP and image)
   - java8.al2 with Gradle (ZIP and image)
   - java8.al2 with Maven (ZIP only)
   - java11 with Gradle (ZIP and image)
   - java11 with Maven (ZIP only)

> ⚠ **Important**
>
> You must install AWS CLI version 1.33.0 or later to allow applications to run in ARM64-based environments. For more information, see Prerequisites.

5. Choose a location for your new project. You can use an existing workspace folder if one is open, **Select a different folder** that already exists, or create a new folder and select it. For this example, choose **There are no workspace folders open** to create a folder named `MY-SAM-APP`.
6. Enter a name for your new project. For this example, use `my-sam-app-nodejs`. After you press **Enter**, the Toolkit for VS Code takes a few moments to create the project.

When the project is created, your application is added to your current workspace. You should see it listed in the **Explorer** window.

Opening a serverless application (local)

To open a serverless application on your local development host, open the folder that contains the application's template file.

1. From the **File**, choose **Open Folder...**.
2. In the **Open Folder** dialog box, navigate to the serverless application folder that you want to open.
3. Choose the **Select Folder** button.

When you open an application's folder, it is added to the **Explorer** window.

Running and debugging a serverless application from template (local)

You can use the Toolkit for VS Code to configure how to debug serverless applications and run them locally in your development environment.

You start to configure debug behavior by using the VS Code CodeLens feature to identify an eligible Lambda function. CodeLens enables content-aware interactions with your source code. For information about ensuring that you can access the CodeLens feature, review the Prerequisites section from earlier in this topic.

Note

In this example, you debug an application that uses JavaScript. However, you can use Toolkit for VS Code debugging features with the following languages and runtimes:

- C# – .NET Core 2.1, 3.1; .NET 5.0
- JavaScript/TypeScript – Node.js 12.*x*, 14.*x*
- Python – 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12
- Java – 8, 8.al2, 11
- Go – 1.x

Your language choice also affects how CodeLens detects eligible Lambda handlers. For more information, see Running and debugging Lambda functions directly from code.

In this procedure, you use the example application created in the Creating a new serverless application (local) section earlier in this topic.

1. To view your application files in VS Code's File Explorer, choose **View**, **Explorer**.
2. From the application folder (for example, *my-sample-app*), open the `template.yaml` file.

   Note

   If you use a template with a name that's different from `template.yaml`, the CodeLens indicator isn't automatically available in the YAML file. This means that you must manually add a debug configuration.

3. In the editor for `template.yaml`, go to the `Resources` section of the template that defines serverless resources. In this case, this is the `HelloWorldFunction` resource of type `AWS::Serverless::Function`.

   In the CodeLens indicator for this resource, choose **Add Debug Configuration**.
4. In the **Command Palette**, select the runtime in which your AWS SAM application will run.
5. In the editor for the `launch.json` file, edit or confirm values for the following configuration properties:

- `"name"` – Enter a reader-friendly name to appear in the **Configuration** drop-down field in the **Run** view.
- `"target"` – Ensure that the value is `"template"` so that the AWS SAM template is the entry point for the debug session.
- `"templatePath"` – Enter a relative or absolute path for the `template.yaml` file.
- `"logicalId"` – Ensure that the name matches the one specified in the **Resources** section of the AWS SAM template. In this case, it's the `HelloWorldFunction` of type `AWS::Serverless::Function`.

For more information about these and other entries in the `launch.json` file, see Configuration options for debugging serverless applications.

6. If you're satisfied with your debug configuration, save `launch.json`. Then, to start debugging, choose the green "play" button in the **RUN** view.

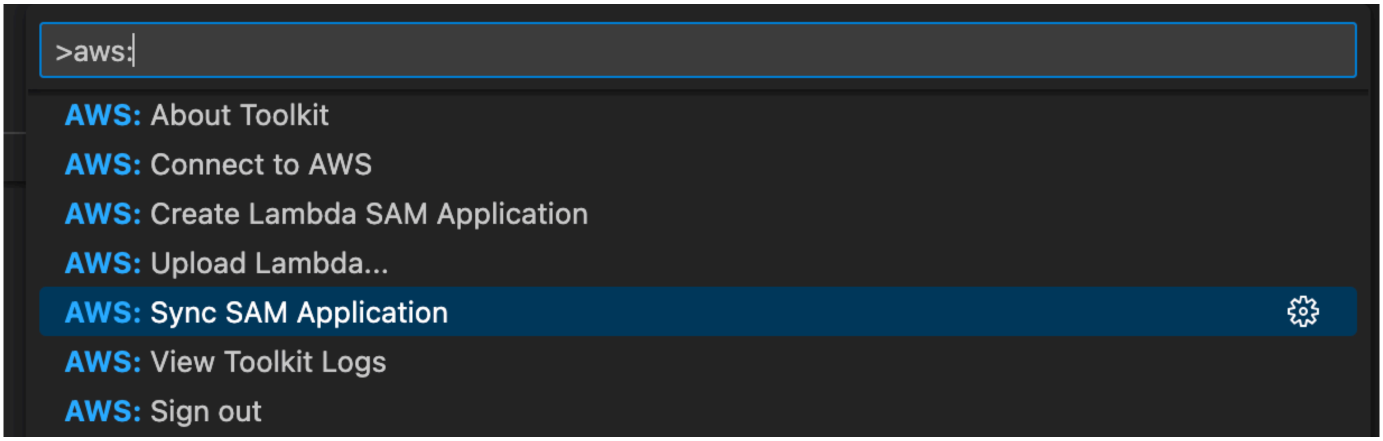
   When the debugging sessions starts, the **DEBUG CONSOLE** panel shows debugging output and displays any values returned by the Lambda function. (When debugging AWS SAM applications, the **AWS Toolkit** is selected as the **Output** channel in the **Output** panel.)

Syncing AWS SAM applications

The AWS Toolkit for Visual Studio Code runs the AWS SAM CLI command `sam sync` to deploy your serverless applications to the AWS Cloud. For additional information about AWS SAM sync, see the AWS SAM CLI command reference topic in the *AWS Serverless Application Model Developer Guide*

The following procedure describes how to deploy your serverless applications to the AWS Cloud with `sam sync` from the Toolkit for VS Code.

1. From the main menu in VS Code, open the **Command Palette** by expanding **View** and choosing **Command Palette**.
2. From the **Command Palette** search for **AWS** and choose **Sync SAM Application** to start setting up your sync.



>aws:

3. Choose the AWS Region to sync your serverless application to.
4. Choose the `template.yaml` file to use for the deployment.
5. Select an existing Amazon S3 bucket or enter a new Amazon S3 bucket name to deploy your application to.

   Important

   Your Amazon S3 bucket must meet the following requirements:

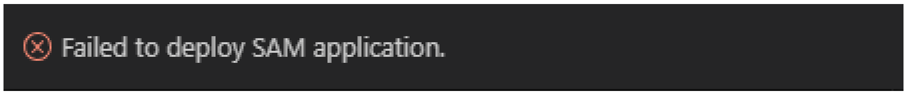
   - The bucket must be in the Region that you're syncing to.
   - The Amazon S3 bucket name must be globally unique across all existing bucket names in Amazon S3.

6. If your serverless application includes a function with package type `Image`, enter the name of an Amazon ECR repository that this deployment can use. The repository must be in the Region that you're deploying to.
7. Select a deployment stack from the list of your previous deployments, or create a new deployment stack be entering a new stack name. Then, proceed to begin the sync process.

   Note

   Stacks used in previous deployments are recalled per workspace and region.

8. During the syncing process, the status of your deployment is captured in the **Terminal** tab of VS Code. Verify that your sync was successful from the terminal tab, if an error occurs you receive a notification.



Failed to deploy SAM application.

> **Note**
>
> For additional details about your sync, the AWS Toolkit for Visual Studio Code logs are accessible from the **Command Palette**.

To access the your AWS Toolkit for Visual Studio Code logs from the Command Palette, expand **View**, choose **Command Palette**, then search for **`AWS: View AWS Toolkits Logs`**, and select it when it populates in the list.

When the deployment is complete, you see your application listed in the **AWS Explorer**. For more information about how to invoke the Lambda function created as part of the application, see the Interacting with Remote Lambda Functions topic in this User Guide.

Deleting a serverless application from the AWS Cloud

Deleting a serverless application involves deleting the AWS CloudFormation stack that you previously deployed to the AWS Cloud. Note that this procedure does not delete your application directory from your local host.

1. Open the AWS Explorer.
2. In the **AWS Toolkit Explorer** window, expand the Region containing the deployed application that you want to delete, and then expand **AWS CloudFormation**.
3. Open the context (right-click) menu for the name of the AWS CloudFormation stack that corresponds to the serverless application that you want to delete, and then choose **Delete AWS CloudFormation Stack**.
4. To confirm that you want to delete the selected stack, choose **Yes**.

If the stack deletion succeeds, the Toolkit for VS Code removes the stack name from the AWS CloudFormation list in **AWS Explorer**.

Running and debugging Lambda functions directly from code

When testing the AWS SAM application, you can choose to run and debug just the Lambda function and exclude other resources that the AWS SAM template defines. This approach involves using the CodeLens feature to identify Lambda function handlers in the source code that you can directly invoke.

The Lambda handlers that are detected by CodeLens depend on the language and runtime that you're using for your application.

Language/runtime	Criteria for Lambda functions to be identified by CodeLens indicators
C# (dotnetcore2.1, 3.1; .NET 5.0)	The function has the following features: • It's a public function of a public class. • It has one or two parameters. With two parameters, the second parameter must implement the `ILambdaContext` interface. • It has a `*.csproj` file in its parent folder within the VS Code workspace folder. The ms-dotnettools.csharp extension (or any extension that provides language symbols for C#) is installed and enabled.
JavaScript/TypeScript (Node.js 12.x, 14.x)	The function has the following features: • It's an exported function with up to three parameters. • It has a `package.json` file in its parent folder within the VS Code workspace folder.
Python (3.7, 3.8, 3.9, 3.10, 3.11, 3.12)	The function has the following features: • It's a top-level function.

Language/runtime	Criteria for Lambda functions to be identified by CodeLens indicators
	- It has a `requirements.txt` file in its parent folder within the VS Code workspace folder. The ms-python.python extension (or any extension that provides language symbols for Python) is installed and enabled.

Language/runtime	Criteria for Lambda functions to be identified by CodeLens indicators
Java (8, 8.al2, 11)	The function has the following features: • It's a public function of a public, non-abstract class. • It has one, two, or three parameters: • One parameter: Parameter can be anything. • Two parameters: Parameters must be a `java.io.InputStream` and a `java.io.OutputStream` OR the last parameter must be a `com.amazonaws.services.lambda.runtime.Context` . • Three parameters: Parameters must be a `java.io.InputStream` and a `java.io.OutputStream` AND the last parameter must be a `com.amazonaws.services.lambda.runtime.Context` . • It has a `build.gradle` (Gradle) or `pom.xml` (Maven) file in its parent folder within the VS Code workspace folder. The redhat.java extension (or any extension that provides language symbols for Java) is installed and enabled. This extension requires Java 11, no matter which Java runtime you're using. The vscjava.vscode-java-debug extension (or any extension that provides a Java debugger) is installed and enabled.

Language/runtime	Criteria for Lambda functions to be identified by CodeLens indicators
Go (1.x)	The function has the following features: • It's a top-level function. • It takes between 0 and 2 arguments. If there are two arguments, the first argument must implement `context.Context` . • It returns between 0 and 2 arguments. If there are more than 0 arguments, the last argument must implement `error`. • It has a `go.mod` file within the VS Code workspace folder. The golang.go extension is installed, configured, and enabled.

