AWS CodePipeline

User Guide

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AWS CodePipeline: User Guide

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What Is AWS CodePipeline?

AWS CodePipeline is a continuous delivery service you can use to model, visualize, and automate the steps required to release your software. You can quickly model and configure the different stages of a software release process. AWS CodePipeline automates the steps required to release your software changes continuously. For information about pricing for AWS CodePipeline, see Pricing.

Topics

Video Introduction to AWS CodePipeline

This short video (3:06) describes how AWS CodePipeline builds, tests, and deploys your code every time there is a code change, based on the release process models you define.

Video Introduction to AWS CodePipeline.

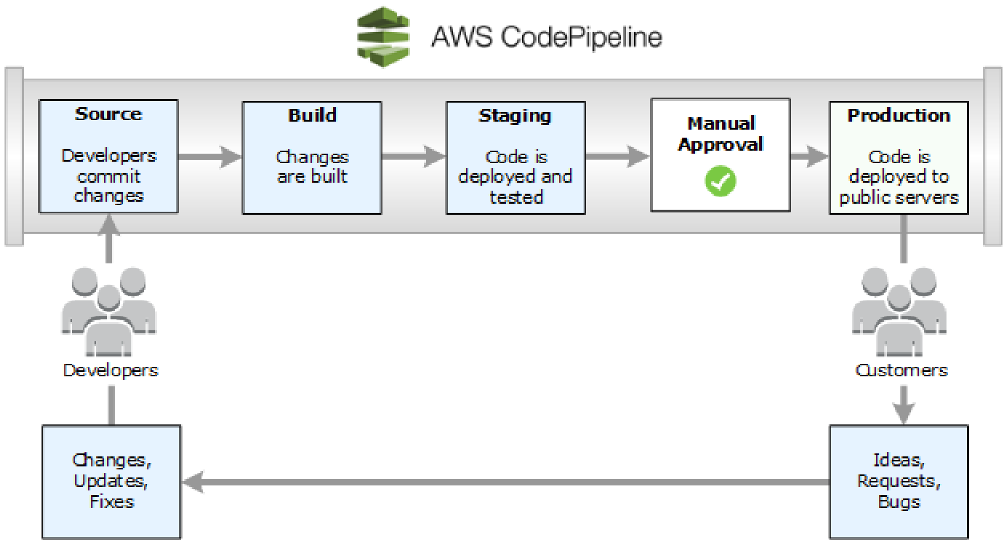
What Can I Do with AWS CodePipeline?

You can use AWS CodePipeline to help you automatically build, test, and deploy your applications in the cloud. Specifically, you can:

- **Automate your release processes**: AWS CodePipeline fully automates your release process from end to end, starting from your source repository through build, test, and deployment. You can prevent changes from moving through a pipeline by including a manual approval action in any stage except a Source stage. You can automatically release when you want, in the way you want, on the systems of your choice, across one instance or multiple instances.
- **Establish a consistent release process**: Define a consistent set of steps for every code change. AWS CodePipeline runs each stage of your release according to your criteria.
- **Speed up delivery while improving quality**: You can automate your release process to allow your developers to test and release code incrementally and speed up the release of new features to your customers.
- **Use your favorite tools**: You can incorporate your existing source, build, and deployment tools into your pipeline. For a full list of AWS services and third-party tools currently supported by AWS CodePipeline, see Product and Service Integrations with AWS CodePipeline (p. 11).
- **View progress at-a-glance**: You can review real-time status of your pipelines, check the details of any alerts, retry failed actions, view details about the source revisions used in the latest pipeline execution in each stage, and manually rerun any pipeline.
- **View pipeline history details**: You can view details about executions of a pipeline, including start and end times, run duration, and execution IDs.

A Quick Look at AWS CodePipeline

The following diagram shows an example release process using AWS CodePipeline.



In this example, when developers commit changes to a source repository, AWS CodePipeline automatically detects the changes. Those changes are built, and if any tests are configured, those tests are run. After the tests are complete, the built code is deployed to staging servers for testing. From the staging server, AWS CodePipeline runs additional tests, such as integration or load tests. Upon the successful completion of those tests, and after a manual approval action that was added to the pipeline is approved, AWS CodePipeline deploys the tested and approved code to production instances.

AWS CodePipeline can deploy applications to Amazon EC2 instances by using AWS CodeDeploy, AWS Elastic Beanstalk, or AWS OpsWorks Stacks. AWS CodePipeline can also deploy container-based applications to services by using Amazon ECS. Developers can also use the integration points provided with AWS CodePipeline to plug in other tools or services, including build services, test providers, or other deployment targets or systems.

A pipeline can be as simple or as complex as your release process requires.

A Quick Look at Input and Output Artifacts

AWS CodePipeline integrates with development tools to automatically check for code changes and then build and deploy through all the stages of the continuous delivery process.

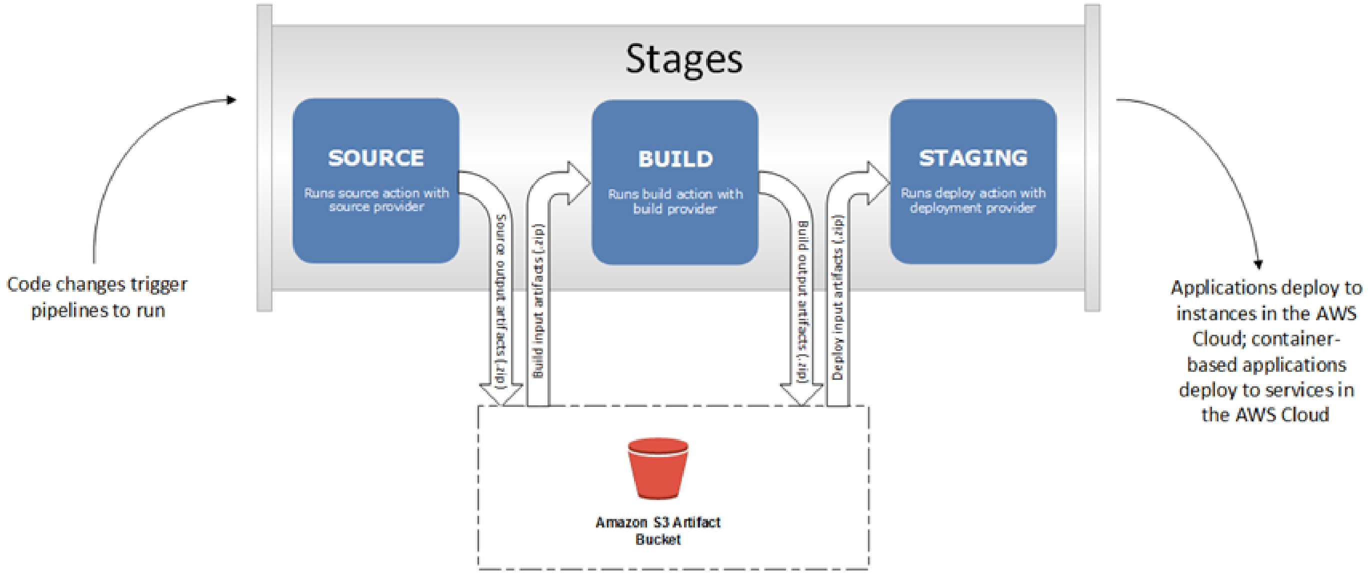
Stages use input and output artifacts that are stored in the Amazon S3 artifact bucket you chose when you created the pipeline. AWS CodePipeline zips and transfers the files for input or output artifacts as appropriate for the action type in the stage. For example, at the start of a build action, AWS CodePipeline retrieves the input artifact (any files to be built) and provides the artifact to the build action. After the action completes, AWS CodePipeline takes the output artifact (the built application) and saves it to the output artifact bucket for use in the next stage.

When you use the **Create Pipeline** wizard to configure or choose stages:

1. AWS CodePipeline automatically triggers your pipeline to run when there is a commit to the source repository, providing the output artifact from the **Source** stage.
2. The output artifact from the previous step is ingested as an input artifact to the **Build** stage. An output artifact from the **Build** stage can be an updated application or an updated Docker image built to a container.

3. The output artifact from the previous step is ingested as an input artifact to the **Deploy** stage, such as staging or production environments in the AWS Cloud. You can deploy applications to a deployment fleet, or you can deploy container-based applications to tasks running in ECS clusters.

The following diagram shows a high-level artifact workflow between stages in AWS CodePipeline.


Stages
SOURCE
Runs source action with source provider
BUILD
Runs build action with build provider
STAGING
Runs deploy action with deployment provider
Source output artifacts (.zip)
Build input artifacts (.zip)
Build output artifacts (.zip)
Deploy input artifacts (.zip)
Code changes trigger pipelines to run
Applications deploy to instances in the AWS Cloud; container-based applications deploy to services in the AWS Cloud
Amazon S3 Artifact Bucket

How Do I Get Started with AWS CodePipeline?

To get started with AWS CodePipeline:

1. **Learn** how AWS CodePipeline works by reading the AWS CodePipeline Concepts (p. 3) section.
2. **Prepare** to use AWS CodePipeline by following the steps in Getting Started with AWS CodePipeline (p. 9).
3. **Experiment** with AWS CodePipeline by following the steps in the AWS CodePipeline Tutorials (p. 26) tutorials.
4. **Use** AWS CodePipeline for your new or existing projects by following the steps in Create a Pipeline in AWS CodePipeline (p. 67).

We Want to Hear from You

We welcome your feedback. To contact us, visit the AWS CodePipeline Forum.

AWS CodePipeline Concepts

You will find modeling and configuring your automated release process easier if you understand the concepts and terms used in AWS CodePipeline and some of the underlying concepts of release automation. Here are some concepts to know about as you use AWS CodePipeline.

Topics

Continuous Delivery and Integration with AWS CodePipeline

AWS CodePipeline is a *continuous delivery* service that automates the building, testing, and deployment of your software into production.

Continuous delivery is a software development methodology where the release process is automated. Every software change is automatically built, tested, and deployed to production. Before the final push to production, a person, an automated test, or a business rule decides when the final push should occur. Although every successful software change can be immediately released to production with continuous delivery, not all changes need to be released right away.

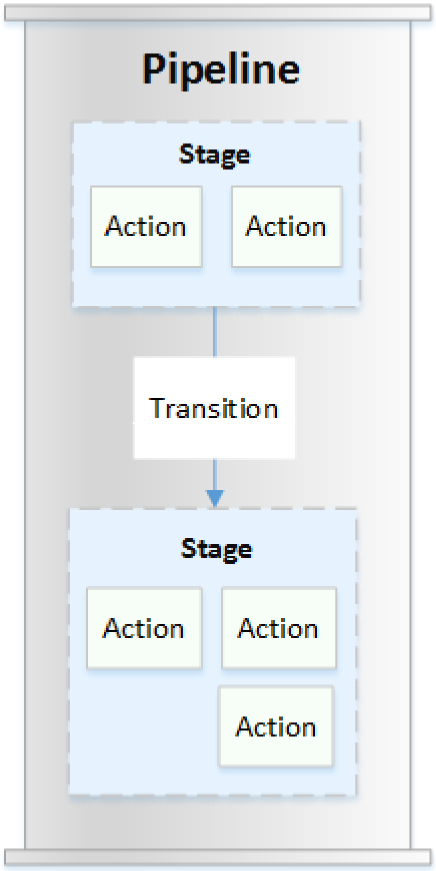
Continuous integration is a software development practice where members of a team use a version control system and frequently integrate their work to the same location, such as a master branch. Each change is built and verified to detect integration errors as quickly as possible. Continuous integration is focused on automatically building and testing code, as compared to *continuous delivery*, which automates the entire software release process up to production.

For more information, see Practicing Continuous Integration and Continuous Delivery on AWS: Accelerating Software Delivery with DevOps.

How AWS CodePipeline Works

AWS CodePipeline helps you create and manage your release process workflow with pipelines. A *pipeline* is a workflow construct that describes how software changes go through a release process. You can create as many pipelines as you need within the limits of AWS and AWS CodePipeline, as described in Limits in AWS CodePipeline (p. 207).

The following diagram and accompanying descriptions introduce you to terms unique to AWS CodePipeline and how these concepts relate to each other:



- You can use the AWS CodePipeline console, the AWS Command Line Interface (AWS CLI), the AWS SDKs, or any combination of these to create and manage your pipelines.

  When you use the console to create your first pipeline, AWS CodePipeline creates an Amazon S3 bucket in the same region as the pipeline to store items for all pipelines in that region associated with your account. Every time you use the console to create another pipeline in that region, AWS CodePipeline creates a folder for that pipeline in the bucket. It uses that folder to store artifacts for your pipeline as the automated release process runs. This bucket is named codepipeline-*`region`*-*`1234567EXAMPLE`*, where *`region`* is the AWS region in which you created the pipeline, and *`1234567EXAMPLE`* is a ten-digit random number that ensures the bucket name is unique.

  If you use the AWS CLI to create a pipeline, you can store the artifacts for that pipeline in any Amazon S3 bucket as long as that bucket is in the same AWS region as the pipeline. You might do this if you are concerned about exceeding the limits of Amazon S3 buckets allowed for your account.
- A *revision* is a change made to a source that is configured in a source action for AWS CodePipeline, such as a pushed commit to a GitHub repository or an AWS CodeCommit repository, or an update to a file in a versioned Amazon S3 bucket. Each revision is run separately through the pipeline. Multiple revisions can be processed in the same pipeline, but each stage can process only one revision at a time. Revisions are run through the pipeline as soon as a change is made in the location specified in the source stage of the pipeline.

  Note
  If a pipeline contains multiple source actions, all of them run again, even if a change is detected for one source action only.
- AWS CodePipeline breaks up your workflow into a series of *stages*. For example, there might be a build stage, where code is built and tests are run. There are also deployment stages, where code updates

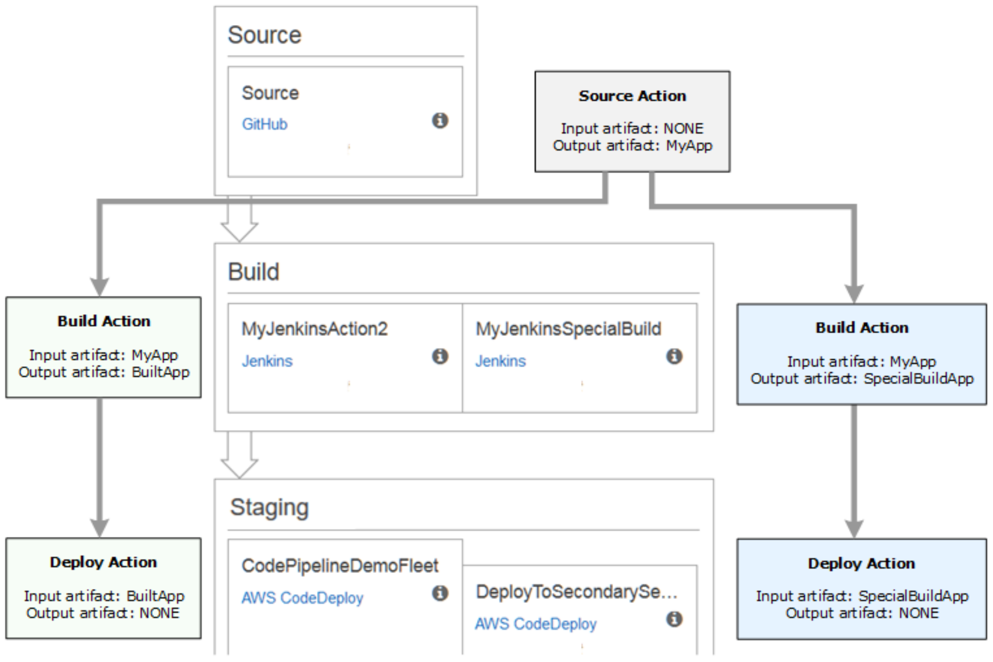
are deployed to runtime environments. You can configure multiple parallel deployments to different environments in the same deployment stage. You can label each stage in the release process for better tracking, control, and reporting (for example "Source," "Build," and "Staging").

Each stage in a pipeline has a unique name, and contains a sequence of actions as part of its workflow. A stage can process only one revision at a time. A revision must run through a stage before the next revision can run through it. All actions configured for a stage must be completed successfully before the stage is considered complete. After a stage is complete, the pipeline transitions the revision and its artifacts created by the actions in that stage to the next stage in the pipeline. You can manually disable and enable these transitions. For more information about stage requirements and structure, see Pipeline and Stage Structure Requirements in AWS CodePipeline (p. 201).

- Every stage contains at least one *action*, which is some kind of task performed on the artifact. Pipeline actions occur in a specified order, in sequence or in parallel, as determined in the configuration of the stage. For example, a deployment stage might contain a deploy action, which deploys code to one or more staging servers. You can configure a stage with a single action to start, and then add actions to that stage if needed. For more information, see Edit a Pipeline in AWS CodePipeline (p. 75) and Action Structure Requirements in AWS CodePipeline (p. 202).

  After a revision starts running through a pipeline, AWS CodePipeline copies files or changes that will be worked on by the actions and stages in the pipeline to the Amazon S3 bucket. These objects are referred to as *artifacts*, and might be the source for an action (*input artifacts*) or the output of an action (*output artifacts*). An artifact can be worked on by more than one action.
- Every action has a type. Depending on the type, the action might have one or both of the following:
  - An input artifact, which is the artifact it consumes or works on over the course of the action run.
  - An output artifact, which is the output of the action.

  Every output artifact in the pipeline must have a unique name. Every input artifact for an action must match the output artifact of an action earlier in the pipeline, whether that action is immediately before the action in a stage or runs in a stage several stages earlier. The following illustration demonstrates how input artifacts and output artifacts are produced and consumed in a pipeline:

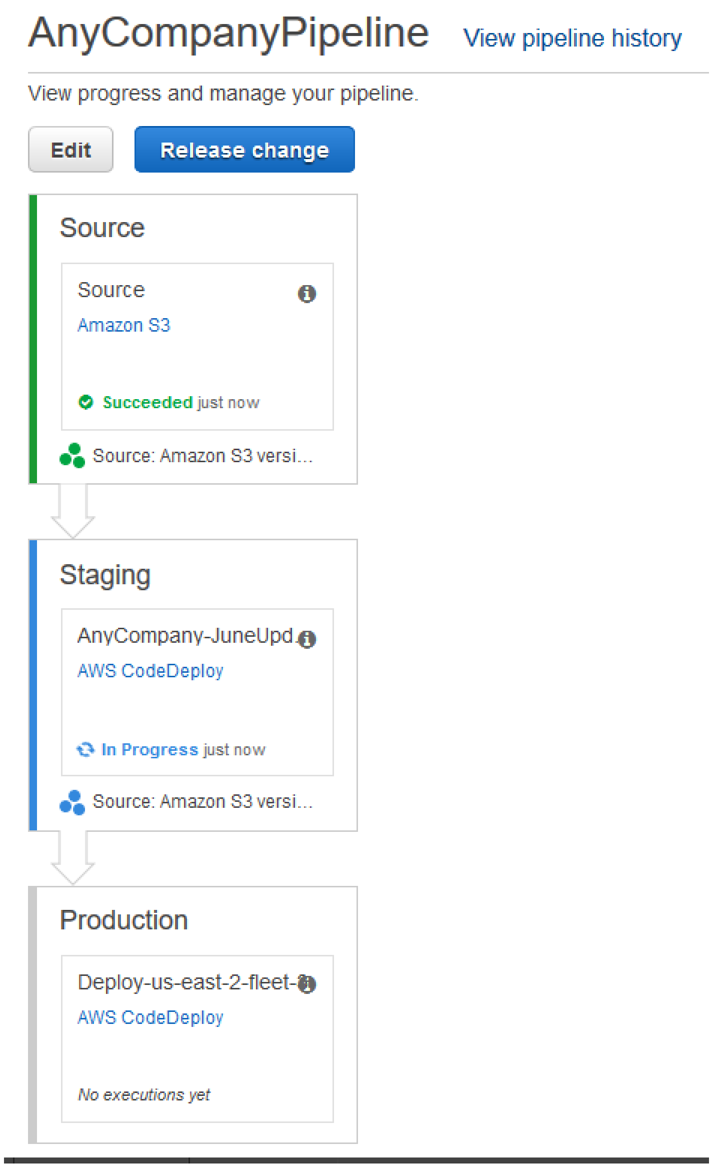


- A *transition* is the act of a revision in a pipeline continuing from one stage to the next in a workflow. In the AWS CodePipeline console, transition arrows connect stages together to show the order in which the stages happen. When a stage is complete, by default the revision will transition to the next stage in the pipeline. You can disable a transition from one stage to the next. When you do, your pipeline will run all actions in the stages before that transition, but will not run any stages or actions after that stage until you enable that transition. This is a simple way to prevent changes from running through the entire pipeline. After you enable the transition, the most recent revision that ran successfully through the previous stages will be run through the stages after that transition. If all transitions are enabled, the pipeline runs *continuously*. Every revision is deployed as part of a successful run through the pipeline (continuous deployment).

- Because only one revision can run through a stage at a time, AWS CodePipeline batches any revisions that have completed the previous stage until the next stage is available. If a more recent revision completes running through the stage, the batched revision is replaced by the most current revision.
- An *approval action* prevents a pipeline from transitioning to the next action until permission is granted (for example, by receiving manual approval from an authorized IAM user). You might use an approval action when you want the pipeline to continue only after a successful code review, for example, or you want to control the time at which a pipeline transitions to a final Production stage. In this case, you can add a manual approval action to a stage just before Production, and approve it yourself when you're ready to release changes to the public.
- A *failure* is an action in a stage that is not completed successfully. If one action fails in a stage, the revision does not transition to the next action in the stage or the next stage in the pipeline. If a failure occurs, no more transitions occur in the pipeline for that revision. AWS CodePipeline pauses the pipeline until one of the following occurs:
  - You manually retry the stage that contains the failed actions.
  - You start the pipeline again for that revision.
  - Another revision is made in a source stage action.
- A pipeline starts automatically when a change is made in the source location (as defined in a source action in a pipeline), or when you manually start the pipeline. You can also set up a rule in Amazon CloudWatch to automatically start a pipeline when events you specify occur. After a pipeline starts, the revision runs through every stage and action in the pipeline. You can view details of the last run of each action in a pipeline on the pipeline view page.

  Note
  If you create or edit a pipeline in the console that has an AWS CodeCommit source repository, AWS CodePipeline uses Amazon CloudWatch Events to detect changes in your repository and start your pipeline when a change occurs.

The following diagram shows two stages in an example pipeline in the AWS CodePipeline console. It includes an action in each stage and the enabled transition between the two stages.


AnyCompanyPipeline
View pipeline history
View progress and manage your pipeline.
Edit
Release change
Source
Source
Amazon S3
Succeeded just now
Source: Amazon S3 versi...
Staging
AnyCompany-JuneUpd
AWS CodeDeploy
In Progress just now
Source: Amazon S3 versi...
Production
Deploy-us-east-2-fleet-
AWS CodeDeploy
No executions yet

Getting Started with AWS CodePipeline

Before you can use AWS CodePipeline for the first time, you must complete the following steps.

Topics

Step 1: Create an AWS Account

Create an AWS account, if you haven't done so already, by going to https://aws.amazon.com/ and choosing **Sign Up**.

Step 2: Create or Use an IAM User

Create an IAM user or use an existing one in your AWS account. Make sure that you have an AWS access key ID and an AWS secret access key associated with that IAM user. For more information, see Creating an IAM User in Your AWS Account.

Step 3: Use an IAM Managed Policy to Assign AWS CodePipeline Permissions to the IAM User

You must give the IAM user permissions to interact with AWS CodePipeline. The quickest way to do this is to apply the **AWSCodePipelineFullAccess** managed policy to the IAM user.

To grant permissions to an IAM user using the AWS Management Console

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.
2. In the IAM console, in the navigation pane, choose **Policies**, and then choose the **AWSCodePipelineFullAccess** managed policy from the list of policies.
3. On the **Policy Details** page, choose the **Attached Entities** tab, and then choose **Attach**.
4. On the **Attach Policy** page, select the check box next to the IAM users or groups, and then choose **Attach Policy**.

   Note
   The **AWSCodePipelineFullAccess** policy provides access to all AWS CodePipeline actions and resources that the IAM user has access to, as well as all possible actions when creating

stages in a pipeline, such as creating stages that include AWS CodeDeploy, Elastic Beanstalk, or Amazon S3. As a best practice, you should grant individuals only the permissions they need to perform their duties. For more information about how to restrict IAM users to a limited set of AWS CodePipeline actions and resources, see Remove Permissions for Unused AWS Services (p. 183).

Step 4: Install the AWS CLI

To install and configure the AWS CLI

1. On your local machine, download and install the AWS CLI. This will enable you to interact with AWS CodePipeline from the command line. For more information, see Getting Set Up with the AWS Command Line Interface.

   Note
   AWS CodePipeline works only with AWS CLI versions 1.7.38 and later. To determine which version of the AWS CLI that you may have installed, run the command `aws --version`. To upgrade an older version of the AWS CLI to the latest version, follow the instructions in Uninstalling the AWS CLI, and then follow the instructions in Installing the AWS Command Line Interface.
2. Configure the AWS CLI with the **configure** command, as follows:

```
aws configure
```

   When prompted, specify the AWS access key and AWS secret access key of the IAM user that you will use with AWS CodePipeline. When prompted for the default region name, specify the region where you will create the pipeline, such as `us-east-2`. When prompted for the default output format, specify `json`. For example:

```
AWS Access Key ID [None]: Type your target AWS access key ID here, and then press Enter
AWS Secret Access Key [None]: Type your target AWS secret access key here, and then
 press Enter
Default region name [None]: Type us-east-2 here, and then press Enter
Default output format [None]: Type json here, and then press Enter
```

   Note
   For more information about IAM, access keys, and secret keys, see Managing Access Keys for IAM Users and How Do I Get Credentials?.
   For more information about the regions and endpoints available for AWS CodePipeline, see Regions and Endpoints.

Step 5: Open the Console for AWS CodePipeline

- Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.

Next Steps

You have completed the prerequisites. You can begin using AWS CodePipeline. To start working with AWS CodePipeline, see the AWS CodePipeline Tutorials (p. 26).

Product and Service Integrations with AWS CodePipeline

By default, AWS CodePipeline is integrated with a number of AWS services and partner products and services. Use the information in the following sections to help you configure AWS CodePipeline to integrate with the products and services you use.

Topics

Integrations with AWS CodePipeline Action Types

The integrations information in this topic is organized by AWS CodePipeline action type.

Topics

Source Action Integrations

The following information is organized by AWS CodePipeline action type and can help you configure AWS CodePipeline to integrate with the products and services you use.

Amazon Simple Storage Service (Amazon S3)	Amazon S3 is storage for the Internet. You can use Amazon S3 to store and retrieve any amount of data at any time, from anywhere on the web. You can configure AWS CodePipeline to use a versioned Amazon S3 bucket as the source stage for your code. You must first create the bucket and then enable versioning on it before you can create a pipeline that uses the bucket as part of a source action within a stage. Learn more: • Step 1: Create an Amazon S3 Bucket for Your Application (p. 27) • Create a Pipeline (CLI) (p. 72)
AWS CodeCommit	AWS CodeCommit is a version control service hosted by AWS that you can use to privately store and manage assets (such as documents, source code, and binary files) in the cloud. You can configure AWS CodePipeline to use a branch in an AWS CodeCommit repository as the source stage for your code. You must first create the repository and associate it with a working directory on your local machine before you can create a pipeline that uses

	the branch as part of a source action within a stage. You can connect to the AWS CodeCommit repository by either creating a new pipeline or editing an existing one. Learn more: • Tutorial: Create a Simple Pipeline (AWS CodeCommit Repository) (p. 40) • AWS for DevOps Getting Started Guide — Learn how to use AWS CodePipeline to continuously deliver and deploy source code in AWS CodeCommit repositories to deployment targets in AWS CodeDeploy, Elastic Beanstalk, and AWS OpsWorks. • AWS CodePipeline uses Amazon CloudWatch Events to detect changes in AWS CodeCommit repositories used as a source for a pipeline. Each source action has a corresponding event rule. This event rule will automatically start your pipeline when a change occurs in the repository. See General Integrations with AWS CodePipeline (p. 18).

GitHub	You can configure AWS CodePipeline to use a GitHub repository as the source stage for your code. You must have previously created a GitHub account and at least one GitHub repository. You can connect to the GitHub repository by either creating a new pipeline or editing an existing one. **Note** AWS CodePipeline integration with GitHub Enterprise is not supported. The first time you add a GitHub repository to a pipeline, you will be asked to authorize AWS CodePipeline access to your repositories. To integrate with GitHub, AWS CodePipeline uses OAuth tokens and requires the GitHub scope `repo`, which is used to read and pull artifacts from public and private repositories into a pipeline. For more information about GitHub scopes, see the GitHub Developer API Reference. **Note** There is a limit to the number of OAuth tokens you can use in GitHub for a particular application, such as AWS CodePipeline. Within a single AWS account, AWS CodePipeline will automatically update existing equivalent OAuth tokens to in an attempt to avoid exceeding this limit. If you exceed this limit as a result of connecting many AWS accounts with the same GitHub user account, you can use personal tokens. For more information, see To configure a pipeline to use a personal access token from GitHub (p. 167). Access for AWS CodePipeline is configured for all repositories to which that GitHub account has access; it cannot currently be configured for individual repositories. You can revoke this access from GitHub by choosing **Settings**, choosing **Applications**, and then, under **Authorized applications**, finding AWS CodePipeline in the list of authorized applications and choosing **Revoke**. Revoking access will immediately prevent AWS CodePipeline from accessing any GitHub repositories previously configured for access with that GitHub account. If you want to limit the access AWS CodePipeline has to specific set of repositories, create a GitHub account, grant that account access to only the repositories you want to integrate with AWS CodePipeline, and then use that account when configuring AWS CodePipeline to use GitHub repositories for source stages in pipelines. Learn more: • Tutorial: Create a Four-Stage Pipeline (p. 53)

Build Action Integrations

AWS CodeBuild	AWS CodeBuild is a fully managed build service in the cloud. AWS CodeBuild compiles your source code, runs unit tests, and produces artifacts that are ready to deploy. You can add AWS CodeBuild as a build action to the build stage of a pipeline. You can use an existing build project or create one in the AWS CodePipeline console. The output of the build project can then be deployed as part of a pipeline.

	Note AWS CodeBuild can also be included in a pipeline as a test action, with or without a build output. Learn more: • What Is AWS CodeBuild? • Add an AWS CodeBuild Build Action to a Pipeline (in Use AWS CodePipeline with AWS CodeBuild to Test Code and Run Builds) • Working with Build Projects in AWS CodeBuild • AWS CodeBuild – Fully Managed Build Service
CloudBees	You can configure AWS CodePipeline to use CloudBees to build or test your code in one or more actions in a pipeline. Learn more: • CloudBees documentation for integrating the CloudBees Jenkins platform with AWS CodePipeline for running your build and test jobs
Jenkins	You can configure AWS CodePipeline to use Jenkins CI to build or test your code in one or more actions in a pipeline. You must have previously created a Jenkins project and installed and configured the AWS CodePipeline Plugin for Jenkins for that project. You can connect to the Jenkins project by either creating a new pipeline or editing an existing one. Access for Jenkins is configured on a per-project basis. You must install the AWS CodePipeline Plugin for Jenkins on every Jenkins instance you want to use with AWS CodePipeline. In addition, you must configure AWS CodePipeline access to the Jenkins project. You should secure your Jenkins project by configuring it to accept HTTPS/SSL connections only. If your Jenkins project is installed on an Amazon EC2 instance, consider providing your AWS credentials by installing the AWS CLI on each instance and configuring an AWS profile on those instances with the IAM user profile and AWS credentials you want to use for connections between AWS CodePipeline and Jenkins, rather than adding them or storing them through the Jenkins web interface. Learn more: • Accessing Jenkins • Tutorial: Create a Four-Stage Pipeline (p. 53)
Solano CI	You can configure AWS CodePipeline to use Solano Labs to build and test your code in one or more actions in a pipeline. Learn more: • Solano Labs documentation for using Solano CI with AWS CodePipeline
TeamCity	You can configure AWS CodePipeline to use TeamCity to build and test your code in one or more actions in a pipeline. Learn more: • TeamCity Plugin for AWS CodePipeline • Building End-to-End Continuous Delivery and Deployment Pipelines in AWS and TeamCity

Test Action Integrations

AWS CodeBuild	AWS CodeBuild is a fully managed build service in the cloud. AWS CodeBuild compiles your source code, runs unit tests, and produces artifacts that are ready to deploy. You can add AWS CodeBuild to a pipeline as a test action to run unit tests against your code, with or without a build output artifact. If you generate an output artifact for the test action, it can be deployed as part of a pipeline. You can use an existing build project or create one in the AWS CodePipeline console. **Note** AWS CodeBuild can also be included in a pipeline as a build action, with a mandatory build output artifact. Learn more: • What Is AWS CodeBuild? • Add an AWS CodeBuild Test Action to a Pipeline (in Use AWS CodePipeline with AWS CodeBuild to Test Code and Run Builds)
Apica	You can configure AWS CodePipeline to use Apica to test your code in one or more actions in a pipeline. Learn more: • Apica documentation for setting up with AWS CodePipeline
BlazeMeter	You can configure AWS CodePipeline to use BlazeMeter to test your code in one or more actions in a pipeline. Learn more: • BlazeMeter documentation for testing with AWS CodePipeline
Ghost Inspector	You can configure AWS CodePipeline to use Ghost Inspector to test your code in one or more actions in a pipeline. Learn more: • Ghost Inspector documentation for service integration with AWS CodePipeline
HPE StormRunner Load	You can configure AWS CodePipeline to use HPE StormRunner Load in one or more actions in a pipeline. Learn more: • HPE StormRunner Load documentation for integrating with AWS CodePipeline
Nouvola	You can configure AWS CodePipeline to use Nouvola to test your code in one or more actions in a pipeline. Learn more: • Nouvola Plugin for AWS CodePipeline

Runscope	You can configure AWS CodePipeline to use Runscope to test your code in one or more actions in a pipeline. Learn more: • Runscope documentation for integrating with AWS CodePipeline

Deploy Action Integrations

AWS CloudFormation	AWS CloudFormation gives developers and systems administrators an easy way to create and manage a collection of related AWS resources, using templates to provision and update those resources. You can use AWS CloudFormation’s sample templates or create your own templates to describe the AWS resources, and any associated dependencies or runtime parameters, required to run your application. The AWS Serverless Application Model (AWS SAM) extends AWS CloudFormation to provide a simplified way to define and deploy serverless applications. AWS SAM supports Amazon API Gateway APIs, AWS Lambda functions, and Amazon DynamoDB tables. You can use AWS CodePipeline with AWS CloudFormation and the AWS Serverless Application Model to continuously deliver your serverless applications. You can add an action to a pipeline that uses AWS CloudFormation as a deployment provider. The unique role of AWS CloudFormation as a deployment provider enables you to take action on AWS CloudFormation stacks and change sets as part of a pipeline execution. AWS CloudFormation can create, update, replace, and delete stacks and change sets when a pipeline runs. As a result, AWS and custom resources can be created, provisioned, updated, or terminated automatically during a pipeline execution according to the specifications you provide in AWS CloudFormation templates and parameter definitions. Learn more: • Continuous Delivery with AWS CodePipeline — Learn how to use AWS CodePipeline to build a continuous delivery workflow for AWS CloudFormation. • Automating Deployment of Lambda-based Applications – Learn how to use the AWS Serverless Application Model and AWS CloudFormation to build a continuous delivery workflow for your Lambda-based application.
AWS CodeDeploy	AWS CodeDeploy coordinates application deployments to Amazon EC2 instances, on-premise instances, or both. You can configure AWS CodePipeline to use AWS CodeDeploy to deploy your code. You can create the AWS CodeDeploy application, deployment, and deployment group to use in a deploy action within a stage either before you create the pipeline or when you use the **Create Pipeline** wizard. Learn more: • Step 2: Create AWS CodeDeploy Resources to Deploy the Sample Application (p. 28) • Explore Continuous Delivery in AWS with the Pipeline Starter Kit

Amazon Elastic Container Service	Amazon ECS is a highly scalable, high performance container management service that allows you to run container-based applications in the AWS Cloud. When you create a pipeline, you can select Amazon ECS as a deployment provider. A change to code in your source control repository triggers your pipeline to build a new Docker image, push it to your container registry, and then deploy the updated image to Amazon ECS. Learn more: • What is Amazon ECS? • Tutorial: Continuous Deployment with AWS CodePipeline • Create a Pipeline in AWS CodePipeline (p. 67)
AWS Elastic Beanstalk	Elastic Beanstalk is an easy-to-use service for deploying and scaling web applications and services developed with Java, .NET, PHP, Node.js, Python, Ruby, Go, and Docker on familiar servers such as Apache, Nginx, Passenger, and IIS. You can configure AWS CodePipeline to use Elastic Beanstalk to deploy your code. You can create the Elastic Beanstalk application and environment to use in a deploy action within a stage either before you create the pipeline or when you use the **Create Pipeline** wizard. Learn more: • Elastic Beanstalk Walkthrough • Create a Pipeline in AWS CodePipeline (p. 67)
AWS OpsWorks Stacks	AWS OpsWorks is a configuration management service that helps you configure and operate applications of all shapes and sizes using Chef. Using AWS OpsWorks Stacks, you can define the application's architecture and the specification of each component including package installation, software configuration and resources such as storage. You can configure AWS CodePipeline to use AWS OpsWorks Stacks to deploy your code in conjunction with custom Chef cookbooks and applications in AWS OpsWorks. • **Custom Chef Cookbooks** – AWS OpsWorks uses Chef Cookbooks to handle tasks such as installing and configuring packages and deploying applications. • **Applications** – An AWS OpsWorks applications consists of code that you want to run on an application server. The application code is stored in a repository, such as an Amazon S3 bucket. You create the AWS OpsWorks stack and layer you want to use before you create the pipeline. You can create the AWS OpsWorks application to use in a deploy action within a stage either before you create the pipeline or when you use the **Create Pipeline** wizard. AWS CodePipeline support for AWS OpsWorks is currently available in the US East (N. Virginia) Region (us-east-1) only. Learn more: • Using AWS CodePipeline with AWS OpsWorks Stacks • Cookbooks and Recipes • AWS OpsWorks Apps

XebiaLabs	You can configure AWS CodePipeline to use XebiaLabs to deploy your code in one or more actions in a pipeline. Learn more: • XebiaLabs documentation for Using XL Deploy with AWS CodePipeline

Approval Action Integrations

Amazon Simple Notification Service	Amazon SNS is a fast, flexible, fully managed push notification service that lets you send individual messages or to fan-out messages to large numbers of recipients. Amazon SNS makes it simple and cost effective to send push notifications to mobile device users, email recipients or even send messages to other distributed services. When you create an manual approval request in AWS CodePipeline, you can optionally publish to a topic in to Amazon SNS so that all IAM users subscribed to it are notified that the Approval action is ready to be approved or rejected. Learn more: • What Is Amazon SNS? • Grant Amazon SNS Permissions to an AWS CodePipeline Service Role (p. 139)

Invoke Action Integrations

AWS Lambda	Lambda lets you run code without provisioning or managing servers. You can configure AWS CodePipeline to use Lambda functions to add flexibility and functionality to your pipelines. You can create the Lambda function to add as an action in a stage either before you create the pipeline or when you use the **Create Pipeline** wizard. Learn more: • Invoke an AWS Lambda Function in a Pipeline in AWS CodePipeline (p. 116)

General Integrations with AWS CodePipeline

The following AWS service integrations are not based on AWS CodePipeline action types.

AWS CloudTrail	CloudTrail captures AWS API calls and related events made by or on behalf of an AWS account and delivers log files to an Amazon S3 bucket that you specify. You can configure CloudTrail to capture API calls from the AWS CodePipeline console, AWS CodePipeline commands from the AWS CLI, and from the AWS CodePipeline API. Learn more:

	• Log AWS CodePipeline API Calls with AWS CloudTrail (p. 160)
Amazon CloudWatch	Amazon CloudWatch monitors your AWS resources. Learn more: • What Is Amazon CloudWatch?
Amazon CloudWatch Events	Amazon CloudWatch Events is a web service that detects changes in your AWS services based on rules that you define and invokes an action in one or more specified AWS services when a change occurs. • **Start a pipeline execution automatically when something changes** — You can configure AWS CodePipeline as a target in rules set up in Amazon CloudWatch Events. This sets up pipelines to start automatically when another service changes. Learn more: • What Is Amazon CloudWatch Events? • How to Start a Pipeline Execution in AWS CodePipeline (p. 65). • Start a Pipeline Automatically Using Amazon CloudWatch Events (p. 82) • **Receive notifications when a pipeline state changes** — You can set up Amazon CloudWatch Events rules to detect and react to changes in execution state for a pipeline, stage, or action. Learn more: • Detect and React to Changes in Pipeline State with Amazon CloudWatch Events (p. 152) • Tutorial: Set Up a CloudWatch Events Rule to Receive Email Notifications for Pipeline State Changes (p. 60)

AWS Key Management Service	AWS KMS is a managed service that makes it easy for you to create and control the encryption keys used to encrypt your data. By default, AWS CodePipeline uses AWS KMS to encrypt artifacts for pipelines stored in Amazon S3 buckets. Learn more:

- There are two ways to configure server side encryption for Amazon S3 artifacts:
  - AWS CodePipeline creates an Amazon S3 artifact bucket and default AWS-managed SSE-KMS encryption keys when you create a pipeline using the Create Pipeline wizard. The master key is encrypted along with object data and managed by AWS.
  - You can create and manage your own customer-managed SSE-KMS keys.

  If you are using the default Amazon S3 key, you cannot change or delete this AWS-managed key. If you are using a customer-managed key in AWS KMS to encrypt or decrypt artifacts in the Amazon S3 bucket, you can change or rotate this key as necessary.

  Amazon S3 supports bucket policies that you can use if you require server-side encryption for all objects that are stored in your bucket. For example, the following bucket policy denies upload object (`s3:PutObject`) permission to everyone if the request does not include the `x-amz-server-side-encryption` header requesting server-side encryption with SSE-KMS.

```
{
    "Version": "2012-10-17",
    "Id": "SSEAndSSLPolicy",
    "Statement": [
        {
            "Sid": "DenyUnEncryptedObjectUploads",
            "Effect": "Deny",
            "Principal": "*",
            "Action": "s3:PutObject",
            "Resource": "arn:aws:s3:::codepipeline-us-
west-2-890506445442/*",
            "Condition": {
                "StringNotEquals": {
                    "s3:x-amz-server-side-encryption":
 "aws:kms"
                }
            }
        },
        {
            "Sid": "DenyInsecureConnections",
            "Effect": "Deny",
```

	(p. 194)

Examples from the Community

The following sections provide links to blog posts, articles, and community-provided examples.

Note
These links are provided for informational purposes only, and should not be considered either a comprehensive list or an endorsement of the content of the examples. AWS is not responsible for the content or accuracy of external content.

Topics

Integration Examples: Blog Posts

- Implementing DevSecOps Using AWS CodePipeline

  Learn how to use a CI/CD pipeline in AWS CodePipeline to automate preventive and detective security controls. This post covers how to use a pipeline to create a simple security group and perform security checks during the source, test, and production stages to improve the security posture of your AWS accounts.

  Published March 2017
- Continuous Deployment to Amazon ECS Using AWS CodePipeline, AWS CodeBuild, Amazon ECR, and AWS CloudFormation

  Learn how to create a continuous deployment pipeline to Amazon Elastic Container Service (Amazon ECS). Applications are delivered as Docker containers using AWS CodePipeline, AWS CodeBuild, Amazon ECR, and AWS CloudFormation.
  - Download a sample AWS CloudFormation template and instructions for using it to create your own continuous deployment pipeline from the ECS Reference Architecture: Continuous Deployment repo on GitHub.

  Published January 2017
- Continuous Deployment for Serverless Applications

  Learn how to use a collection of AWS services to create a continuous deployment pipeline for your serverless applications. You'll use the Serverless Application Model (SAM) to define the application and its resources and AWS CodePipeline to orchestrate your application deployment.
  - View a sample application written in Go with the Gin framework and an API Gateway proxy shim.

  Published December 2016
- Integrating Git with AWS CodePipeline

  Learn how to integrate AWS CodePipeline with Git servers that support webhooks functionality, such as GitHub Enterprise, Bitbucket, and GitLab.

  Published November 2016
- Scaling DevOps Deployments with AWS CodePipeline and Dynatrace

  Learn how use Dynatrace monitoring solutions to scale pipelines in AWS CodePipeline, automatically analyze test executions before code is committed, and maintain optimal lead times.

Published November 2016

- Create a Pipeline for AWS Elastic Beanstalk in AWS CodePipeline Using CloudFormation and CodeCommit

  Learn how to implement continuous delivery in an AWS CodePipeline pipeline for an application in AWS Elastic Beanstalk. All AWS resources are provisioned automatically through the use of an AWS CloudFormation template. This walkthrough also incorporates AWS CodeCommit and AWS Identity and Access Management (IAM).

  Published May 2016

- Automate AWS CodeCommit and AWS CodePipeline in AWS CloudFormation

  Use AWS CloudFormation to automate the provisioning of AWS resources for a continuous delivery pipeline that uses AWS CodeCommit, AWS CodePipeline, AWS CodeDeploy, and AWS Identity and Access Management.

  Published April 2016

- Create a Cross-Account Pipeline in AWS CodePipeline

  Learn how to automate the provisioning of cross-account access to pipelines in AWS CodePipeline by using AWS Identity and Access Management. Includes examples in an AWS CloudFormation template.

  Published March 2016

- Exploring ASP.NET Core Part 2: Continuous Delivery

  Learn how to create a full continuous delivery system for an ASP.NET Core application using AWS CodeDeploy and AWS CodePipeline.

  Published March 2016

- Create a Pipeline Using the AWS CodePipeline Console

  Learn how to use the AWS CodePipeline console to create a two-stage pipeline in a walkthrough based on the AWS CodePipeline Tutorial: Create a Four-Stage Pipeline (p. 53).

  Published March 2016

- Mocking AWS CodePipeline Pipelines with AWS Lambda

  Learn how to invoke a Lambda function that lets you visualize the actions and stages in an AWS CodePipeline software delivery process as you design it, before the pipeline is operational. As you design your pipeline structure, you can use the Lambda function to test whether your pipeline will complete successfully.

  Published February 2016

- Running AWS Lambda Functions in AWS CodePipeline Using AWS CloudFormation

  Learn how to create an AWS CloudFormation stack that provisions all the AWS resources used in the user guide task Invoke an AWS Lambda Function in a Pipeline in AWS CodePipeline (p. 116).

  Published February 2016

- Provisioning Custom AWS CodePipeline Actions in AWS CloudFormation

  Learn how to use AWS CloudFormation to provision custom actions in AWS CodePipeline.

  Published January 2016

- Provisioning AWS CodePipeline with AWS CloudFormation

Learn how to provision a basic continuous delivery pipeline in AWS CodePipeline using AWS CloudFormation.

Published December 2015

- Building Continuous Deployment on AWS with AWS CodePipeline, Jenkins, and Elastic Beanstalk

  Learn how to use GitHub, AWS CodePipeline, Jenkins, and Elastic Beanstalk to create a deployment pipeline for a web application that is updated automatically every time you change your code.

  Published December 2015
- Continuous Delivery for a PHP Application Using AWS CodePipeline, Elastic Beanstalk, and Solano Labs

  Learn how to use Solano CI with AWS CodePipeline to test a PHP application using PHPUnit, and then deploy the application to Elastic Beanstalk.

  Published December 2015
- Performance Testing in Continuous Delivery Using AWS CodePipeline and BlazeMeter

  Learn how to inject automated load tests at the right places in the AWS CodePipeline delivery workflow with BlazeMeter's native AWS CodePipeline integration.

  Published September 2015
- Deploying from AWS CodePipeline to AWS OpsWorks Using a Custom Action and AWS Lambda

  Learn how to configure your pipeline and the AWS Lambda function to deploy to AWS OpsWorks using AWS CodePipeline.

  Published July 2015
- Automated Delivery Acceptance Test Nirvana: Powered by AWS CodePipeline, CloudWatch, and BlazeMeter

  Learn how to use AWS CodePipeline, CloudWatch, and BlazeMeter to create a continuous delivery workflow that reduces time to release and increases test coverage for developers during the release.

  Published July 2015

Integration Examples: Videos

- **Create a Pipeline Using the AWS CodePipeline Console**

  Learn how to use the AWS CodePipeline console to create a pipeline that uses AWS CodeDeploy and Amazon S3.

  Create a Pipeline Using the AWS CodePipeline Console

  Published March 2016

  Duration: 8:53
- **Solano CI and AWS CodePipeline**

  View a demo setup and successful run of AWS CodePipeline using Solano CI.

  Solano CI and AWS CodePipeline

  Published November 2015

Duration: 3:07

- **Apica and AWS CodePipeline Setup Guide**

  Learn how to set up Apica LoadTest with AWS CodePipeline.

  Apica and AWS CodePipeline Setup Guide

  Published July 2015

  Duration: 2:59

AWS CodePipeline Tutorials

After you complete the steps in Getting Started with AWS CodePipeline (p. 9), you can try one of the tutorials in this user guide:

I want to create a pipeline that uses AWS CodeDeploy to deploy a sample application from an Amazon S3 bucket to Amazon EC2 instances running Amazon Linux.	See Tutorial: Create a Simple Pipeline (Amazon S3 Bucket) (p. 26).
I want to create a pipeline that uses AWS CodeDeploy to deploy a sample application from an AWS CodeCommit repository to an Amazon EC2 instance running Amazon Linux.	See Tutorial: Create a Simple Pipeline (AWS CodeCommit Repository) (p. 40).

Note
Tutorial: Create a Four-Stage Pipeline (p. 53) shows how to create a pipeline that gets source code from a GitHub repository, uses Jenkins to build and test the source code, and then uses AWS CodeDeploy to deploy the built and tested source code to Amazon EC2 instances running Amazon Linux or Microsoft Windows Server. Because this tutorial builds on concepts covered in the walkthroughs, we recommend you complete at least one of them first.
If you want to try AWS CodePipeline with AWS CodeDeploy without setting up all the required resources, try the Explore Continuous Delivery in AWS with the Pipeline Starter Kit. The starter kit sets up a complete pipeline that builds and deploys a sample application in just a few steps, using an AWS CloudFormation template to create the pipeline and all of its resources in the US East (N. Virginia) Region.

The following tutorials and walkthroughs in other user guides provide guidance for integrating other AWS services into your pipelines:

- Create a Pipeline that Uses AWS CodeBuild in *AWS CodeBuild User Guide*
- Using AWS CodePipeline with AWS OpsWorks Stacks in *AWS OpsWorks User Guide*
- Continuous Delivery with AWS CodePipeline in *AWS CloudFormation User Guide*
- Elastic Beanstalk Walkthrough in *AWS Elastic Beanstalk Developer Guide*
- AWS for DevOps Getting Started Guide
- Explore Continuous Delivery in AWS with the Pipeline Starter Kit
- Set Up a Continuous Deployment Pipeline Using AWS CodePipeline

Tutorial: Create a Simple Pipeline (Amazon S3 Bucket)

The easiest way to get started with AWS CodePipeline is to use the **Create Pipeline** wizard in the AWS CodePipeline console to create a simple pipeline.

In this walkthrough, you will create a two-stage pipeline that uses a versioned Amazon S3 bucket and AWS CodeDeploy to release a sample application. After you create this simple pipeline, you will add an additional stage and then disable and enable the transition between stages.

> **Important**
> For this tutorial, in addition to completing the steps in Getting Started with AWS CodePipeline (p. 9), you should create an Amazon EC2 instance key pair you will use to connect to the Amazon EC2 instances after they are launched. To create an Amazon EC2 instance key pair, follow the instructions in Creating Your Key Pair Using Amazon EC2.

Not what you're looking for? To create a simple pipeline using an AWS CodeCommit branch as a code repository, see Tutorial: Create a Simple Pipeline (AWS CodeCommit Repository) (p. 40).

Before you begin this walkthrough, you should complete the prerequisites in Getting Started with AWS CodePipeline (p. 9).

Topics

Step 1: Create an Amazon S3 Bucket for Your Application

You can store your source files or applications in any versioned location. For the purposes of this walkthrough, you will create an Amazon S3 bucket for the sample applications and enable versioning on that bucket. After you have enabled versioning, you will copy the sample applications to that bucket. If you want to use an existing Amazon S3 bucket, see Enable Versioning for a Bucket, copy the sample applications to that bucket, and skip ahead to Step 2: Create AWS CodeDeploy Resources to Deploy the Sample Application (p. 28). If you want to use a GitHub repository for your source instead of an Amazon S3 bucket, copy the sample applications to that repository, and skip ahead to Step 2: Create AWS CodeDeploy Resources to Deploy the Sample Application (p. 28).

To create an Amazon S3 bucket

1. Sign in to the AWS Management Console and open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Choose **Create bucket**.
3. In **Bucket name**, type a name for your bucket, such as **`awscodepipeline-demobucket-example-date`**.

   > **Note**
   > Because all bucket names in Amazon S3 must be unique, use one of your own, not the name shown in the example. You can change the example name just by adding the date to it. Make a note of this name because you will use it for the rest of this tutorial.

   In the **Region** drop-down box, choose the region where you will create your pipeline, such as **US West (Oregon)**, and then choose **Next**.
4. Choose **Versioning**, select **Enable versioning**, and then choose **Save**.

   When versioning is enabled, Amazon S3 saves every version of every object in the bucket.
5. Choose **Next**, and modify permissions for the bucket as needed.
6. Choose **Next**, and then choose **Create bucket**.

7. Next, you will download a sample from a GitHub repository and save it into a folder or directory on your local computer.

   Important
   Do not use the **Clone or download** or **Download ZIP** buttons in the GitHub repositories. This creates a nested folder structure that does not work with AWS CodeDeploy.

   a. Open the GitHub repository that hosts the sample.

      - If you want to deploy to Amazon Linux instances using AWS CodeDeploy: https://github.com/awslabs/aws-codepipeline-s3-aws-codedeploy_linux
      - If you want to deploy to Windows Server instances using AWS CodeDeploy: https://github.com/awslabs/AWSCodePipeline-S3-AWSCodeDeploy_Windows

   b. Choose the **dist** folder.
   c. Choose the file name.

      - If you want to deploy to Amazon Linux instances: `aws-codepipeline-s3-aws-codedeploy_linux.zip`
      - If you want to deploy to Windows Server instances: `AWSCodePipeline-S3-AWSCodeDeploy_Windows.zip`

   d. Choose **View Raw**, and then save the sample file to your local computer.
8. In the Amazon S3 console for your bucket, choose **Upload**, and follow the instructions to upload your .zip files into the bucket.

Step 2: Create AWS CodeDeploy Resources to Deploy the Sample Application

You can use Elastic Beanstalk or AWS CodeDeploy to deploy your code for staging or into production. In this walkthrough, you will use the **Sample deployment wizard** in AWS CodeDeploy to create your deployment resources.

To create an AWS CodeDeploy automated deployment

1. Open the AWS CodeDeploy console at https://console.aws.amazon.com/codedeploy in the region where you intend to create your pipeline. For example, if you intend to create your pipeline in US East (Ohio), choose that region in the region selector.

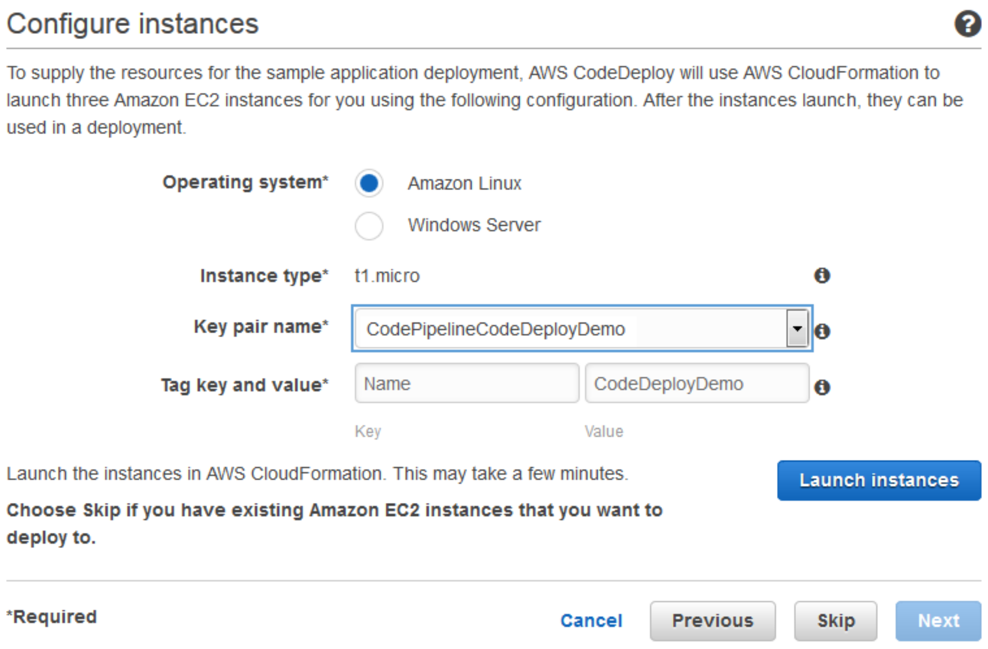
   For more information about the regions and endpoints available for AWS CodePipeline, see Regions and Endpoints.

   If you see the **Applications** page instead of the **Welcome** page, in the **More info** section, choose **Sample deployment wizard**.
2. On the **Get started with AWS CodeDeploy** page, choose **Sample deployment**, and then choose **Next**.
3. On the **Choose a deployment type** page, choose **In-place deployment**, and then choose **Next**.
4. On the **Configure instances** page, do the following:

   1. Choose the operating system and Amazon EC2 instance key pair you want to use. Your choice of operating system should match the sample application you downloaded from GitHub.

      Important
      If you downloaded `aws-codepipeline-s3-aws-codedeploy_linux.zip`, choose Amazon Linux.
      If you downloaded `AWSCodePipeline-S3-AWSCodeDeploy_Windows.zip`, choose Windows Server.

2. From the **Key pair name** drop-down list, choose the name of the Amazon EC2 instance key pair you will use to connect to the Amazon EC2 instances after they are launched.
3. In **Tag key and value**, leave the **Key** name unchanged. In **Value**, type **`CodePipelineDemo`**.
4. Choose **Launch instances**.



Configure instances

To supply the resources for the sample application deployment, AWS CodeDeploy will use AWS CloudFormation to launch three Amazon EC2 instances for you using the following configuration. After the instances launch, they can be used in a deployment.

Operating system*	[✓ Amazon Linux] Windows Server
Instance type*	t1.micro
Key pair name*	CodePipelineCodeDeployDemo
Tag key and value*	Key: Name; Value: CodeDeployDemo

Launch the instances in AWS CloudFormation. This may take a few minutes.

Choose Skip if you have existing Amazon EC2 instances that you want to deploy to.

*Required

For more information about each of these choices, see Step 3: Configure instances in the *AWS CodeDeploy User Guide*.

5. After your instances have been created, choose **Next**.
6. On the **Name your application** page, in **Application name**, type **`CodePipelineDemoApplication`**, and then choose **Next**.
7. On the **Select a revision** page, choose **Next**.
8. On the **Create a deployment group** page, in **Deployment group name**, type **`CodePipelineDemoFleet`**, and then choose **Next**.

   Note
   The instances created for you in **Step 3: Configure instances** are listed in the **Add instances** area.
9. On the **Select a service role** page, from the **Service role** drop-down box, choose **Use an existing service role**. In the **Role name** list, choose the service role you want to use, and then choose **Next**.

   Note
   If no service roles appear in **Role name**, or if you do not have a service role you want to use, choose **Create a service role** or follow the steps in Create a Service Role.
   The service role you create or use for AWS CodeDeploy is different from the service role you will create for AWS CodePipeline.
10. On the **Choose a deployment configuration** page, choose **Next**.
11. On the **Review deployment details** page, choose **Deploy**. The sample application for AWS CodeDeploy is deployed to each of the Amazon EC2 instances.
12. After the sample application is successfully deployed, verify the deployment in your web browser by going to `http://`*`PublicDNS`* for each Amazon EC2 instance in the deployment. To get the public

DNS value for an Amazon EC2 instance, in the Amazon EC2 console, select the instance, and look for the **Public DNS** value on the **Description** tab.

The web page will display links to the AWS CodeDeploy documentation.

> **Note**
> This web page is not the one you will deploy and release with the pipeline you will create in the next section.

For more information about AWS CodeDeploy, see Getting Started with AWS CodeDeploy.

Step 3: Create Your First Pipeline in AWS CodePipeline

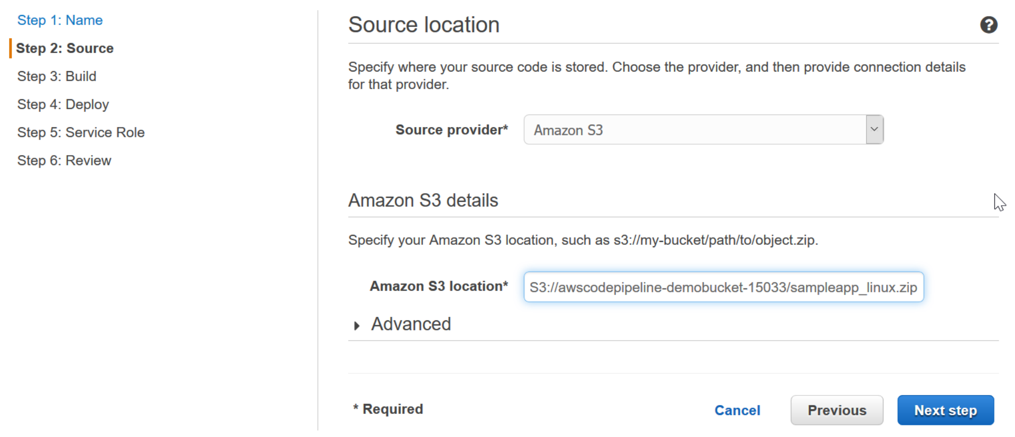
In this part of the walkthrough, you will create the pipeline. The sample will run automatically through the pipeline.

To create an AWS CodePipeline automated release process

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.
2. On the introductory page, choose **Get started**.

   If you see the **Welcome** page, choose **Create pipeline**.
3. In **Step 1: Name**, in **Pipeline name**, type **`MyFirstPipeline`**, and then choose **Next step**.

   > **Note**
   > If you choose another name for your pipeline, be sure to use that name instead of *`MyFirstPipeline`* for the rest of this walkthrough. After you create a pipeline, you cannot change its name. Pipeline names are subject to some limitations. For more information, see Limits in AWS CodePipeline (p. 207).
4. In **Step 2: Source**, in **Source provider**, choose **Amazon S3**. In **Amazon S3 location**, type the name of the Amazon S3 bucket you created in Step 1: Create an Amazon S3 Bucket for Your Application (p. 27) and the sample file you copied to that bucket, either `aws-codepipeline-s3-aws-codedeploy_linux.zip` or `AWSCodePipeline-S3-AWSCodeDeploy_Windows.zip`. Choose **Next step**.



Source location

Specify where your source code is stored. Choose the provider, and then provide connection details for that provider.

Source provider* Amazon S3

Amazon S3 details

Specify your Amazon S3 location, such as s3://my-bucket/path/to/object.zip.

Amazon S3 location* S3://awscodepipeline-demobucket-15033/sampleapp_linux.zip

* Required

For example, if you named your bucket **`awscodepipeline-demobucket-example-date`** and you chose Amazon Linux for your Amazon EC2 instances in AWS CodeDeploy, you would type:

```
s3://awscodepipeline-demobucket-example-date/aws-codepipeline-s3-aws-
codedeploy_linux.zip
```

If you named your bucket **`awscodepipeline-demobucket-example-date`** and you chose Windows for your Amazon EC2 instances in AWS CodeDeploy, you would type:

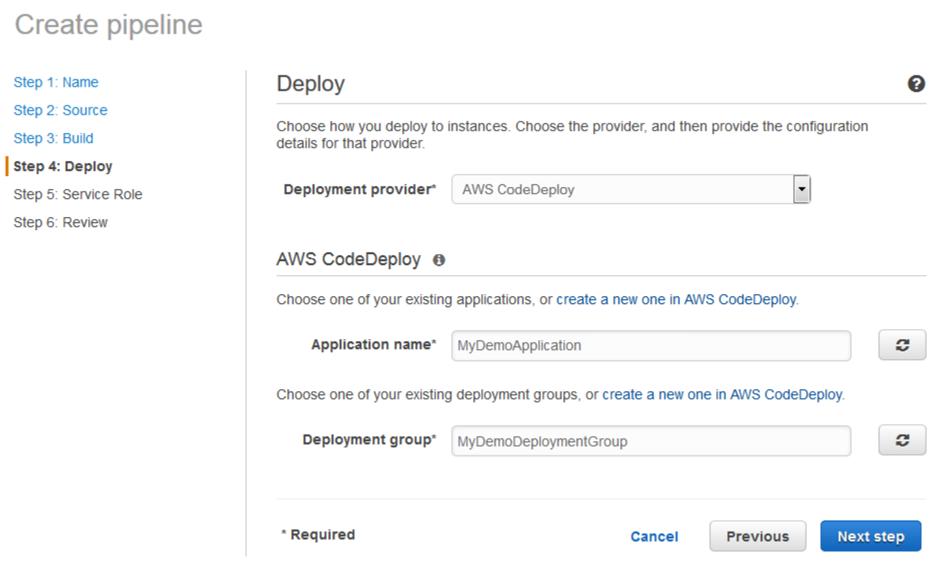
```
s3://awscodepipeline-demobucket-example-date/AWSCodePipeline-S3-
AWSCodeDeploy_Windows.zip
```

Note
If you chose to copy the sample application to a GitHub repository instead of an Amazon S3 bucket, choose **GitHub** from the list of source providers, and then follow the instructions. For more information, see Create a Pipeline (Console) (p. 69).

5. In **Step 3: Build**, choose **No Build**, and then choose **Next step**.

   Note
   Configuring a build requires a build server or system. You can walk through the steps for setting up build resources and creating a pipeline that uses those resources in the next tutorial, Tutorial: Create a Four-Stage Pipeline (p. 53).

6. In **Step 4: Deploy**, in **Deployment provider**, choose **AWS CodeDeploy**. In **Application name**, type **`CodePipelineDemoApplication`**, or choose the **Refresh** button, and then choose the application name from the list. In **Deployment group**, type **`CodePipelineDemoFleet`**, or choose it from the list, and then choose **Next step**.



Choose how you deploy to instances. Choose the provider, and then provide the configuration details for that provider.

Deployment provider*: AWS CodeDeploy

Choose one of your existing applications, or create a new one in AWS CodeDeploy.

Application name*: MyDemoApplication

Choose one of your existing deployment groups, or create a new one in AWS CodeDeploy.

Deployment group*: MyDemoDeploymentGroup

   Note
   The name "Staging" is the name given by default to the stage created in the **Step 4: Deploy** step, just as "Source" is the name given to the first stage of the pipeline.

7. In **Step 5: Service Role**, choose **Create role**.

   On the IAM console page that describes the AWS-CodePipeline-Service role that will be created for you, choose **Allow**.

   On the **Step 5: Service Role** page where AWS-CodePipeline-Service appears in **Role name**, choose **Next step**.

Note
Service role creation is only required the first time you create a pipeline in AWS CodePipeline. If a service role has already been created, you will be able to choose it from the drop-down list of roles. Because the drop-down list will display all IAM service roles associated with your account, if you choose a name different from the default, be sure that the name is recognizable as the service role for AWS CodePipeline.