To run and debug a serverless application directly from the application code

1. To view your application files in the VS Code File Explorer, choose **View**, **Explorer**.
2. From the application folder (for example, *my-sample-app*), expand the function folder (in this case, *hello-world*) and open the `app.js` file.
3. In the CodeLens indicator that identifies an eligible Lambda function handler, choose `Add Debug Configuration`.
4. In the **Command Palette**, select the runtime in which your AWS SAM application will run.
5. In the editor for the `launch.json` file, edit or confirm values for the following configuration properties:

   - `"name"` – Enter a reader-friendly name to appear in the **Configuration** dropdown field in the **Run** view.
   - `"target"` – Ensure that the value is `"code"` so that a Lambda function handler is directly invoked.

- `"lambdaHandler"` – Enter the name of the method within your code that Lambda calls to invoke your function. For example, for applications in JavaScript, the default is `app.lambdaHandler`.
- `"projectRoot"` – Enter the path to the application file that contains the Lambda function.
- `"runtime"` – Enter or confirm a valid runtime for the Lambda execution environment, for example, `"nodejs.12x"`.
- `"payload"` – Choose one of the following options to define the event payload that you want to provide to your Lambda function as input:
  - `"json"`: JSON-formatted key-value pairs that define the event payload.
  - `"path"`: A path to the file that's used as the event payload.

  In the example below, the `"json"` option defines the payload.

For more information about these and other entries in the `launch.json` file, see Configuration options for debugging serverless applications.

6. If you're satisfied with the debug configuration, to start debugging, choose the green play arrow next to **RUN**.

   When the debugging sessions starts, the **DEBUG CONSOLE** panel shows debugging output and displays any values that the Lambda function returns. (When debugging AWS SAM applications, **AWS Toolkit** is selected as the **Output** channel in the **Output** panel.)

Running and debugging local Amazon API Gateway resources

You can run or debug AWS SAM API Gateway local resources, specified in `template.yaml`, by running a VS Code launch config of `type=aws-sam` with the `invokeTarget.target=api`.

> **Note**
>
> API Gateway supports two types of APIs, REST and HTTP. However, the API Gateway feature with the AWS Toolkit for Visual Studio Code only supports REST APIs. Sometimes HTTP APIs are called "API Gateway V2 APIs."

To run and debug local API Gateway resources

1. Choose one of the following approaches to create a launch config for an AWS SAM API Gateway resource:

   - **Option 1:** Visit the handler source code (.js, .cs, or .py file) in your AWS SAM project, hover over the Lambda handler, and choose the **Add Debug Configuration** CodeLens. Then, in the menu, choose the item marked **API Event**.
   - **Option 2:** Edit `launch.json` and create a new launch configuration using the following syntax.

   ```
   {
     "type": "aws-sam",
     "request": "direct-invoke",
     "name": "myConfig",
     "invokeTarget": {
       "target": "api",
       "templatePath": "n12/template.yaml",
       "logicalId": "HelloWorldFunction"
     },
     "api": {
       "path": "/hello",
       "httpMethod": "post",
       "payload": {
         "json": {}
       }
     },
     "sam": {},
     "aws": {}
   }
   ```

2. In the VS Code **Run** panel, choose the launch config (named `myConfig` in the above example).
3. (Optional) Add breakpoints to your Lambda project code.
4. Type **F5** or choose **Play** in the **Run** panel.
5. In the output pane, view the results.

Configuration

When you use the `invokeTarget.target` property value `api`, the Toolkit changes the launch configuration validation and behavior to support an `api` field.

```
{
  "type": "aws-sam",
  "request": "direct-invoke",
  "name": "myConfig",
  "invokeTarget": {
    "target": "api",
    "templatePath": "n12/template.yaml",
    "logicalId": "HelloWorldFunction"
  },
  "api": {
    "path": "/hello",
    "httpMethod": "post",
    "payload": {
      "json": {}
    },
    "querystring": "abc=def&qrs=tuv",
    "headers": {
        "cookie": "name=value; name2=value2; name3=value3"
    }
  },
  "sam": {},
  "aws": {}
}
```

Replace the values in the example as follows:

invokeTarget.logicalId

An API resource.

path

The API path that the launch config requests, for example, `"path": "/hello"`.

Must be a valid API path resolved from the `template.yaml` specified by `invokeTarget.templatePath`.

httpMethod

One of the following verbs: "delete", "get", "head", "options", "patch", "post", "put".

payload

The JSON payload (HTTP body) to send in the request , with the same structure and rules as the lambda.payload field.

`payload.path` points to a file containing the JSON payload.

`payload.json` specifies a JSON payload inline.

headers

Optional map of name-value pairs, which you use to specify HTTP headers to include in the request, as shown in the following example.

```
"headers": {
     "accept-encoding": "deflate, gzip;q=1.0, *;q=0.5",
     "accept-language": "fr-CH, fr;q=0.9, en;q=0.8, de;q=0.7, *;q=0.5",
     "cookie": "name=value; name2=value2; name3=value3",
     "user-agent": "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_6)
 AppleWebKit/537.36 (KHTML, like Gecko) Chrome/86.0.4240.198 Safari/537.36",
}
```

querystring

Optional string which sets the `querystring` of the request, for example, `"querystring": "abc=def&ghi=jkl"`.

AWS

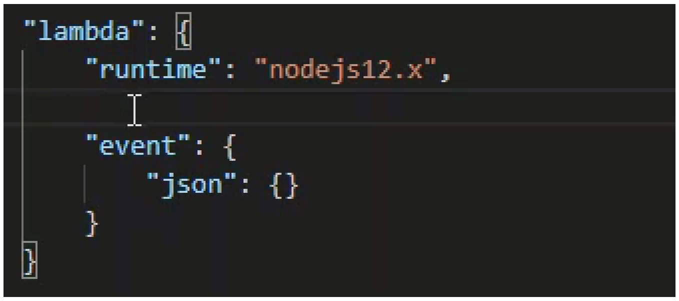
How AWS connection information is provided. For more information, see the **AWS connection ("aws") properties** table in the Configuration options for debugging serverless applications section.

sam

How the AWS SAM CLI builds the application. For more information, see the **AWS SAM CLI ("sam") properties** table in the Configuration options for debugging serverless applications section.

Configuration options for debugging serverless applications

When you open the `launch.json` file to edit debug configurations, you can use the VS Code IntelliSense feature to view and automatically complete valid properties. To trigger IntelliSense in the editor, press **Ctrl+Spacebar**.



```
"lambda": {
    "runtime": "nodejs12.x",

    "event": {
        "json": {}
    }
}
```

IntelliSense enables you to find and define properties for invoking Lambda functions directly or with the AWS SAM template. You can also define properties for `"lambda"` (how the function runs), `"sam"` (how the AWS SAM CLI builds the application), and `"aws"` (how AWS connection information is provided).

AWS SAM: Direct Lambda handler invoke / Template-based Lambda invoke

Property	Description
`type`	Specifies which extension manages the launch configuration. Always set to `aws-sam` to use the AWS SAM CLI to build and debug locally.
`name`	Specifies a reader-friendly name to appear in the **Debug launch configuration** list.
`request`	Specifies the type of configuration to be performed by the designated extension (`aws-sam`). Always set to `direct-invoke` to start the Lambda function.
`invokeTarget`	Specifies the entry point for invoking the resource. For invoking the Lambda function directly, set values for the following `invokeTarget` fields: • `target` – Set to `code`.

Property	Description
	• `lambdaHandler` – The name of the Lambda function handler to invoke. • `projectRoot` – The path for the application file containing the Lambda function handler. • `architecture` – Processor architecture of the emulated environment in which your local SAM Lambda application runs. For certain runtimes, you can choose `arm64` instead of the default `x86_64` architecture. For more information, see Creating a new serverless application (local). For invoking the Lambda resources with the AWS SAM template, set values for the following `invokeTarget` fields: • `target` – Set to `template`. • `templatePath` – The path to the AWS SAM template file. • `logicalId` – The resource name of the `AWS::Lambda::Function` or `AWS::Serverless::Function` to invoke. You can find the resource name in the YAML-formatted AWS SAM template. Note that the AWS Toolkit implicitly recognizes functions defined with `PackageType: Image` in the AWS SAM template as Image-based Lambda functions. For more information, see Lambda deployment packages in the *AWS Lambda Developer Guide*.

Lambda ("`lambda`") properties

Property	Description
`environmentVariables`	Passes operational parameters to your Lambda function. For example, if you're writing to an Amazon S3 bucket, instead of hard-coding the bucket name that you're writing to, configure the bucket name as an environment variable.

<table>
<tr><th>Property</th><th>Description</th></tr>
<tr><td></td><td>

Note

When specifying environment variables for a serverless application, you must add configurations to both the AWS SAM template (`template.yaml`) and the `launch.json` file.

Example of formatting for an environment variable in the AWS SAM template:

<pre>
Resources:
 HelloWorldFunction:
 Type: AWS::Serverless::Function
 Properties:
   CodeUri: hello-world/
   Handler: app.lambdaHandlerN10
   Runtime: nodejs10.x
   Environment:
     Variables:
       SAMPLE1: Default Sample 1 Value
</pre>

Example of formatting for an environment variable in the `launch.json` file:

<pre>
"environmentVariables": {
    "SAMPLE1": "My sample 1 value"
 }
</pre>

</td></tr>
<tr><td><code>payload</code></td><td>

Provides two options for the event payload that you provide to your Lambda function as input.

- `"json"`: JSON-formatted key-value pairs that define the event payload.
- `"path"`: A path to the file that's used as the event payload.

</td></tr>
<tr><td><code>memoryMB</code></td><td>Specifies megabytes (MB) of memory provided for running an invoked Lambda function.</td></tr>
</table>

<table>
<tr><th>Property</th><th>Description</th></tr>
<tr><td><code>runtime</code></td><td>Specifies the runtime that the Lambda function uses. For more information, see AWS Lambda runtimes.</td></tr>
<tr><td><code>timeoutSec</code></td><td>Sets the time allowed, in seconds, before the debug session times out.</td></tr>
<tr><td><code>pathMappings</code></td><td>

Specifies where local code is in relation to where it runs in the container.

By default, the Toolkit for VS Code sets <code>localRoot</code> to the Lambda function's code root in the local workspace, and <code>remoteRoot</code> to <code>/var/task</code>, which is the default working directory for code running in Lambda. If the working directory is changed in the Dockerfile or with the <code>WorkingDirectory</code> parameter in the AWS CloudFormation template file, at least one <code>pathMapping</code> entry must be specified so that the debugger can successfully map locally set breakpoints to the code running in the Lambda container.

Example of formatting for <code>pathMappings</code> in the <code>launch.json</code> file:

```
"pathMappings": [
    {
        "localRoot": "${workspaceFolder}/sam-app/HelloWorldFunction",
        "remoteRoot": "/var/task"
    }
]
```

Caveats:

- For .NET image-based Lambda functions, the <code>remoteRoot</code> entry must be the build directory.
- For Node.js-based Lambda functions, you can specify only a single path mapping entry.

</td></tr>
</table>

The Toolkit for VS Code uses the AWS SAM CLI to build and debug serverless applications locally. You can configure the behavior of AWS SAM CLI commands using properties of the `"sam"` configuration in the `launch.json` file.

AWS SAM CLI (`"sam"`) properties

Property	Description	Default value
`buildArguments`	Configures how the `sam build` command builds your Lambda source code. To view build options, see sam build in the *AWS Serverless Application Model Developer Guide*.	Empty string
`containerBuild`	Indicates whether to build your function inside a Lambda-like Docker container.	`false`
`dockerNetwork`	Specifies the name or ID of an existing Docker network that the Lambda Docker containers should connect to, along with the default bridge network. If not specified, the Lambda containers connect only to the default bridge Docker network.	Empty string
`localArguments`	Specifies additional local invoke arguments.	Empty string
`skipNewImageCheck`	Specifies whether the command should skip pulling down the latest Docker image for Lambda runtime.	`false`

Property	Description	Default value
`template`	Customizes your AWS SAM template using parameters to input customer values. For more information, see Parameters in the *AWS CloudFormation User Guide*.	`"parameters":{}`

AWS connection ("aws") properties

Property	Description	Default value
`credentials`	Selects a specific profile (for example, `profile:default`) from your credential file to get AWS credentials.	The AWS credentials that your existing shared AWS config file or shared AWS credentials file provide to the Toolkit for VS Code.
`region`	Sets the AWS Region of the service (for example, us-east-1).	The default AWS Region associated with the active credentials profile.