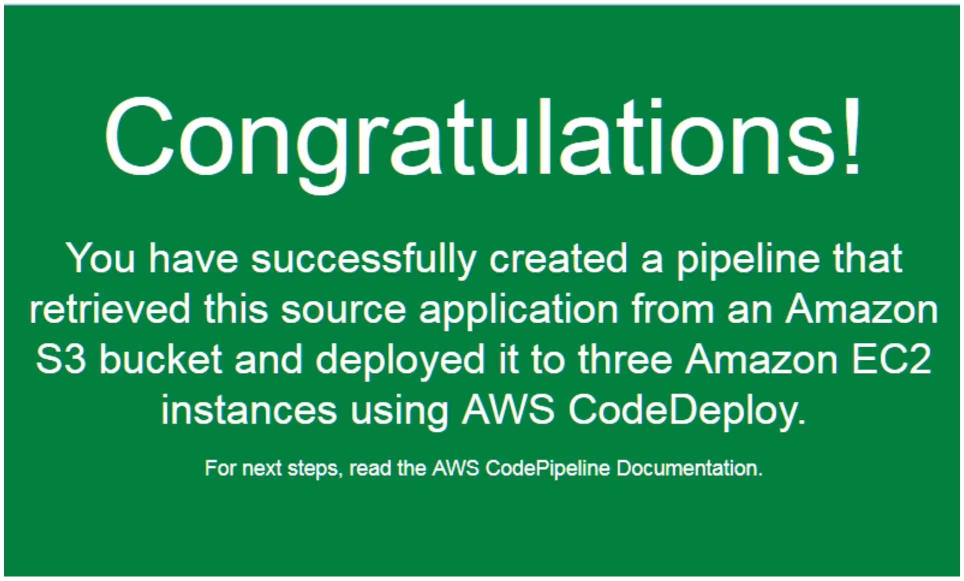
8. In **Step 6: Review**, review the information, and then choose **Create pipeline**.
9. The pipeline automatically starts to run. You can view progress and success and failure messages as the AWS CodePipeline sample deploys a web page to each of the Amazon EC2 instances in the AWS CodeDeploy deployment.

Congratulations! You just created a simple pipeline in AWS CodePipeline. The pipeline has two stages: a source stage named **Source**, which automatically detects changes in the versioned sample application stored in the Amazon S3 bucket and pulls those changes into the pipeline, and a **Staging** stage that deploys those changes to Amazon EC2 instances with AWS CodeDeploy. Now, verify the results.

To verify your pipeline ran successfully

1. View the initial progress of the pipeline. The status of each stage will change from **No executions yet** to **In Progress**, and then to either **Succeeded** or **Failed**. The pipeline should complete the first run within a few minutes.
2. After **Succeeded** is displayed for the action status, in the status area for the **Staging** stage, choose **Details**.
3. In the **Deployment details** section, in **Instance ID**, choose the instance ID of one of the successfully deployed instances.
4. On the **Description** tab, in **Public DNS**, copy the address, and then paste it into the address bar of your web browser.

   The following page is the sample application you uploaded to your Amazon S3 bucket.



Congratulations!

You have successfully created a pipeline that retrieved this source application from an Amazon S3 bucket and deployed it to three Amazon EC2 instances using AWS CodeDeploy.

For next steps, read the AWS CodePipeline Documentation.

For more information about stages, actions, and how pipelines work, see AWS CodePipeline Concepts (p. 3).

Step 4: Add Another Stage to Your Pipeline

Now add another stage in the pipeline to deploy from staging servers to production servers using AWS CodeDeploy. First, you will create another deployment group in the CodePipelineDemoApplication in AWS CodeDeploy. Then you will add a stage that includes an action that uses this deployment group. To add another stage, you will use the AWS CodePipeline console or the AWS CLI to retrieve and manually edit the structure of the pipeline in a JSON file, and then run the **update-pipeline** command to update the pipeline with your changes.

Topics

Create a Second Deployment Group in AWS CodeDeploy

Note
In this part of the walkthrough, you will create a second deployment group, but deploy to the same Amazon EC2 instances as before. This is for demonstration purposes only. It is purposely designed to fail in order to show you how errors are displayed in AWS CodePipeline.

To create a second deployment group in AWS CodeDeploy

1. Open the AWS CodeDeploy console at https://console.aws.amazon.com/codedeploy.
2. Choose **Applications**, and in the list of applications, choose **CodePipelineDemoApplication**.
3. In **Deployment groups**, choose **Create deployment group**.
4. On the **Create deployment group** page, in **Deployment group name**, type a name for the second deployment group, such as **`CodePipelineProductionFleet`**.
5. Choose **In-place deployment**.
6. In **Key**, enter **Name**, but in **Value**, choose **`CodePipelineDemo`** from the list. Leave the default configuration for **Deployment configuration**. In **Service role ARN**, choose the same AWS CodeDeploy service role you used for the initial deployment (not the AWS CodePipeline service role), and then choose **Create deployment group**.

Add the Deployment Group as Another Stage in Your Pipeline

Now that you have another deployment group, you can add a stage that uses this deployment group to deploy to the same Amazon EC2 instances you used earlier. You can use the AWS CodePipeline console or the AWS CLI to add this stage.

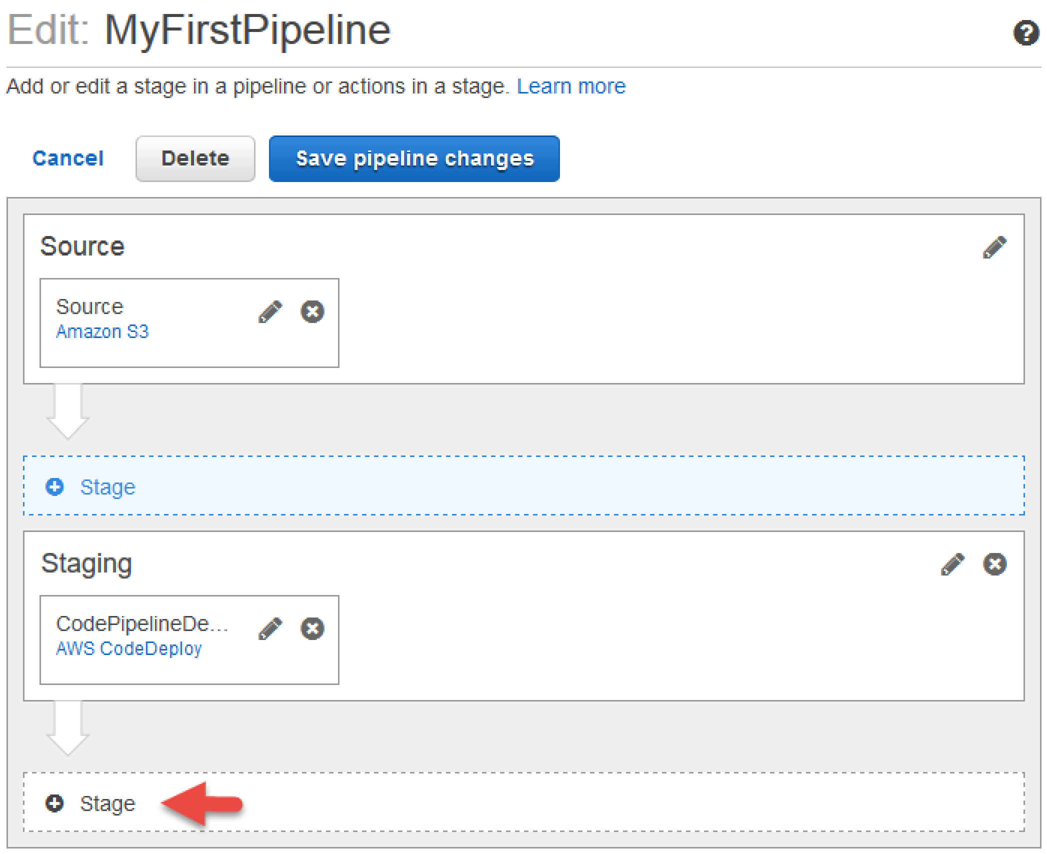
Topics

Create a Third Stage (Console)

You can use the AWS CodePipeline console to add a new stage that uses the new deployment group. Because this deployment group is deploying to the Amazon EC2 instances you've already used, the deploy action in this stage will fail.

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.
2. In **Name**, choose the name of the pipeline you created, MyFirstPipeline.

3. On the pipeline details page, choose **Edit**.
4. On the **Edit** page, choose **+ Stage** to add a stage immediately after the Staging stage.



5. In the name field for the new stage, type **`Production`**, and then choose **+ Action**:

6. In the **Action category** drop-down list, choose **Deploy**.

   In **Action name**, type ***`Deploy-Second-Deployment`***.

   In **Deployment provider**, choose **AWS CodeDeploy** from the drop-down list.

   In the AWS CodeDeploy section, in **Application name**, choose **`CodePipelineDemoApplication`** from the drop-down list, as you did when you created the pipeline. In **Deployment group**, choose the deployment group you just created, **`CodePipelineProductionFleet`**. In the **Input artifacts** section, type **`MyApp`** in **Input artifacts #1**, and then choose **Add action**.

   Note
   The name of the input artifact, **`MyApp`**, was created automatically for you in the **Create pipeline** wizard as the output artifact of the source action. Every action has an input artifact (the artifact the action works on), an output artifact (the product or result of the action), or both, depending on the action type. In this example, the deploy action inputs the output of the source action in the source stage, `MyApp`, and deploys it. Because the action configured for the previous stage (Staging) has already deployed the application to the same Amazon EC2 instances, this action will fail. For more information about input and output artifacts and the structure of pipelines, see AWS CodePipeline Pipeline Structure Reference (p. 201).

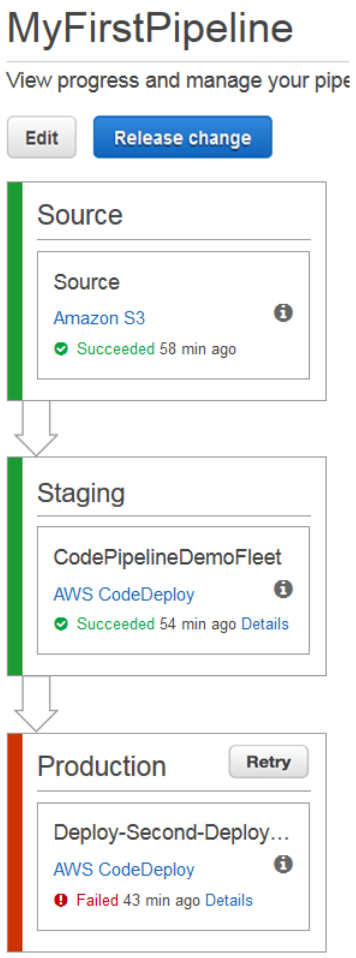
7. On the **Edit** page, choose **Save pipeline changes**. In the **Save pipeline changes** dialog box, choose **Save and continue**.
8. Although the new stage has been added to your pipeline, a status of **No executions yet** is displayed because no changes have triggered another run of the pipeline. You will have to manually rerun the last revision to see how the pipeline runs now that it has been edited. On the pipeline details page, choose **Release change**, and then choose **Release** when prompted. This will run the most recent revision available in each source location specified in a source action through the pipeline.

   Alternatively, to use the AWS CLI to rerun the pipeline, from a terminal on your local Linux, macOS, or Unix machine, or a command prompt on your local Windows machine, run the **start-pipeline-execution** command, specifying the name of the pipeline. This will run the application in your source bucket through the pipeline for a second time.

   ```
   aws codepipeline start-pipeline-execution --name MyFirstPipeline
   ```

   This command returns a `pipelineExecutionId` object.
9. Return to the AWS CodePipeline console and choose **`MyFirstPipeline`** in the list of pipelines to open the view page for that pipeline.

   The pipeline shows three stages and the state of the artifact running through those three stages. It might take up to five minutes for the pipeline to run through all stages. You'll see the deployment succeeds on the first two stages, just as before, but the **Production** stage shows the **Deploy-Second-Deployment** action failed.


MyFirstPipeline
View progress and manage your pipe

Source
Source
Amazon S3
Succeeded 58 min ago
Staging
CodePipelineDemoFleet
AWS CodeDeploy
Succeeded 54 min ago Details
Production

Deploy-Second-Deploy…
AWS CodeDeploy
Failed 43 min ago Details

10. In the **Deploy-Second-Deployment** action, choose **Details**. In the **Action execution failed** dialog box, choose **Link to execution details**. You will be redirected to the details page for the AWS CodeDeploy deployment. In this case, the failure is the result of the first instance group deploying to all of the Amazon EC2 instances, leaving no instances for the second deployment group.

    Note
    This failure is by design, to demonstrate what happens when there is a failure in a pipeline stage.

Create a Third Stage (CLI)

Although using the AWS CLI to add a stage to your pipeline is more complex than using the console, it provides more visibility into the structure of the pipeline.

To create a third stage for your pipeline

1. Open a terminal session on your local Linux, macOS, or Unix machine, or a command prompt on your local Windows machine, and run the **get-pipeline** command to display the structure of the pipeline you just created. For **`MyFirstPipeline`**, you would type the following command:

```
aws codepipeline get-pipeline --name "MyFirstPipeline"
```

   This command returns the structure of MyFirstPipeline. The first part of the output should look similar to the following:

```
{
    "pipeline": {
        "roleArn": "arn:aws:iam::80398EXAMPLE:role/AWS-CodePipeline-Service",
        "stages": [
    ...
```

   The final part of the output includes the pipeline metadata and should look similar to the following:

```
    ...
        ],
        "artifactStore": {
            "type": "S3"
            "location": "codepipeline-us-east-2-250656481468",
        },
        "name": "MyFirstPipeline",
        "version": 4
    },
    "metadata": {
        "pipelineArn": "arn:aws:codepipeline:us-east-2:80398EXAMPLE:MyFirstPipeline",
        "updated": 1501626591.112,
        "created": 1501626591.112
    }
}
```

2. Copy and paste this structure into a plain-text editor, and save the file as **`pipeline.json`**. For convenience, save this file in the same directory where you run the **aws codepipeline** commands.

    Note
    You can pipe the JSON directly into a file with the **get-pipeline** command as follows:

```
aws codepipeline get-pipeline --name MyFirstPipeline >pipeline.json
```

3. Copy the **Staging** stage section and paste it after the first two stages. Because it is a deploy stage, just like the **Staging** stage, you will use it as a template for the third stage.

4. Change the name of the stage and the deployment group details, and then save the file.

   The following example shows the JSON you will add to the pipeline.json file after the **Staging** stage. Edit the emphasized elements with new values. Remember to include a comma to separate the **Staging** and **Production** stage definitions.

```
,
{
    "name": "Production",
     "actions": [
        {
         "inputArtifacts": [
             {
              "name": "MyApp"
             }
           ],
          "name": "Deploy-Second-Deployment",
          "actionTypeId": {
              "category": "Deploy",
              "owner": "AWS",
              "version": "1",
              "provider": "CodeDeploy"
              },
         "outputArtifacts": [],
         "configuration": {
              "ApplicationName": "CodePipelineDemoApplication",
              "DeploymentGroupName": "CodePipelineProductionFleet"
               },
         "runOrder": 1
        }
    ]
}
```

5. Run the **update-pipeline** command, specifying the pipeline JSON file, similar to the following:

   Important
   Be sure to include `file://` before the file name. It is required in this command.

```
aws codepipeline update-pipeline --cli-input-json file://pipeline.json
```

   This command returns the entire structure of the updated pipeline.

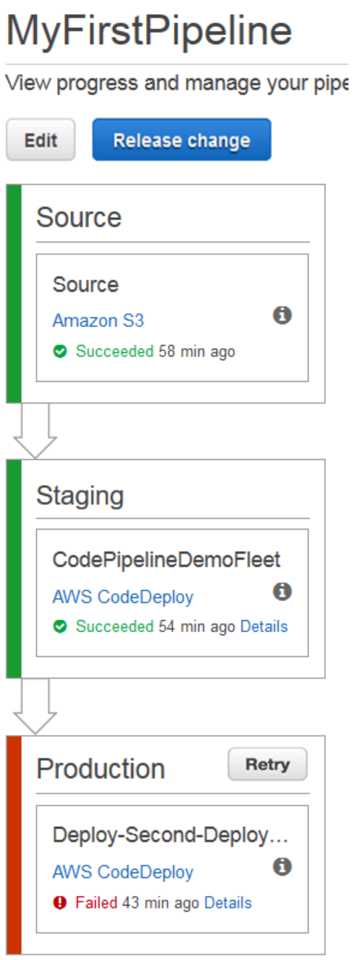
6. Run the **start-pipeline-execution** command, specifying the name of the pipeline. This will run the application in your source bucket through the pipeline for a second time.

```
aws codepipeline start-pipeline-execution --name MyFirstPipeline
```

   This command returns a `pipelineExecutionId` object.

7. Open the AWS CodePipeline console and choose **`MyFirstPipeline`** from the list of pipelines.

   The pipeline shows three stages and the state of the artifact running through those three stages. It might take up to five minutes for the pipeline to run through all stages. Although the deployment succeeds on the first two stages, just as before, the **Production** stage shows that the **Deploy-Second-Deployment** action failed.



8. In the **Deploy-Second-Deployment** action, choose **Details** to see details of the failure. You will be redirected to the details page for the AWS CodeDeploy deployment. In this case, the failure is the result of the first instance group deploying to all of the Amazon EC2 instances, leaving no instances for the second deployment group.

   Note
   This failure is by design, to demonstrate what happens when there is a failure in a pipeline stage.

Step 5: Disable and Enable Transitions Between Stages in AWS CodePipeline

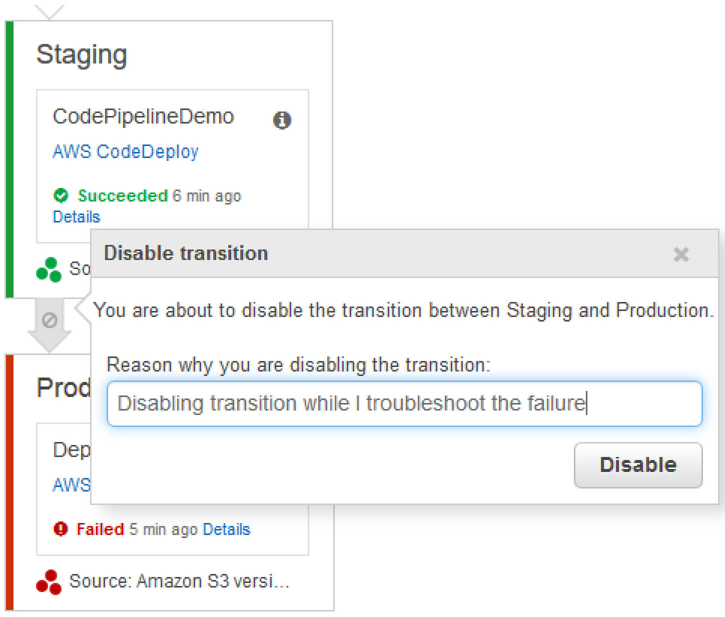
You can enable or disable the transition between stages in a pipeline. Disabling the transition between stages allows you to manually control transitions between one stage and another. For example, you might want to run the first two stages of a pipeline, but disable transitions to the third stage until you are ready to deploy to production, or while you troubleshoot a problem or failure with that stage.

To disable and enable transitions between stages in an AWS CodePipeline pipeline

1. Open the AWS CodePipeline console and choose **`MyFirstPipeline`** from the list of pipelines.

2. On the details page for the pipeline, choose the arrow that indicates the transition between the second stage, **Staging**, and the third stage that you added in the previous section, **Production**.
3. In the **Disable transition** dialog box, type a reason for disabling the transition between the stages, and then choose **Disable**.

   The arrow between stages displays an icon and color change indicating that the transition has been disabled.



Staging

CodePipelineDemo

AWS CodeDeploy

Succeeded 6 min ago

Details

Disable transition

You are about to disable the transition between Staging and Production.

Reason why you are disabling the transition:

Disabling transition while I troubleshoot the failure

Disable

Failed 5 min ago Details

Source: Amazon S3 versi...

4. Upload your sample again to the Amazon S3 bucket. Because the bucket is versioned, this change will automatically start the pipeline. For information, see Upload the sample application (p. 28).
5. Return to the details page for your pipeline and watch the status of the stages. The pipeline view will change to show progress and success on the first two stages, but no changes will occur on the third stage. This process might take a few minutes.
6. Enable the transition by choosing the arrow that indicates the transition has been disabled between the two stages. In the **Enable transition** dialog box, choose **Enable**. The stage will begin running in a few minutes and attempt to process the artifact that has already been run through the first two stages of the pipeline.

   Note
   If you want this third stage to succeed, edit the CodePipelineProductionFleet deployment group before you enable the transition, and specify a different set of Amazon EC2 instances where you will deploy the application. For more information about how to do this, see Change Deployment Group Settings. If you create more Amazon EC2 instances, you may incur additional costs.

Step 6: Clean Up Resources

You can use some of the resources you created in this walkthrough for the tutorial, Tutorial: Create a Four-Stage Pipeline (p. 53). For example, you can reuse the AWS CodeDeploy application and deployment. However, after you complete this and any other tutorials, you should delete the pipeline and the resources it uses, so that you will not be charged for the continued use of those resources. First, delete the pipeline, then the AWS CodeDeploy application and its associated Amazon EC2 instances, and finally, the Amazon S3 bucket.

To clean up the resources used in this tutorial

1. To clean up your AWS CodePipeline resources, follow the instructions in Delete a Pipeline in AWS CodePipeline (p. 95).
2. To clean up your AWS CodeDeploy resources, follow the instructions in Clean Up Deployment Walkthrough Resources.
3. To delete the Amazon S3 bucket, follow the instructions in Deleting or Emptying an Amazon S3 Bucket. If you do not intend to create more pipelines, delete the Amazon S3 bucket created for storing your pipeline artifacts. For more information about this bucket, see AWS CodePipeline Concepts (p. 3).

Tutorial: Create a Simple Pipeline (AWS CodeCommit Repository)

The easiest way to get started with AWS CodePipeline is to use the **Create Pipeline** wizard in the AWS CodePipeline console to create a simple pipeline.

In this tutorial, you will use AWS CodePipeline to deploy code that is maintained in an AWS CodeCommit repository to a single Amazon EC2 instance. You will use AWS CodeDeploy as the deployment service.

Not what you're looking for? To create a simple pipeline using a versioned Amazon S3 bucket as a code repository, see Tutorial: Create a Simple Pipeline (Amazon S3 Bucket) (p. 26).

After you complete this tutorial, you should have enough practice with AWS CodeCommit concepts to use it as a repository in your pipelines.

AWS CodePipeline uses Amazon CloudWatch Events to detect changes in your AWS CodeCommit source repository and branch. Using Amazon CloudWatch Events to automatically start your pipeline when changes occur is the default for this source type. When you create a pipeline in this wizard using the console, the rule is created.

Before you begin, make sure you have completed the following tasks:

- Configure an IAM user
- Install and configure the AWS CLI
- Create your key pair using Amazon EC2

In addition, make sure to complete these service-specific tasks:

- AWS CodeCommit: Install Git and configure credentials
- AWS CodeDeploy: Create an IAM instance profile and an AWS CodeDeploy service role
- AWS CodePipeline: Assign AWS CodePipeline permissions to the IAM user role

Note
If you have already completed the Tutorial: Create a Simple Pipeline (Amazon S3 Bucket) (p. 26) tutorial, but not yet cleaned up its resources, you will need to create different names for many of the resources you used in that tutorial. For example, instead of **`MyFirstPipeline`**, you might name your pipeline **`MySecondPipeline`**.

Topics

Step 1: Create an AWS CodeCommit Repository and Local Repo

To start this tutorial, you will create a repository in AWS CodeCommit. Your pipeline will get source code from this repository when it runs. You will also create a local repository where you maintain and update code before pushing it to the AWS CodeCommit repository.

Important
AWS CodeCommit is currently supported for pipelines in the following regions only:

- US East (Ohio) Region (us-east-2)
- US East (N. Virginia) Region (us-east-1)
- US West (Oregon) Region (us-west-2)
- EU (Ireland) Region (eu-west-1)
- South America (São Paulo) Region (sa-east-1)

Be sure to complete all of the steps in this tutorial with one of these AWS regions selected.

Follow the first two procedures in the Git with AWS CodeCommit Tutorial in the *AWS CodeCommit User Guide*:

- Step 1: Create an AWS CodeCommit Repository
- Step 2: Create a Local Repo

Note
For information about connecting to a local repo you create, see Connect to an AWS CodeCommit Repository.

After you complete these two procedures, return to this page and continue to the next step. Do not continue to the third step in the AWS CodeCommit tutorial. You will complete different steps in this tutorial instead.

Step 2: Add Sample Code to Your AWS CodeCommit Repository

In this step, you will download code for a sample application that was created for an AWS CodeDeploy sample walkthrough, and add it to your AWS CodeCommit repository.

1. Download the following file:
   - SampleApp_Linux.zip.
2. Unzip the files from SampleApp_Linux.zip into the local directory you created in the previous procedure (for example, `/tmp/my-demo-repo` or `c:\temp\my-demo-repo`).

Be sure to place the files directly into your local repository. Do not include a `SampleApp_Linux` folder. On your local Linux, macOS, or Unix machine, for example, your directory and file hierarchy should look like this:

```
/tmp
  |my-demo-repo
    |-- appspec.yml
    |-- index.html
    |-- LICENSE.txt
    `-- scripts
      |-- install_dependencies
      |-- start_server
      `-- stop_server
```

3. Change directories to your local repo:

```
(For Linux, macOS, or Unix) cd /tmp/my-demo-repo
(For Windows) cd c:\temp\my-demo-repo
```

4. Run the following command to stage all of your files at once:

```
git add -A
```

5. Run the following command to commit the files with a commit message:

```
git commit -m "Added sample application files"
```

6. Run the following command to push the files from your local repo to your AWS CodeCommit repository:

```
git push
```

7. The files you downloaded and added to your local repo have now been added to the `master` branch in your AWS CodeCommit `MyDemoRepo` repository and are ready to be included in a pipeline.

Step 3: Create an Amazon EC2 Instance and Install the AWS CodeDeploy Agent

In this step, you will create the Amazon EC2 instance to which you will deploy a sample application. As part of this process, you will install the AWS CodeDeploy agent on the instance. The AWS CodeDeploy agent is a software package that enables an instance to be used in AWS CodeDeploy deployments.

To launch an instance

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. From the console dashboard, choose **Launch Instance**.
3. On the **Step 1: Choose an Amazon Machine Image (AMI)** page, locate the row for the HVM edition of the Amazon Linux AMI, and then choose **Select**. (This AMI is labeled "Free tier eligible" and can be found at the top of the list.)

   Note
   These basic configurations, called *Amazon Machine Images (AMIs)*, serve as templates for your instance. This tutorial can be completed with any of the free tier eligible AMIs. For simplicity, we will use the HVM edition of the Amazon Linux AMI.

4. On the **Step 2: Choose an Instance Type** page, choose the free tier eligible `t2.micro` type as the hardware configuration for your instance, and then choose **Next: Configure Instance Details**.
5. On the **Step 3: Configure Instance Details** page, do the following:

   - In **Number of instances**, enter `1`.
   - In **Auto-assign Public IP**, choose **Enable**.
   - In **IAM role**, choose an IAM role that has been configured for use as an IAM instance profile for use with AWS CodeDeploy. If you do not have an IAM instance profile, choose **Create new IAM role** and follow the instructions in Create an IAM Instance Profile for Your Amazon EC2 Instances.

     Note
     For the purposes of this tutorial, you can use the following unrestricted policy in your IAM instance profile for AWS CodeDeploy. For pipelines you use in your development workflows, you might create a more restrictive bucket policy.

     ```
     {
       "Version": "2012-10-17",
       "Statement": [
         {
           "Action": [
             "s3:Get*",
             "s3:List*"
           ],
           "Effect": "Allow",
           "Resource": "*"
         }
       ]
     }
     ```
6. On the **Step 3: Configure Instance Details** page, expand **Advanced Details**, and in the **User data** field, type the following:

   ```
   #!/bin/bash
   yum -y update
   yum install -y ruby
   yum install -y aws-cli
   cd /home/ec2-user
   aws s3 cp s3://aws-codedeploy-us-east-2/latest/install . --region us-east-2
   chmod +x ./install
   ./install auto
   ```

   This code will install the AWS CodeDeploy agent on your instance as it is created. If you prefer, you can connect to your Linux instance using SSH and install the AWS CodeDeploy agent manually after the instance is created.
7. Leave the rest of the items on the **Step 3: Configure Instance Details** page unchanged. Choose **Next: Add Storage**, leave the **Step 4: Add Storage** page unchanged, and then choose **Next: Add Tags**.
8. On the **Add Tags** page, with **Name** displayed in the **Key** box, type `MyCodePipelineDemo` in the **Value** box, and then choose **Next: Configure Security Group**.

   Important
   The **Key** and **Value** boxes are case-sensitive.
9. On the **Step 6: Configure Security Group** page, do the following:

   - Next to **Assign a security group**, choose **Create a new security group**.
   - In the row for **SSH**, under **Source**, choose **My IP**.
   - Choose **Add Rule**, choose **HTTP**, and then under **Source**, choose **My IP**.
10. Choose **Review and Launch**.

11. On the **Review Instance Launch** page, choose **Launch**, and then do one of the following when prompted for a key pair:

    - If you already have a key pair to use with Amazon EC2 instances, select **Choose an existing key pair**, and then select your key pair.
    - If you have not created a key pair yet, select **Create a new key pair**, enter a name for the key pair, and then choose **Download Key Pair**. This is your only chance to save the private key file. Be sure to download it. Save the private key file in a safe place. You'll need to provide the name of your key pair when you launch an instance; you'll need to provide the corresponding private key each time you connect to the instance. For more information, see Amazon EC2 Key Pairs.

    Warning
    Don't select the **Proceed without a key pair** option. If you launch your instance without a key pair, you can't connect to it if you need to troubleshoot issues with the AWS CodeDeploy agent.

    When you are ready, select the acknowledgement check box, and then choose **Launch Instances**.
12. Choose **View Instances** to close the confirmation page and return to the console.
13. You can view the status of the launch on the **Instances** page. When you launch an instance, its initial state is `pending`. After the instance starts, its state changes to `running`, and it receives a public DNS name. (If the **Public DNS** column is not displayed, choose the **Show/Hide** icon, and then select **Public DNS**.)
14. It can take a few minutes for the instance to be ready for you to connect to it. Check that your instance has passed its status checks. You can view this information in the **Status Checks** column.

If you want to confirm that the AWS CodeDeploy agent is configured correctly, you can connect to your Linux instance using SSH and then verify the AWS CodeDeploy agent is running.

Step 4: Create an Application in AWS CodeDeploy

In AWS CodeDeploy, an *application* is an identifier, in the form of a name, for the code you want to deploy. AWS CodeDeploy uses this name to ensure the correct combination of revision, deployment configuration, and deployment group are referenced during a deployment. You will select the name of the AWS CodeDeploy application you create in this step when you create your pipeline later in this tutorial.

To create an application in AWS CodeDeploy

1. Open the AWS CodeDeploy console at https://console.aws.amazon.com/codedeploy.
2. If the **Applications** page does not appear, on the AWS CodeDeploy menu, choose **Applications**.
3. Choose **Create application**.
4. In the **Application name** box, type `MyDemoApplication`.
5. In the **Deployment group name** box, type `MyDemoDeploymentGroup`.
6. In the **Search by tags** list, select the Amazon EC2 tag type, choose **Name** in the **Key** box, and in the **Value** box, type `MyCodePipelineDemo`.

    Important
    You must choose the same value for the **Name** key here that you assigned to your Amazon EC2 instance when you created it. If you tagged your instance with something other than `MyCodePipelineDemo`, be sure to use it here.
7. In the **Deployment configuration** list, choose `CodeDeployDefault.OneAtaTime`.
8. In the **Service role ARN** box, choose an Amazon Resource Name (ARN) for a service role that trusts AWS CodeDeploy with, at minimum, the trust and permissions described in Create a Service Role for AWS CodeDeploy. To get the service role ARN, see Get the Service Role ARN (Console).

9. Choose **Create application**.

Step 5: Create Your First Pipeline in AWS CodePipeline

You're now ready to create and run your first pipeline.