Example: Template launch configuration

Here is an example launch configuration file for an AWS SAM template target:

```
{
    "configurations": [
        {
            "type": "aws-sam",
            "request": "direct-invoke",
            "name": "my-example:HelloWorldFunction",
            "invokeTarget": {
                "target": "template",
                "templatePath": "template.yaml",
                "logicalId": "HelloWorldFunction"
            },
            "lambda": {
                "payload": {},
                "environmentVariables": {}
            }
        }
    ]
}
```

Example: Code launch configuration

Here is an example launch configuration file for a Lambda function target:

```
{
    "configurations": [
        {
            "type": "aws-sam",
            "request": "direct-invoke",
            "name": "my-example:app.lambda_handler (python3.7)",
            "invokeTarget": {
                "target": "code",
                "projectRoot": "hello_world",
                "lambdaHandler": "app.lambda_handler"
            },
            "lambda": {
                "runtime": "python3.7",
                "payload": {},
                "environmentVariables": {}
            }
        }
    ]
}
```

Troubleshooting serverless applications

This topic details common errors that you might encounter when creating serverless applications with the Toolkit for VS Code and how to resolve them.

Topics

- How can I use a samconfig.toml with a SAM launch configuration?
- Error: "RuntimeError: Container does not exist"
- Error: "docker.errors.APIError: 500 Server Error ... You have reached your pull rate limit."

- Error: "500 Server Error: Mounting C:\Users\..."
- Using WSL, webviews (for example, the "Invoke on AWS" form) are broken
- Debugging a TypeScript application, but breakpoints are not working

How can I use a samconfig.toml with a SAM launch configuration?

Specify the location of your SAM CLI samconfig.toml by configuring the `--config-file` argument in the `sam.localArguments` property of your launch configuration. For example, if the samconfig.toml file is located at the top level of your workspace:

```
"sam": {
    "localArguments": ["--config-file", "${workspaceFolder}/samconfig.toml"],
}
```

Error: "RuntimeError: Container does not exist"

The `sam build` command can show this error if your system does not have enough disk space for the Docker container. If your system storage has only 1-2 GB of space available, `sam build` might fail during processing, even if system storage is not completely full before the build starts. For more information, see this GitHub issue.

Error: "docker.errors.APIError: 500 Server Error ... You have reached your pull rate limit."

Docker Hub limits requests that anonymous users can make. If your system reaches the limit, Docker fails and this error appears in the OUTPUT view of VS Code:

```
docker.errors.APIError: 500 Server Error: Internal Server Error ("toomanyrequests: You
 have
reached your pull rate limit. You may increase the limit by authenticating and
 upgrading:
https://www.docker.com/increase-rate-limit")
```

Ensure that your system Docker service has authenticated with your Docker Hub credentials.

Error: "500 Server Error: Mounting C:\Users\..."

Windows users might see this Docker mounting error when debugging AWS SAM applications:

```
Fetching lambci/lambda:nodejs10.x Docker container image......
2019-07-12 13:36:58 Mounting C:\Users\<username>\AppData\Local\Temp\ ... as /var/
task:ro,delegated inside runtime container
Traceback (most recent call last):
...
requests.exceptions.HTTPError: 500 Server Error: Internal Server Error ...
```

Try refreshing the credentials for your shared drives (in the Docker settings).

Using WSL, webviews (for example, the "Invoke on AWS" form) are broken

This is a known VS Code issue for users of Cisco VPN. For more information, see this GitHub issue.

A workaround is suggested in this WSL tracking issue.

Debugging a TypeScript application, but breakpoints are not working

This will happen if there isn't a source map to link the compiled JavaScript file to the source TypeScript file. To correct this, open your `tsconfig.json` file and ensure the following option and value are set: `"inlineSourceMap": true`.

Working with Systems Manager Automation documents

AWS Systems Manager gives you visibility and control of your infrastructure on AWS. Systems Manager provides a unified user interface so you can view operational data from multiple AWS services and automate operational tasks across your AWS resources.

A Systems Manager document defines the actions that Systems Manager performs on your managed instances. An Automation document is a type of Systems Manager document that you use to perform common maintenance and deployment tasks such as creating or updating an Amazon Machine Image (AMI). This topic outlines how to create, edit, publish, and delete Automation documents with AWS Toolkit for Visual Studio Code.

Topics

- Publishing a Systems Manager Automation document
- Deleting a Systems Manager Automation document
- Executing a Systems Manager Automation document
- Troubleshooting Systems Manager Automation documents in Toolkit for VS Code

Assumptions and prerequisites

Before you begin, make sure:

- You have installed Visual Studio Code and the latest version of the AWS Toolkit for Visual Studio Code. For more information, see Installing the AWS Toolkit for Visual Studio Code.
- You're familiar with Systems Manager. For more information, see the *AWS Systems Manager User Guide*.
- You're familiar with Systems Manager Automation use cases. For more information, see AWS Systems Manager Automation in the *AWS Systems Manager User Guide*.