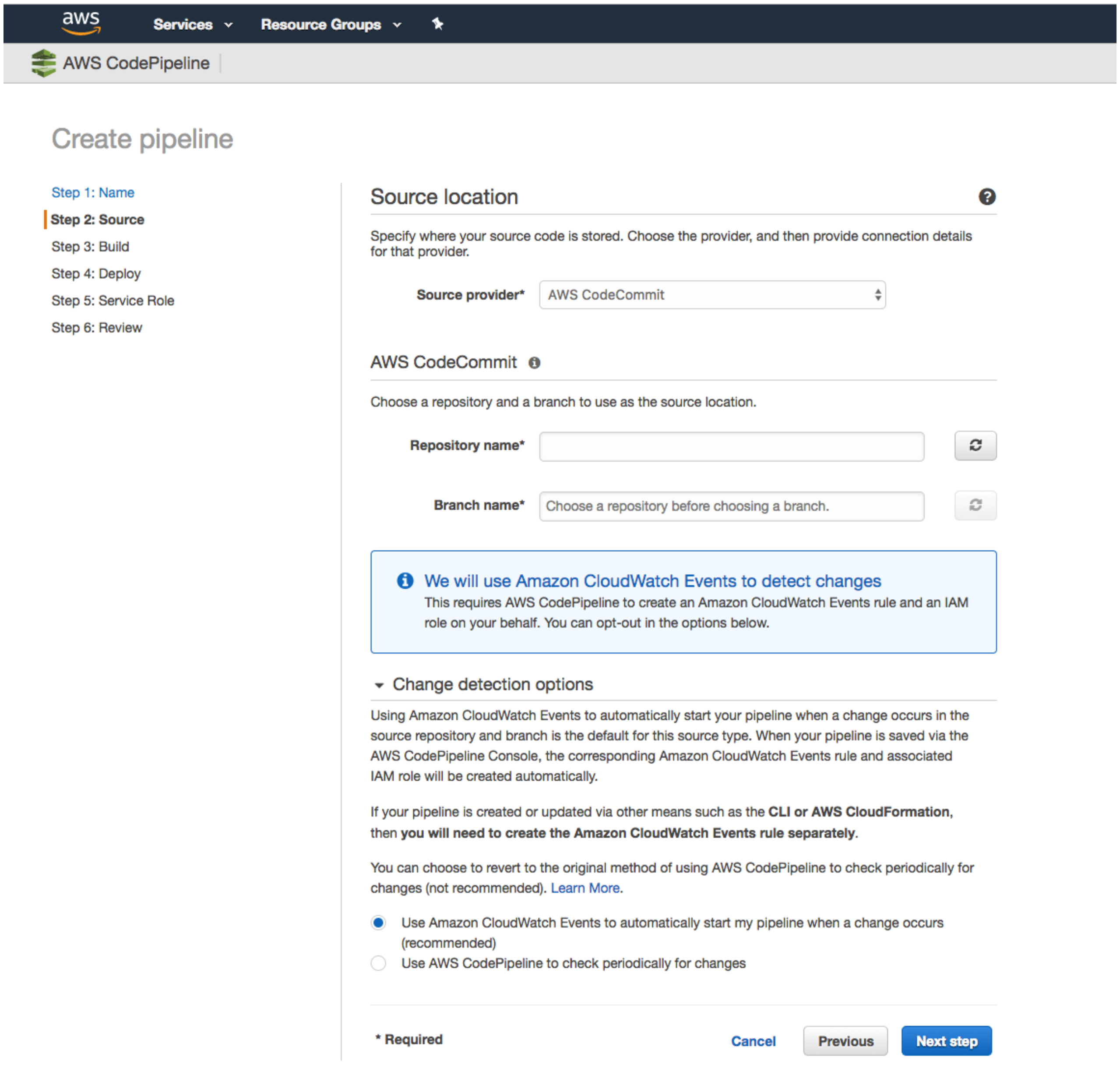
To create an AWS CodePipeline automated release process

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.
2. On the introductory page, choose **Get started**.

   If you see the **All pipelines** page, choose **Create pipeline**.
3. In **Step 1: Name**, in **Pipeline name**, type **`MyFirstPipeline`**, and then choose **Next step**.

   Note
   If you choose another name for your pipeline, be sure to use it instead of *`MyFirstPipeline`* in the remaining steps of this tutorial. After you create a pipeline, you cannot change its name. Pipeline names are subject to some limitations. For more information, see Limits in AWS CodePipeline (p. 207).
4. In **Step 2: Source**, in **Source provider**, choose AWS CodeCommit. In **Repository name**, choose the name of the AWS CodeCommit repository you created in Step 1: Create an AWS CodeCommit Repository and Local Repo (p. 41). In **Branch name**, choose the name of the branch that contains your latest code update. Unless you created a different branch on your own, only `master` will be available.

   Choose **Next step**.



Create pipeline

Step 1: Name
Step 2: Source
Step 3: Build
Step 4: Deploy
Step 5: Service Role
Step 6: Review

Source location

Specify where your source code is stored. Choose the provider, and then provide connection details for that provider.

Source provider* AWS CodeCommit

AWS CodeCommit

Choose a repository and a branch to use as the source location.

Repository name*

Branch name* Choose a repository before choosing a branch.

We will use Amazon CloudWatch Events to detect changes
This requires AWS CodePipeline to create an Amazon CloudWatch Events rule and an IAM role on your behalf. You can opt-out in the options below.

Change detection options

Using Amazon CloudWatch Events to automatically start your pipeline when a change occurs in the source repository and branch is the default for this source type. When your pipeline is saved via the AWS CodePipeline Console, the corresponding Amazon CloudWatch Events rule and associated IAM role will be created automatically.

If your pipeline is created or updated via other means such as the **CLI or AWS CloudFormation**, then **you will need to create the Amazon CloudWatch Events rule separately**.

You can choose to revert to the original method of using AWS CodePipeline to check periodically for changes (not recommended). Learn More.

● Use Amazon CloudWatch Events to automatically start my pipeline when a change occurs (recommended)
○ Use AWS CodePipeline to check periodically for changes

* Required

Cancel Previous Next step

After you select the repository name and branch, you'll see a message showing the Amazon CloudWatch Events rule that will be created for this pipeline.

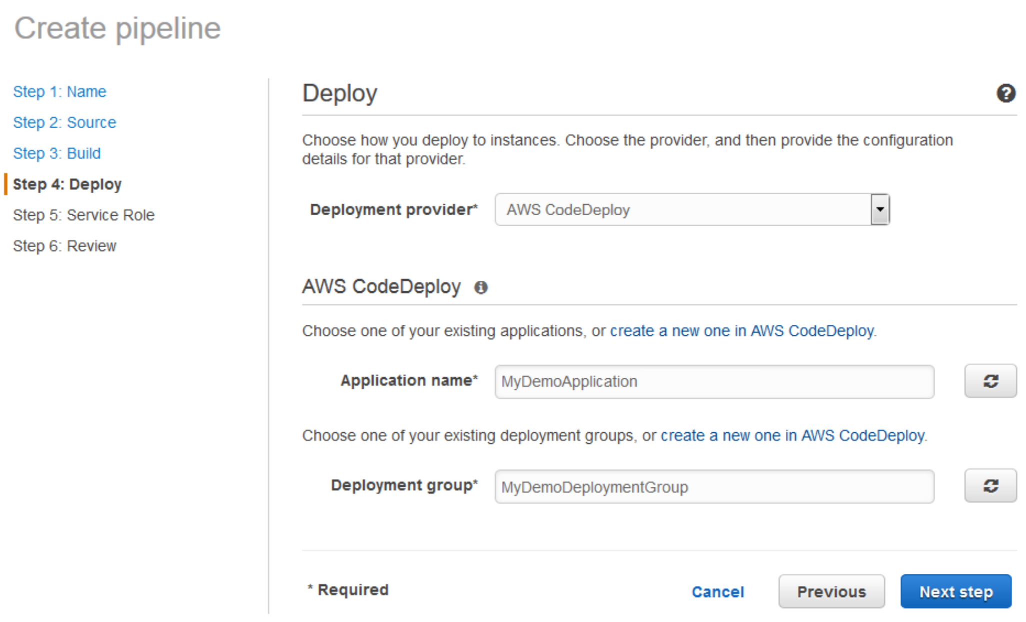
Under **Change detection options**, leave the defaults. This allows AWS CodePipeline to use Amazon CloudWatch Events to detect changes in your source repository.

5. In **Step 3: Build**, choose **No Build**, and then choose **Next step**.

   Note
   In this tutorial, you are deploying code that requires no build service.

6. In **Step 4: Deploy**, in **Deployment provider**, choose **AWS CodeDeploy**. In **Application name**, type **`MyDemoApplication`**, or choose the **Refresh** button, and then choose the application name from

the list. In **Deployment group**, type **`MyDemoDeploymentGroup`**, or choose it from the list, and then choose **Next step**.


Create pipeline

Step 1: Name
Step 2: Source
Step 3: Build
Step 4: Deploy
Step 5: Service Role
Step 6: Review

Deploy

Choose how you deploy to instances. Choose the provider, and then provide the configuration details for that provider.

Deployment provider* AWS CodeDeploy

AWS CodeDeploy

Choose one of your existing applications, or create a new one in AWS CodeDeploy.

Application name* MyDemoApplication

Choose one of your existing deployment groups, or create a new one in AWS CodeDeploy.

Deployment group* MyDemoDeploymentGroup

* Required

Note
The name "Staging" is the name given by default to the stage created in the **Step 4: Deploy** step, just as "Source" is the name given to the first stage of the pipeline.

7. In **Step 5: Service Role**, you will choose the IAM role to give AWS CodePipeline permission to use resources in your account. Service role creation is only required the first time you create a pipeline in AWS CodePipeline.

   If you have not already created a service role for AWS CodePipeline:

   1. Choose **Create role**.
   2. On the IAM console page that describes the AWS-CodePipeline-Service role that will be created for you, choose **Allow**. After you create the role, AWS-CodePipeline-Service will appear in **Role name** on the **Step 5: Service Role** page.
   3. Choose **Next step**.

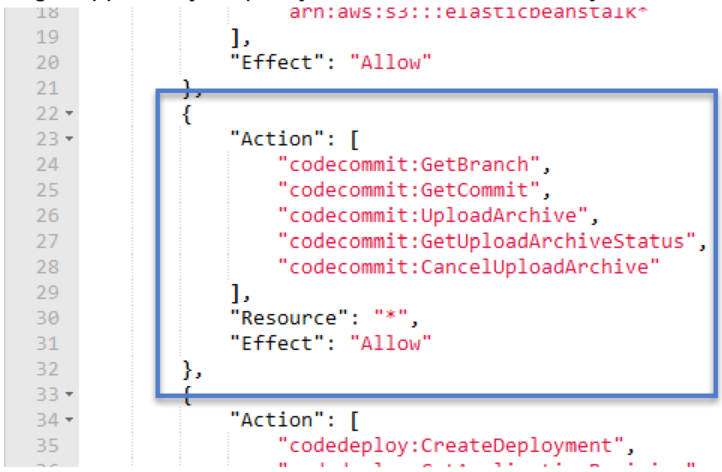
   If you already have a service role for AWS CodePipeline, you must ensure that it includes the permissions needed to work with AWS CodeCommit. If your service role was created after April 18, 2016, it includes the necessary permissions. If it was created on or before April 18, 2016, you may need to follow these steps:

   1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.
   2. In the IAM console, in the navigation pane, choose **Roles**, and then choose your `AWS-CodePipeline-Service` role from the list of roles.
   3. On the **Permissions** tab, in **Inline Policies**, in the row for your service role policy, choose **Edit Policy**.

      Note
      Your service role has a name in a format similar to `oneClick_AWS-CodePipeline-1111222233334`.
   4. In the **Policy Document** box, add the following to your policy statement:

```
{
  "Action": [
      "codecommit:GetBranch",
      "codecommit:GetCommit",
      "codecommit:UploadArchive",
      "codecommit:GetUploadArchiveStatus",
      "codecommit:CancelUploadArchive"
            ],
  "Resource": "*",
  "Effect": "Allow"
},
```

The permissions might appear in your policy document like this after you add them:

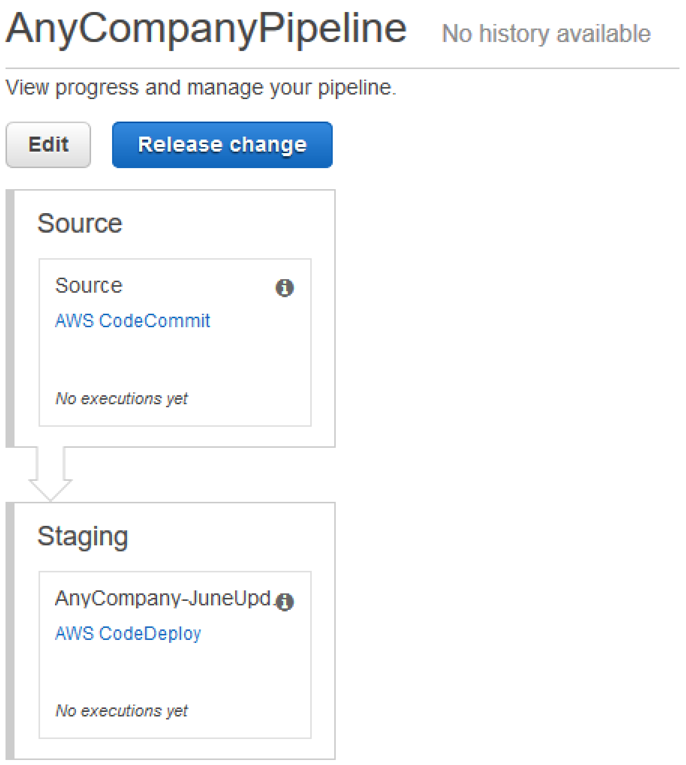


```
                "arn:aws:s3:::elasticbeanstalk*"
            ],
            "Effect": "Allow"
        },
        {
            "Action": [
                "codecommit:GetBranch",
                "codecommit:GetCommit",
                "codecommit:UploadArchive",
                "codecommit:GetUploadArchiveStatus",
                "codecommit:CancelUploadArchive"
            ],
            "Resource": "*",
            "Effect": "Allow"
        },
        {
            "Action": [
                "codedeploy:CreateDeployment",
```

5. Choose **Validate Policy** to ensure the policy contains no errors. When the policy is error-free, choose **Apply Policy**.
6. In the **Step 5: Service Role** page, in **Role name**, choose the name of your service role for AWS CodePipeline.

   Because the drop-down list will display all IAM service roles associated with your account, if you choose a name different from the default, be sure that the name is recognizable as the service role for AWS CodePipeline.
7. Choose **Next step**.

8. In **Step 6: Review**, review the information, and then choose **Create pipeline**.
9. The pipeline automatically starts to run. You can view progress and success and failure messages as the AWS CodePipeline sample deploys the web page to the Amazon EC2 instance in the AWS CodeDeploy deployment.

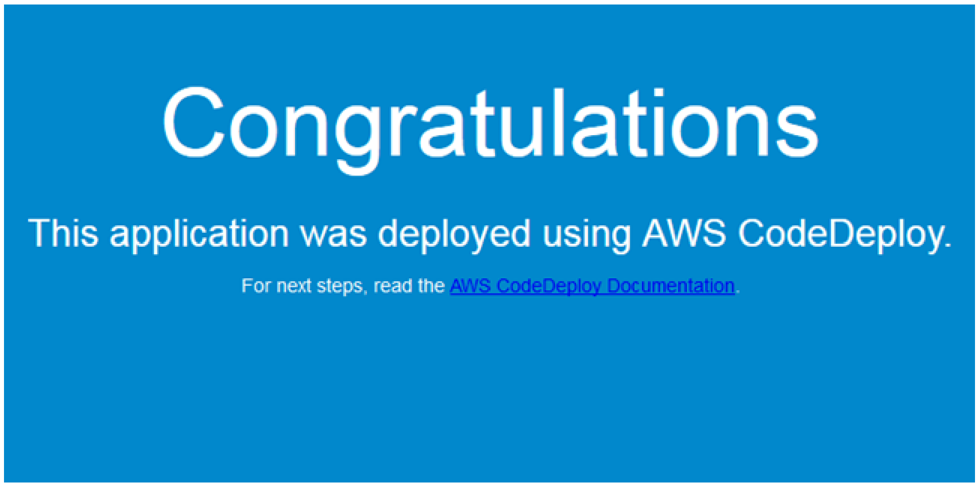


Congratulations! You just created a simple pipeline in AWS CodePipeline. The pipeline has two stages: a source stage named **Source**, which detects changes in the sample application stored in the AWS CodeCommit repository and pulls those changes into the pipeline, and a **Staging** stage that deploys those changes to the Amazon EC2 instance using AWS CodeDeploy. Next, you will verify the results.

To verify that your pipeline ran successfully

1. View the initial progress of the pipeline. The status of each stage will change from **No executions yet** to **In Progress**, and then to either **Succeeded** or **Failed**. The pipeline should complete the first run within a few minutes.
2. After the pipeline status displays **Succeeded**, in the status area for the **Staging** stage, choose **Details**.
3. In the AWS CodeDeploy console, in **Deployment Details**, in **Instance ID**, choose the instance ID of the successfully deployed instance.
4. On the **Description** tab, in **Public DNS**, copy the address, and then paste it into the address bar of your web browser.

   This is the sample application you downloaded and pushed to your AWS CodeCommit repository.



Congratulations

This application was deployed using AWS CodeDeploy.

For next steps, read the AWS CodeDeploy Documentation.

For more information about stages, actions, and how pipelines work, see AWS CodePipeline Concepts (p. 3).

Step 6: Modify Code in Your AWS CodeCommit Repository

In this step, you will make changes to the HTML file that is part of the sample AWS CodeDeploy application you deployed to your Amazon EC2 instance. When your pipeline runs again later in this tutorial, the changes you make will be visible at the `http://PublicDNS` URLs.

1. Change directories to your local repo:

```
(For Linux, macOS, or Unix) cd /tmp/my-demo-repo
(For Windows) cd c:\temp\my-demo-repo
```

2. Use a text editor to modify the `index.html` file:

```
(For Linux or Unix)gedit index.html
(For OS X)open -e index.html
(For Windows)notepad index.html
```

3. Revise the contents of the `index.html` file to change the background color and some of the text on the web page, and then save the file.

```
<!DOCTYPE html>
<html>
<head>
  <title>Updated Sample Deployment</title>
  <style>
    body {
      color: #000000;
      background-color: #CCFFCC;
      font-family: Arial, sans-serif;
      font-size:14px;
    }

    h1 {
      font-size: 250%;
      font-weight: normal;
      margin-bottom: 0;
    }

    h2 {
      font-size: 175%;
      font-weight: normal;
      margin-bottom: 0;
    }
  </style>
</head>
<body>
  <div align="center"><h1>Updated Sample Deployment</h1></div>
  <div align="center"><h2>This application was updated using AWS CodePipeline, AWS
 CodeCommit, and AWS CodeDeploy.</h2></div>
  <div align="center">
    <p>Learn more:</p>
    <p><a href="http://docs.aws.amazon.com/codepipeline/latest/userguide/">AWS
 CodePipeline User Guide</a></p>
    <p><a href="http://docs.aws.amazon.com/codecommit/latest/userguide/">AWS CodeCommit
 User Guide</a></p>
    <p><a href="http://docs.aws.amazon.com/codedeploy/latest/userguide/">AWS CodeDeploy
 User Guide</a></p>
  </div>
</body>
</html>
```

4. Commit and push your changes to your AWS CodeCommit repository by running the following commands, one at a time:

   ```
   git commit -am "Updated sample application files"
   ```

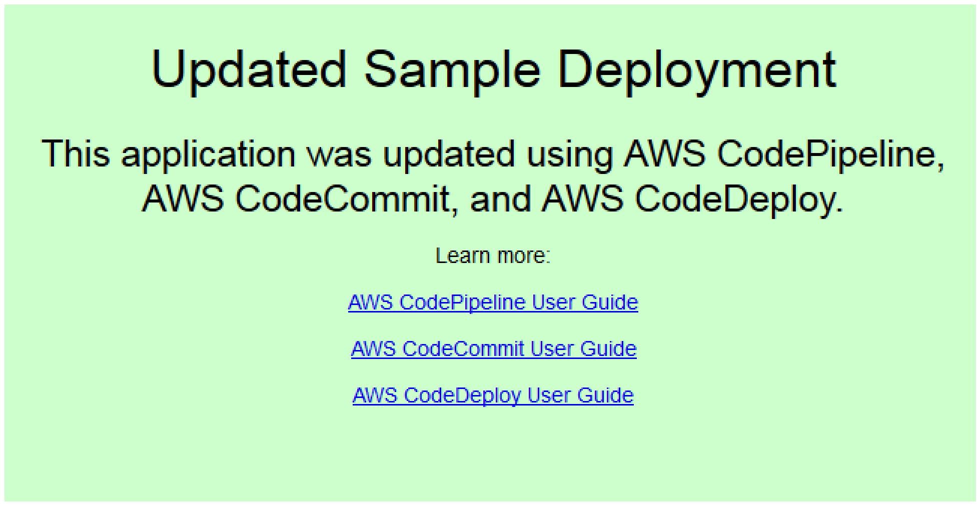
   ```
   git push
   ```

Your pipeline is configured to run whenever code changes are made to your AWS CodeCommit repository.

To verify your pipeline ran successfully

1. View the initial progress of the pipeline. The status of each stage will change from **No executions yet** to **In Progress**, and then to either **Succeeded** or **Failed**. The pipeline should complete within a few minutes.
2. After the action status displays **Succeeded**, in the status area for the **Staging** stage, choose **Details**.
3. In the **Deployment Details** section, in **Instance ID**, choose the instance ID of the instance.
4. On the **Description** tab, in **Public DNS**, copy the address, and then paste it into the address bar of your web browser.

   The updated web page will be displayed:


Updated Sample Deployment

This application was updated using AWS CodePipeline, AWS CodeCommit, and AWS CodeDeploy.

Learn more:

AWS CodePipeline User Guide

AWS CodeCommit User Guide

AWS CodeDeploy User Guide

For more information about stages, actions, and how pipelines work, see AWS CodePipeline Concepts (p. 3).

Step 7: Optional Stage Management Tasks

If you want to gain more experience working with stages before you end the tutorial, you can follow two additional procedures in the Tutorial: Create a Simple Pipeline (Amazon S3 Bucket) (p. 26).

- Step 4: Add Another Stage to Your Pipeline (p. 33)
- Disable and Enable Transitions Between Stages in AWS CodePipeline (p. 38)

Note
In step 4 of the second procedure, instead of uploading your sample to an Amazon S3 bucket again, as described, make a change to the sample app in your local repo and push it to your AWS CodeCommit repository.

Step 8: Clean Up Resources

You can use some of the resources you created in this tutorial for the next tutorial, Tutorial: Create a Four-Stage Pipeline (p. 53). For example, you can reuse the AWS CodeDeploy application and deployment. However, after you complete this and any other tutorials, you should delete the pipeline and the resources it uses, so that you will not be charged for the continued use of those resources. First, delete the pipeline, then the AWS CodeDeploy application and its associated Amazon EC2 instance, and finally, the AWS CodeCommit repository.

To clean up the resources used in this tutorial

1. To clean up your AWS CodePipeline resources, follow the instructions in Delete a Pipeline in AWS CodePipeline (p. 95).
2. To clean up your AWS CodeDeploy resources, follow the instructions in Clean Up Deployment Walkthrough Resources.
3. To delete the AWS CodeCommit repository, follow the instructions in Delete an AWS CodeCommit Repository.

Tutorial: Create a Four-Stage Pipeline

Now that you've created your first pipeline in Tutorial: Create a Simple Pipeline (Amazon S3 Bucket) (p. 26) or Tutorial: Create a Simple Pipeline (AWS CodeCommit Repository) (p. 40), you can start creating more complex pipelines. This tutorial will walk you through the creation of a four-stage pipeline that uses a GitHub repository for your source, a Jenkins build server to build the project, and an AWS CodeDeploy application to deploy the built code to a staging server. After the pipeline is created, you will edit it to add a stage with a test action to test the code, also using Jenkins.

Before you can create this pipeline, you must configure the required resources. For example, if you want to use a GitHub repository for your source code, you must create the repository before you can add it to a pipeline. As part of setting up, this tutorial walks you through setting up Jenkins on an Amazon EC2 instance for demonstration purposes.

Before you begin this tutorial, you should have already completed the general prerequisites in Getting Started with AWS CodePipeline (p. 9).

Topics

Step 1: Set Up Prerequisites

To integrate with Jenkins, AWS CodePipeline requires you to install the AWS CodePipeline Plugin for Jenkins on any instance of Jenkins you want to use with AWS CodePipeline. You should also configure a dedicated IAM user to use for permissions between your Jenkins project and AWS CodePipeline. The easiest way to integrate Jenkins and AWS CodePipeline is to install Jenkins on an Amazon EC2 instance that uses an IAM instance role that you create for Jenkins integration. In order for links in the pipeline for Jenkins actions to successfully connect, you must configure proxy and firewall settings on the server or Amazon EC2 instance to allow inbound connections to the port used by your Jenkins project. Make sure you have configured Jenkins to authenticate users and enforce access control before you allow connections on those ports (for example, 443 and 8443 if you have secured Jenkins to only use HTTPS connections, or 80 and 8080 if you allow HTTP connections). For more information, see Securing Jenkins.

Note
This tutorial uses a code sample and configures build steps that convert the sample from Haml to HTML. You can download the open-source sample code from the GitHub repository by following the steps in this topic. You will need the entire sample in your GitHub repository, not just the .zip file.
This tutorial also assumes that:

- You are familiar with installing and administering Jenkins and creating Jenkins projects.
- You have installed Rake and the Haml gem for Ruby on the same computer or instance that hosts your Jenkins project.
- You have set the required system environment variables so that Rake commands can be run from the terminal or command line (for example, on Windows systems, modifying the PATH variable to include the directory where you installed Rake).

Topics

- Install and Configure Jenkins and the AWS CodePipeline Plugin for Jenkins (p. 54)

Copy or Clone the Sample into a GitHub Repository

Clone the sample and push to a GitHub repository

1. Download the sample code from the GitHub repository, or clone the repositories to your local computer. There are two sample packages:
   - If you will be deploying your sample to Amazon Linux, RHEL, or Ubuntu Server instances, choose aws-codepipeline-jenkins-aws-codedeploy_linux.zip.
   - If you will be deploying your sample to Windows Server instances, choose AWSCodePipeline-Jenkins-AWSCodeDeploy_Windows.zip.
2. From the repository, choose **Fork** to clone the sample repo into a repo in your Github account. For more information, see the GitHub documentation.

Create an IAM Role to Use for Jenkins Integration

As a best practice, consider launching an Amazon EC2 instance to host your Jenkins server and using an IAM role to grant the instance the required permissions for interacting with AWS CodePipeline.

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.
2. In the IAM console, in the navigation pane, choose **Roles**, and then choose **Create new role**.
3. On the **Select role type** page, with **AWS Service Role** selected, next to **Amazon EC2**, choose **Select**.
4. On the **Attach Policy** page, select the **AWSCodePipelineCustomActionAccess** managed policy, and then choose **Next Step**.
5. On the **Set role name and review** page, in the **Role name** box, type the name of the role you will create specifically for Jenkins integration (for example *`JenkinsAccess`*), and then choose **Create role**.

When you create the Amazon EC2 instance where you will install Jenkins, in **Step 3: Configure Instance Details**, make sure you choose the instance role (for example, *`JenkinsAccess`*).

For more information about instance roles and Amazon EC2, see IAM Roles for Amazon EC2, Using IAM Roles to Grant Permissions to Applications Running on Amazon EC2 Instances, and Creating a Role to Delegate Permissions to an AWS Service.

Install and Configure Jenkins and the AWS CodePipeline Plugin for Jenkins

To install Jenkins and the AWS CodePipeline Plugin for Jenkins

1. Create an Amazon EC2 instance where you will install Jenkins, and in **Step 3: Configure Instance Details**, make sure you choose the instance role you created (for example, *`JenkinsAccess`*). For more information about creating Amazon EC2 instances, see Launch an Amazon EC2 Instance.

   Note
   If you already have Jenkins resources you want to use, you can do so, but you must create a special IAM user, apply the **AWSCodePipelineCustomActionAccess** managed policy to that user, and then configure and use the access credentials for that user on your Jenkins resource. If you want to use the Jenkins UI to supply the credentials, configure Jenkins to only allow HTTPS. For more information, see Troubleshooting AWS CodePipeline (p. 165).

2. Install Jenkins on the Amazon EC2 instance. For more information, see the Jenkins documentation for installing Jenkins and starting and accessing Jenkins, as well as details of integration with Jenkins (p. 14) in Product and Service Integrations with AWS CodePipeline (p. 11).
3. Launch Jenkins, and on the home page, choose **Manage Jenkins**.
4. On the **Manage Jenkins** page, choose **Manage Plugins**.
5. Choose the **Available** tab, and in the **Filter** search box, type **`AWS CodePipeline`**. Choose **AWS CodePipeline Plugin for Jenkins** from the list and choose **Download now and install after restart**.
6. On the **Installing Plugins/Upgrades** page, select **Restart Jenkins when installation is complete and no jobs are running**.
7. Choose **Back to Dashboard**.
8. On the main page, choose **New Item**.
9. In **Item Name**, type a name for the Jenkins project (for example, *`MyDemoProject`*). Choose **Freestyle project**, and then choose **OK**.

   Note
   Make sure the name for your project meets the requirements for AWS CodePipeline. For more information, see Limits in AWS CodePipeline (p. 207).
10. On the configuration page for the project, select the **Execute concurrent builds if necessary** check box. In **Source Code Management**, choose **AWS CodePipeline**. If you have installed Jenkins on an Amazon EC2 instance and configured the AWS CLI with the profile for the IAM user you created for integration between AWS CodePipeline and Jenkins, leave all of the other fields empty.
11. Choose **Advanced**, and in **Provider**, type a name for the provider of the action as it will appear in AWS CodePipeline (for example, *`MyJenkinsProviderName`*). Make sure this name is unique and easy to remember. You will use it when you add a build action to your pipeline later in this tutorial, and again when you add a test action.

    Note
    This action name must meet the naming requirements for actions in AWS CodePipeline. For more information, see Limits in AWS CodePipeline (p. 207).
12. In **Build Triggers**, clear any check boxes, and then select **Poll SCM**. In **Schedule**, type five asterisks separated by spaces, as follows:

```
* * * * *
```

    This polls AWS CodePipeline every minute.
13. In **Build**, choose **Add build step**. Choose **Execute shell** (Amazon Linux, RHEL, or Ubuntu Server) **Execute batch command** (Windows Server), and then type the following:

```
rake
```

    Note
    Make sure your environment is configured with the variables and settings required to run rake; otherwise, the build will fail.
14. Choose **Add post-build action**, and then choose **AWS CodePipeline Publisher**. Choose **Add**, and in **Build Output Locations**, leave the location blank. This configuration is the default. It will create a compressed file at the end of the build process.
15. Choose **Save** to save your Jenkins project.

Step 2: Create a Pipeline in AWS CodePipeline

In this part of the tutorial, you will create the pipeline using the **Create Pipeline** wizard.

To create an AWS CodePipeline automated release process

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.
2. If necessary, use the region selector to change the region to the same region where your pipeline resources are located. For example, if you created resources for the previous tutorial in us-east-2, make sure the region selector is set to US East (Ohio).

   For more information about the regions and endpoints available for AWS CodePipeline, see Regions and Endpoints.
3. On the **All Pipelines** page, choose **Create pipeline**.

   Note
   If you see the AWS CodePipeline start page, choose **Get started**.
4. In **Step 1: Name**, in **Pipeline name**, type **`MySecondPipeline`**, and then choose **Next step**.

   Note
   If you choose another name for your pipeline, be sure to use it instead of *`MySecondPipeline`* for the rest of this tutorial. After you create a pipeline, you cannot change its name. Pipeline names are subject to some limitations. For more information, see Limits (p. 207).
5. In **Step 2: Source**, in **Source provider**, choose **GitHub**, and then choose **Connect to GitHub**. This will open a new browser window that will connect you to GitHub. If prompted to sign in, provide your GitHub credentials.

   Important
   Do not provide your AWS credentials on the GitHub website.

   After you have connected to GitHub, choose the repository and branch where you pushed the sample you want to use for this tutorial (aws-codepipeline-jenkins-aws-codedeploy_linux.zip or AWSCodePipeline-Jenkins-AWSCodeDeploy_Windows.zip), and then choose **Next step**.

   Note
   There is a limit to the number of OAuth tokens you can use in GitHub for a particular application, such as AWS CodePipeline. Within a single AWS account, AWS CodePipeline will automatically update existing equivalent OAuth tokens to in an attempt to avoid exceeding this limit. If you exceed this limit as a result of connecting many AWS accounts with the same GitHub user account, you can use personal tokens. For more information, see To configure a pipeline to use a personal access token from GitHub (p. 167).
6. In **Step 3: Build**, choose **Add Jenkins**. In **Provider name**, type the name of the action you provided in the AWS CodePipeline Plugin for Jenkins (for example *`MyJenkinsProviderName`*). This name must exactly match the name in the AWS CodePipeline Plugin for Jenkins. In **Server URL**, type the URL of the Amazon EC2 instance where Jenkins is installed. In **Project name**, type the name of the project you created in Jenkins, such as *`MyDemoProject`*, and then choose **Next step**.
7. In **Step 4: Deploy**, reuse the AWS CodeDeploy application and deployment group you created in Tutorial: Create a Simple Pipeline (Amazon S3 Bucket) (p. 26). In **Deployment provider**, choose **AWS CodeDeploy**. In **Application name**, type **`CodePipelineDemoApplication`**, or choose the refresh button, and then choose the application name from the list. In **Deployment group**, type **`CodePipelineDemoFleet`**, or choose it from the list, and then choose **Next step**.

   Note
   You can use your own AWS CodeDeploy resources or create new ones, but you might incur additional costs.
8. In **Step 5: Service Role**, from **Role name**, choose the service role you created for AWS CodePipeline (for example, AWS-CodePipeline-Service), and then choose **Next step**.

   Note
   Service role creation is only required the first time you create a pipeline in AWS CodePipeline. If you followed the steps in one of the simple pipeline tutorials, you already

created this service role and will be able to choose it from the drop-down list. Because the drop-down list will display all IAM service roles associated with your account, if you chose a name different from the default, choose that name instead. If you have not yet created a service role, choose **Create role**.
If you are using an AWS CodeCommit repository instead of a GitHub repository, and are using a service role that was created before April 18, 2016, make sure it includes the permissions required to access AWS CodeCommit. For more information, see Add Permissions for Other AWS Services (p. 181).

9. In **Step 6: Review**, review the information, and then choose **Create pipeline**.
10. The pipeline automatically starts and runs the sample through the pipeline. You can view progress and success and failure messages as the pipeline builds the Haml sample to HTML and deploys it a web page to each of the Amazon EC2 instances in the AWS CodeDeploy deployment.

Step 3: Add Another Stage to Your Pipeline

Now you will add a test stage and then a test action to that stage that uses the Jenkins test included in the sample to determine whether the web page has any content. This test is for demonstration purposes only.

Note
If you did not want to add another stage to your pipeline, you could add a test action to the Staging stage of the pipeline, before or after the deployment action.

Add a Test Stage to Your Pipeline

Topics

Look Up the IP Address of an Instance

To verify the IP address of an instance where you deployed your code

1. After **Succeeded** is displayed for the pipeline status, in the status area for the Staging stage, choose **Details**.
2. In the **Deployment Details** section, in **Instance ID**, choose the instance ID of one of the successfully deployed instances.
3. Copy the IP address of the instance (for example, *`192.168.0.4`*). You will use this IP address in your Jenkins test.

Create a Jenkins project for Testing the Deployment

To create the Jenkins project

1. On the instance where you installed Jenkins, open Jenkins and from the main page, choose **New Item**.
2. In **Item Name**, type a name for the Jenkins project (for example, *`MyTestProject`*). Choose **Freestyle project**, and then choose **OK**.