IAM permissions for Systems Manager Automation documents

In the Toolkit for VS Code you must have a credentials profile that contains the AWS Identity and Access Management (IAM) permissions necessary to create, edit, publish, and delete Systems Manager Automation documents. The following policy document defines the necessary IAM permissions that can be used in a principal policy:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "ssm:ListDocuments",
                "ssm:ListDocumentVersions",
                "ssm:DescribeDocument",
                "ssm:GetDocument",
                "ssm:CreateDocument",
                "ssm:UpdateDocument",
                "ssm:UpdateDocumentDefaultVersion",
                "ssm:DeleteDocument"
            ],
            "Resource": "*"
        }
    ]
}
```

For information on how to update an IAM policy, see Creating IAM policies in the *IAM User Guide*. For information on how to set up your credentials profile, see AWS IAM credentials.

Creating a new Systems Manager Automation document

You can create a new Automation document in `JSON` or `YAML` using Visual Studio Code. When you create a new Automation document, it will be presented in an untitled file. You can name your file and save it in VS Code, however the name of the file isn't visible to AWS.

To create a new Automation document

1. Open VS Code.
2. On the **View** menu, choose **Command Palette** to open the Command Palette.
3. In the Command Palette, enter **AWS Toolkit Create a new Systems Manager Document Locally**.
4. Choose one of the starter templates for a Hello World example.
5. Choose either `JSON` or `YAML`.

   A new Automation document is created.

> **Note**
>
> Your new Automation document in VS Code doesn't automatically appear in AWS. You must publish it to AWS before you can run it.

Opening an existing Systems Manager Automation document

You use the AWS Explorer to find existing Systems Manager Automation documents. When you open an existing Automation document, it appears as an untitled file in VS Code.

To open your Automation document

1. Open VS Code.

2. From the left-hand navigation, choose **AWS** to open the AWS Explorer.
3. In the AWS Explorer, for **Systems Manager**, choose the download icon on the document that you want to open and then choose the document version. The file will open in the format for that version. Otherwise choose either **Download as JSON** or **Download as YAML**.

> ⓘ **Note**
>
> Locally saving an Automation document as a file in VS Code doesn't make it appear in AWS. It needs to be published to AWS before executing.

Editing a Systems Manager Automation document

If you own any Automation documents, they appear in the **Owned by Me** category of Systems Manager documents in the AWS Explorer. You can own Automation documents that already exist in AWS, and you can own new or updated documents that you previously published to AWS from VS Code.

When you open an Automation document for editing in VS Code, you can do more with it than you can in the AWS Management Console. For example:

- There is schema validation on both `JSON` and `YAML` formats.
- There are snippets available in the document editor for you to create any of the automation step types.
- There is auto-complete support on various options in `JSON` and `YAML`.

Working with versions

Systems Manager Automation documents use versions for change management. You can choose the default version for an Automation document in VS Code.

To set a default version

- In the AWS Explorer, navigate to the document that you want to set the default version on, open the context (right-click) menu for the document, and choose **Set default version**.

Note

If the chosen document only has one version, you won't be able to change the default.

Publishing a Systems Manager Automation document

After you edit your Automation document in VS Code, you can publish it to AWS.

To publish your Automation document

1. Open the Automation document that you want to publish using the procedure outlined in Opening an existing Systems Manager Automation document.
2. Make the changes that you want to be published. For more information, see Editing a Systems Manager Automation document.
3. In the upper right of the open file, choose the upload icon.
4. In the publishing workflow dialog box, choose the AWS Region that you want to publish the Automation document to.
5. If you're publishing a new document, choose **Quick Create**. Otherwise, choose **Quick Update** to update an existing Automation document in that AWS Region.
6. Enter the name for this Automation document.

When you publish an update to an existing Automation document to AWS, a new version is added to the document.

Deleting a Systems Manager Automation document

You can delete Automation documents in VS Code. Deleting an Automation document deletes the document and all versions of the document.

Important

- Deleting is a destructive action that can't be undone.
- Deleting an Automation document that has already been run doesn't delete the AWS resources that were created or modified when it was started.

To delete your Automation document

1. Open VS Code.
2. From the left-hand navigation, choose **AWS** to open the AWS Explorer.
3. In the AWS Explorer, for **Systems Manager**, open the context (right-click) menu for the document you want to delete, and choose **Delete document**.

Executing a Systems Manager Automation document

Once your Automation document is published to AWS, you can run it to perform tasks on your behalf in your AWS account. To run your Automation document, you use the AWS Management Console, the Systems Manager APIs, the AWS CLI, or the AWS Tools for PowerShell. For instructions on how to run an Automation document, see Running a simple automation in the *AWS Systems Manager User Guide*.

Alternatively, if you want to use one of the AWS SDKs with the Systems Manager APIs to run your Automation document, see the AWS SDK references.

> **Note**
>
> Executing an Automation document can create new resources in AWS and can incur billing costs. We strongly recommend that you understand what your Automation document will create in your account before you started it.

Troubleshooting Systems Manager Automation documents in Toolkit for VS Code

I saved my Automation document in VS Code, but I don't see it in the AWS Management Console.

Saving an Automation document in VS Code does not publish the Automation document to AWS. For more information on publishing your Automation document, see Publishing a Systems Manager Automation document.

Publishing my Automation document failed with a permissions error.

Make sure your AWS credentials profile has the necessary permissions to publish Automation documents. For an example permissions policy, see IAM permissions for Systems Manager Automation documents.

I published my Automation document to AWS, but I don't see it in the AWS Management Console.

Make sure that you've published the document to the same AWS Region you're browsing in the AWS Management Console.

I've deleted my Automation document, but I'm still being billed for the resources it created.

Deleting an Automation document doesn't delete the resources it created or modified. You can identify the AWS resources that you've created from the AWS Billing Management Console, explore your charges, and choose what resources to delete from there.

Working with AWS Step Functions

The AWS Toolkit for Visual Studio Code (VS Code) provides support for AWS Step Functions. Using the Toolkit for VS Code, you can create, update and execute Step Functions state machines.

Topics

Working with AWS Step Functions

You can use the AWS Toolkit for Visual Studio Code (VS Code) to perform various operations with state machines.

Topics

Prerequisites

- Be sure your system meets the prerequisites specified in Installing the Toolkit for VS Code, then install the toolkit.
- Ensure that you have configured your credentials before opening the **AWS Explorer**.

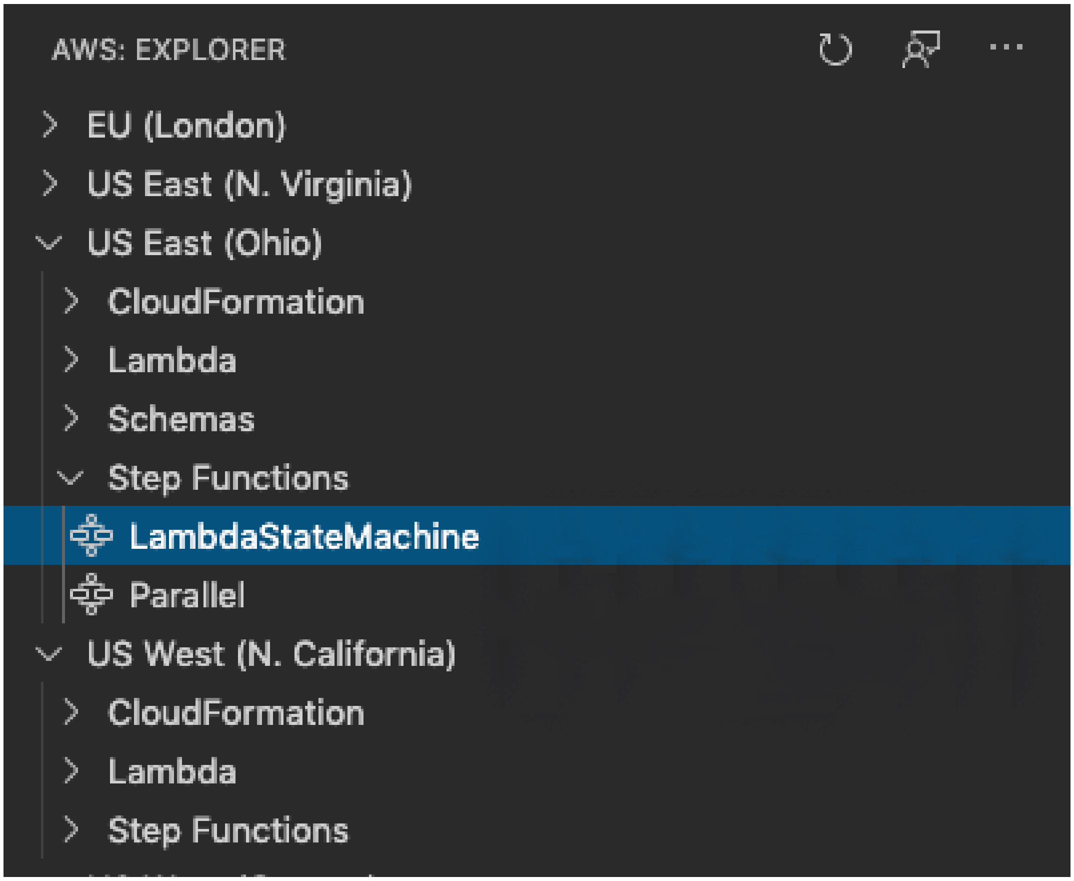
Work with state machines in VS Code

You can use VS Code to interact with remote state machines, and develop state machines locally in JSON or YAML format. You can create or update state machines, list existing state machines, run them, and download them. VS Code also lets you create new state machines from templates, see a visualization of your state machine, and provides code snippets, code completion, and code validation.

List existing state machines

If you've already created state machines, you can view a list of them:

1. Open the **AWS Explorer**.
2. Select Step Functions
3. Verify that it lists all the state machines in your account.



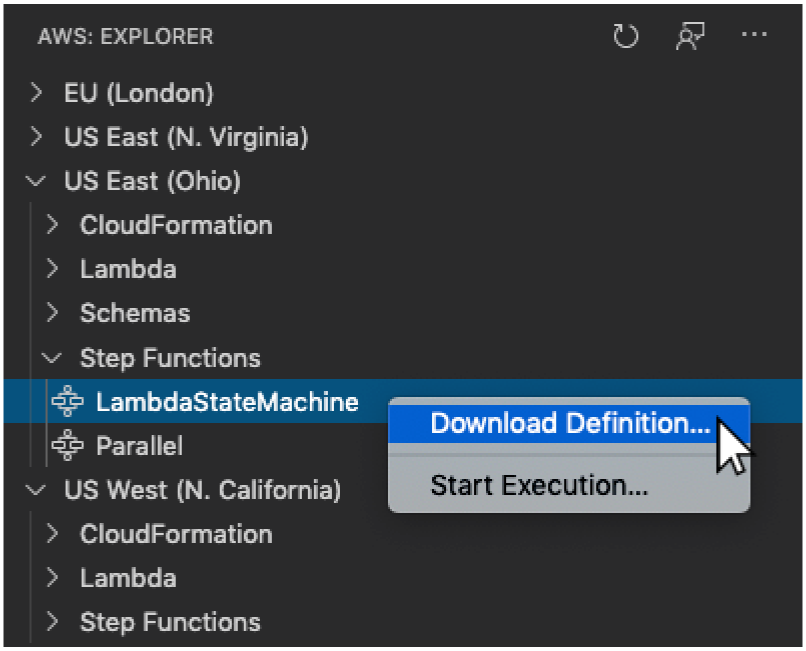
AWS: EXPLORER

- EU (London)
- US East (N. Virginia)
- US East (Ohio)
  - CloudFormation
  - Lambda
  - Schemas
  - Step Functions
    - LambdaStateMachine
    - Parallel
- US West (N. California)
  - CloudFormation
  - Lambda
  - Step Functions

Download a state machine

To download a state machine:

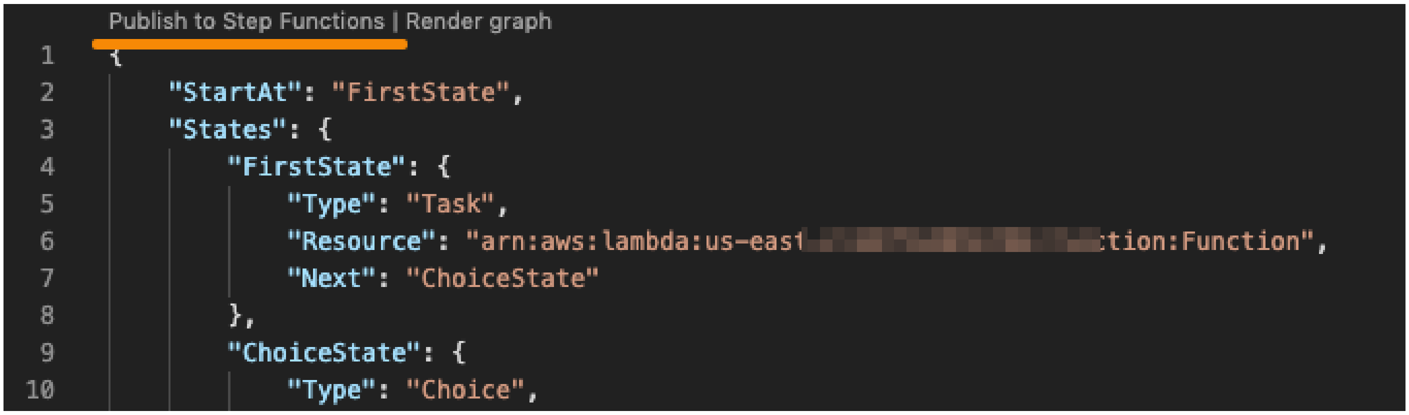
1. In the **AWS Explorer**, right click the state machine that you want to download.
2. Select Download, then select the location where you want to download the state machine.
3. Verify that it downloaded correctly.



Create a state machine

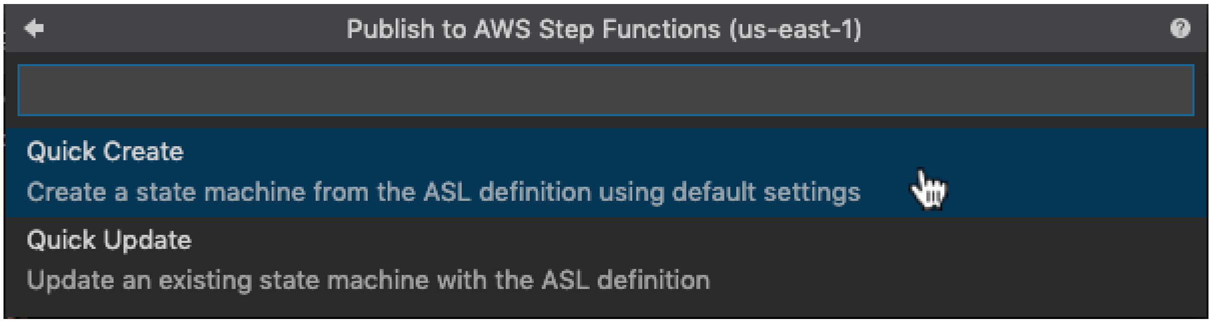
You can create a new state machine yourself, or you can use a template. For more information on creating a state machine from a template, see the **State Machine Templates** section. To create a new state machine:

1. Create a new Amazon States Language (ASL) file with your state machine definition. Use the menu at the bottom right to set it as Amazon States Language.
2. Select **Publish to Step Functions**.