   Note
   Make sure the name for your project meets the AWS CodePipeline requirements. For more information, see Limits in AWS CodePipeline (p. 207).

3. On the configuration page for the project, select the **Execute concurrent builds if necessary** check box. In **Source Code Management**, choose **AWS CodePipeline**. If you have installed Jenkins on an Amazon EC2 instance and configured the AWS CLI with the profile for the IAM user you created for integration between AWS CodePipeline and Jenkins, leave all the other fields empty.

   Important
   If you are configuring a Jenkins project and it is not installed on an Amazon EC2 instance, or it is installed on an Amazon EC2 instance that is running a Windows operating system, complete the fields as required by your proxy host and port settings, and provide the credentials of the IAM user you configured for integration between Jenkins and AWS CodePipeline.
4. Choose **Advanced**, and in **Category**, choose **Test**.
5. In **Provider**, type the same name you used for the build project (for example, *MyJenkinsProviderName*). You will use this name when you add the test action to your pipeline later in this tutorial.

   Note
   This name must meet the AWS CodePipeline naming requirements for actions. For more information, see Limits in AWS CodePipeline (p. 207).
6. In **Build Triggers**, clear any check boxes, and then select **Poll SCM**. In **Schedule**, type five asterisks separated by spaces, as follows:

   ```
   * * * * *
   ```

   This polls AWS CodePipeline every minute.
7. In **Build**, choose **Add build step**. If you are deploying to Amazon Linux, RHEL, or Ubuntu Server instances, choose **Execute shell** , and then type the following, where the IP address is the address of the Amazon EC2 instance you copied earlier:

   ```
   TEST_IP_ADDRESS=192.168.0.4 rake test
   ```

   If you are deploying to Windows Server instances, choose **Execute batch command**, and then type the following, where the IP address is the address of the Amazon EC2 instance you copied earlier:

   ```
   set TEST_IP_ADDRESS=192.168.0.4 rake test
   ```

   Note
   The test assumes a default port of 80. If you want to specify a different port, add a test port statement, as follows:

   ```
   TEST_IP_ADDRESS=192.168.0.4 TEST_PORT=8000 rake test
   ```
8. Choose **Add post-build action**, and then choose **AWS CodePipeline Publisher**. Do not choose **Add**.
9. Choose **Save** to save your Jenkins project.

Create a Fourth Stage

To add a stage to your pipeline that includes the Jenkins test action

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.
2. In **Name**, choose the name of the pipeline you created, MySecondPipeline.
3. On the pipeline details page, choose **Edit**.

4. On the **Edit** page, choose **+ Stage** to add a stage immediately after the Staging stage.
5. In the name field for the new stage, type a name (for example, `Testing`), and then choose **+ Action**.
6. In the **Action category** drop-down list, choose **Test**. In **Action name**, type *`MyJenkinsTest-Action`*. In **Test provider**, choose the provider name you specified in Jenkins (for example, *`MyJenkinsProviderName`*). In **Project name**, type the name of the project you created in Jenkins (for example, *`MyTestProject`*). In **Input artifacts**, choose the artifact from the Jenkins build whose default name is *`MyBuiltApp`*, and then choose **Add action**.

   For more information about input and output artifacts and the structure of pipelines, see AWS CodePipeline Pipeline Structure Reference (p. 201).
7. On the **Edit** page, choose **Save pipeline changes**. In the **Save pipeline changes** dialog box, choose **Save and continue**.
8. Although the new stage has been added to your pipeline, a status of **No executions yet** is displayed for that stage because no changes have triggered another run of the pipeline. To run the sample through the revised pipeline, on the pipeline details page, choose **Release change**.

   The pipeline view shows the stages and actions in your pipeline and the state of the revision running through those four stages. The time it takes for the pipeline to run through all stages will depend on the size of the artifacts, the complexity of your build and test actions, and other factors.

Step 4: Clean Up Resources

After you complete this tutorial, you should delete the pipeline and the resources it uses so you will not be charged for continued use of those resources. If you do not intend to keep using AWS CodePipeline, delete the pipeline, then the AWS CodeDeploy application and its associated Amazon EC2 instances, and finally, the Amazon S3 bucket used to store artifacts. You should also consider whether to delete other resources, such as the GitHub repository, if you do not intend to keep using them.

To clean up the resources used in this tutorial

1. Open a terminal session on your local Linux, macOS, or Unix machine, or a command prompt on your local Windows machine, and run the **delete-pipeline** command to delete the pipeline you created. For **`MySecondPipeline`**, you would type the following command:

   ```
   aws codepipeline delete-pipeline --name "MySecondPipeline"
   ```

   This command returns nothing.
2. To clean up your AWS CodeDeploy resources, follow the instructions in Cleaning Up.
3. To clean up your instance resources, delete the Amazon EC2 instance where you installed Jenkins. For more information, see Clean Up Your Instance and Volume.
4. If you do not intend to create more pipelines or use AWS CodePipeline again, delete the Amazon S3 bucket used to store artifacts for your pipeline. To delete the bucket, follow the instructions in Deleting a Bucket.
5. If you do not intend to use the other resources for this pipeline again, consider deleting them by following the guidance for that particular resource. For example, if you want to delete the GitHub repository, follow the instructions in Deleting a repository on the GitHub website.

Tutorial: Set Up a CloudWatch Events Rule to Receive Email Notifications for Pipeline State Changes

After you set up a pipeline, you can set up a CloudWatch Events rule to send notifications whenever there are changes to the execution state of your pipelines, or in the stages or actions in your pipelines. For more information on using CloudWatch Events to set up notifications for pipeline state changes, see Detect and React to Changes in Pipeline State with Amazon CloudWatch Events (p. 152).

In this tutorial, you configure a notification to send an email when a pipeline's state changes to FAILED. This tutorial uses an input transformer method when creating the CloudWatch Events rule. It transforms the message schema details to deliver the message in human-readable text.

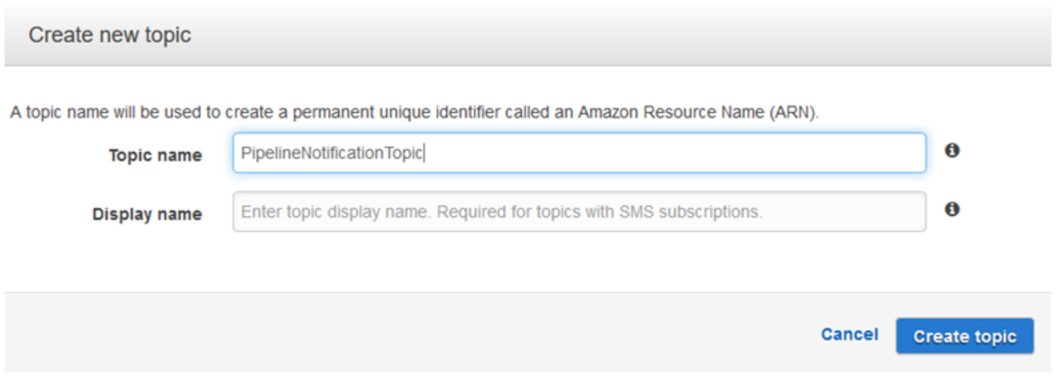
Topics

Step 1: Set Up an Email Notification Using Amazon SNS

Amazon SNS coordinates use of topics to deliver messages to subscribing endpoints or clients. Use Amazon SNS to create a notification topic and then subscribe to the topic using your email address. The Amazon SNS topic will be added as a target to your CloudWatch Events rule. For more information, see the Amazon Simple Notification Service Developer Guide .

1. Create or identify a topic in Amazon SNS. AWS CodePipeline will use CloudWatch Events to send notifications to this topic through Amazon SNS. To create a topic:

   1. Open the Amazon SNS console at https://console.aws.amazon.com/sns.
   2. Choose **Create topic**.
   3. In the **Create new topic** dialog box, for **Topic name**, type a name for the topic (for example, `PipelineNotificationTopic`).



Create new topic

A topic name will be used to create a permanent unique identifier called an Amazon Resource Name (ARN).

Topic name: PipelineNotificationTopic

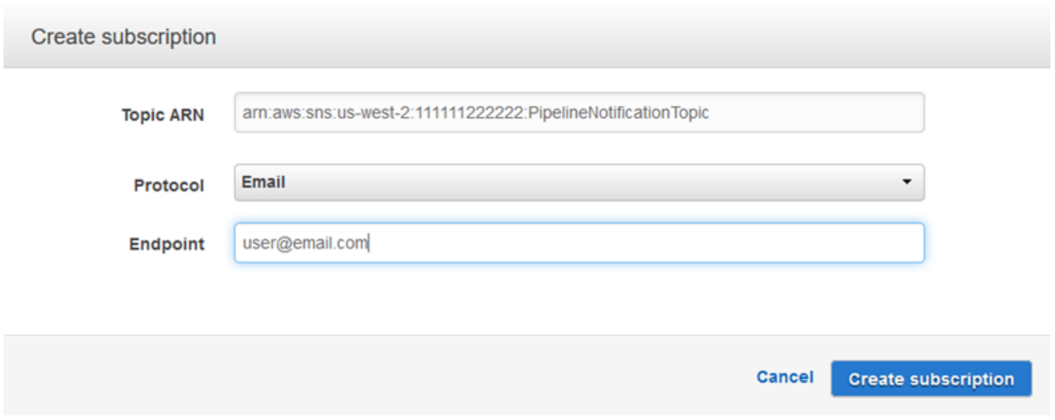
Display name: Enter topic display name. Required for topics with SMS subscriptions.

   4. Choose **Create topic**.

      For more information, see Create a Topic in the *Amazon SNS Developer Guide*.

2. Subscribe one or more recipients to the topic to receive email notifications. To subscribe a recipient to a topic:

1. In the Amazon SNS console, from the **Topics** list, select the check box next to your new topic. Choose **Actions, Subscribe to topic**.
2. In the **Create subscription** dialog box, verify that an ARN appears in **Topic ARN**.
3. For **Protocol**, choose **Email**.
4. For **Endpoint**, type the recipient's full email address. Compare your results to the following:



Create subscription

Topic ARN: arn:aws:sns:us-west-2:111111222222:PipelineNotificationTopic

Protocol: Email

Endpoint: user@email.com

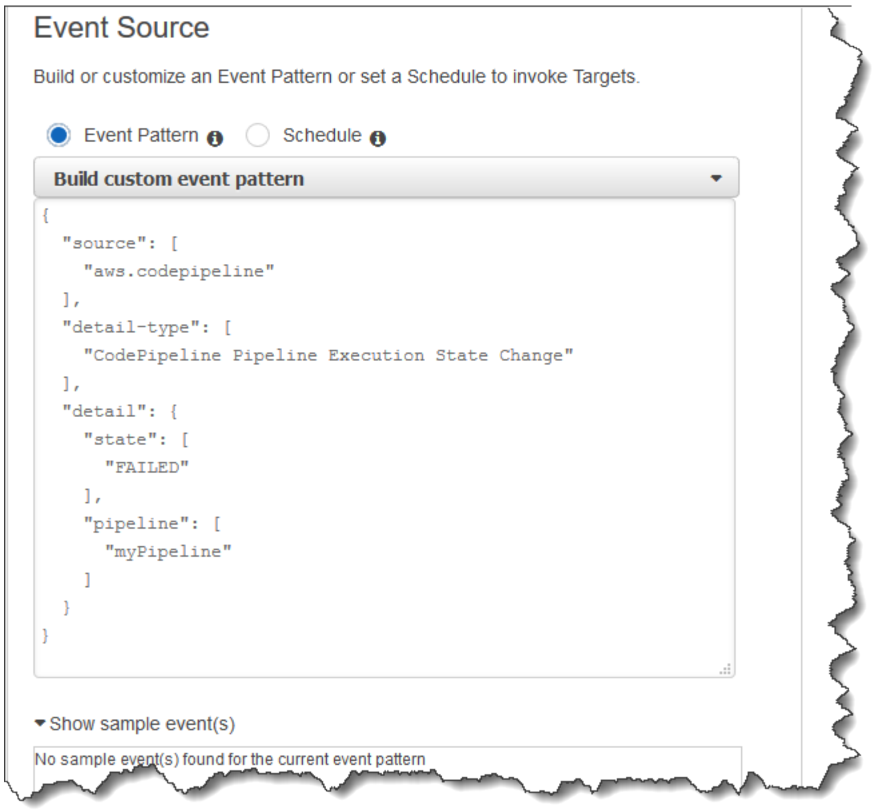
5. Choose **Create Subscription**.
6. Amazon SNS sends a subscription confirmation email to the recipient. To receive email notifications, the recipient must choose the **Confirm subscription** link in this email. After the recipient clicks the link, if successfully subscribed, Amazon SNS displays a confirmation message in the recipient's web browser.

For more information, see Subscribe to a Topic in the *Amazon SNS Developer Guide*.

Step 2: Create a Rule and Add the SNS Topic as the Target

Create a CloudWatch Events notification rule with AWS CodePipeline as the event source.

1. Open the CloudWatch console at https://console.aws.amazon.com/cloudwatch/.
2. In the navigation pane, choose **Events**.
3. Choose **Create rule**. Under **Event source**, choose **AWS CodePipeline**. For **Event Type**, choose **Pipeline Execution State Change**.
4. Choose **Specific state(s)**, and choose **`FAILED`**.
5. Choose **Edit** to open the JSON editor for the **Event Pattern Preview** pane. Add the **`pipeline`** parameter with the name of your pipeline as shown in the following example for a pipeline named "myPipeline."


Event Source
Build or customize an Event Pattern or set a Schedule to invoke Targets.
Event Pattern
Schedule
Build custom event pattern
Show sample event(s)

```
{
  "source": [
    "aws.codepipeline"
  ],
  "detail-type": [
    "CodePipeline Pipeline Execution State Change"
  ],
  "detail": {
    "state": [
      "FAILED"
    ],
    "pipeline": [
      "myPipeline"
    ]
  }
}
```

No sample event(s) found for the current event pattern

6. For **Targets**, choose **Add target**.
7. In the list of targets, choose **SNS topic**. For **Topic**, enter the topic you created.
8. Expand **Configure input**, and then choose **Input Transformer**.
9. In the **Input Path** box, type the following key-value pairs.

   ```
   { "pipeline" : "$.detail.pipeline" }
   ```

   In the **Input Template** box, type the following:

   ```
   "The Pipeline <pipeline> has failed."
   ```

10. Choose **Configure details**.
11. On the **Configure rule details** page, type a name and an optional description. For **State**, leave the **Enabled** box selected.
12. Choose **Create rule**.
13. Confirm that AWS CodePipeline is now sending build notifications. For example, check to see if the build notification emails are now in your inbox.
14. To change a rule's behavior, in the CloudWatch console, choose the rule, and then choose **Actions**, **Edit**. Edit the rule, choose **Configure details**, and then choose **Update rule**.

    To stop using a rule to send build notifications, in the CloudWatch console, choose the rule, and then choose **Actions**, **Disable**.

    To delete a rule, in the CloudWatch console, choose the rule, and then choose **Actions**, **Delete**.

Step 3: Clean Up Resources

After you complete this tutorial, you should delete the pipeline and the resources it uses so you will not be charged for continued use of those resources.

For information about how to clean up the SNS notification and delete the Amazon CloudWatch Events rule, see Clean Up (Unsubscribe from an Amazon SNS Topic) and reference `DeleteRule` in the Amazon CloudWatch Events API Reference.

AWS CodePipeline Best Practices and Use Cases

AWS CodePipeline is integrated with a number of products and services. The following sections describe best practices and use cases for AWS CodePipeline and these related products and services.

A simple business use case for AWS CodePipeline can help you understand ways you might implement the service and control user access. The use cases are described in general terms. They do not prescribe the APIs to use to achieve the results you want.

Topics

Best Practices

Use the security best practices in section Security Best Practices (p. 194) when working with AWS CodePipeline.

Continuous Delivery of AWS Lambda-Based Applications

You can use AWS Lambda with AWS CodePipeline for continuous delivery and automation. For more information, see Automating Deployment of Lambda-based Applications.

Continuous Delivery of AWS CloudFormation Templates

You can use AWS CloudFormation with AWS CodePipeline for continuous delivery and automation. For more information, see Continuous Delivery with AWS CodePipeline.

Working with Pipelines in AWS CodePipeline

To define an automated release process, you create a pipeline, which is a workflow construct that describes how software changes go through a release process, and is composed of a combination of stages and actions that you configure.

Note
When you add stages for Build, Deploy, Test, or Invoke, in addition to the default options provided with AWS CodePipeline, you can choose custom actions that you have already created for use with your pipelines. Custom actions can be used for tasks such as running an internally developed build process or a test suite. Version identifiers are included to help you distinguish among different versions of a custom action in the provider lists. For more information, see Create and Add a Custom Action in AWS CodePipeline (p. 106).

Before you can create a pipeline, you must first complete the steps in Getting Started with AWS CodePipeline (p. 9).

For more information about pipelines, see AWS CodePipeline Concepts (p. 3), AWS CodePipeline Tutorials (p. 26), and, if you want to create a pipeline using the AWS CLI, AWS CodePipeline Pipeline Structure Reference (p. 201). To view a list of pipelines, see View Pipeline Details and History in AWS CodePipeline (p. 90).

Topics

How to Start a Pipeline Execution in AWS CodePipeline

When a pipeline execution starts, it runs a revision through every stage and action in the pipeline.

There are two ways to start a pipeline execution:

- **Automatically**: Using change-detection methods that you specify, you can make your pipeline start automatically when a change is made to a repository. You can also make your pipeline start automatically on a schedule.
- **Manually**: You can use the console or the AWS CLI to start a pipeline, as described in Start a Pipeline Manually in AWS CodePipeline (p. 81).

By default, pipelines are configured to start automatically using available change detection methods.

Note
Your pipeline runs only when something changes in the source repository and branch you have defined.

Topics

Change-Detection Methods Used to Start Pipelines Automatically

When you create or update a pipeline, you specify the change-detection method used to react to source repository changes. Your choice then determines how your pipeline is automatically started.

Source	Detection Method	Description	Requires Additional Resources?	Ways to Set Up Pipeline	Manually Set Up Additional Resources?
Amazon S3	Periodic checks (recommended)	AWS CodePipeline periodically contacts the source repository.	No	Console (p. 76), CLI (p. 77), CloudFormation	N/A
AWS CodeCommit	Amazon CloudWatch Events (recommended)	• Your pipeline is triggered as soon as a change is made to the repository. • Faster and more configurable than periodic checks.	Yes. Amazon CloudWatch Events rule must be applied.	Console (p. 76)	Console creates resources on your behalf.
				CLI (p. 77), CloudFormation	• Set up the Amazon CloudWatch Events rule manually (p. 82). • Disable automatic checks using the steps in the CLI (p. 77) procedure.
	Periodic checks	AWS CodePipeline periodically contacts the source repository.	No	Console (p. 76), CLI (p. 77), CloudFormation	N/A
GitHub	Periodic checks (recommended)	AWS CodePipeline periodically contacts the source repository.	No	Console (p. 76), CLI (p. 77), CloudFormation	N/A

How Do You Start Pipelines Using Amazon CloudWatch Events?

Amazon CloudWatch is a web service that monitors your AWS resources and the applications that you run on AWS.

In Amazon CloudWatch, an event indicates a change in your AWS environment. AWS resources can generate events when their state changes. Using simple rules that are set up in Amazon CloudWatch Events, you can match events and route them to one or more target functions or streams.

Amazon CloudWatch Events can be set up to point to AWS CodePipeline as a target. AWS CodePipeline uses Amazon CloudWatch Events to detect changes in the configured source repository and branch. When a change occurs, Amazon CloudWatch Events automatically starts your pipeline.

To configure CloudWatch Events to start your pipeline automatically when something in your source repository changes

1. Create a CloudWatch Events rule that uses one of the available services as an event source.
2. Create a target for your rule that selects AWS CodePipeline as a target.
3. Grant permissions to CloudWatch Events to start the pipeline by creating or selecting an AWS CodePipeline service role that CloudWatch Events will assume.

When you create or update a pipeline in the console, as soon as you pick an AWS CodeCommit repository and branch, the AWS CodePipeline console creates the pipeline's Amazon CloudWatch Events rule and automatically displays the rule name. If you have an AWS CodeCommit repository and are creating or updating a pipeline in the CLI, you should create an Amazon CloudWatch Events manually and disable periodic checks.

Create a Pipeline in AWS CodePipeline

You can create a pipeline by using the AWS CodePipeline console or by using the AWS CLI.

You can also create pipelines that build and deploy container-based applications by using Amazon ECS as the deployment provider. Before you create a pipeline that deploys container-based applications with Amazon ECS, you must prepare an image definitions file.

Topics

Create Image Definitions File for Deploying Container-based Applications

An image definitions document is a JSON file that describes your Amazon ECS service's container name and the image and tag. If you are deploying container-based applications, you must generate an image definitions file to provide the AWS CodePipeline job worker with the Amazon ECS container and image identification to use for your pipeline's deployment stage.

- The maximum file size limit for the image definitions file is 100 KB.
- You must generate the image definitions file so that it is ingested as an input artifact for the deploy action.

The image definitions file provides the container name and image URI and must be constructed with the following set of key-value pairs.

Create the image definitions file as a source or build artifact for container-based deployments

Key	Value
name	*container_name*
imageURI	*image_URI*

JSON structure, where the container name is `sample-app`, and the image URI is `ecs-repo` and the tag is `latest`:

```
[
    {
        "name": "sample-app",
        "imageUri": "11111EXAMPLE.dkr.ecr.us-west-2.amazonaws.com/ecs-repo:latest"
    }
]
```

You can also construct the image definitions file to list multiple container/image pairs.

JSON structure:

```
[
    {
        "name": "simple-app",
        "imageUri": "httpd:2.4"
    },
    {
        "name": "simple-app-1",
        "imageUri": "mysql"
    },
    {
        "name": "simple-app-2",
        "imageUri": "java1.8"
    }
]
```

Before you create your pipeline, use the steps below to set up the image definitions file.

1. As part of planning the container-based application deployment for your pipeline, plan the source stage and the build stage, if applicable.
2. Choose one of the following:

    a. If your pipeline has no build stage, you must manually create the JSON file and upload it to your source repository so the source action can provide the artifact. Create the file using a text editor, and name the file or use the default `imagedefinitions.json` filename. Push the image definitions file to your source repository.

    Note
    Remember to zip the JSON file if your source repository is an Amazon S3 bucket.

    b. If your pipeline has a build stage, add a command to your build spec file that outputs the image definitions file in your source repository during the build phase. The example below uses the printf command to create an imagedefinitions.json file. List this command in the `post_build` section of the buildspec.yml file:

    ```
    printf '[{"name":"container_name","imageUri":"image_URI"}]' >
    imagedefinitions.json
    ```

You must include the image definitions file as an output artifact in the buildspec.yml file.

3. When you create your pipeline in the console, you must enter the exact image definitions filename into the **Image Filename** field on the **Deploy** screen of the Create Pipeline wizard.

For a step-by-step tutorial for creating a pipeline that uses Amazon ECS as the deployment provider, see Tutorial: Continuous Deployment with AWS CodePipeline.

Topics

Create a Pipeline (Console)

To create a pipeline in the console, you'll need to provide the source file location and information about the providers you will use for your actions.

When you use the console to create a pipeline, you must include a Source stage and one or both of the following:

- A Build stage.
- A Staging (deployment) stage.

When you use the pipeline wizard, AWS CodePipeline creates the names of stages (Source, Build, Staging). These names cannot be changed. You can give more specific names (for example, BuildToGamma or DeployToProd) to stages you add later.

AWS CodePipeline uses Amazon CloudWatch Events to detect changes in your AWS CodeCommit source repository and branch. Using Amazon CloudWatch Events to automatically start your pipeline when changes occur is the default for this source type.

Note
When you use the console to create a pipeline that has an AWS CodeCommit source repository, the rule is created for you. If you use the AWS CLI to create the pipeline, you must create the Amazon CloudWatch Events rule and IAM role manually. For more information, see Start a Pipeline Automatically Using Amazon CloudWatch Events (p. 82).

To create a pipeline

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.
2. On the **Welcome** page, choose **Create pipeline**.

   If this is your first time using AWS CodePipeline, an introductory page appears instead of **Welcome**. Choose **Get Started Now**.
3. On the **Step 1: Name** page, in the **Pipeline name** box, type the name for your pipeline, and then choose **Next step**.

   Within a single AWS account, each pipeline you create in a region must have a unique name. Names can be reused for pipelines in different regions.

   Note
   After you create a pipeline, you cannot change its name. For information about other limitations, see Limits in AWS CodePipeline (p. 207).
4. On the **Step 2: Source** page, in the **Source provider** drop-down list, choose the type of repository where your source code is stored and specify its required options:

- **GitHub**: Choose **Connect to GitHub**. If prompted to sign in, provide your GitHub credentials.

  Important
  Do not provide your AWS credentials.

  If this is your first time connecting to GitHub from AWS CodePipeline, you will be asked to authorize application access to your account. Review the permissions required for integration, and then, if you want to continue, choose **Authorize application**. For more information about how AWS CodePipeline integrates with GitHub, see Source Action Integrations (p. 11).

  Note
  There is a limit to the number of OAuth tokens you can use in GitHub for a particular application, such as AWS CodePipeline. Within a single AWS account, AWS CodePipeline will automatically update existing equivalent OAuth tokens to in an attempt to avoid exceeding this limit. If you exceed this limit as a result of connecting many AWS accounts with the same GitHub user account, you can use personal tokens. For more information, see To configure a pipeline to use a personal access token from GitHub (p. 167).

  On the **Source** page in the **Create Pipeline** wizard, from the **Repository** drop-down list, choose the GitHub repository you want to use as the source location for your pipeline. In **Branch**, from the drop-down list, choose the branch you want to use, and then choose **Next step**.
- **Amazon S3**: In **Amazon S3 location**, provide the Amazon S3 bucket name and path to the object in a bucket with versioning enabled, and then choose **Next step**. The format of the bucket name and path will look something like this:

```
s3://bucketName/folderName/objectName
```

- **AWS CodeCommit**: In **Repository name**, choose the name of the AWS CodeCommit repository you want to use as the source location for your pipeline. In **Branch name**, from the drop-down list, choose the branch you want to use.

  After you choose the AWS CodeCommit repository name and branch, a message is displayed in **Change detection options** showing the Amazon CloudWatch Events rule that will be created for this pipeline. Accept the defaults under **Change detection options**. This allows AWS CodePipeline to use Amazon CloudWatch Events to detect changes for your new pipeline. Choose **Next step**.

Note
The object and file type must be compatible with the deployment system you plan to use, for example Elastic Beanstalk or AWS CodeDeploy. Example supported file types might include .zip, .tar, and .tgz files. For more information about the supported container types for Elastic Beanstalk, see Customizing and Configuring Elastic Beanstalk Environments and Supported Platforms. For more information about deploying revisions with AWS CodeDeploy, see Uploading Your Application Revision and Prepare a Revision.

5. On the **Step 3: Build** page, do one of the following, and then choose **Next step**:

   - Choose **No Build** to skip the configuration of a build stage.
   - Choose a custom action provider of build services that you want to use, and provide the configuration details for that provider.

     Note
     The steps for adding a build provider vary by provider. For an example of how to add Jenkins as a build provider, see Tutorial: Create a Four-Stage Pipeline (p. 53).
   - Choose AWS CodeBuild, and then either choose **Select an existing build project** or **Create a new build project**.
     - For an existing build project, in **Project name**, choose the name of the build project, and then choose **Save build project**.

    - For a new build project, make sure you've completed the steps in Plan a Build, and then follow the instructions in Create a Pipeline that Uses AWS CodeBuild in *AWS CodeBuild User Guide*.

      Note
      Make sure that the service role for AWS CodePipeline has appropriate permissions for AWS CodeBuild. For more information, see Add Permissions for Other AWS Services (p. 181).

6. On the **Step 4: Deploy** page, do one of the following, and then choose **Next step**:

   - Choose **No Deployment** to skip the configuration of a deployment stage.

     Note
     You can skip adding a deployment provider now only if you chose a build provider in the previous step.

   - Choose a custom action that you have created for a deployment provider.
   - Choose one of the following default providers from the **Deployment provider** drop-down list:
     - **AWS CodeDeploy**: Type or choose the name of an existing AWS CodeDeploy application in **Application name** and the name of a deployment group for that application in **Deployment group**, and then choose **Next step**. Alternatively, you can create an application, deployment group, or both by choosing those links in AWS CodeDeploy.
     - **AWS Elastic Beanstalk**: Type or choose the name of an existing Elastic Beanstalk application in **Application name** and an environment for that application in **Environment name**, and then choose **Next step**. Alternatively, you can create an application, environment, or both by choosing those links in Elastic Beanstalk.
     - **AWS OpsWorks Stacks**: Type or choose the name of the stack you want to use in **Stack** and the layer that your target instances belong to in **Layer**. In **App**, choose the application that you want to update and deploy. If you need to create an app, choose **create a new one in AWS OpsWorks**.

       For information about adding an application to a stack and layer in AWS OpsWorks, see Adding Apps in the *AWS OpsWorks User Guide*.

       For an end-to-end example of how to use a simple pipeline in AWS CodePipeline as the source for code that you run on AWS OpsWorks layers, see Using AWS CodePipeline with AWS OpsWorks Stacks.
     - **AWS CloudFormation**: Do one of the following:
       - In **Action mode**, choose **Create or update a stack**, enter a stack name and template file name, and then choose the name of a role for AWS CloudFormation to assume. Optionally, enter the name of a configuration file and choose an IAM capability option.
       - In **Action mode**, choose **Create or replace a change set**, enter a stack name and change set name, and then choose the name of a role for AWS CloudFormation to assume. Optionally, enter the name of a configuration file and choose an IAM capability option.

       For detailed information about integrating AWS CloudFormation capabilities into a pipeline in AWS CodePipeline, see Continuous Delivery with AWS CodePipeline in *AWS CloudFormation User Guide*.
     - **Amazon ECS**: In **Cluster name**, type or choose the name of an existing Amazon ECS cluster. In **Service name**, type or choose the name of the service running on the cluster. Alternatively, you can create a new cluster and service. In **Image filename**, type the name of the image definitions file that describes your service's container and image. Choose **Next step**.

       Note
       Make sure your Amazon ECS cluster is configured with two or more instances. Amazon ECS clusters must contain at least two instances, in order to maintain one **Primary** instance and another instance to accommodate new deployments.

For a tutorial about deploying container-based applications with your pipeline, see Tutorial: Continuous Deployment with AWS CodePipeline.

Note
After a pipeline is created successfully, you can edit it to add more deployment stages or actions to a deployment stage.

7. On the **Step 5: Service Role** page, do one of the following, and then choose **Next step**:

   - In the **Service Role**, drop-down list, choose an IAM service role you have set up for AWS CodePipeline.
   - If you do not have a service role, choose **Create role**, and then on the IAM console page that describes the role that will be created for you, choose **Allow**. On the **Step 5: Service Role** page, *`AWS-CodePipeline-Service`* will appear in the drop-down box.

   Note
   Depending on when your service role was created, you may need to update its permissions to support additional AWS services. For information, see Add Permissions for Other AWS Services (p. 181).

   For more information about the service role and its policy statement, see Manage the AWS CodePipeline Service Role (p. 179).
8. On the **Step 6: Review** page, review your pipeline configuration, and then choose **Create pipeline** to create the pipeline or **Previous** to go back and edit your choices. To exit the wizard without creating a pipeline, choose **Cancel**.

Now that you've created your pipeline, you can view it in the console. The pipeline will start to run automatically after you create it. For more information, see View Pipeline Details and History in AWS CodePipeline (p. 90). You can also make changes to the pipeline. For more information, see Edit a Pipeline in AWS CodePipeline (p. 75).

Create a Pipeline (CLI)

To use the AWS CLI to create a pipeline, you create a JSON file to define the pipeline structure, and then run the **create-pipeline** command with the `--cli-input-json` parameter.

The simplest way to create the JSON file is to start with an existing pipeline. You can use the **get-pipeline** command to get a copy of the JSON structure of that pipeline, and then modify that structure in a plain-text editor. For more information about pipeline structure, see AWS CodePipeline Pipeline Structure Reference (p. 201) and create-pipeline in the AWS CodePipeline API Reference.

Note
If you don’t already have a pipeline, you can use the wizard in the AWS CodePipeline console to create a pipeline, and then use that JSON structure as the basis for your pipeline.

You will need the ARN of the service role you created for AWS CodePipeline in Getting Started with AWS CodePipeline (p. 9) and the name of an Amazon S3 bucket where artifacts for the pipeline will be stored. This bucket must be in the same region as the pipeline. You will use both when you run the **create-pipeline** command. Unlike the console, the **create-pipeline** command in the AWS CLI cannot create an Amazon S3 bucket for storing artifacts. The bucket must already exist.

Important
You cannot use the AWS CLI to create a pipeline that includes partner actions. To create a pipeline that includes partner actions, use the AWS CodePipeline console.

Topics

Create the JSON file

To create a JSON file, use the **get-pipeline** command to copy the structure of an existing pipeline to a file, edit it, and then call that file when running the **create-pipeline** command.

To create the JSON file

1. At a terminal (Linux, macOS, or Unix) or command prompt (Windows), run the **get-pipeline** command on a pipeline, and then copy the output of the command to a JSON file. For example, for a pipeline named MyFirstPipeline, you would type something similar to the following:

   ```
   aws codepipeline get-pipeline --name MyFirstPipeline >pipeline.json
   ```

   The output of the command is sent to the `pipeline.json` file.
2. Open the file in a plain-text editor and edit the values to reflect the structure you want to create. At a minimum, you must change the name of the pipeline. You should also consider whether you want to change the Amazon S3 bucket where artifacts for this pipeline are stored; the source location for your code; the deployment provider; how you want your code deployed; and other details.