```
{
    "StartAt": "FirstState",
    "States": {
        "FirstState": {
            "Type": "Task",
            "Resource": "arn:aws:lambda:us-east[redacted]tion:Function",
            "Next": "ChoiceState"
        },
        "ChoiceState": {
            "Type": "Choice",
```

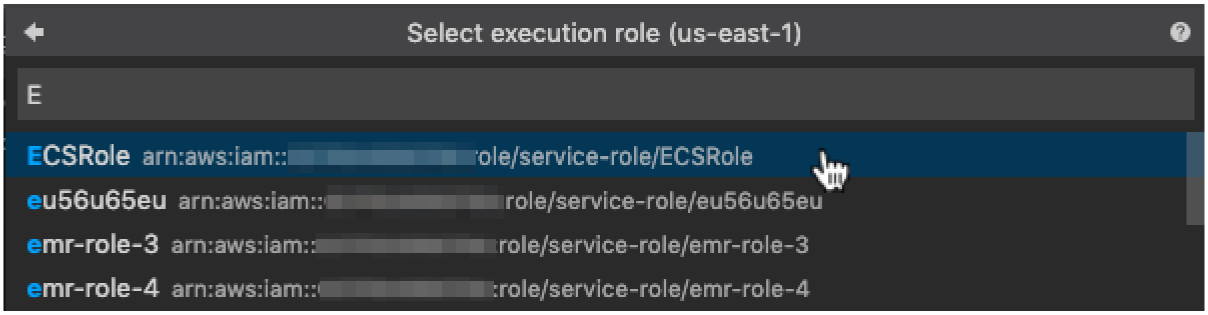
3. Select **Quick Create**, choose a role, and name your state machine.



Publish to AWS Step Functions (us-east-1)

Quick Create
Create a state machine from the ASL definition using default settings

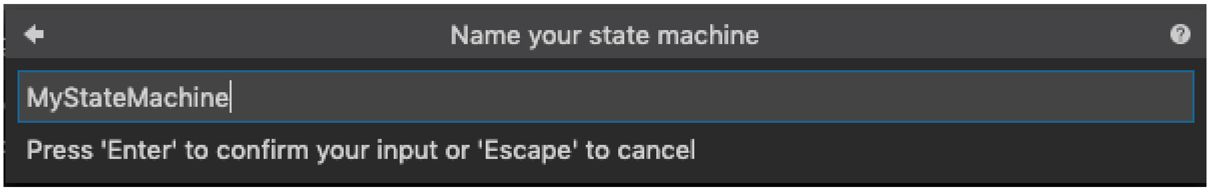
Quick Update
Update an existing state machine with the ASL definition



Select execution role (us-east-1)

E

ECSRole arn:aws:iam::[redacted]role/service-role/ECSRole
eu56u65eu arn:aws:iam::[redacted]role/service-role/eu56u65eu
emr-role-3 arn:aws:iam::[redacted]role/service-role/emr-role-3
emr-role-4 arn:aws:iam::[redacted]role/service-role/emr-role-4



Name your state machine

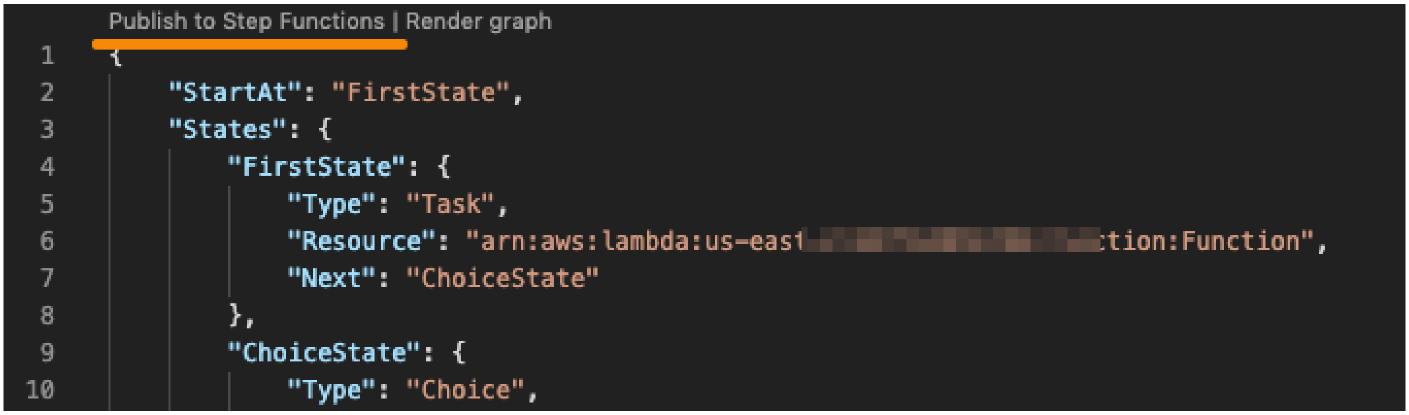
MyStateMachine

Press 'Enter' to confirm your input or 'Escape' to cancel

Update a state machine

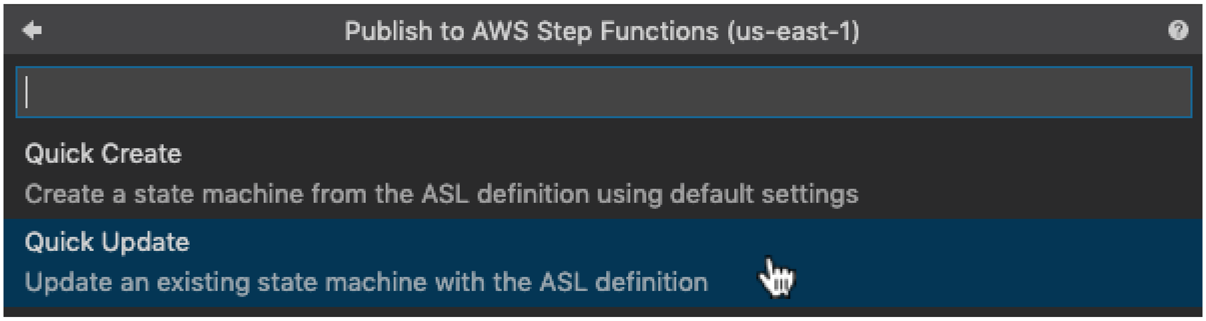
To update a state machine:

1. Edit the ASL file with your state machine definition.
2. Select **Publish to Step Functions**.



```
{
    "StartAt": "FirstState",
    "States": {
        "FirstState": {
            "Type": "Task",
            "Resource": "arn:aws:lambda:us-east[redacted]tion:Function",
            "Next": "ChoiceState"
        },
        "ChoiceState": {
            "Type": "Choice",
```

3. Select **Quick Update**, then select the state machine you want to update.



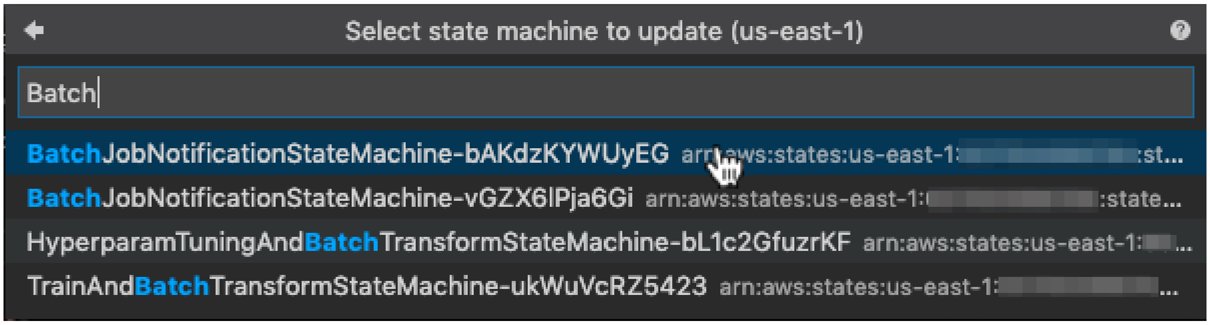
Publish to AWS Step Functions (us-east-1)

Quick Create

Create a state machine from the ASL definition using default settings

Quick Update

Update an existing state machine with the ASL definition



Select state machine to update (us-east-1)

Batch

BatchJobNotificationStateMachine-bAKdzKYWUyEG arn:aws:states:us-east-1:[redacted]:st...

BatchJobNotificationStateMachine-vGZX6lPja6Gi arn:aws:states:us-east-1:[redacted]:state...

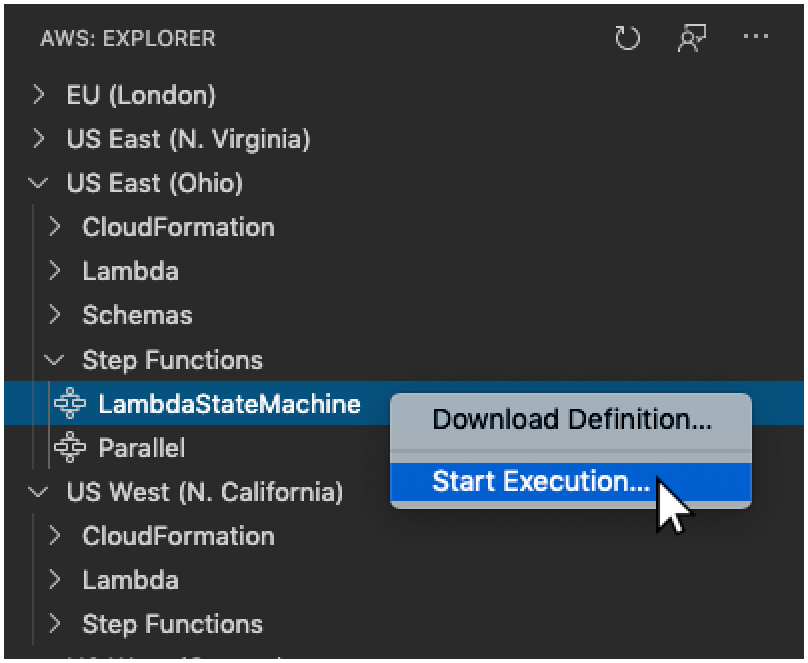
HyperparamTuningAndBatchTransformStateMachine-bL1c2GfuzrKF arn:aws:states:us-east-1:[redacted]...

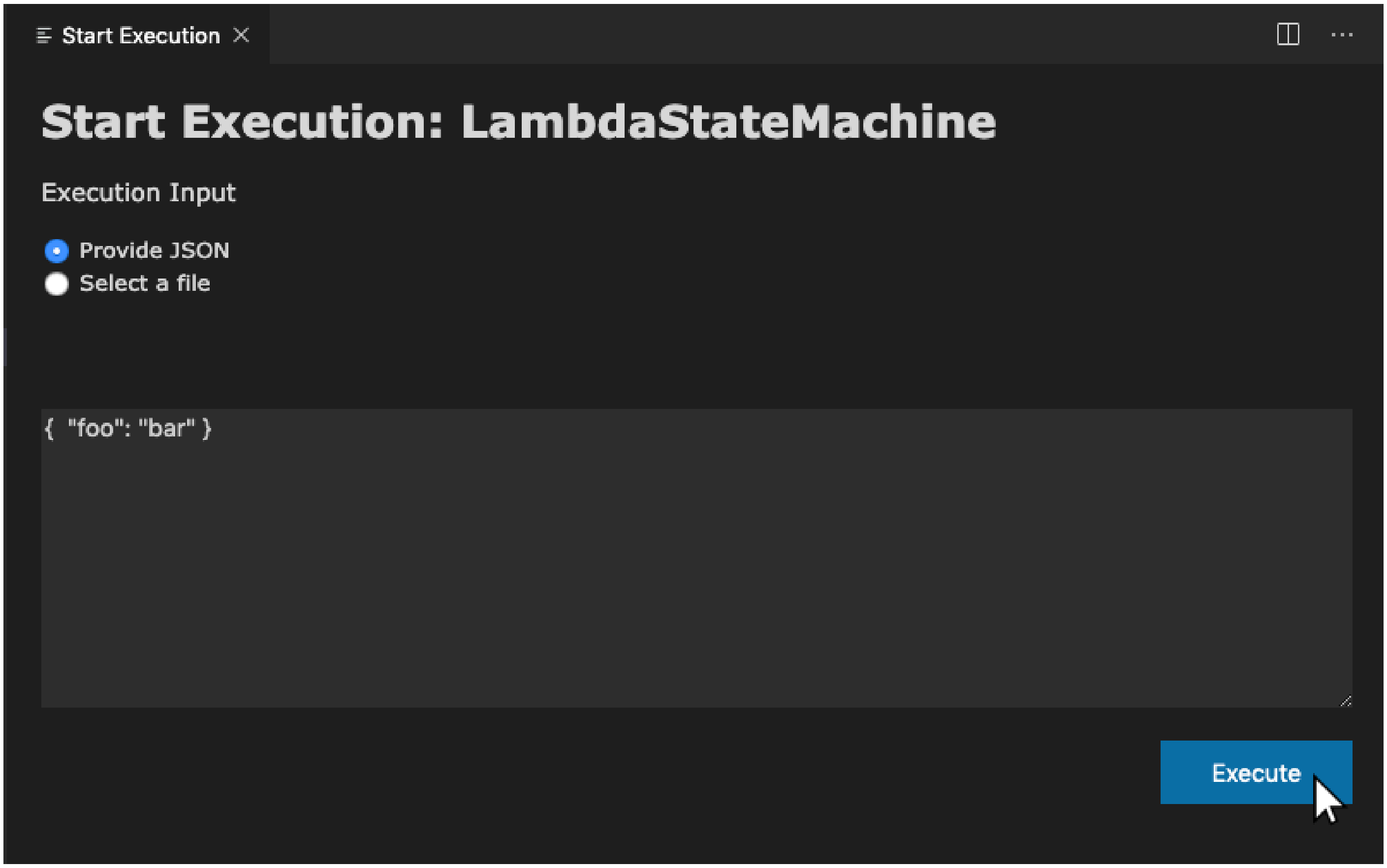
TrainAndBatchTransformStateMachine-ukWuVcRZ5423 arn:aws:states:us-east-1:[redacted]...

Run a state machine

To run a state machine:

1. In the **AWS Explorer**, right click the state machine that you want to run.
2. Provide input for the state machine. You can try both input from a file, and input in a text box.
3. Start the state machine and verify that it runs successfully.





Start Execution: LambdaStateMachine

Execution Input

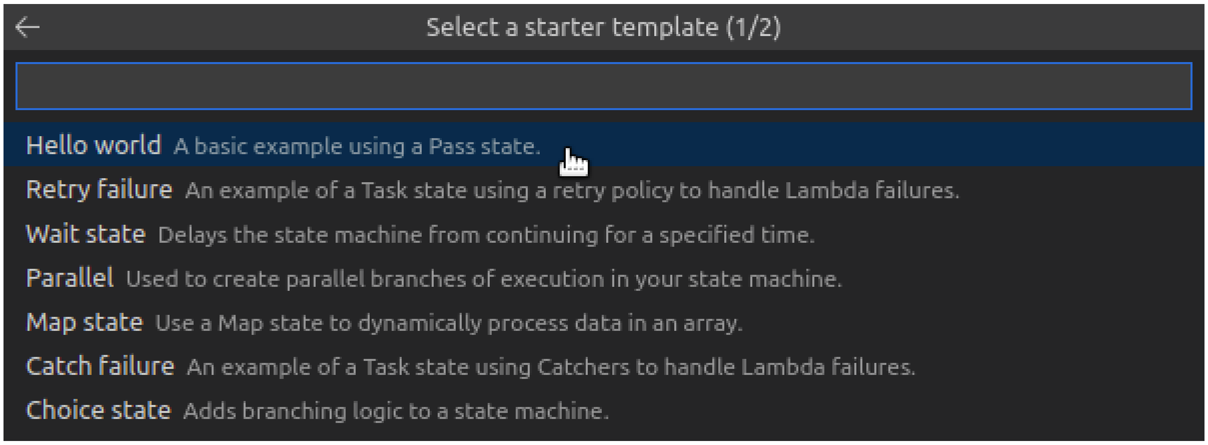
● Provide JSON
○ Select a file