   The following two-stage sample pipeline structure highlights the values you should consider changing for your pipeline. Your pipeline will likely contain more than two stages:

   ```
   {
       "pipeline": {
           "roleArn": "arn:aws:iam::80398EXAMPLE::role/AWS-CodePipeline-Service",
           "stages": [
               {
                   "name": "Source",
                   "actions": [
                       {
                           "inputArtifacts": [],
                           "name": "Source",
                           "actionTypeId": {
                               "category": "Source",
                               "owner": "AWS",
                               "version": "1",
                               "provider": "S3"
                           },
                           "outputArtifacts": [
                               {
                                   "name": "MyApp"
                               }
                           ],
                           "configuration": {
                               "S3Bucket": "awscodepipeline-demobucket-example-date",
                               "S3ObjectKey": "ExampleCodePipelineSampleBundle.zip"
                           },
                           "runOrder": 1
                       }
                   ]
               },
               {
                   "name": "Staging",
                   "actions": [
                       {
                           "inputArtifacts": [
                               {
   ```

```
                                "name": "MyApp"
                            }
                        ],
                        "name": "Deploy-CodeDeploy-Application",
                        "actionTypeId": {
                            "category": "Deploy",
                            "owner": "AWS",
                            "version": "1",
                            "provider": "CodeDeploy"
                        },
                        "outputArtifacts": [],
                        "configuration": {
                            "ApplicationName": "CodePipelineDemoApplication",
                            "DeploymentGroupName": "CodePipelineDemoFleet"
                        },
                        "runOrder": 1
                    }
                ]
            }
        ],
        "artifactStore": {
            "type": "S3",
            "location": "codepipeline-us-east-2-250656481468"
        },
        "name": "MyFirstPipeline",
        "version": 1
    },
    "metadata": {
        "pipelineArn": "arn:aws:codepipeline:us-east-2:80398EXAMPLE:MyFirstPipeline",
        "updated": 1501626591.112,
        "created": 1501626591.112
    }
}
```

AWS CodePipeline uses Amazon CloudWatch Events to detect changes in your AWS CodeCommit source repository and branch. Using Amazon CloudWatch Events to automatically start your pipeline when changes occur is recommended and is accomplished using these steps in the CLI:

a. Open the JSON file in a plain-text editor and modify the file by setting the `PollForSourceChanges` parameter to false. The flag is located in the source stage of the pipeline structure.

   The following example shows how the parameter should look after the file is modified to disable periodic checks;

```
{
    "name": "Source",
    "actions": [
        {
            "inputArtifacts": [],
            "name": "Source",
            "actionTypeId": {
                "category": "Source",
                "owner": "AWS",
                "version": "1",
                "provider": "CodeCommit"
            },
            "outputArtifacts": [
                {
                    "name": "MyApp"
                }
            ],
            "configuration": {
                "PollForSourceChanges": "false",
                "BranchName": "master",
                "RepositoryName": "MyTestRepo"
            },
            "runOrder": 1
        }
    ]
},
```

b. After you create your pipeline, you must manually create the CloudWatch Events rule for change detection. For more information on using the CLI to create the rule, see Start a Pipeline Automatically Using Amazon CloudWatch Events (p. 82).

3. When you are satisfied with its structure, save your file as with a name like **`pipeline.json`**.

Run the create-pipeline Command

After you have a JSON file that contains the structure of your pipeline, call that file when you run the **create-pipeline** command.

To create a pipeline

1. Run the **create-pipeline** command and use the `--cli-input-json` parameter to specify the JSON file you created previously.

   To create a pipeline named *`MySecondPipeline`* with a JSON file named pipeline.json that includes the name "*`MySecondPipeline`*" as the value for `name` in the JSON, your command would look similar to the following:

   Important
   Be sure to include `file://` before the file name. It is required in this command.

   ```
   aws codepipeline create-pipeline --cli-input-json file://pipeline.json
   ```

   This command returns the structure of the entire pipeline you created.

2. To view the pipeline you just created, either open the AWS CodePipeline console and choose it from the list of pipelines, or use the **get-pipeline-state** command. For more information, see View Pipeline Details and History in AWS CodePipeline (p. 90).

Edit a Pipeline in AWS CodePipeline

A pipeline describes the release process you want AWS CodePipeline to follow, including the stages and actions that must be completed. You can edit a pipeline to add or remove these elements. However, when you edit or update a pipeline, values such as the pipeline name or pipeline metadata cannot be changed.

Unlike creating a pipeline, editing a pipeline does not rerun the most recent revision through the pipeline. If you want to run the most recent revision through a pipeline you've just edited, you must manually rerun it. Otherwise, the edited pipeline will run the next time you make a change to a source location configured in the source stage of the pipeline. For information, see Start a Pipeline Manually in AWS CodePipeline (p. 81).

Topics

Edit a Pipeline (Console)

You can use the AWS CodePipeline console to add, edit, or remove stages in a pipeline, as well as to add, edit, or remove actions in a stage.

AWS CodePipeline uses Amazon CloudWatch Events to detect changes in your AWS CodeCommit source repository and branch. Using Amazon CloudWatch Events to automatically start your pipeline when changes occur is the default behavior for this source type.

> **Note**
> When you use the console to edit a pipeline that has an AWS CodeCommit source repository, the rule and IAM role are created for you. If you use the AWS CLI to edit the pipeline, you must create the Amazon CloudWatch Events rule and IAM role manually. For more information, see Start a Pipeline Automatically Using Amazon CloudWatch Events (p. 82).

To edit a pipeline in the AWS CodePipeline console

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.

   The names of all pipelines associated with your AWS account are displayed.
2. In **Name**, choose the name of the pipeline you want to edit. This opens a detailed view of the pipeline, including the state of each of the actions in each stage of the pipeline.
3. On the pipeline details page, choose **Edit**. This opens the editing page for the pipeline.
4. On the **Edit** page, do one of the following:

   - To edit a stage, choose the edit icon ( ) on that stage. You can add actions (Action) in serial and parallel with existing actions:

     You can also edit actions in this view by choosing the edit icon for those actions. To delete an action, choose the delete icon (⊗) on that action.

     To add AWS CodeBuild as a build action or test action to a stage, see Use AWS CodePipeline with AWS CodeBuild to Test Code and Run Builds in *AWS CodeBuild User Guide*.
   - To edit an action, choose the edit icon for that action, and then on **Edit action**, change the values. Items marked with an asterisk (*****) are required.

     > **Note**
     > If you edit a source action by choosing an updated AWS CodeCommit repository name and branch, a message is displayed under **Change detection options** showing the Amazon CloudWatch Events rule that will be created for this pipeline. This allows AWS CodePipeline to use Amazon CloudWatch Events to detect changes for your new pipeline.
   - To add a stage, choose **+ Stage** at the point in the pipeline where you want to add a stage. Provide a name for the stage, and then add at least one action to it. Items marked with an asterisk (*****) are required.
   - To delete a stage, choose the delete icon on that stage. The stage and all of its actions will be deleted.

   For example, if you wanted to add an action to an existing stage in a pipeline:

   1. In the stage where you want to add your action, choose the edit icon ( ), and then add your action by choosing **+ Action**.

Note
To add an action that runs in parallel with another action, choose the add action icon next to that action. To run your action before another action, choose the add action icon above that action. To run your action after another action in that stage, choose the add action icon under that action.

2. The **Add action** panel opens. In **Action category**, choose the category of your action, such as build or deploy. In the system drop-down list, choose the system, and then provide all the required details for the action configuration, such as a name for the action, a provider, and the input or output artifact, depending on the action type. Items marked with an asterisk (*) are required. For more information about the requirements for actions in AWS CodePipeline, including names for input and output artifacts and how they are used, see Action Structure Requirements in AWS CodePipeline (p. 202).

   Note
   Some action providers, such as GitHub, require you to connect to the provider's website before you can complete the configuration of the action. When connecting to a provider's website, make sure you use the credentials for that website. Do not use your AWS credentials.

3. When you have finished configuring your action, choose **Add action**.

Note
You cannot rename an action or a stage in the console view. You can add a new stage or action with the name you want to change, and then delete the old one. Make sure you have added all the actions you want in that stage before you delete the old one.

5. When you have finished editing your pipeline, choose **Save pipeline changes** to return to the summary page.

   Important
   After you save your changes, you cannot undo them. You must re-edit the pipeline. In addition, if a revision is running through your pipeline when you save your changes, it will not complete the run. If you want a specific commit or change to run through the edited pipeline, you must manually rerun the change through the pipeline after saving your changes. Otherwise, the next commit or change will run automatically through the pipeline.

6. To test your action, choose **Release change** to process that commit through the pipeline, commit a change to the source specified in the source stage of the pipeline, or follow the steps in Start a Pipeline Manually in AWS CodePipeline (p. 81) to manually release a change using the AWS CLI.

Edit a Pipeline (AWS CLI)

You can use the **update-pipeline** command to edit a pipeline.

Important
While you can edit pipelines that include partner actions using the AWS CLI, you must not manually edit the JSON of a partner action itself. If you do so, the partner action will likely fail after you update the pipeline.

To edit a pipeline in the AWS CLI

1. Open a terminal session (Linux, macOS, or Unix) or command prompt (Windows) and run the **get-pipeline** command to copy the pipeline structure into a JSON file. For example, for a pipeline named **`MyFirstPipeline`**, you would type the following command:

```
aws codepipeline get-pipeline --name MyFirstPipeline >pipeline.json
```

This command returns nothing, but the file you created should appear in the directory where you ran the command.

2. Open the JSON file in any plain-text editor and modify the structure of the file to reflect the changes you want to make to the pipeline. For example, you can add or remove stages, or add another action to an existing stage.

   Note
   Some edits, such as moving an action from one stage to another stage, delete the last known state history for the action. In addition, if a pipeline contains one or more secret parameters, such as an OAuth token for an action, that token is masked by a series of asterisks (****). These secret parameters are left unchanged unless you edit that portion of the pipeline (for example, if you change the name of the action that includes the OAuth token or the name of the stage that contains an action that uses an OAuth token). If you make a change that affects an action that includes an OAuth token, you must include the value of the token in the edited JSON. For more information, see AWS CodePipeline Pipeline Structure Reference (p. 201). It is a security best practice to rotate your personal access token on a regular basis. For more information, see Use GitHub and the AWS CodePipeline CLI to Create and Rotate Your GitHub Personal Access Token on a Regular Basis (p. 197).

   The following example shows how you would add another deployment stage in the pipeline.json file. This stage will run after the first deployment stage named *Staging*.

   Note
   This is just a portion of the file, not the entire structure. For more information, see AWS CodePipeline Pipeline Structure Reference (p. 201).

```
,
        {
            "name": "Staging",
            "actions": [
                    {
                        "inputArtifacts": [
                            {
                                "name": "MyApp"
                            }
                        ],
                        "name": "Deploy-CodeDeploy-Application",
                        "actionTypeId": {
                            "category": "Deploy",
                            "owner": "AWS",
                            "version": "1",
                            "provider": "CodeDeploy"
                        },
                        "outputArtifacts": [],
                        "configuration": {
                            "ApplicationName": "CodePipelineDemoApplication",
                            "DeploymentGroupName": "CodePipelineDemoFleet"
                        },
                        "runOrder": 1
                    }
                ]
             },
        {
            "name": "Production",
            "actions":  [
                    {
                        "inputArtifacts": [
                            {
                                "name": "MyApp"
                            }
                        ],
                        "name": "Deploy-Second-Deployment",
                        "actionTypeId": {
                            "category": "Deploy",
                            "owner": "AWS",
                            "version": "1",
                            "provider": "CodeDeploy"
                        },
                        "outputArtifacts": [],
                        "configuration": {
                        "ApplicationName": "CodePipelineDemoApplication",
                        "DeploymentGroupName": "CodePipelineProductionFleet"
                        },
                        "runOrder": 1
                    }
                ]
            }
    ]
}
```

The following example shows how you would add a source stage that uses a GitHub repository as its source action. For more information about how AWS CodePipeline integrates with GitHub, see Source Action Integrations (p. 11).

Note
This is just a portion of the file, not the entire structure. For more information, see AWS CodePipeline Pipeline Structure Reference (p. 201).

```
{
                "name": "Source",
                "actions": [
                    {
                        "inputArtifacts": [],
                        "name": "Source",
                        "actionTypeId": {
                            "category": "Source",
                            "owner": "ThirdParty",
                            "version": "1",
                            "provider": "GitHub"
                        },
                        "outputArtifacts": [
                            {
                                "name": "MyApp"
                            }
                        ],
                        "configuration": {
                            "Owner": "MyGitHubAccountName",
                            "Repo": "MyGitHubRepositoryName",
                            "Branch": "master",
                            "OAuthToken": "****"
                        },
                        "runOrder": 1
                    }
                ]
            },
```

You must supply a value for `OAuthToken` to access the GitHub repository. You can use a personal access token for this value. To create a personal access token, see Pipeline Error: I receive a pipeline error that includes the following message: "PermissionError: Could not access the GitHub repository" (p. 167).

For information about using the CLI to add an approval action to a pipeline, see Add a Manual Approval Action to a Pipeline in AWS CodePipeline (p. 140).

AWS CodePipeline uses Amazon CloudWatch Events to detect changes in your AWS CodeCommit source repository and branch. Using Amazon CloudWatch Events to automatically start your pipeline when changes occur is recommended and is accomplished using these steps in the CLI:

a. Open the JSON file in a plain-text editor and modify the file by setting the `PollForSourceChanges` parameter to `false`. The parameter is located in the source stage of the pipeline structure.

   The following example shows how the parameter should look after the file is modified to disable periodic checks:

```
{
    "name": "Source",
    "actions": [
        {
            "inputArtifacts": [],
            "name": "Source",
            "actionTypeId": {
                "category": "Source",
                "owner": "AWS",
                "version": "1",
                "provider": "CodeCommit"
            },
            "outputArtifacts": [
                {
                    "name": "MyApp"
                }
            ],
            "configuration": {
                "PollForSourceChanges": "false",
                "BranchName": "master",
                "RepositoryName": "MyTestRepo"
            },
            "runOrder": 1
        }
    ]
},
```

b. After you edit your pipeline, you must manually create the CloudWatch Events rule for change detection. For more information on using the CLI to create the rule, see Start a Pipeline Automatically Using Amazon CloudWatch Events (p. 82).

3. To apply your changes, run the **update-pipeline** command, specifying the pipeline JSON file, similar to the following:

   Important
   Be sure to include `file://` before the file name. It is required in this command.

```
aws codepipeline update-pipeline --cli-input-json file://pipeline.json
```

   This command returns the entire structure of the edited pipeline.

   Note
   The **update-pipeline** command stops the pipeline. If a revision is being run through the pipeline when you run the **update-pipeline** command, that run will be stopped. You must manually start the pipeline to run that revision through the updated pipeline.

4. Open the AWS CodePipeline console and choose the pipeline you just edited from the list.

The pipeline shows your changes. The next time you make a change to the source location, the pipeline will run that revision through the revised structure of the pipeline.

5. To manually run the last revision through the revised structure of the pipeline, run the **start-pipeline-execution** command. For more information, see Start a Pipeline Manually in AWS CodePipeline (p. 81).

For more information about the structure of a pipeline and expected values, see AWS CodePipeline Pipeline Structure Reference (p. 201) and AWS CodePipeline API Reference.

Start a Pipeline Manually in AWS CodePipeline

By default, a pipeline starts automatically when it is created and then any time a change is made in a source repository. However, you might want to rerun the most recent revision through the pipeline a second time. You can use the AWS CodePipeline console or the AWS CLI and **start-pipeline-execution** command to manually rerun the most recent revision through your pipeline.

Topics

- Start a Pipeline Manually (Console) (p. 81)
- Start a Pipeline Manually (CLI) (p. 81)

Start a Pipeline Manually (Console)

To manually start a pipeline and run the most recent revision through a pipeline

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.
2. In **Name**, choose the name of the pipeline you want to start.
3. On the pipeline details page, choose **Release change**. This starts the most recent revision available in each source location specified in a source action through the pipeline.

Start a Pipeline Manually (CLI)

To manually start a pipeline and run the most recent version of an artifact through a pipeline

1. Open a terminal (Linux, macOS, or Unix) or command prompt (Windows) and use the AWS CLI to run the **start-pipeline-execution** command, specifying the name of the pipeline you want to manually start. For example, to start running the last change through a pipeline named *MyFirstPipeline*:

```
aws codepipeline start-pipeline-execution --name MyFirstPipeline
```

2. To verify success, view the returned object. This command returns an ExecutionID object, similar to the following:

```
{
    "pipelineExecutionId": "c53dbd42-This-Is-An-Example"
}
```

Note
After you have started the pipeline, you can monitor its progress in the AWS CodePipeline console or by running the **get-pipeline-state** command. For more information, see View Pipeline Details and History (Console) (p. 90) and View Pipeline Details and History (CLI) (p. 93).

Start a Pipeline Automatically Using Amazon CloudWatch Events

You can use Amazon CloudWatch Events to trigger pipelines to start automatically when Amazon CloudWatch Events rule or schedule criteria are met.

You can use criteria you specify in an Amazon CloudWatch Events rule to detect and react to changes in the state of the pipeline's defined source. Then, based on rules you create, CloudWatch Events starts your pipeline automatically when an event you specify occurs in a repository, pipeline, or other resource.

Note
This section provides instructions to manually set up the Amazon CloudWatch Events rule that you can use to automatically start your pipeline. If you used the console to save a pipeline, AWS CodePipeline uses Amazon CloudWatch Events to automatically start your pipeline when changes occur. This is the default behavior for the AWS CodeCommit source type. When you use the console to create or edit a pipeline, the rule and IAM role are created automatically.

To create the rule:

1. Create an Amazon CloudWatch Events rule that uses the pipeline's source repository as the event source.
2. Add AWS CodePipeline as the target.
3. Give Amazon CloudWatch Events permissions to start the pipeline.

As you build your rule, the **Event Pattern Preview** pane in the console (or the `--event-pattern` output in the AWS CLI) displays the event fields, in JSON format. The following sample AWS CodeCommit event pattern uses this JSON structure:

```
{
  "source": [ "aws.codecommit" ],
  "detail-type": [ "CodeCommit Repository State Change" ],
  "resources": [ "CodeCommitRepo_ARN" ],
  "detail": {
     "event": [
       "referenceCreated",
       "referenceUpdated"],
     "referenceType":["branch"],
     "referenceName": ["branch_name"]
  }
}
```

The following is a sample AWS CodeCommit event pattern in the **Event** window for a "MyTestRepo" repository with a branch named "master":

```
{
  "source": [
    "aws.codecommit"
  ],
  "detail-type": [
    "CodeCommit Repository State Change"
  ],
  "resources": [
    "arn:aws:codecommit:us-west-2:80398EXAMPLE:MyTestRepo"
  ],
  "detail": {
    "referenceType": [
      "branch"
    ],
    "referenceName": [
      "master"
    ]
  }
}
```

The event pattern uses these fields:

- `source:` should contain `aws.codecommit` as the event source.
- `detail-type:` displays the available event type (`CodeCommit Repository State Change`).
- `resources:` contains the repository ARN.
- `detail:` contains the repository branch information `referenceType` and `referenceName`.

Topics

Prerequisites

Before you create rules for use in your AWS CodePipeline operations, you should do the following:

- Complete the CloudWatch Events prerequisites. For information, see Amazon CloudWatch Events Prerequisites.
- Familiarize yourself with events, rules, and targets in CloudWatch Events. For more information, see What Is Amazon CloudWatch Events.

Start a Pipeline Whenever a Source Repository Changes

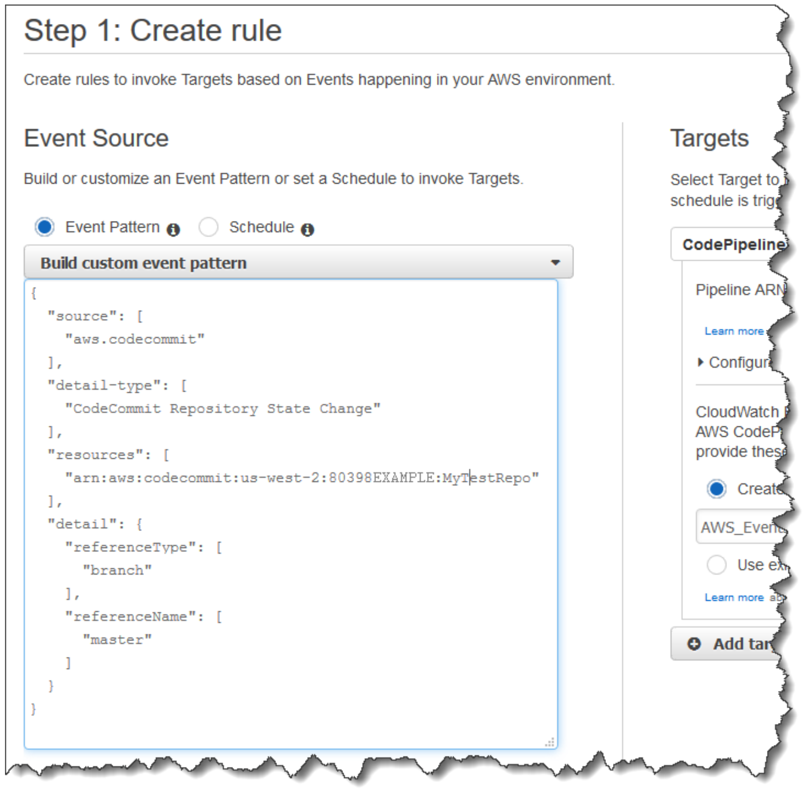
You can set up a rule in CloudWatch Events to start a pipeline as soon as the source repository changes.

Note
Your pipeline runs only when something changes in the source repository and branch you have defined.
Supported services can also be configured as CloudWatch event sources for Lambda functions. For more information, see Supported Event Sources in the AWS Lambda Developer Guide.

Start a Pipeline Whenever a Source Repository Changes (Console)

To create a CloudWatch Events rule that targets AWS CodePipeline

1. Open the CloudWatch console at https://console.aws.amazon.com/cloudwatch/.
2. In the navigation pane, choose **Events**.
3. Choose **Create rule**, and then under **Event source**, choose **CodeCommit** from the **Service Name** drop-down list.
4. The service name specifies the service that owns the event resource. For example, choose AWS CodeCommit to trigger a pipeline when there are changes to the CodeCommit repository associated with a pipeline.
5. From the **Event Type** drop-down list, choose **CodeCommit Repository State Change**.



Step 1: Create rule

Create rules to invoke Targets based on Events happening in your AWS environment.

Event Source

Build or customize an Event Pattern or set a Schedule to invoke Targets.

[✓ Event Pattern] Schedule

Build custom event pattern

```
{
  "source": [
    "aws.codecommit"
  ],
  "detail-type": [
    "CodeCommit Repository State Change"
  ],
  "resources": [
    "arn:aws:codecommit:us-west-2:80398EXAMPLE:MyTestRepo"
  ],
  "detail": {
    "referenceType": [
      "branch"
    ],
    "referenceName": [
      "master"
    ]
  }
}
```

6. To make a rule that applies to all repositories, choose **Any resource**.

   To make a rule that applies to one or more repositories, choose **Specific resource(s) by ARN**, and then enter the ARN.

   Note
   You can find a CodeCommit repository ARN on the **Settings** page in the CodeCommit console.

   To specify the branch to associate with the repository, select Edit above the **Event Pattern Preview** box, and type the resource type branch and the branch name. Use the event pattern options for `detail`. This preceding example shows the detail options for an AWS CodeCommit repository branch named "master." Choose **Save**.

   In the **Event Pattern Preview** pane, view the rule.

7. In the **Targets** area, choose **CodePipeline**.
8. Enter the pipeline ARN for the pipeline that will start when triggered by this rule.

   Note
   You can find the pipeline ARN in the metadata output after using the CLI to run the `get-pipeline` command. The pipeline ARN is constructed in this format:
   arn:aws:codepipeline:*region*:*account*:*pipeline-name*
   Sample pipeline ARN:
   arn:aws:codepipeline:us-east-2:80398EXAMPLE:MyFirstPipeline
9. Choose one of the following to create or specify an IAM service role that will give Amazon CloudWatch Events permissions to invoke the target associated with your Amazon CloudWatch Events rule (in this case, the target is AWS CodePipeline).

   - Select **Create a new role for this specific resource** to create a service role that gives Amazon CloudWatch Events permissions to your start your pipeline executions when triggered.
   - Select **Use existing role** to enter a service role that gives Amazon CloudWatch Events permissions to your start your pipeline executions when triggered.
10. Review your rule setup to make sure it meets your requirements.
11. Choose **Configure details**.
12. On the **Configure rule details** page, type a name and description for the rule, and then choose **State** to enable the rule.
13. If you're satisfied with the rule, choose **Create rule**.

Start a Pipeline Whenever a Source Repository Changes (CLI)

To use the AWS CLI to create a rule, call the **put-rule** command, specifying:

- A name that uniquely identifies the rule you are creating. This name must be unique across all of the pipelines you create with AWS CodePipeline associated with your AWS account.
- The event pattern for the source and detail fields used by the rule. For more information, see Amazon CloudWatch Events and Event Patterns.

To create a CloudWatch Events rule with AWS CodeCommit as the event source and AWS CodePipeline as the target

1. Call the **put-rule** command and include the **--name** and **--event-pattern** parameters.

   Use the following syntax:

   ```
   aws events put-rule
   --name "rule_name"
   --event-pattern "{"source":["aws.service_name"], "detail-type":["event_type"],
    "resources":"repository_ARN"]}"
   ```

   Examples:

   The following sample command uses **--event-pattern** to create a rule called MyCodeCommitRepoRule.

   ```
   aws events put-rule --name "MyCodeCommitRepoRule" --event-pattern "{\"source\":
   [\"aws.codecommit\"],\"detail-type\":[\"CodeCommit Repository State Change\"],\"detail
   \":{\"referenceType\":[\"branch\"],\"referenceName \":[\"master\"]}}"
   ```

2. To add AWS CodePipeline as a target, call the **put-targets** command and include the **--rule** and **--Id** parameters.

   Use the following syntax:

   ```
   aws events put-targets
   --rule rule_name
   --targets Id,ARN
   ```

   Examples:

   The following sample command specifies that for the rule called MyCodeCommitRepoRule, the target is the ID and ARN for the pipeline that starts when something changes in the repository.

   ```
   aws events put-targets --rule MyCodeCommitRepoRule --targets
    Id=1,Arn=arn:aws:codepipeline:us-west-2:80398EXAMPLE:TestPipeline
   ```

3. Add permissions for Amazon CloudWatch Events to use AWS CodePipeline to invoke the rule. For more information, see Using Resource-Based Policies for Amazon CloudWatch Events.

   a. Create the trust policy to allow CloudWatch Events to assume the service role. Use the following sample trust policy and name it "trustpolicyforCWE.json."

      ```
      {
          "Version": "2012-10-17",
          "Statement": [
              {
                  "Effect": "Allow",
                  "Principal": {
                      "Service": "events.amazonaws.com"
                  },
                  "Action": "sts:AssumeRole"
              }
          ]
      }
      ```

   b. Use the following command to create the "Role-for-MyRule" role and attach the trust policy:

      ```
      aws iam create-role --role-name Role-for-MyRule --assume-role-policy-document
       file://trustpolicyforCWE.json
      ```

   c. Create the permissions policy JSON as shown in this sample for the pipeline named “MyFirstPipeline.” Name the permissions policy “permissionspolicyforCWE.json”:

      ```
      {
          "Version": "2012-10-17",
          "Statement": [
              {
                  "Effect": "Allow",
                  "Action": [
                      "codepipeline:StartPipelineExecution"
                  ],
                  "Resource": [
                      "arn:aws:codepipeline:us-west-2:80398EXAMPLE:MyFirstPipeline"
                  ]
              }
          ]
      }
      ```

d. Use the following command to attach the new “CodePipeline-Permissions-Policy-for-CWE” permissions policy to the “Role-for-MyRule” role you created:

```
aws iam put-role-policy --role-name Role-for-MyRule --policy-name CodePipeline-
Permissions-Policy-For-CWE --policy-document file://permissionspolicyforCWE.json
```

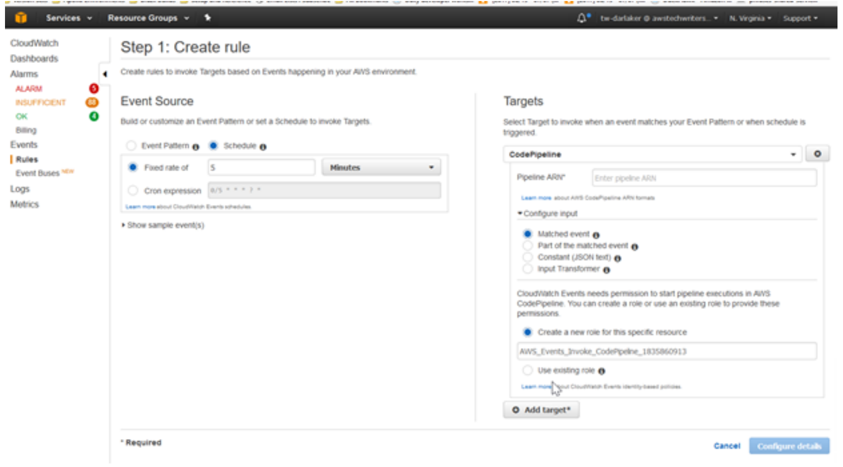
Start a Pipeline on a Schedule

You can set up a rule in Amazon CloudWatch Events to start a pipeline on a schedule.

Start a Pipeline on a Schedule (Console)

To create a CloudWatch Events schedule that uses AWS CodePipeline as a target

1. Open the CloudWatch console at https://console.aws.amazon.com/cloudwatch/.
2. In the navigation pane, choose **Events**.
3. Choose **Create rule**, and then under **Event Source**, choose **Schedule**.



Step 1: Create rule

Create rules to invoke Targets based on Events happening in your AWS environment.

Event Source

Build or customize an Event Pattern or set a Schedule to invoke Targets.

Event Pattern [✓ Schedule]

[✓ Fixed rate of] 5 Minutes

Cron expression 0/5 * * * ? *

Learn more about CloudWatch Events schedules

Show sample event(s)

Targets

Select Target to invoke when an event matches your Event Pattern or when schedule is triggered.

CodePipeline

Pipeline ARN* Enter pipeline ARN

Learn more about AWS CodePipeline ARN formats

Configure input

[✓ Matched event]
Part of the matched event
Constant (JSON text)
Input Transformer

CloudWatch Events needs permission to start pipeline executions in AWS CodePipeline. You can create a role or use an existing role to provide these permissions.

[✓ Create a new role for this specific resource]

AWS_Events_Invoke_CodePipeline_1835860913

Use existing role

Learn more about CloudWatch Events identity-based policies.

* Required

4. Set up the schedule using a fixed rate or expression. For information, see Schedule Expression for Rules.
5. In the **Targets** area, choose **CodePipeline**.
6. Enter the pipeline ARN for the pipeline execution that starts when triggered by this schedule.

   Note
   You can find the pipeline ARN in the metadata output after using the CLI to run the `get-pipeline` command.
7. Choose one of the following to create or specify an IAM service role that gives Amazon CloudWatch Events permissions to invoke the target associated with your Amazon CloudWatch Events rule (in this case, the target is AWS CodePipeline).

   - Select **Create a new role for this specific resource** to create a service role that gives Amazon CloudWatch Events permissions to your start your pipeline executions when triggered.
   - Select **Use existing role** to enter a service role that gives Amazon CloudWatch Events permissions to your start your pipeline executions when triggered.
8. Choose **Configure details**.
9. On the **Configure rule details** page, type a name and description for the rule, and then choose **State** to enable the rule.

10. If you're satisfied with the rule, choose **Create rule**.

Start a Pipeline on a Schedule (CLI)

To use the AWS CLI to create a rule, call the **put-rule** command, specifying:

- A name that uniquely identifies the rule you are creating. This name must be unique across all of the pipelines you create with AWS CodePipeline associated with your AWS account.
- The schedule expression for the rule.

To create a CloudWatch Events rule with a schedule as the event source

1. Call the **put-rule** command and include the **--name** and **--schedule-expression** parameters.

   Examples:

   The following sample command uses **--schedule-expression** to create a rule called MyRule2 that filters CloudWatch Events on a schedule.

   ```
   aws events put-rule --schedule-expression 'cron(15 10 ? * 6L 2002-2005)' --name MyRule2
   ```

2. Add permissions for Amazon CloudWatch Events to use AWS CodePipeline to invoke the rule. For more information, see Using Resource-Based Policies for Amazon CloudWatch Events.

   a. Create the trust policy to allow CloudWatch Events to assume the service role. Use the following sample trust policy and name it "trustpolicyforCWE.json."

      ```
      {
          "Version": "2012-10-17",
          "Statement": [
              {
                  "Effect": "Allow",
                  "Principal": {
                      "Service": "events.amazonaws.com"
                  },
                  "Action": "sts:AssumeRole"
              }
          ]
      }
      ```

   b. Use the following command to create the "Role-for-MyRule" role and attach the trust policy:

      ```
      aws iam create-role --role-name Role-for-MyRule --assume-role-policy-document
       file://trustpolicyforCWE.json
      ```

   c. Create the permissions policy JSON as shown in this sample for the pipeline named “MyFirstPipeline.” Name the permissions policy “permissionspolicyforCWE.json”:

      ```
      {
          "Version": "2012-10-17",
          "Statement": [
              {
                  "Effect": "Allow",
                  "Action": [
                      "codepipeline:StartPipelineExecution"
                  ],
                  "Resource": [
                      "arn:aws:codepipeline:us-west-2:80398EXAMPLE:MyFirstPipeline"
      ```

```
                ]
            }
        ]
}
```

d. Use the following command to attach the new “CodePipeline-Permissions-Policy-for-CWE” permissions policy to the “Role-for-MyRule” role you created:

```
aws iam put-role-policy --role-name Role-for-MyRule --policy-name CodePipeline-
Permissions-Policy-For-CWE --policy-document file://permissionspolicyforCWE.json
```

Migrate to Amazon CloudWatch Events Change Detection for Pipelines with an AWS CodeCommit Repository

You can now use event-based Amazon CloudWatch Events rules as the change detection method for your pipelines with a AWS CodeCommit repository. Amazon CloudWatch Events will detect changes in real time and then start your pipeline. AWS CodePipeline now creates the Amazon CloudWatch Events event-based rule when you create or edit a pipeline in the console.