```
{ "foo": "bar" }
```

State machine templates

When you create a state machine, you have the option to create it from a template. The template contains a sample state machine definition with several commonly used states, and provides you with a starting point. To use state machine templates:

1. Open the **Command Palette** in VS Code.
2. Select **AWS Toolkit Create a new Step Functions state machine**.
3. Choose the template you want to use.



Select a starter template (1/2)

Hello world A basic example using a Pass state.

Retry failure An example of a Task state using a retry policy to handle Lambda failures.

Wait state Delays the state machine from continuing for a specified time.

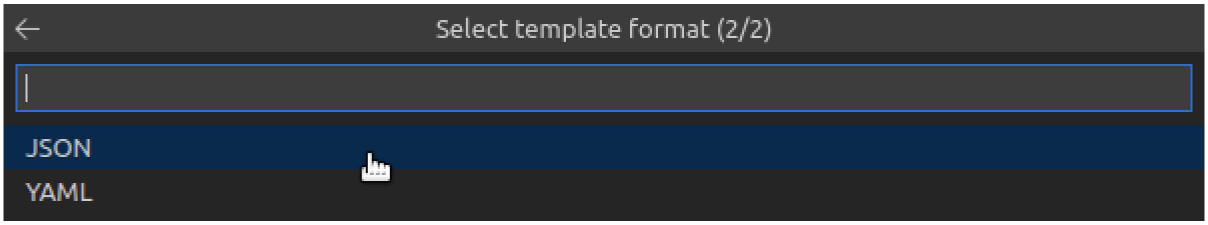
Parallel Used to create parallel branches of execution in your state machine.

Map state Use a Map state to dynamically process data in an array.

Catch failure An example of a Task state using Catchers to handle Lambda failures.

Choice state Adds branching logic to a state machine.

4. Choose whether you want to use the JSON or the YAML template format.



Select template format (2/2)

JSON

YAML

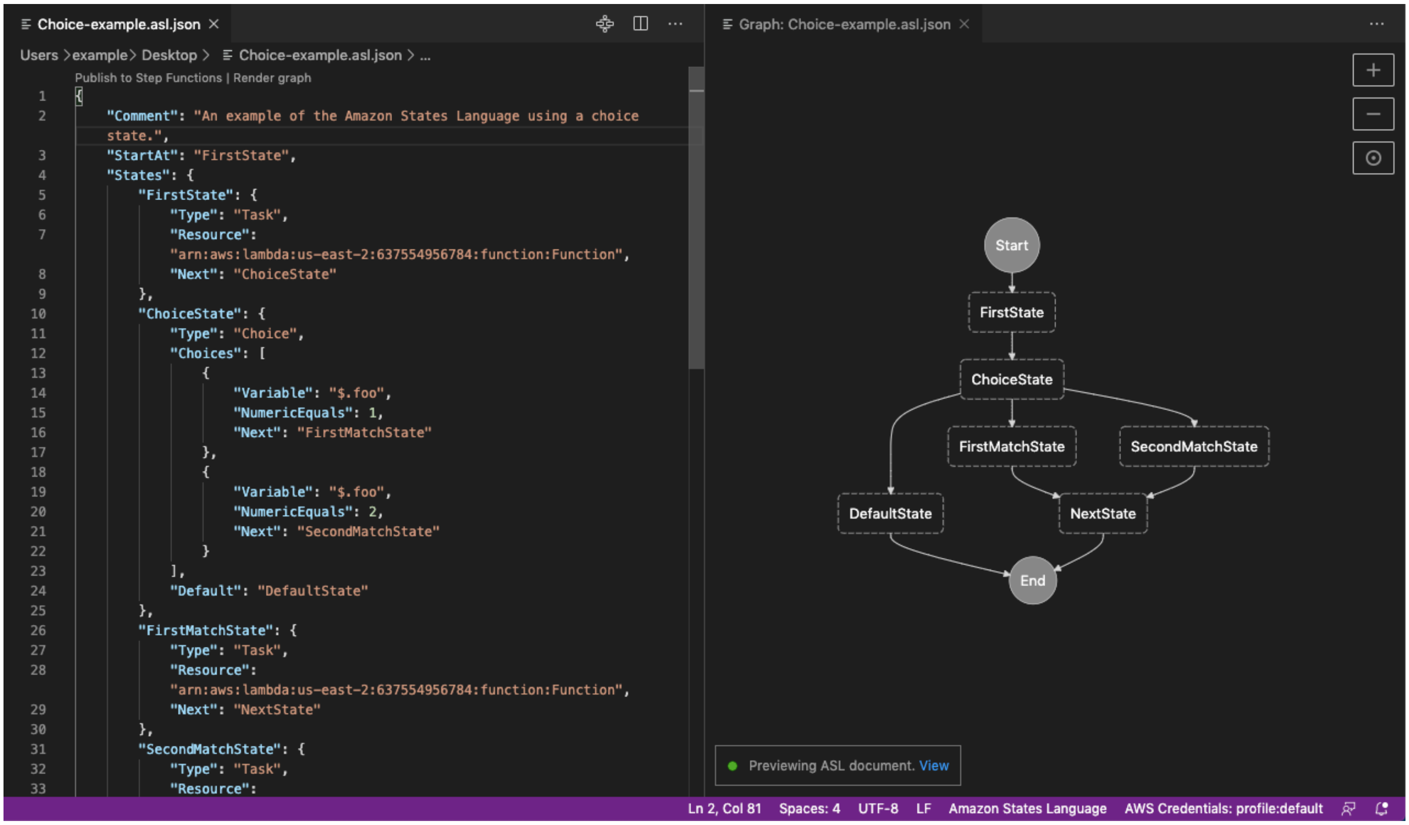
State machine graph visualization

Graph visualizations let you see what your state machine looks like in graphical format. When you create a graph visualization, another tab will open and display a visualizion of the state machine JSON or YAML. You can then compare the state machine definition you are writing concurrently with its visualization. As you change your state machine definition, the visualization will be updated.

> **Note**
>
> To create a visualizion of a state machine definition, the definition must be open in the active editor. If you close or rename the definition file, the visualization will close.

To create a state machine graph visualization:

1. Define your state machine.
2. Open the **Command Palette** in VS Code.
3. To create a visualization, use the visualization button in the upper right corner, or choose **AWS Render graph**.



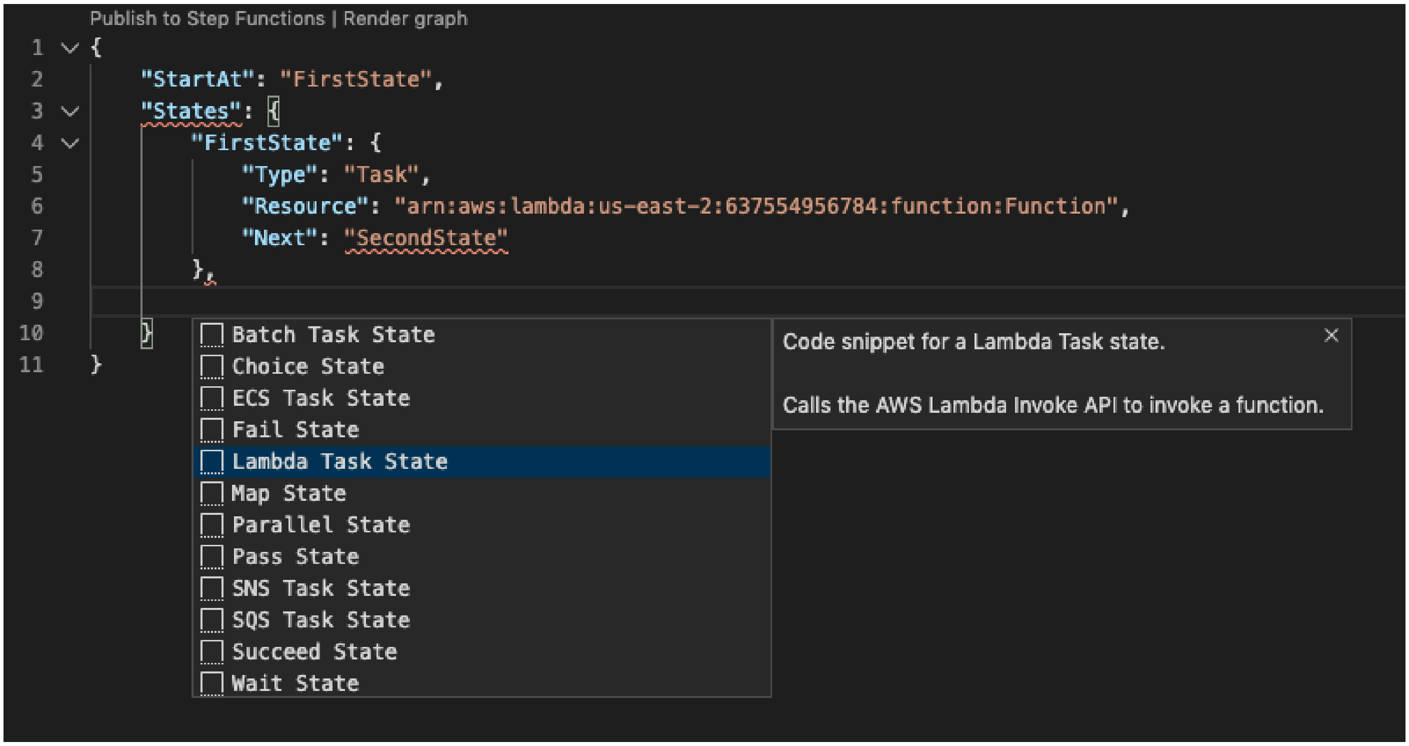
Choice-example.asl.json
Users >example> Desktop > Choice-example.asl.json > ...
Publish to Step Functions | Render graph
Graph: Choice-example.asl.json
Start
FirstState
ChoiceState
FirstMatchState
SecondMatchState
DefaultState
NextState
End
Previewing ASL document. View
Ln 2, Col 81
Spaces: 4
UTF-8
LF
Amazon States Language
AWS Credentials: profile:default

```
{
    "Comment": "An example of the Amazon States Language using a choice
    state.",
    "StartAt": "FirstState",
    "States": {
        "FirstState": {
            "Type": "Task",
            "Resource":
            "arn:aws:lambda:us-east-2:637554956784:function:Function",
            "Next": "ChoiceState"
        },
        "ChoiceState": {
            "Type": "Choice",
            "Choices": [
                {
                    "Variable": "$.foo",
                    "NumericEquals": 1,
                    "Next": "FirstMatchState"
                },
                {
                    "Variable": "$.foo",
                    "NumericEquals": 2,
                    "Next": "SecondMatchState"
                }
            ],
            "Default": "DefaultState"
        },
        "FirstMatchState": {
            "Type": "Task",
            "Resource":
            "arn:aws:lambda:us-east-2:637554956784:function:Function",
            "Next": "NextState"
        },
        "SecondMatchState": {
            "Type": "Task",
            "Resource":
```

Code snippets

Code snippets let you insert short sections of code. To use code snippets:

1. Open a file and save it with the extension `.asl.json` for JSON format, or `.asl.yaml` for YAML format.
2. Create a new state machine with the **States** property.
3. Place the cursor within **States**.
4. Use the key combination `Control + Space`, and select your preferred code snippet.
5. Use `Tab` to traverse the variable and parameters in the code snippet.
6. Test **Retry** and **Catch** snippets by placing the cursor within the related state.