This section includes migration procedures based on the type of pipeline.

Automatic Migration for Existing Pipelines

Existing pipelines are migrated automatically, as soon as the pipeline is edited in the console. AWS CodePipeline updates the pipeline and creates the rule when you choose **Update** on the **Edit** action page.

1. In the AWS CodePipeline console, open your pipeline and choose **Edit**.
2. On the **Edit** page, choose the pencil icon next to the source action.
3. On the **Edit action** page, choose the AWS CodeCommit repository. AWS CodePipeline automatically moves this source action to using Amazon CloudWatch Events for change detection.
4. Choose **Update**.
5. Choose **Save pipeline changes**.

For more information, see Edit a Pipeline (Console) (p. 76).

Reverting to Previous Detection Option

If your pipeline has been migrated to use Amazon CloudWatch Events for change detection, but you want to use the previous detection option, go to the AWS CodePipeline console. On the **Edit action** page, under **Change detection options**, clear the option to use Amazon CloudWatch Events.

1. In the AWS CodePipeline console, open your pipeline and choose **Edit**.
2. On the **Edit** page, choose the pencil icon next to the source action.
3. On the **Edit action** page, under **Change detection options**, choose the option to check periodically. (This option is not recommended.)
4. Choose **Update**.
5. Choose **Save pipeline changes**.

For more information, see Edit a Pipeline (Console) (p. 76).

Manual Migration for Pipelines Configured Using AWS CloudFormation Templates

If you own a pipeline with an AWS CodeCommit repository that you manage using an AWS CloudFormation template, you can modify the template and then follow the procedure to manually create the Amazon CloudWatch Events rule, as described in Start a Pipeline Automatically Using Amazon CloudWatch Events (p. 82).

Manual Migration for Pipelines Edited in the CLI

Existing pipelines are automatically migrated as soon as the pipeline is edited in the console. Migration is not performed for pipelines edited in the CLI.

1. Use the CLI to run the **update-pipeline** command and set the `PollForSourceChanges` parameter to `false`.
2. Create the Amazon CloudWatch Events rule as described in Start a Pipeline Automatically Using Amazon CloudWatch Events (p. 82).

For more information, see Edit a Pipeline (AWS CLI) (p. 77).

Start a Pipeline Automatically Using Periodic Checks

Pipelines start automatically when repository changes are detected. You can use rules set up in Amazon CloudWatch Events or periodic checks in AWS CodePipeline to detect repository changes.

Although periodic checks are the default way to start your pipeline automatically when something changes, Amazon CloudWatch Events is recommended. It's faster and more configurable.

- Amazon CloudWatch Events can be set up to detect changes in an AWS CodeCommit repository and start the pipeline automatically.
- Periodic checks are enabled by default, but can be disabled using the `PollForSourceChanges` flag. For more information, see AWS CodePipeline Pipeline Structure Reference (p. 201).

View Pipeline Details and History in AWS CodePipeline

You can use the AWS CodePipeline console or the AWS CLI to view details about pipelines associated with your AWS account.

Topics

View Pipeline Details and History (Console)

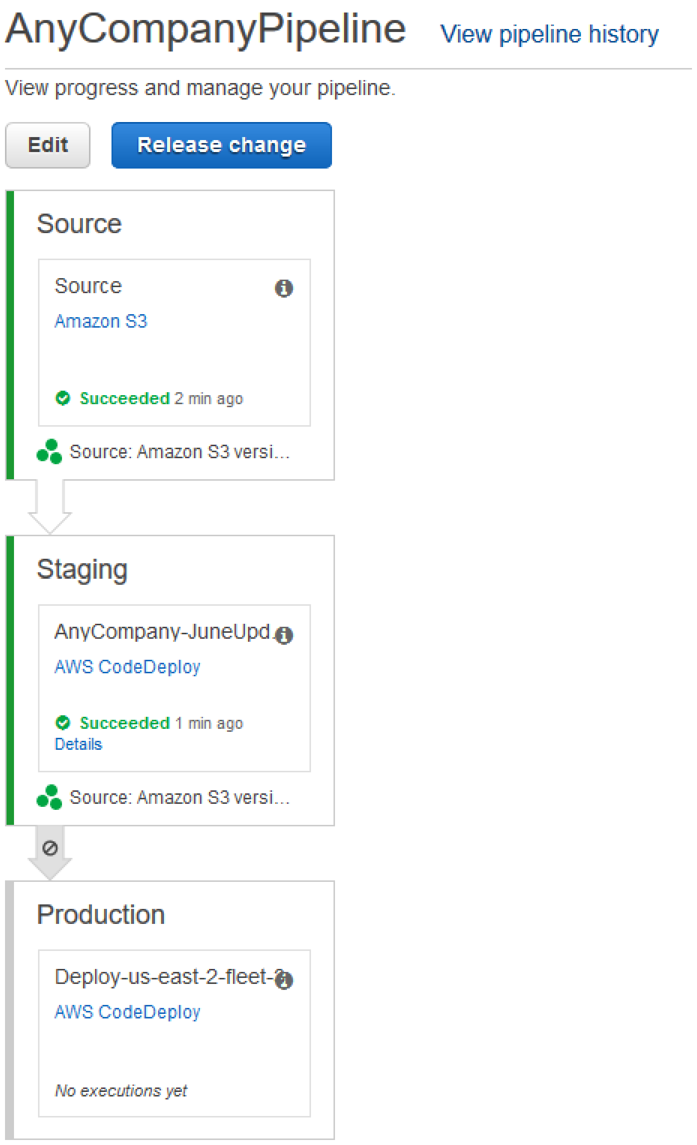
You can use the AWS CodePipeline console to view a list of all of the pipelines in your account. You can also view details for each pipeline, including when actions last ran in the pipeline, whether a transition between stages is enabled or disabled, whether any actions have failed, and other information. You can also view a history page that shows details for all pipeline executions for which history has been recorded. Execution history is limited to the most recent 12 months.

> **Note**
> After an hour, the detailed view of a pipeline will stop refreshing automatically in your browser. To view current information, refresh the page.

To view a pipeline

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.

   The names and creation date of all pipelines associated with your AWS account will be displayed, along with a link to view execution history for the pipeline.
2. To see details for a single pipeline, in **Name**, choose the pipeline. You'll see a detailed view of the pipeline, including the state of each action in each stage and the state of the transitions.



The graphical view displays the following information for each stage:

- The name of the stage.
- Every action configured for the stage.
- The state of transitions between stages (enabled or disabled), as indicated by the state of the arrow between stages. An enabled transition is indicated by a plain arrow. A disabled transition is indicated by a gray arrow and icon.
- A color bar to indicate the status of the stage:
  - Gray: No executions yet
  - Blue: In progress
  - Green: Succeeded
  - Red: Failed

The graphical view also displays the following information about actions in each stage:

- The name of the action.
- The provider of the action, such as AWS CodeDeploy.
- When the action was last run.
- Whether the action succeeded or failed.
- Links to other details about the last run of the action, where available.
- Details about the source revisions that are running through the latest pipeline execution in the stage or, for AWS CodeDeploy deployments, the latest source revisions that were deployed to target instances.

3. To see the configuration details for an action in a stage of a pipeline, choose or hover over the information icon next to the action.
4. To view the details of the provider of the action, choose the provider. For example, in the preceding example pipeline, if you choose AWS CodeDeploy in either the Staging or Production stages the AWS CodeDeploy console page for the deployment group configured for that stage is displayed.
5. To see the progress details for an action in a stage, choose **Details** when it is displayed next to an action in progress (indicated by an **In Progress** message). If the action is in progress, you will see the incremental progress and the steps or actions as they occur.

   Note
   Details are available for source actions that retrieve content from GitHub repositories, but not those that retrieve content from Amazon S3 buckets or AWS CodeCommit repositories.
6. To approve or reject actions that have been configured for manual approval, choose **Review**.
7. To retry actions in a stage that were not completed successfully, choose **Retry**.
8. To get more information about errors or failures for a completed action in a stage, choose **Details**. You will see details from the last time the action ran, including the results of that action, **Succeeded** or **Failed**.
9. To view details about source artifacts (output artifact that originated in the first stage of a pipeline) that are used the latest pipeline execution for a stage, click in the details information area at the bottom of the stage. You can view details about identifiers, such as commit IDs, check-in comments, and the time since the artifact was created or updated. For more information, see View Current Source Revision Details in a Pipeline in AWS CodePipeline (p. 162).
10. To view details about the most recent executions for the pipeline, choose **View pipeline history** next to the pipeline's name. For past executions, you can view revision details associated with source artifacts, such as execution IDs, status, start and end times, duration, and commit IDs and messages.

View Pipeline Details and History (CLI)

You can run the following commands to view details about your pipelines and pipeline executions:

- **list-pipelines** command to view a summary of all of the pipelines associated with your AWS account.
- **get-pipeline** command to review details of a single pipeline.
- **list-pipeline-executions** to view summaries of the most recent executions for a pipeline.
- **get-pipeline-execution** to view information about an execution of a pipeline, including details about artifacts, the pipeline execution ID, and the name, version, and status of the pipeline.

For information about using the CLI to view details about the source revisions used in the latest pipeline execution for a stage, see View Current Source Revision Details in a Pipeline (CLI) (p. 163).

To view a pipeline

1. Open a terminal (Linux, macOS, or Unix) or command prompt (Windows) and use the AWS CLI to run the **list-pipelines** command, as follows:

```
aws codepipeline list-pipelines
```

   This command returns a list of all of the pipelines associated with your AWS account.
2. To view details about a pipeline, run the **get-pipeline** command, specifying the unique name of the pipeline. For example, to view details about a pipeline named *MyFirstPipeline*, you would type the following:

```
aws codepipeline get-pipeline --name MyFirstPipeline
```

   This command returns the structure of the pipeline.
3. To view details about the current state of a pipeline, run the **get-pipeline-state** command, specifying the unique name of the pipeline. For example, to view details about the current state of a pipeline named *MyFirstPipeline*, you would type the following:

```
aws codepipeline get-pipeline-state --name MyFirstPipeline
```

   This command returns the current status of all stages of the pipeline and the status of the actions within those stages.

   The following example shows the returned data for a three-stage pipeline named *MyFirstPipeline*, where the first two stages and actions show success, the third shows failure, and the transition between the second and third stages is disabled:

```
{
    "updated": 1427245911.525,
    "created": 1427245911.525,
    "pipelineVersion": 1,
    "pipelineName": "MyFirstPipeline",
    "stageStates": [
        {
            "actionStates": [
                {
                    "actionName": "Source",
                    "entityUrl": "https://console.aws.amazon.com/s3/home?#",
                    "latestExecution": {
                        "status": "Succeeded",
                        "lastStatusChange": 1427298837.768
                    }
                }
            ],
            "stageName": "Source"
        },
        {
            "actionStates": [
                {
                    "actionName": "Deploy-CodeDeploy-Application",
                    "entityUrl": "https://console.aws.amazon.com/codedeploy/home?#",
                    "latestExecution": {
                        "status": "Succeeded",
                        "lastStatusChange": 1427298939.456,
                        "externalExecutionUrl": "https://console.aws.amazon.com/?#",
                        "externalExecutionId": ""c53dbd42-This-Is-An-Example"",
                        "summary": "Deployment Succeeded"
                    }
                }
            ],
            "inboundTransitionState": {
                "enabled": true
            },
            "stageName": "Staging"
        },
        {
            "actionStates": [
                {
                    "actionName": "Deploy-Second-Deployment",
                    "entityUrl": "https://console.aws.amazon.com/codedeploy/home?#",
                    "latestExecution": {
                        "status": "Failed",
                        "errorDetails": {
                            "message": "Deployment Group is already deploying
 deployment ...",
                            "code": "JobFailed"
                        },
                        "lastStatusChange": 1427246155.648
                    }
                }
            ],
            "inboundTransitionState": {
                "disabledReason": "Disabled while I investigate the failure",
                "enabled": false,
                "lastChangedAt": 1427246517.847,
                "lastChangedBy": "arn:aws:iam::80398EXAMPLE:user/CodePipelineUser"
            },
            "stageName": "Production"
        }
    ]
}
```

4. To view details about past executions of a pipeline, run the **list-pipeline-executions** command, specifying the unique name of the pipeline. For example, to view details about the current state of a pipeline named *MyFirstPipeline*, you would type the following:

```
aws codepipeline list-pipeline-executions --pipeline-name MyFirstPipeline
```

This command returns summary information about all pipeline executions for which history has been recorded over the most recent 12 months. The summary includes start and end times, duration, and status.

The following example shows the returned data for a pipeline named *MyFirstPipeline* that has had three executions:

```
{
    "pipelineExecutionSummaries": [
        {
            "lastUpdateTime": 1496380678.648,
            "pipelineExecutionId": "7cf7f7cb-3137-539g-j458-d7eu3EXAMPLE",
            "startTime": 1496380258.243,
            "status": "Succeeded"
        },
        {
            "lastUpdateTime": 1496591045.634,
            "pipelineExecutionId": "3137f7cb-8d494hj4-039j-d84l-d7eu3EXAMPLE",
            "startTime": 1496590401.222,
            "status": "Succeeded"
        },
        {
            "lastUpdateTime": 1496946071.6456,
            "pipelineExecutionId": "4992f7jf-7cf7-913k-k334-d7eu3EXAMPLE",
            "startTime": 1496945471.5645,
            "status": "Succeeded"
        }
    ]
}
```

To view additional details about a pipeline execution, run the **get-pipeline-execution**, specifying the unique ID of the pipeline execution. For example, to view more details about the first execution in the previous example, you would type the following:

```
aws codepipeline get-pipeline-execution --pipeline-name MyFirstPipeline --pipeline-
execution-id 7cf7f7cb-3137-539g-j458-d7eu3EXAMPLE
```

This command returns summary information about an execution of a pipeline, including details about artifacts, the pipeline execution ID, and the name, version, and status of the pipeline.

The following example shows the returned data for a pipeline named *MyFirstPipeline*:

```
{
    "pipelineExecution": {
        "pipelineExecutionId": "3137f7cb-7cf7-039j-s83l-d7eu3EXAMPLE",
        "pipelineVersion": 2,
        "pipelineName": "MyFirstPipeline",
        "status": "Succeeded",
        "artifactRevisions": [
            {
                "created": 1496380678.648,
                "revisionChangeIdentifier": "1496380258.243",
                "revisionId": "7636d59f3c461cEXAMPLE8417dbc6371",
                "name": "MyApp",
                "revisionSummary": "Updating the application for feature 12-4820"
            }
        ]
    }
}
```

Delete a Pipeline in AWS CodePipeline

You can always edit a pipeline to change its functionality, but you might decide you want to delete it instead. You can delete a pipeline by using the AWS CodePipeline console or by using the AWS CLI and **delete-pipeline** command.

Topics

Delete a Pipeline (Console)

To delete a pipeline in the AWS CodePipeline console

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.
2. The names of all pipelines associated with your AWS account are displayed, along with their status.
3. In **Name**, choose the name of the pipeline you want to delete. This opens a detailed view of the pipeline.
4. On the pipeline details page, choose **Edit**. This opens the editing page for the pipeline.
5. On the **Edit** page, choose **Delete**.
6. Type the name of the pipeline, and then choose **Delete**.

   Important
   This action cannot be undone.

Delete a Pipeline (CLI)

To manually delete a pipeline by using the AWS CLI, use the delete-pipeline command.

Important
Deleting a pipeline is irreversible. There is no confirmation dialog box. After the command is run, the pipeline is deleted, but none of the resources used in the pipeline are deleted. This makes it easier to create a new pipeline that uses those resources to automate the release of your software.

To delete a pipeline by using the AWS CLI

1. Open a terminal (Linux, macOS, or Unix) or command prompt (Windows) and use the AWS CLI to run the **delete-pipeline** command, specifying the name of the pipeline you want to delete. For example, to delete a pipeline named *MyFirstPipeline*:

   ```
   aws codepipeline delete-pipeline --name MyFirstPipeline
   ```

   This command returns nothing.
2. Delete any resources no longer needed.

   Note
   Deleting a pipeline does not delete the resources used in the pipeline, such as the AWS CodeDeploy or Elastic Beanstalk application you used to deploy your code, or, if you created your pipeline from the AWS CodePipeline console, the Amazon S3 bucket AWS CodePipeline created to store the artifacts of your pipelines. Make sure that you delete resources that are no longer required so that you will not be charged for them in the future. For example, when you use the console to create a pipeline for the first time, AWS CodePipeline creates one Amazon S3 bucket to store all artifacts for all of your pipelines. If you have deleted all of your pipelines, follow the steps in Deleting a Bucket.

Create a Pipeline in AWS CodePipeline That Uses Resources from Another AWS Account

You might want to create a pipeline that uses resources created or managed by another AWS account. For example, you might want to use one account for your pipeline and another for your AWS CodeDeploy resources. To do so, you must create a AWS Key Management Service (AWS KMS) key to use, add the key to the pipeline, and set up account policies and roles to enable cross-account access.

> **Note**
> Source actions cannot use Amazon S3 buckets from other AWS accounts.

In this walkthrough and its examples, *AccountA* is the account originally used to create the pipeline. It has access to the Amazon S3 bucket used to store pipeline artifacts and the service role used by AWS CodePipeline. *AccountB* is the account originally used to create the AWS CodeDeploy application, deployment group, and service role used by AWS CodeDeploy.

For *AccountA* to edit a pipeline to use the AWS CodeDeploy application created by *AccountB*, *AccountA* must:

- Request the ARN or account ID of *AccountB* (in this walkthrough, the *AccountB* ID is *012ID_ACCOUNT_B*).
- Create or use an AWS KMS customer-managed key in the region for the pipeline, and grant permissions to use that key to the service role (*AWS-CodePipeline-Service*) and *AccountB*.
- Create an Amazon S3 bucket policy that grants *AccountB* access to the Amazon S3 bucket (for example, *codepipeline-us-east-2-1234567890*).
- Create a policy that allows *AccountA* to assume a role configured by *AccountB*, and attach that policy to the service role (*AWS-CodePipeline-Service*).
- Edit the pipeline to use the customer-managed AWS KMS key instead of the default key.

For *AccountB* to allow access to its resources to a pipeline created in *AccountA*, *AccountB* must:

- Request the ARN or account ID of *AccountA* (in this walkthrough, the *AccountA* ID is *012ID_ACCOUNT_A*).
- Create a policy applied to the Amazon EC2 instance role configured for AWS CodeDeploy that allows access to the Amazon S3 bucket (*codepipeline-us-east-2-1234567890*).
- Create a policy applied to the Amazon EC2 instance role configured for AWS CodeDeploy that allows access to the AWS KMS customer-managed key used to encrypt the pipeline artifacts in *AccountA*.
- Configure and attach an IAM role (*CrossAccount_Role*) with a trust relationship policy that allows *AccountA* to assume the role.
- Create a policy that allows access to the deployment resources required by the pipeline and attach it to *CrossAccount_Role*.
- Create a policy that allows access to the Amazon S3 bucket (*codepipeline-us-east-2-1234567890*) and attach it to *CrossAccount_Role*.

Topics

Prerequisite: Create an AWS KMS Encryption Key

Customer-managed keys are specific to a region, as are all AWS KMS keys. You must create your customer-managed AWS KMS key in the same region where the pipeline was created (for example, `us-east-2`).

Note
For more information about the regions and endpoints available for AWS CodePipeline, see Regions and Endpoints.

To create a customer-managed key in AWS KMS

1. Sign in to the AWS Management Console with *`AccountA`* and open the IAM console at https://console.aws.amazon.com/iam/.
2. In **Dashboard**, choose **Encryption keys**.
3. In **Encryption keys**, in **Filter**, make sure the region selected is the same as the region where the pipeline was created, and then choose **Create key**.

   For example, if the pipeline was created in us-east-2, make sure the filter is set to US East (Ohio).
4. In **Alias**, type an alias to use for this key (for example, *`PipelineName-Key`*). Optionally, provide a description for this key, and then choose **Next Step**.
5. In **Define Key Administrative Permissions**, choose your IAM user and any other users or groups you want to act as administrators for this key, and then choose **Next Step**.
6. In **Define Key Usage Permissions**, under **This Account**, select the name of the service role for the pipeline (for example, AWS-CodePipeline-Service). Under **External Accounts**, choose **Add an External Account**. Type the account ID for *`AccountB`* to complete the ARN, and then choose **Next Step**.
7. In **Preview Key Policy**, review the policy, and then choose **Finish**.
8. From the list of keys, choose the alias of your key and copy its ARN (for example, ***`arn:aws:kms:us-east-2:012ID_ACCOUNT_A:key/2222222-3333333-4444-556677EXAMPLE`***). You will need this when you edit your pipeline and configure policies.

Step 1: Set Up Account Policies and Roles

Once you have created the AWS KMS key, you must create and attach policies that will enable the cross-account access. This requires actions from both *`AccountA`* and *`AccountB`*.

Topics

Configure Policies and Roles in the Account That Will Create the Pipeline (*`AccountA`*)

To create a pipeline that uses AWS CodeDeploy resources associated with another AWS account, *`AccountA`* must configure policies for both the Amazon S3 bucket used to store artifacts and the service role for AWS CodePipeline.

To create a policy for the Amazon S3 bucket that grants access to AccountB (console)

1. Sign in to the AWS Management Console with *`AccountA`* and open the Amazon S3 console at https://console.aws.amazon.com/s3/.

2. In the list of Amazon S3 buckets, choose the Amazon S3 bucket where artifacts for your pipelines are stored. This bucket is named codepipeline-*region*-*1234567EXAMPLE*, where *region* is the AWS region in which you created the pipeline and *1234567EXAMPLE* is a ten-digit random number that ensures the bucket name is unique (for example, *codepipeline-us-east-2-1234567890*).
3. On the detail page for the Amazon S3 bucket, choose **Properties**.
4. In the properties pane, expand **Permissions**, and then choose **Add bucket policy**.

   Note
   If a policy is already attached to your Amazon S3 bucket, choose **Edit bucket policy**. You can then add the statements in the following example to the existing policy. To add a new policy, choose the link, and follow the instructions in the AWS Policy Generator. For more information, see Overview of IAM Policies.
5. In the **Bucket Policy Editor** window, type the following policy. This will allow *AccountB* access to the pipeline artifacts, and will give *AccountB* the ability to add output artifacts if an action, such as a custom source or build action, creates them.

   In the following example, the ARN is for *AccountB* is *012ID_ACCOUNT_B*. The ARN for the Amazon S3 bucket is *codepipeline-us-east-2-1234567890*. Replace these ARNs with the ARN for the account you want to allow access and the ARN for the Amazon S3 bucket:

```
{
 "Version": "2012-10-17",
 "Id": "SSEAndSSLPolicy",
 "Statement": [
{
  "Sid": "DenyUnEncryptedObjectUploads",
  "Effect": "Deny",
  "Principal": "*",
  "Action": "s3:PutObject",
  "Resource": "arn:aws:s3:::codepipeline-us-east-2-1234567890/*",
  "Condition": {
 "StringNotEquals": {
 "s3:x-amz-server-side-encryption": "aws:kms"
 }
   }
 },
{
  "Sid": "DenyInsecureConnections",
  "Effect": "Deny",
  "Principal": "*",
  "Action": "s3:*",
  "Resource": "arn:aws:s3:::codepipeline-us-east-2-1234567890/*",
  "Condition": {
 "Bool": {
    "aws:SecureTransport": false
  }
 }
  },
{
  "Sid": "",
  "Effect": "Allow",
  "Principal": {
 "AWS": "arn:aws:iam::012ID_ACCOUNT_B:root"
 },
  "Action": [
           "s3:Get*",
           "s3:Put*"
       ],
  "Resource": "arn:aws:s3:::codepipeline-us-east-2-1234567890/*"
},
{
  "Sid": "",
   "Effect": "Allow",
   "Principal": {
       "AWS": "arn:aws:iam::012ID_ACCOUNT_B:root"
   },
   "Action": "s3:ListBucket",
   "Resource": "arn:aws:s3:::codepipeline-us-east-2-1234567890"
 }
   ]
}
```

6. Choose **Save**, and then close the policy editor.
7. Choose **Save** to save the permissions for the Amazon S3 bucket.

To create a policy for the service role for AWS CodePipeline (console)

1. Sign in to the AWS Management Console with *AccountA* and open the IAM console at https://console.aws.amazon.com/iam/.
2. In **Dashboard**, choose **Roles**.
3. In the list of roles, under **Role Name**, choose the name of the service role for AWS CodePipeline. By default, this is AWS-CodePipeline-Service. If you used a different name for your service role, be sure to choose it from the list.
4. On the **Summary** page, on the **Permissions** tab, expand **Inline Policies**, and then choose **Create Role Policy**.

   Note
   If you have not previously created any role policies, **Create Role Policy** will not appear. Choose the link to create a new policy instead.
5. In **Set Permissions**, choose **Custom Policy**, and then choose **Select**.
6. On the **Review Policy** page, type a name for the policy in **Policy Name**. In **Policy Document**, type the following policy to allow *AccountB* to assume the role. In the following example, *012ID_ACCOUNT_B* is the ARN for *AccountB*:

```
{
   "Version": "2012-10-17",
   "Statement": {
       "Effect": "Allow",
       "Action": "sts:AssumeRole",
       "Resource": [
           "arn:aws:iam::012ID_ACCOUNT_B:role/*"
       ]
   }
 }
```

7. Choose **Validate Policy**.
8. After the policy is validated, choose **Apply Policy**.

Configure Policies and Roles in the Account That Owns the AWS Resource (*AccountB*)

When you create an application, deployment, and deployment group in AWS CodeDeploy, you also create an Amazon EC2 instance role. (This role is created for you if you use the Run Deployment Walkthrough wizard, but you can also create it manually.) For a pipeline created in *AccountA* to use AWS CodeDeploy resources created in *AccountB*, you must:

- Configure a policy for the instance role that allows it to access the Amazon S3 bucket where pipeline artifacts are stored.

- Create a second role in *AccountB* configured for cross-account access.

  This second role must not only have access to the Amazon S3 bucket in *AccountA*, it must also contain a policy that allows access to the AWS CodeDeploy resources and a trust relationship policy that allows *AccountA* to assume the role.

  Note
  These policies are specific to setting up AWS CodeDeploy resources to be used in a pipeline created using a different AWS account. Other AWS resources will require policies specific to their resource requirements.

To create a policy for the Amazon EC2 instance role configured for AWS CodeDeploy (console)

1. Sign in to the AWS Management Console with *AccountB* and open the IAM console at https://console.aws.amazon.com/iam/.
2. In **Dashboard**, choose **Roles**.
3. In the list of roles, under **Role Name**, choose the name of the service role used as the Amazon EC2 instance role for the AWS CodeDeploy application. This role name can vary, and more than one instance role can be used by a deployment group. For more information, see Create an IAM Instance Profile for your Amazon EC2 Instances.
4. On the **Summary** page, on the **Permissions** tab, expand **Inline Policies**, and then choose **Create Role Policy**.
5. In **Set Permissions**, choose **Custom Policy**, and then choose **Select**.
6. On the **Review Policy** page, type a name for the policy in **Policy Name**. In **Policy Document**, type the following policy to grant access to the Amazon S3 bucket used by *AccountA* to store artifacts for pipelines (in this example, *codepipeline-us-east-2-1234567890*):

```
{
   "Version": "2012-10-17",
   "Statement": [
     {
       "Effect": "Allow",
       "Action": [
         "s3:Get*"
       ],
       "Resource": [
         "arn:aws:s3:::codepipeline-us-east-2-1234567890/*"
       ]
     },
     {
       "Effect": "Allow",
       "Action": [
         "s3:ListBucket"
       ],
       "Resource": [
         "arn:aws:s3:::codepipeline-us-east-2-1234567890"
       ]
     }
   ]
 }
```

7. Choose **Validate Policy**.
8. After the policy is validated, choose **Apply Policy**.
9. Create a second policy for AWS KMS where ***arn:aws:kms:us-east-1:012ID_ACCOUNT_A:key/2222222-3333333-4444-556677EXAMPLE*** is the ARN of the customer-managed key created in *AccountA* and configured to allow *AccountB* to use it:

```
{
    "Version": "2012-10-17",
    "Statement": [
      {
        "Effect": "Allow",
        "Action": [
           "kms:DescribeKey",
           "kms:GenerateDataKey*",
           "kms:Encrypt",
           "kms:ReEncrypt*",
           "kms:Decrypt"
          ],
        "Resource": [
           "arn:aws:kms:us-
east-1:012ID_ACCOUNT_A:key/2222222-3333333-4444-556677EXAMPLE"
          ]
      }
   ]
}
```

Important
You must use the account ID of *AccountA* in this policy as part of the resource ARN for the AWS KMS key, as shown here, or the policy will not work.

10. Choose **Validate Policy**.
11. After the policy is validated, choose **Apply Policy**.

Now create an IAM role to use for cross-account access, and configure it so that *AccountA* can assume the role. This role must contain policies that allow access to the AWS CodeDeploy resources and the Amazon S3 bucket used to store artifacts in *AccountA*.

To configure the cross-account role in IAM

1. Sign in to the AWS Management Console with *AccountB* and open the IAM console at https://console.aws.amazon.com/iam/.
2. In **Dashboard**, choose **Roles**, and then choose **Create New Role**.
3. On the **Set New Role** page, type a name for this role in **Role Name** (for example, *CrossAccount_Role*). You can name this role anything you want as long as it follows the naming conventions in IAM. Consider giving the role a name that clearly states its purpose.
4. On the **Select Role Type** page, choose **Role for Cross-Account Access**. Next to **Provide access between AWS accounts you own**, choose **Select**.
5. Type the AWS account ID for the account that will create the pipeline in AWS CodePipeline (*AccountA*), and then choose **Next Step**.

   Note
   This step creates the trust relationship policy between *AccountB* and *AccountA*.
6. In **Attach Policy**, choose **AmazonS3ReadOnlyAccess**, and then choose **Next Step**.

   Note
   This is not the policy you will use. You must choose a policy to complete the wizard.
7. On the **Review** page, choose **Create Role**.
8. From the list of roles, choose the policy you just created (for example, *CrossAccount_Role*) to open the **Summary** page for that role.
9. Expand **Permissions**, and then expand **Inline Policies**. Choose the link to create an inline policy.
10. In **Set Permissions**, choose **Custom Policy**, and then choose **Select**.