```
{
    "StartAt": "FirstState",
    "States": {
        "FirstState": {
            "Type": "Task",
            "Resource": "arn:aws:lambda:us-east-2:637554956784:function:Function",
            "Next": "SecondState"
        },

    }
}
```

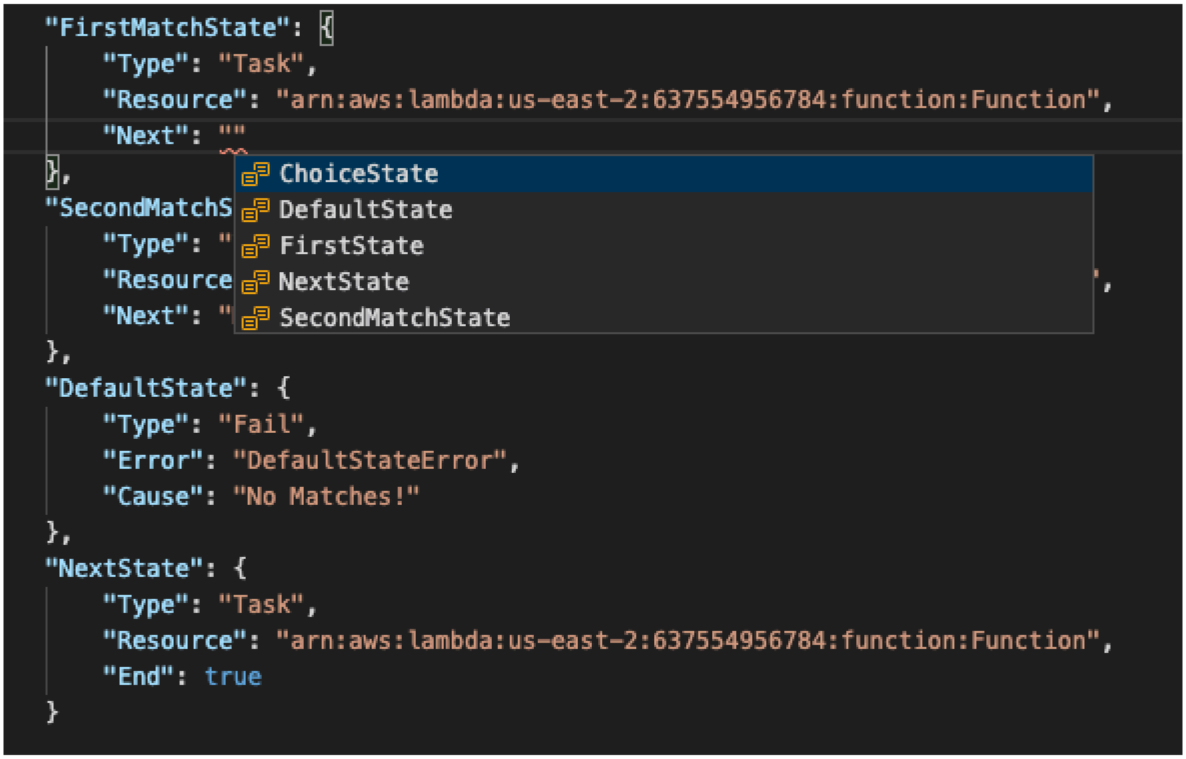
Code snippet for a Lambda Task state.

Calls the AWS Lambda Invoke API to invoke a function.

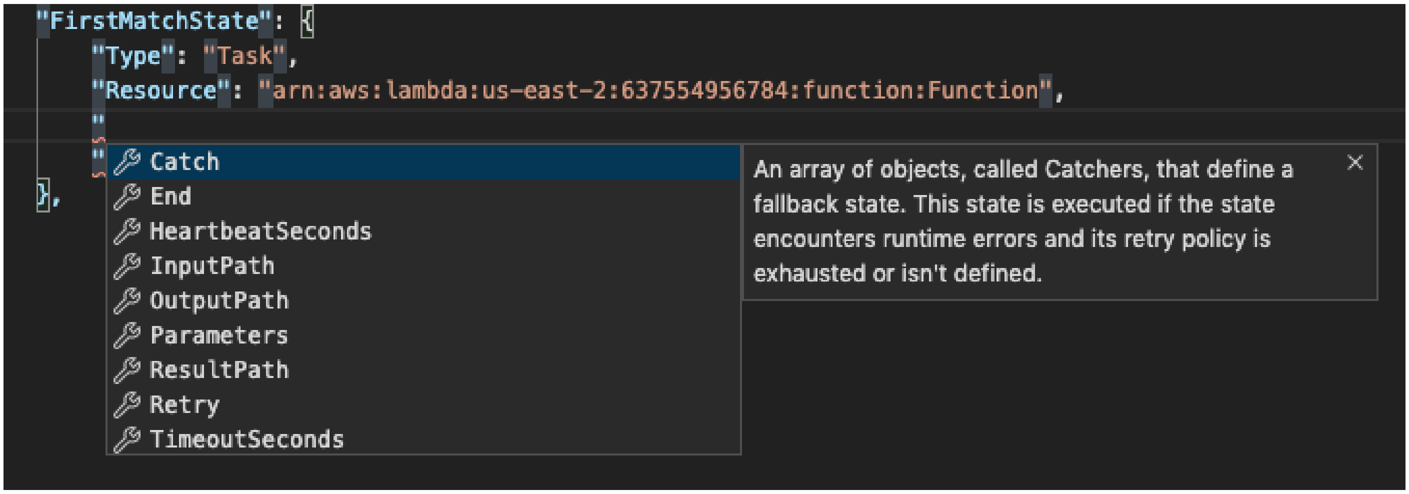
Code completion and validation

To see how code completion works:

1. Create several states.
2. Place the cursor after a **Next**, **StartAt**, or **Default** property.
3. Use the key combination `Control + Space` to list available completions. Additional properties can be accessed using `Control + Space` again, and will be based on the `Type` of the `State`.
4. As you work, code validation will happen for:
   - Missing properties
   - Incorrect values
   - No terminal state
   - Nonexistent states that are pointed to



```
"FirstMatchState": {
    "Type": "Task",
    "Resource": "arn:aws:lambda:us-east-2:637554956784:function:Function",
    "Next": ""
},
"SecondMatchS
    "Type": "
    "Resource                                                          ",
    "Next": "
},
"DefaultState": {
    "Type": "Fail",
    "Error": "DefaultStateError",
    "Cause": "No Matches!"
},
"NextState": {
    "Type": "Task",
    "Resource": "arn:aws:lambda:us-east-2:637554956784:function:Function",
    "End": true
}
```



```
"FirstMatchState": {
    "Type": "Task",
    "Resource": "arn:aws:lambda:us-east-2:637554956784:function:Function",
    ""
},
```

An array of objects, called Catchers, that define a fallback state. This state is executed if the state encounters runtime errors and its retry policy is exhausted or isn't defined.

Working with Threat Composer

You can use the AWS Toolkit for Visual Studio Code to work with the Threat Composer tool. Threat Composer is a threat-modeling tool that can simplify your threat modeling process.

For detailed information about the Threat Composer tool, see the Threat Composer GitHub repository.

The following topics describe how to work with Threat Composer in the AWS Toolkit for Visual Studio Code.

Topics

Working with Threat Composer from the Toolkit

With Threat Composer you can create, view, and edit Threat Composer threat models directly in VS Code. For detailed information about the Threat Composer tool, see the Threat Composer GitHub repository.

The following sections describe how to access Threat Composer tools in the AWS Toolkit for Visual Studio Code.

Accessing Threat Composer from the Toolkit

There are 3 main ways that you can access Threat Composer from the Toolkit.

Accessing Threat Composer through an existing threat model

To open Threat Composer, open an existing threat-model file (extension `.tc.json`) in VS Code. Threat Composer automatically opens and renders a visualization of your threat-model file in the VS Code editor window.

Creating a new Threat Composer threat model

1. From the VS Code main menu, expand **File**, then choose **New File**.
2. From the **New File** dialog, choose **Threat Composer File...**.
3. When prompted, enter a `file name`, then press the **`enter`** key to open Threat Composer and create a visualization of your empty threat-model file in a new VS Code editor window.

Creating a new Threat Composer threat model from the Command Palette

1. From VS Code, open the Command Palette by pressing **`Cmd + Shift + P`** or **`Ctrl + Shift + P`** (Windows).
2. In the search field, enter **`Threat Composer`** and choose **Create New Threat Composer File** when it populates in the results.

3. When prompted, enter a `file name`, then press the **`enter`** key to open Threat Composer and create a visualization of your empty threat-model file in a new VS Code editor window.

Working with resources

In addition to accessing AWS services that are listed by default in the AWS Explorer, you can also go to **Resources** and choose from hundreds of resources to add to the interface. In AWS, a **resource** is an entity you can work with. Some of the resources that can be added include Amazon AppFlow, Amazon Kinesis Data Streams, AWS IAM roles, Amazon VPC, and Amazon CloudFront distributions.

After making your selection, you can go to **Resources** and expand the resource type to list the available resources for that type. For example, if you select the `AWS Toolkit:Lambda::Function` resource type, you can access the resources that define different functions, their properties, and their attributes.

After adding a resource type to **Resources**, you can interact with it and its resources in the following ways:

- View a list of existing resources that are available in the current AWS Region for this resource type.
- View a read-only version of the JSON file that describes a resource.
- Copy the resource identifier for the resource.
- View the AWS documentation that explains the purpose of the resource type and the schema (in JSON and YAML formats) for modelling a resource.
- Create a new resource by editing and saving a JSON-formatted template that conforms to a schema.*
- Update or delete an existing resource.*

⚠ **Important**

*In the current release of the AWS Toolkit for Visual Studio Code the option to create, edit, and delete resources is an *experimental feature*. Because experimental features continue to be tested and updated, they may have usability issues. And experimental features may be removed from the AWS Toolkit for Visual Studio Code without notice.
To allow the use of experimental features for resources, open the **Settings** pane in your VS Code IDE, and expand **Extensions** and choose **AWS Toolkit**.

Under **AWS Toolkit Experiments**, select **jsonResourceModification** to allow you to create, update, and delete resources.
For more information, see Working with experimental features.

IAM permissions for accessing resources

You require specific AWS Identity and Access Management permissions to access the resources associated with AWS services. For example, an IAM entity, such as a user or a role, requires Lambda permissions to access `AWS Toolkit:Lambda::Function` resources.

In addition to permissions for service resources, an IAM entity requires permissions to permit the Toolkit for VS Code to call AWS Cloud Control API operations on its behalf. Cloud Control API operations allow the IAM user or role to access and update the remote resources.

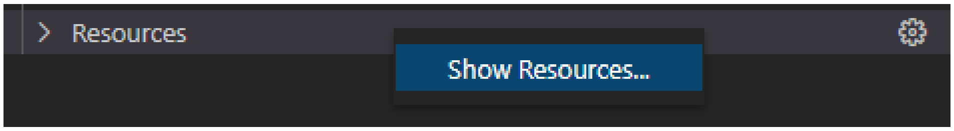
The easiest way to grant permissions is to attach the AWS managed policy, **PowerUserAccess**, to the IAM entity that's calling these API operations using the Toolkit interface. This managed policy grants a range of permissions for performing application development tasks, including calling API operations.

For specific permissions that define allowable API operations on remote resources, see the AWS Cloud Control API User Guide.

Adding and interacting with existing resources

1. In the **AWS Explorer**, right-click **Resources** and choose **Show Resources**.

   A pane displays a list of resource types that are available for selection.

2. In the selection pane, select the resource types to add to the **AWS Explorer** and press **Return** or choose **OK** to confirm.

   The resource types that you selected are listed under **Resources**.

> **Note**
>
> If you've already added a resource type to the **AWS Explorer** and then clear the checkbox for that type, it's no longer listed under **Resources** after you choose **OK**. Only those resource types that are currently selected are visible in the **AWS Explorer**.

3. To view the resources that already exist for a resource type, expand the entry for that type.

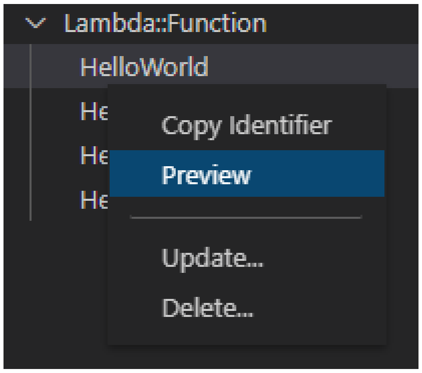
   A list of available resources is displayed under their resource type.

4. To interact with a specific resource, right-click its name and choose one of the following options:

   - **Copy Resource Identifier**: Copy the identifier for the specific resource to the clipboard. (For example, the `AWS Toolkit:DynamoDB::Table` resource can be identified using the `TableName` property.)
   - **Preview**: View a read-only version of the JSON-formatted template that describes the resource.

     After the resource template displays, you can modify it by choosing the **Update** icon at the right of editor tab. To update a resource, you must have the required ??? enabled.
   - **Update**: Edit the JSON-formatted template for the resource in a VS Code editor. For more information, see Creating and editing resources.
   - **Delete**: Delete the resource by confirming the deletion in a dialog box that is displayed. (Deleting resources is currently an ??? in this version of AWS Toolkit for Visual Studio Code.)

   > **Warning**
   >
   > If you delete a resource, any AWS CloudFormation stack that uses that resource will fail to update. To fix this update failure, you need to either recreate the resource or remove the reference to it in the stack's AWS CloudFormation template. For more information, see this Knowledge Center article.



Creating and editing resources

Important

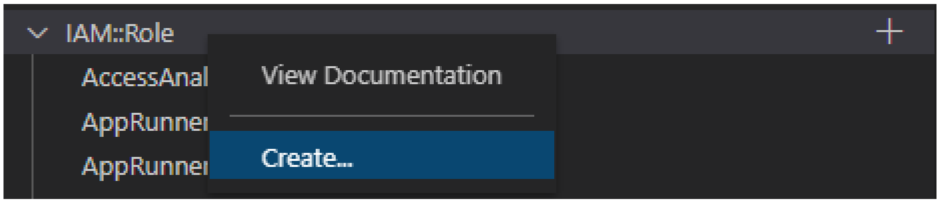
The creation and updating of resources is currently an ??? in this version of the AWS Toolkit for Visual Studio Code.

Creating a new resource involves adding a resource type to the **Resources** list and then editing a JSON-formatted template that defines the resource, its properties, and its attributes.

For example, a resource that belongs to the `AWS Toolkit:SageMaker::UserProfile` resource type is defined with a template that creates a user profile for Amazon SageMaker Studio. The template that defines this user profile resource must conform to the resource type schema for `AWS Toolkit:SageMaker::UserProfile`. If the template doesn't comply with the schema because of missing or incorrect properties, for example, the resource can't be created or updated.

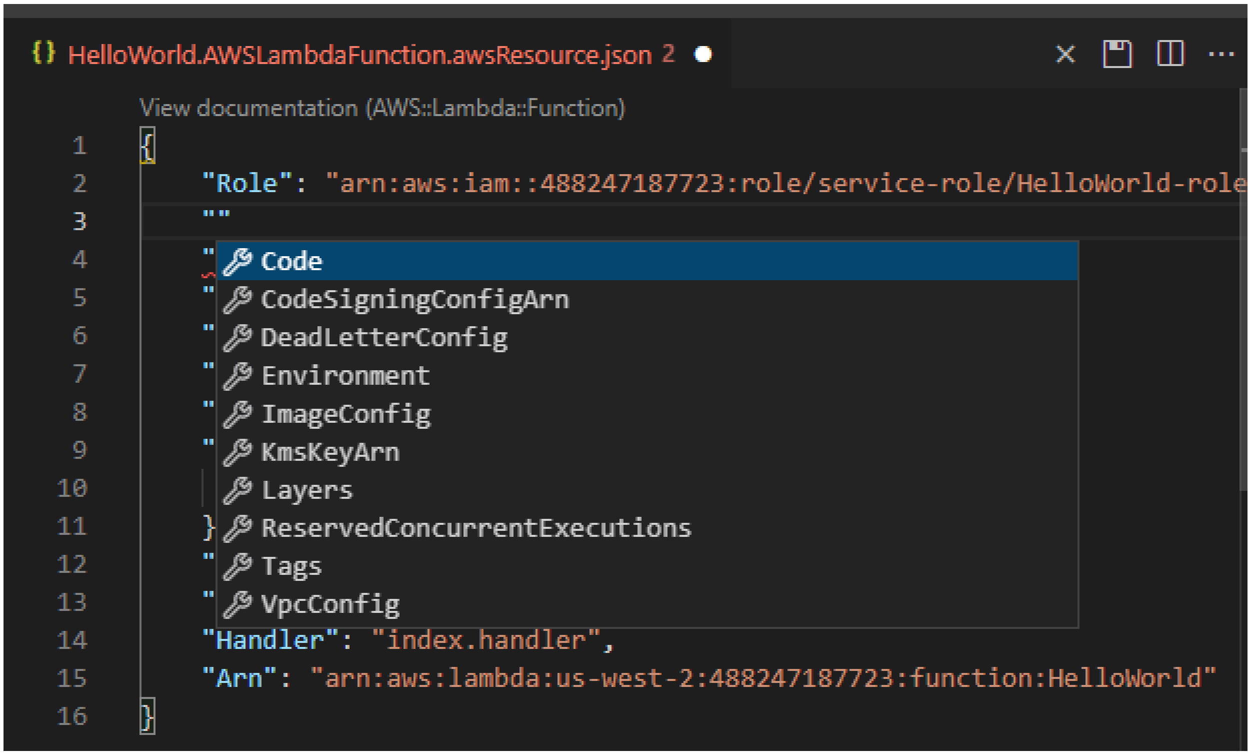
1. Add the resource type for the resource you want to create by right-clicking **Resources** and choosing **Show Resources**.
2. After the resource type is added under **Resources**, choose the plus ("+") icon to open the template file in a new editor.

   Alternatively, you can right-click the resource type's name and choose **Create**. You can also access information about how to model the resource by choosing **View Documentation**.



3. In the editor, start to define properties that make up the resource template. The autocomplete feature suggests property names that conform with your template's schema. When you hover over a property type, a pane displays a description of what it's used for. For detailed information about the schema, choose **View Documentation**.

   Any text that doesn't conform to the resource schema is indicated by a wavy red underline.


HelloWorld.AWSLambdaFunction.awsResource.json 2
View documentation (AWS::Lambda::Function)
Code
CodeSigningConfigArn
DeadLetterConfig
Environment
ImageConfig
KmsKeyArn
Layers
ReservedConcurrentExecutions
Tags
VpcConfig

```
{
    "Role": "arn:aws:iam::488247187723:role/service-role/HelloWorld-role
    ""
    "
    "
    "
    "
    "
    "

    }
    "
    "
    "Handler": "index.handler",
    "Arn": "arn:aws:lambda:us-west-2:488247187723:function:HelloWorld"
}
```

4. After you finish declaring your resource, choose the **Save** icon to validate your template and save the resource to the remote AWS Cloud.

   If your template defines the resource in accordance with its schema, a message displays to confirm that the resource was created. (If the resource already exists, the message confirms that the resource was updated.)

   After the resource is created, it's added to the list under the resource type heading.

5. If your file contains errors, a message displays to explain that the resource couldn't be created or updated. Choose **View Logs** to identify the template elements that you need to fix.

Security for AWS Toolkit for Visual Studio Code

Topics

- Data protection in AWS Toolkit for Visual Studio Code

Data protection in AWS Toolkit for Visual Studio Code

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

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

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

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

Document history for the AWS Toolkit for Visual Studio Code User Guide

Latest major documentation update: October 14, 2021

The following table describes important changes in each release of the AWS Toolkit for Visual Studio Code. For notification about updates to this documentation, you can subscribe to an RSS feed.

Change	Description	Date
Created userguide: Create a CloudFormation template	Created a new userguide describing how to Create a CloudFormation template using the Toolkit for VS Code	December 17, 2021
Minor UI Update	Updated existing text for "Preview Machine State" to "Render graph" in order to better match the UI.	December 14, 2021
Created user guide for Amazon Elastic Container Service Exec	This is an overview of the Amazon ECS Exec.	December 13, 2021
Created user guide for the AWS IoT Toolkit for VS Code service	This user guide is intended to help you get started using the AWS IoT service for Toolkit for VS Code.	November 22, 2021
Support for experimental features	Added support for turning on experimental features for AWS services.	October 14, 2021
Support for AWS resources	Added support for accessing resource types along with	October 14, 2021

	interface options to create, edit, and delete resources.	
Overview of the Amazon ECR service for AWS Toolkit for Visual Studio Code	Added an overview and walkthrough for the features and functions of the Amazon ECR service that are accessible in VS Code	October 14, 2021
Support for ARM64 environments	You can now run serverless applications in ARM64-bas ed emulated environments as well as in x86_64-based environments.	October 1, 2021
AWS Serverless Application	Added support for running AWS SAM applications on ARM64 platform	September 30, 2021
Format update Node.js section	Per customer feedback, updated formatting for Node.js/ TypeScript.	August 12, 2021
App Runner support	Added support for AWS App Runner to AWS Toolkit for Visual Studio Code.	August 11, 2021
Debugging Go functions	Added support for debugging local Go functions.	May 10, 2021
Debugging Java functions	Added support for debugging local Java functions.	April 22, 2021
YAML support for AWS Step Functions	Added YAML support for AWS Step Functions.	March 4, 2021
Debugging Amazon API Gateway resources	Added support for debugging local Amazon API Gateway resources.	December 1, 2020

Amazon API Gateway	Added support for Amazon API Gateway.	December 1, 2020
AWS Serverless Application	Added support for Lambda container images with serverless applications.	December 1, 2020
AWS Systems Manager support	Added support for Systems Manager Automation documents.	September 30, 2020
CloudWatch Logs	Added support for CloudWatc h Logs.	August 24, 2020
Amazon S3	Added support for Amazon S3.	July 30, 2020
AWS Step Functions support	Added support for AWS Step Functions.	March 31, 2020
Security Content	Added security content.	February 6, 2020
Working with Amazon EventBridge Schemas	Added support for Amazon EventBridge Schemas	December 1, 2019
AWS CDK	Preview release of the AWS CDK service.	November 25, 2019
Using an external credential process	Added information about using an external credentia l process to obtain AWS credentials.	September 25, 2019
Using IntelliSense for task-definition files	IntelliSense support was added for working with Amazon ECS task Definition files.	September 24, 2019

User Guide for the AWS Toolkit for Visual Studio Code	Release for general availability.	July 11, 2019
User Guide for the AWS Toolkit for Visual Studio Code	Updated the document structure for clarity and ease of use.	July 3, 2019
Installing the AWS Toolkit for Visual Studio Code	Added information about installing language SDKs to support various toolchains.	June 12, 2019
Configure your toolchain	Added information about configuring various toolchains.	June 12, 2019
Initial Release	Initial release of the user guide for AWS Toolkit for Visual Studio Code.	March 28, 2019