11. On the **Review Policy** page, type a name for the policy in **Policy Name**. In **Policy Document**, type the following policy to allow access to AWS CodeDeploy resources:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "codedeploy:CreateDeployment",
        "codedeploy:GetDeployment",
        "codedeploy:GetDeploymentConfig",
        "codedeploy:GetApplicationRevision",
        "codedeploy:RegisterApplicationRevision"
      ],
      "Resource": "*"
    }
  ]
}
```

12. Choose **Validate Policy**.
13. After the policy is validated, choose **Apply Policy**.
14. In **Inline Policies**, choose **Create Role Policy**.
15. In **Set Permissions**, choose **Custom Policy**, and then choose **Select**.
16. On the **Review Policy** page, type a name for the policy in **Policy Name**. In **Policy Document**, type the following policy to allow this role to retrieve input artifacts from, and put output artifacts into, the Amazon S3 bucket in *AccountA*:

```
{
   "Version": "2012-10-17",
   "Statement": [
     {
       "Effect": "Allow",
       "Action": [
         "s3:GetObject*",
         "s3:PutObject",
         "s3:PutObjectAcl",
         "codecommit:ListBranches",
         "codecommit:ListRepositories"
       ],
       "Resource": [
         "arn:aws:s3:::codepipeline-us-east-2-1234567890/*"
       ]
     }
   ]
}
```

17. Choose **Validate Policy**.
18. When the policy is validated, choose **Apply Policy**.
19. In **Managed Policies**, find **AmazonS3ReadOnlyAccess** in the list of policies under **Policy Name**, and choose **Detach Policy**. When prompted, choose **Detach**.

Step 2: Edit the Pipeline

You cannot use the AWS CodePipeline console to create or edit a pipeline that uses resources associated with another AWS account. However, you can use the console to create the general structure of the pipeline, and then use the AWS CLI to edit the pipeline and add those resources. Alternatively, you can use the structure of an existing pipeline and manually add the resources to it.

To add the resources associated with another AWS account (AWS CLI)

1. At a terminal (Linux, macOS, or Unix) or command prompt (Windows), run the **get-pipeline** command on the pipeline to which you want to add resources. Copy the command output to a JSON file. For example, for a pipeline named MyFirstPipeline, you would type something similar to the following:

   ```
   aws codepipeline get-pipeline --name MyFirstPipeline >pipeline.json
   ```

   The output is sent to the *`pipeline.json`* file.

2. Open the JSON file in any plain-text editor. After `"type": "S3"` in the artifact store, add the KMS encryptionKey, ID, and type information where *`codepipeline-us-east-2-1234567890`* is the name of the Amazon S3 bucket used to store artifacts for the pipeline and ***`arn:aws:kms:us-east-1:012ID_ACCOUNT_A:key/2222222-3333333-4444-556677EXAMPLE`*** is the ARN of the customer-managed key you just created:

   ```
   {
     "artifactStore”: {
       "location": "codepipeline-us-east-2-1234567890",
       "type": "S3",
       "encryptionKey": {
         "id": "arn:aws:kms:us-
   east-1:012ID_ACCOUNT_A:key/2222222-3333333-4444-556677EXAMPLE",
         "type": "KMS"
       }
     },
   ```

3. Add a deploy action in a stage to use the AWS CodeDeploy resources associated with *`AccountB`*, including the `roleArn` values for the cross-account role you created (*`CrossAccount_Role`*).

   The following example shows JSON that adds a deploy action named *`ExternalDeploy`*. It uses the AWS CodeDeploy resources created in *`AccountB`* in a stage named *`Staging`*. In the following example, the ARN for *`AccountB`* is *`012ID_ACCOUNT_B`*:

   ```
   ,
               {
                   "name": "Staging",
                   "actions": [
                       {
                           "inputArtifacts": [
                               {
                                   "name": "MyAppBuild"
                               }
                           ],
                           "name": "ExternalDeploy",
                           "actionTypeId": {
                               "category": "Deploy",
                               "owner": "AWS",
                               "version": "1",
                               "provider": "CodeDeploy"
                           },
                           "outputArtifacts": [],
                           "configuration": {
                               "ApplicationName": "AccountBApplicationName",
                               "DeploymentGroupName": "AccountBApplicationGroupName"
                           },
                           "runOrder": 1,
                           "roleArn":
    "arn:aws:iam::012ID_ACCOUNT_B:role/CrossAccount_Role"
                       }
                   ]
   ```

```
            }
```

Note
This is not the JSON for the entire pipeline, just the structure for the action in a stage.

4. Save the file.
5. To apply your changes, run the **update-pipeline** command, specifying the pipeline JSON file, similar to the following:

   Important
   Be sure to include `file://` before the file name. It is required in this command.

   ```
   aws codepipeline update-pipeline --cli-input-json file://pipeline.json
   ```

   This command returns the entire structure of the edited pipeline.

To test the pipeline that uses resources associated with another AWS account

1. At a terminal (Linux, macOS, or Unix) or command prompt (Windows), run the **start-pipeline-execution** command, specifying the name of the pipeline, similar to the following:

   ```
   aws codepipeline start-pipeline-execution --name MyFirstPipeline
   ```

   For more information, see Start a Pipeline Manually in AWS CodePipeline (p. 81).
2. Sign in to the AWS Management Console with *`AccountA`* and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.

   The names of all pipelines associated with your AWS account are displayed.
3. In **Name**, choose the name of the pipeline you just edited. This opens a detailed view of the pipeline, including the state of each action in each stage of the pipeline.
4. Watch the progress through the pipeline. Wait for a success message on the action that uses the resource associated with another AWS account.

   Note
   You will receive an error if you try to view details for the action while signed in with *`AccountA`*. Sign out, and then sign in with *`AccountB`* to view the deployment details in AWS CodeDeploy.

Working with Actions in AWS CodePipeline

In AWS CodePipeline, an action is part of the sequence in a stage of a pipeline. It is a task performed on the artifact in that stage. Pipeline actions occur in a specified order, in sequence or in parallel, as determined in the configuration of the stage.

AWS CodePipeline provides support for six types of actions:

- Source
- Build
- Test
- Deploy
- Approval
- Invoke

For information about the AWS services and partner products and services you can integrate into your pipeline based on action type, see Integrations with AWS CodePipeline Action Types (p. 11).

Topics

Create and Add a Custom Action in AWS CodePipeline

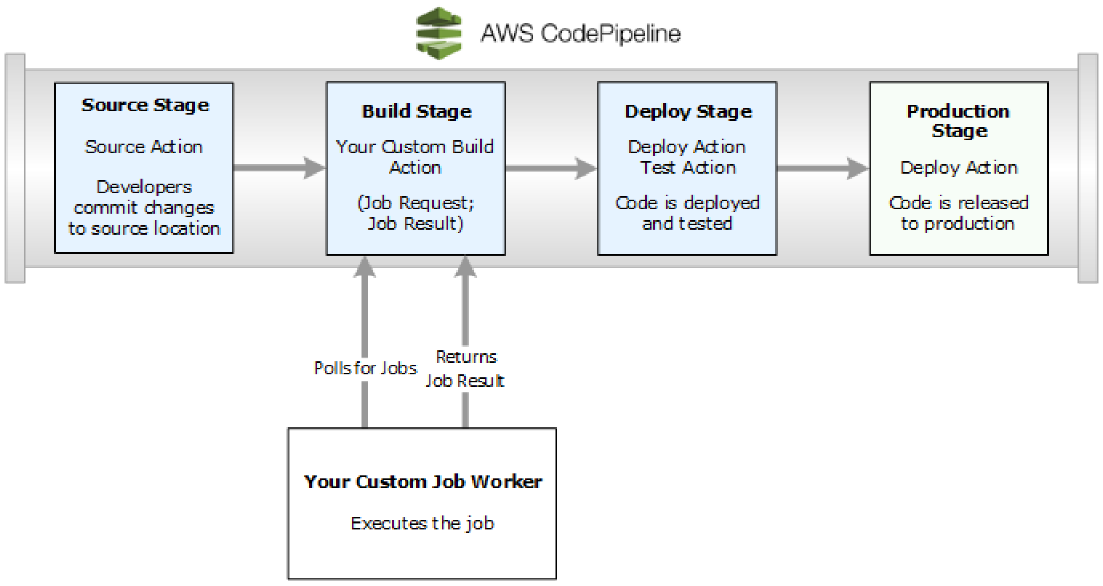
AWS CodePipeline includes a number of actions that help you configure build, test, and deployment resources for your automated release process. If your release process includes activities that are not included in the default actions, such as an internally developed build process or a test suite, you can create a custom action for that purpose and include it in your pipeline. You can use the AWS CLI to create custom actions in pipelines associated with your AWS account.

Custom actions fall into the following categories:

- A build action that builds or transforms the items
- A deploy action that deploys items to one or more servers, websites, or repositories
- A test action that configures and runs automated tests
- An invoke action that runs functions

When you create a custom action, you must also create a job worker that will poll AWS CodePipeline for job requests for this custom action, execute the job, and return the status result to AWS CodePipeline. This job worker can be located on any computer or resource as long as it has access to the public endpoint for AWS CodePipeline. To easily manage access and security, consider hosting your job worker on an Amazon EC2 instance.

The following diagram shows a high-level view of a pipeline that includes a custom build action:



When a pipeline includes a custom action as part of a stage, the pipeline will create a job request. A custom job worker detects that request and performs that job (in this example, a custom process using third-party build software). When the action is complete, the job worker returns either a success result or a failure result. If a success result is received, the pipeline will transition the revision and its artifacts to the next action. If a failure is returned, the pipeline will not transition the revision to the next action in the pipeline.

Note
These instructions assume that you have already completed the steps in Getting Started with AWS CodePipeline (p. 9).

Topics

Create a Custom Action (CLI)

Create a custom action with the AWS CLI

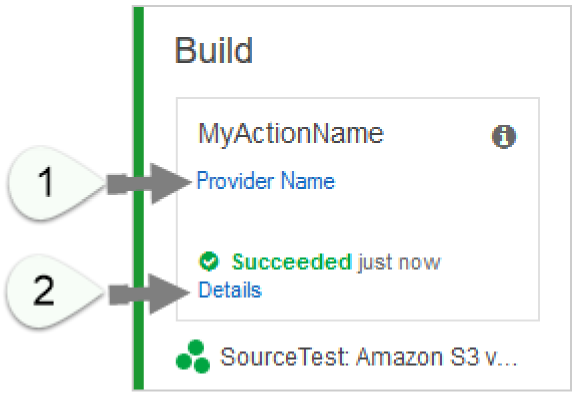
1. Open a text editor and create a JSON file for your custom action that includes the action category, the action provider, and any settings required by your custom action. For example, to create a custom build action that requires only one property, your JSON file might look like this:

```
{
    "category": "Build",
    "provider": "My-Build-Provider-Name",
    "version": "1",
    "settings": {
        "entityUrlTemplate": "https://my-build-instance/job/{Config:ProjectName}/",
        "executionUrlTemplate": "https://my-build-instance/job/{Config:ProjectName}/
lastSuccessfulBuild/{ExternalExecutionId}/"
    },
    "configurationProperties": [{
        "name": "ProjectName",
        "required": true,
        "key": true,
        "secret": false,
        "queryable": false,
        "description": "The name of the build project must be provided when this action
 is added to the pipeline.",
        "type": "String"
    }],
    "inputArtifactDetails": {
        "maximumCount": integer,
        "minimumCount": integer
    },
    "outputArtifactDetails": {
        "maximumCount": integer,
        "minimumCount": integer
    }
}
```

You'll notice that there are two properties included in the JSON file, `entityUrlTemplate` and `executionUrlTemplate`. You can refer to a name in the configuration properties of the custom action within the URL templates by following the format of `{Config:`*`name`*`}`, as long as the configuration property is both required and not secret. For example, in the sample above, the `entityUrlTemplate` value refers to the configuration property *`ProjectName`*.

- `entityUrlTemplate`: the static link that provides information about the service provider for the action. In the example, the build system includes a static link to each build project. The link format will vary, depending on your build provider (or, if you are creating a different action type, such as test, other service provider). You must provide this link format so that when the custom action is added, the user can choose this link to open a browser to a page on your website that provides the specifics for the build project (or test environment).
- `executionUrlTemplate`: the dynamic link that will be updated with information about the current or most recent run of the action. When your custom job worker updates the status of a job (for example, success, failure, or in progress), it will also provide an `externalExecutionId` that will be used to complete the link. This link can be used to provide details about the run of an action.

For example, when you view the action in the pipeline, you see the following two links:



1 This static link appears after you add your custom action and points to the address in `entityUrlTemplate`, which you specify when you create your custom action.

2 This dynamic link is updated after every run of the action and points to the address in `executionUrlTemplate`, which you specify when you create your custom action.

For more information about these link types, as well as `RevisionURLTemplate` and `ThirdPartyURL`, see ActionTypeSettings and CreateCustomActionType in the AWS CodePipeline API Reference. For more information about action structure requirements and how to create an action, see AWS CodePipeline Pipeline Structure Reference (p. 201).

2. Save the JSON file and give it a name you can easily remember (for example, *`MyCustomAction`*.json).
3. Open a terminal session (Linux, OS X, Unix) or command prompt (Windows) on a computer where you have installed the AWS CLI.
4. Use the AWS CLI to run the **aws codepipeline create-custom-action-type** command, specifying the name of the JSON file you just created.

   For example, to create a build custom action:

   Important
   Be sure to include `file://` before the file name. It is required in this command.

```
aws codepipeline create-custom-action-type --cli-input-json file://MyCustomAction.json
```

5. This command returns the entire structure of the custom action you created, as well as the `JobList` action configuration property, which is added for you. When you add the custom action to a pipeline, you can use `JobList` to specify which projects from the provider you can poll for jobs. If you do not configure this, all available jobs will be returned when your custom job worker polls for jobs.

   For example, the preceding command might return a structure similar to the following:

```
{
    "actionType": {
        "inputArtifactDetails": {
            "maximumCount": 1,
            "minimumCount": 1
       },
       "actionConfigurationProperties": [
            {
                "secret": false,
                "required": true,
                "name": "ProjectName",
                "key": true,
                "description": "The name of the build project must be provided when
 this action is added to the pipeline."
            }
        ],
        "outputArtifactDetails": {
            "maximumCount": 0,
            "minimumCount": 0
        },
        "id": {
            "category": "Build",
            "owner": "Custom",
            "version": "1",
            "provider": "My-Build-Provider-Name"
        },
        "settings": {
            "entityUrlTemplate": "https://my-build-instance/job/{Config:ProjectName}/",
            "executionUrlTemplate": "https://my-build-instance/job/mybuildjob/
lastSuccessfulBuild/{ExternalExecutionId}/"
        }
    }
}
```

Note
As part of the output of the **create-custom-action-type** command, the `id` section includes `"owner": "Custom"`. AWS CodePipeline automatically assigns `Custom` as the owner of custom action types. This value can't be assigned or changed when you use the **create-custom-action-type** command or the **update-pipeline** command.

Create a Job Worker for Your Custom Action

Custom actions require a job worker that will poll AWS CodePipeline for job requests for the custom action, execute the job, and return the status result to AWS CodePipeline. The job worker can be located on any computer or resource as long as it has access to the public endpoint for AWS CodePipeline.

There are many ways to design your job worker. The following sections provide some practical guidance for developing your custom job worker for AWS CodePipeline.

Topics

Choose and Configure a Permissions Management Strategy for Your Job Worker

To develop a custom job worker for your custom action in AWS CodePipeline, you will need a strategy for the integration of user and permission management.

The simplest strategy is to add the infrastructure you need for your custom job worker by creating Amazon EC2 instances with an IAM instance role, which allow you to easily scale up the resources you need for your integration. You can use the built-in integration with AWS to simplify the interaction between your custom job worker and AWS CodePipeline.

To set up Amazon EC2 instances

1. Learn more about Amazon EC2 and determine whether it is the right choice for your integration. For information, see Amazon EC2 - Virtual Server Hosting.
2. Get started creating your Amazon EC2 instances. For information, see Getting Started with Amazon EC2 Linux Instances.

Another strategy to consider is using identity federation with IAM to integrate your existing identity provider system and resources. This strategy is particularly useful if you already have a corporate identity provider or are already configured to support users using web identity providers. Identity federation allows you to grant secure access to AWS resources, including AWS CodePipeline, without having to create or manage IAM users. You can leverage features and policies for password security requirements and credential rotation. You can use sample applications as templates for your own design.

To set up identity federation

1. Learn more about IAM identity federation. For information, see Manage Federation.

2. Review the examples in Scenarios for Granting Temporary Access to identify the scenario for temporary access that best fits the needs of your custom action.
3. Review code examples of identity federation relevant to your infrastructure, such as:
   - Identity Federation Sample Application for an Active Directory Use Case
   - Mobile Application Identity Federation with Amazon Cognito
4. Get started configuring identity federation. For information, see Identity Providers and Federation in *IAM User Guide*.

A third strategy to consider is to create an IAM user to use under your AWS account when running your custom action and job worker.

To set up an IAM user

1. Learn more about IAM best practices and use cases in IAM Best Practices and Use Cases.
2. Get started creating IAM users by following the steps in Creating an IAM User in Your AWS Account.

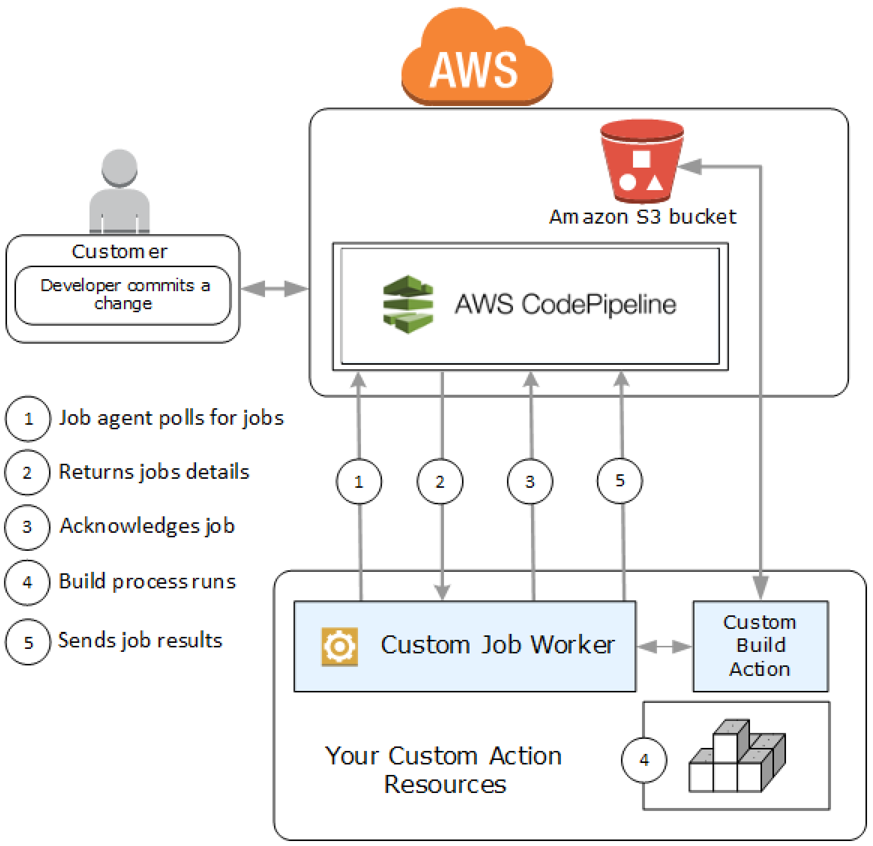
The following is an example policy you might create for use with your custom job worker. This policy is meant as an example only and is provided as-is.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "codepipeline:PollForJobs",
        "codepipeline:AcknowledgeJob",
        "codepipeline:GetJobDetails",
        "codepipeline:PutJobSuccessResult",
        "codepipeline:PutJobFailureResult"
      ],
      "Resource": [
        "arn:aws:codepipeline:us-east-2::actionType:custom/Build/MyBuildProject/1/"
      ]
    }
  ]
}
```

> **Note**
> Consider using the **AWSCodePipelineCustomActionAccess** managed policy for the IAM user.

Develop a Job Worker for Your Custom Action

After you've chosen your permissions management strategy, you should consider how your job worker will interact with AWS CodePipeline. The following high-level diagram shows the workflow of a custom action and job worker for a build process.



1. Your job worker polls AWS CodePipeline for jobs using `PollForJobs`.
2. When a pipeline is triggered by a change in its source stage (for example, when a developer commits a change), the automated release process begins. The process continues until the stage at which your custom action has been configured. When it reaches your action in this stage, AWS CodePipeline queues a job. This job will appear if your job worker calls `PollForJobs` again to get status. Take the job detail from `PollForJobs` and pass it back to your job worker.
3. The job worker calls `AcknowledgeJob` to send AWS CodePipeline a job acknowledgement. AWS CodePipeline returns an acknowledgement that indicates the job worker should continue the job (`InProgress`), or, if you have more than one job worker polling for jobs and another job worker has already claimed the job, an `InvalidNonceException` error response will be returned. After the `InProgress` acknowledgement, AWS CodePipeline waits for results to be returned.
4. The job worker initiates your custom action on the revision, and then your action runs. Along with any other actions, your custom action returns a result to the job worker. In the example of a build custom action, the action pulls artifacts from the Amazon S3 bucket, builds them, and pushes successfully built artifacts back to the Amazon S3 bucket.
5. While the action is running, the job worker can call `PutJobSuccessResult` with a continuation token (the serialization of the state of the job generated by the job worker, for example a build identifer in JSON format, or an Amazon S3 object key), as well as the `ExternalExecutionId` information that will be used to populate the link in `executionUrlTemplate`. This will update the console view of the pipeline with a working link to specific action details while it is in progress. Although not required, it is a best practice because it enables users to view the status of your custom action while it runs.

   Once `PutJobSuccessResult` is called, the job is considered complete. A new job is created in AWS CodePipeline that includes the continuation token. This job will appear if your job worker calls

`PollForJobs` again. This new job can be used to check on the state of the action, and either returns with a continuation token, or returns without a continuation token once the action is complete.

> **Note**
> If your job worker performs all the work for a custom action, you should consider breaking your job worker processing into at least two steps. The first step establishes the details page for your action. Once you have created the details page, you can serialize the state of the job worker and return it as a continuation token, subject to size limits (see Limits in AWS CodePipeline (p. 207)). For example, you could write the state of the action into the string you use as the continuation token. The second step (and subsequent steps) of your job worker processing perform the actual work of the action. The final step returns success or failure to AWS CodePipeline, with no continuation token on the final step.

For more information about using the continuation token, see the specifications for `PutJobSuccessResult` in the AWS CodePipeline API Reference.

6. Once the custom action completes, the job worker returns the result of the custom action to AWS CodePipeline by calling one of two APIs:
   - `PutJobSuccessResult` without a continuation token, which indicates the custom action ran successfully
   - `PutJobFailureResult`, which indicates the custom action did not run successfully

   Depending on the result, the pipeline will either continue on to the next action (success) or stop (failure).

Custom Job Worker Architecture and Examples

After you have mapped out your high-level workflow, you can create your job worker. Although the specifics of your custom action will ultimately determine what is needed for your job worker, most job workers for custom actions include the following functionality:

- Polling for jobs from AWS CodePipeline using `PollForJobs`.
- Acknowledging jobs and returning results to AWS CodePipeline using `AcknowledgeJob`, `PutJobSuccessResult`, and `PutJobFailureResult`.
- Retrieving artifacts from and/or putting artifacts into the Amazon S3 bucket for the pipeline. To download artifacts from the Amazon S3 bucket, you must create an Amazon S3 client that uses signature version 4 signing (Sig V4). Sig V4 is required for SSE-KMS.

  To upload artifacts to the Amazon S3 bucket, you must additionally configure the Amazon S3 `PutObject` request to use encryption. Currently only SSE-KMS is supported for encryption. In order to know whether to use the default key or a customer-managed key to upload artifacts, your custom job worker must look at the job data and check the encryption key property. If the encryption key property is set, you should use that encryption key ID when configuring SSE-KMS. If the key is null, you use the default master key. AWS CodePipeline uses the default Amazon S3 master key unless otherwise configured.

  The following sample shows how to create the KMS parameters in Java:

```
private static SSEAwsKeyManagementParams createSSEAwsKeyManagementParams(final
 EncryptionKey encryptionKey) {
    if (encryptionKey != null
           &&  encryptionKey.getId() != null
           &&  EncryptionKeyType.KMS.toString().equals(encryptionKey.getType())) {
           // Use a customer-managed encryption key
        return new SSEAwsKeyManagementParams(encryptionKey.getId());
    }
          // Use the default master key
    return new SSEAwsKeyManagementParams();
}
```

For more samples, see Specifying the AWS Key Management Service in Amazon S3 Using the AWS SDKs. For more information about the Amazon S3 bucket for AWS CodePipeline, see AWS CodePipeline Concepts (p. 3).

A more complex example of a custom job worker is available on GitHub. This sample is open source and provided as-is.

- Sample Job Worker for AWS CodePipeline: Download the sample from the GitHub repository.

Add a Custom Action to a Pipeline

After you have a job worker, you can add your custom action to a pipeline by creating a new one and choosing it when you use the Create Pipeline wizard, by editing an existing pipeline and adding the custom action, or by using the AWS CLI, the SDKs, or the APIs.

Note
You can create a pipeline in the Create Pipeline wizard that includes a custom action if it is a build or deploy action. If your custom action is in the test category, you must add it by editing an existing pipeline.

Topics

Add a Custom Action to a Pipeline (Console)

To create a pipeline with your custom action by using the AWS CodePipeline console, follow the steps in Create a Pipeline in AWS CodePipeline (p. 67) and choose your custom action from as many stages as you would like to test. To add your custom action to an existing pipeline by using the AWS CodePipeline console, follow the steps in Edit a Pipeline in AWS CodePipeline (p. 75) and add your custom action to one or more stages in the pipeline.

Add a Custom Action to an Existing Pipeline (CLI)

You can use the AWS CLI to add a custom action to an existing pipeline.

1. Open a terminal session (Linux, macOS, or Unix) or command prompt (Windows) and run the **get-pipeline** command to copy the pipeline structure you want to edit into a JSON file. For example, for a pipeline named **MyFirstPipeline**, you would type the following command:

   ```
   aws codepipeline get-pipeline --name MyFirstPipeline >pipeline.json
   ```

   This command returns nothing, but the file you created should appear in the directory where you ran the command.

2. Open the JSON file in any text editor and modify the structure of the file to add your custom action to an existing stage.

   Note
   If you want your action to run in parallel with another action in that stage, make sure you assign it the same `runOrder` value as that action.

For example, to modify the structure of a pipeline to add a stage named Build and to add a build custom action to that stage, you might modify the JSON to add the Build stage before a deployment stage as follows:

```
,
    {
      "name": "MyBuildStage",
      "actions":  [
              {
                "inputArtifacts": [
                {
                   "name": "MyApp"
                 }
                   ],
                    "name": "MyBuildCustomAction",
                    "actionTypeId": {
                        "category": "Build",
                        "owner": "Custom",
                        "version": "1",
                        "provider": "My-Build-Provider-Name"
                    },
                    "outputArtifacts": [
                        {
                          "name": "MyBuiltApp"
                        }
                    ],
                    "configuration": {
                        "ProjectName": "MyBuildProject"
                    },
                    "runOrder": 1
                }
            ]
        },
        {
            "name": "Staging",
            "actions": [
                    {
                        "inputArtifacts": [
                            {
                                "name": "MyBuiltApp"
                            }
                        ],
                        "name": "Deploy-CodeDeploy-Application",
                        "actionTypeId": {
                            "category": "Deploy",
                            "owner": "AWS",
                            "version": "1",
                            "provider": "CodeDeploy"
                        },
                        "outputArtifacts": [],
                        "configuration": {
                            "ApplicationName": "CodePipelineDemoApplication",
                            "DeploymentGroupName": "CodePipelineDemoFleet"
                        },
                        "runOrder": 1
                    }
                ]
             }
    ]
}
```

3. To apply your changes, run the **update-pipeline** command, specifying the pipeline JSON file, similar to the following:

Important
Be sure to include `file://` before the file name. It is required in this command.

```
aws codepipeline update-pipeline --cli-input-json file://pipeline.json
```

This command returns the entire structure of the edited pipeline.

4. Open the AWS CodePipeline console and choose the name of the pipeline you just edited.

   The pipeline shows your changes. The next time you make a change to the source location, the pipeline will run that revision through the revised structure of the pipeline.

Invoke an AWS Lambda Function in a Pipeline in AWS CodePipeline

AWS Lambda is a compute service that lets you run code without provisioning or managing servers. You can create Lambda functions and add them as actions in your pipelines. Because Lambda allows you to write functions to perform almost any task, you can customize the way your pipeline works.

Note
Creating and running Lambda functions might result in charges to your AWS account. For more information, see Pricing.

The following are some ways Lambda functions can be used in pipelines:

- To roll out changes to your environment by applying or updating an AWS CloudFormation template.
- To create resources on demand in one stage of a pipeline using AWS CloudFormation and delete them in another stage.
- To deploy application versions with zero downtime in AWS Elastic Beanstalk with a Lambda function that swaps CNAME values.
- To deploy to Amazon ECS Docker instances.
- To back up resources before building or deploying by creating an AMI snapshot.
- To add integration with third-party products to your pipeline, such as posting messages to an IRC client.

This topic assumes you are familiar with AWS CodePipeline and AWS Lambda and know how to create pipelines, functions, and the IAM polices and roles on which they depend. In this topic, we will walk through the steps for:

- Creating a Lambda function that tests whether a web page was deployed successfully.
- Configuring the AWS CodePipeline and Lambda execution roles and the permissions required to run the function as part of the pipeline.
- Editing a pipeline to add the Lambda function as an action.
- Testing the action by manually releasing a change.

This topic includes sample functions to demonstrate the flexibility of working with Lambda functions in AWS CodePipeline:

- Basic Lambda function (p. 119)
  - Creating a basic Lambda function to use with AWS CodePipeline.

  - Returning success or failure results to AWS CodePipeline in the **Details** link for the action.
- A Sample Python Function That Uses an AWS CloudFormation Template (p. 126)
  - Using JSON-encoded user parameters to pass multiple configuration values to the function (`get_user_params`).
  - Interacting with .zip artifacts in an artifact bucket (`get_template`).
  - Using a continuation token to monitor a long-running asynchronous process (`continue_job_later`). This will allow the action to continue and the function to succeed even if it exceeds a five-minute runtime (a limitation in Lambda).

Each sample function includes information about the permissions you must add to the role. For information about limits in AWS Lambda, see Limits in the AWS Lambda Developer Guide.

Important
The sample code, roles, and polices included in this topic are meant as examples only, and are provided as-is.

Topics

Step 1: Create a Pipeline

In this step, you will create a pipeline to which you will later add the Lambda function. This is the same pipeline you created in AWS CodePipeline Tutorials (p. 26). If that pipeline is still configured for your account and is in the same region where you will create the Lambda function, you can skip this step.

Important
You must create the pipeline and all of its resources in the same region where you will create the Lambda function.

To create the pipeline

1. Follow the first three steps in Tutorial: Create a Simple Pipeline (Amazon S3 Bucket) (p. 26) to create an Amazon S3 bucket, AWS CodeDeploy resources, and a two-stage pipeline. Choose the Amazon Linux option for your instance types. You can use any name you want for the pipeline, but the steps in this topic use MyLambdaTestPipeline.
2. On the status page for your pipeline, in the AWS CodeDeploy action, choose **Details**. On the deployment details page for the deployment group, choose an instance ID from the list.
3. In the Amazon EC2 console, on the **Description** tab for the instance, copy the IP address in **Public IP** (for example, **`192.0.2.4`**). You will use this address as the target of the function in AWS Lambda.

Note
The default service role for AWS CodePipeline, AWS-CodePipeline-Service, includes the Lambda permissions required to invoke the function, so you do not have to create an additional invocation policy or role. However, if you have modified the default service role or selected a different one, make sure the policy for the role allows the `lambda:InvokeFunction` and

`lambda:ListFunctions` permissions. Otherwise, pipelines that include Lambda actions will fail.

Step 2: Create the Lambda Function

In this step, you will create a Lambda function that makes an HTTP request and checks for a line of text on a web page. As part of this step, you must also create an IAM policy and Lambda execution role. For more information about Lambda, execution roles and why this is required, see Permissions Model in the AWS Lambda Developer Guide.

To create the execution role

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.
2. Choose **Policies**, and then choose **Create Policy**.
3. On the **Create Policy** page, choose the **Select** button next to **Create Your Own Policy**.
4. On the **Review Policy** page, in **Policy Name**, type a name for the policy (for example, **`CodePipelineLambdaExecPolicy`**). In **Description**, type **`Enables Lambda to execute code`**. In **Policy Document**, copy and paste the following policy into the policy box, and then choose **Validate Policy**.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Action": [
        "logs:*"
      ],
      "Effect": "Allow",
      "Resource": "arn:aws:logs:*:*:*"
    },
    {
      "Action": [
        "codepipeline:PutJobSuccessResult",
        "codepipeline:PutJobFailureResult"
        ],
        "Effect": "Allow",
        "Resource": "*"
     }
  ]
}
```

   After the policy is validated, choose **Create Policy**.

   Note
   These are the minimum permissions required for a Lambda function to interoperate with AWS CodePipeline and Amazon CloudWatch. If you want to expand this policy to allow functions that interact with other AWS resources, you should modify this policy to allow the actions required by those Lambda functions.
5. On the policy dashboard page, choose **Roles**, and then choose **Create New Role**.
6. On the **Set Role Name** page, type a name for the role (for example, **`CodePipelineLambdaExecRole`**), and then choose **Next Step**.
7. On the **Select Role Type** page, in the list of roles under **AWS Service Roles**, choose the **Select** button next to **AWS Lambda**.
8. On the **Attach Policy** page, select the check box next to **CodePipelineLambdaExecPolicy**, and then choose **Next Step**.
9. On the **Review** page, choose **Create Role**.

To create the sample Lambda function to use with AWS CodePipeline

1. Sign in to the AWS Management Console and open the AWS Lambda console at https://console.aws.amazon.com/lambda/.
2. On the **Lambda: Function list** page, choose **Create a Lambda function**.

   Note
   If you see a **Welcome** page instead of the **Lambda: Function list** page, choose **Get Started Now**.
3. On the **Select blueprint** page, choose **Skip**.
4. On the **Configure function** page, in **Name**, type a name for your Lambda function (for example, **`MyLambdaFunctionForAWSCodePipeline`**). Optionally, in **Description**, type a description for the function (for example, **`A sample test to check whether the website responds with a 200 (OK) and contains a specific word on the page`**). In the **Runtime** list, choose **Node.js**, and then copy the following code into the **Lambda function code** box:

   Note
   The event object, under the CodePipeline.job key, contains the job details. For a full example of the JSON event AWS CodePipeline returns to Lambda, see Example JSON Event (p. 125).

```
var assert = require('assert');
var AWS = require('aws-sdk');
var http = require('http');

exports.handler = function(event, context) {

    var codepipeline = new AWS.CodePipeline();

    // Retrieve the Job ID from the Lambda action
    var jobId = event["CodePipeline.job"].id;

    // Retrieve the value of UserParameters from the Lambda action configuration in AWS
 CodePipeline, in this case a URL which will be
    // health checked by this function.
    var url =
 event["CodePipeline.job"].data.actionConfiguration.configuration.UserParameters;

    // Notify AWS CodePipeline of a successful job
    var putJobSuccess = function(message) {
        var params = {
            jobId: jobId
        };
        codepipeline.putJobSuccessResult(params, function(err, data) {
            if(err) {
                context.fail(err);
            } else {
                context.succeed(message);
            }
        });
    };

    // Notify AWS CodePipeline of a failed job
    var putJobFailure = function(message) {
        var params = {
            jobId: jobId,
            failureDetails: {
                message: JSON.stringify(message),
                type: 'JobFailed',
                externalExecutionId: context.invokeid
            }
        };
        codepipeline.putJobFailureResult(params, function(err, data) {
            context.fail(message);
        });
    };

    // Validate the URL passed in UserParameters
    if(!url || url.indexOf('http://') === -1) {
        putJobFailure('The UserParameters field must contain a valid URL address to
 test, including http:// or https://');
        return;
    }

    // Helper function to make a HTTP GET request to the page.
    // The helper will test the response and succeed or fail the job accordingly
    var getPage = function(url, callback) {
        var pageObject = {
            body: '',
            statusCode: 0,
            contains: function(search) {
                return this.body.indexOf(search) > -1;
            }
        };
        http.get(url, function(response) {
            pageObject.body = '';
            pageObject.statusCode = response.statusCode;

            response.on('data', function (chunk) {
                pageObject.body += chunk;
            });

            response.on('end', function () {
                callback(pageObject);
            });

            response.resume();
        }).on('error', function(error) {
            // Fail the job if our request failed
            putJobFailure(error);
        });
    };

    getPage(url, function(returnedPage) {
        try {
            // Check if the HTTP response has a 200 status
            assert(returnedPage.statusCode === 200);
            // Check if the page contains the text "Congratulations"
            // You can change this to check for different text, or add other tests as
 required
            assert(returnedPage.contains('Congratulations'));

            // Succeed the job
            putJobSuccess("Tests passed.");
        } catch (ex) {
            // If any of the assertions failed then fail the job
            putJobFailure(ex);
        }
    });
};
```

5. Leave the value of **Handler name** at the default value, but change **Role** to **`CodePipelineLambdaExecRole`**.
6. In **Advanced settings**, for **Timeout (s)**, type **`20`**.
7. After you have finished configuring these details, choose **Next**.
8. On the **Review** page, choose **Create function**.

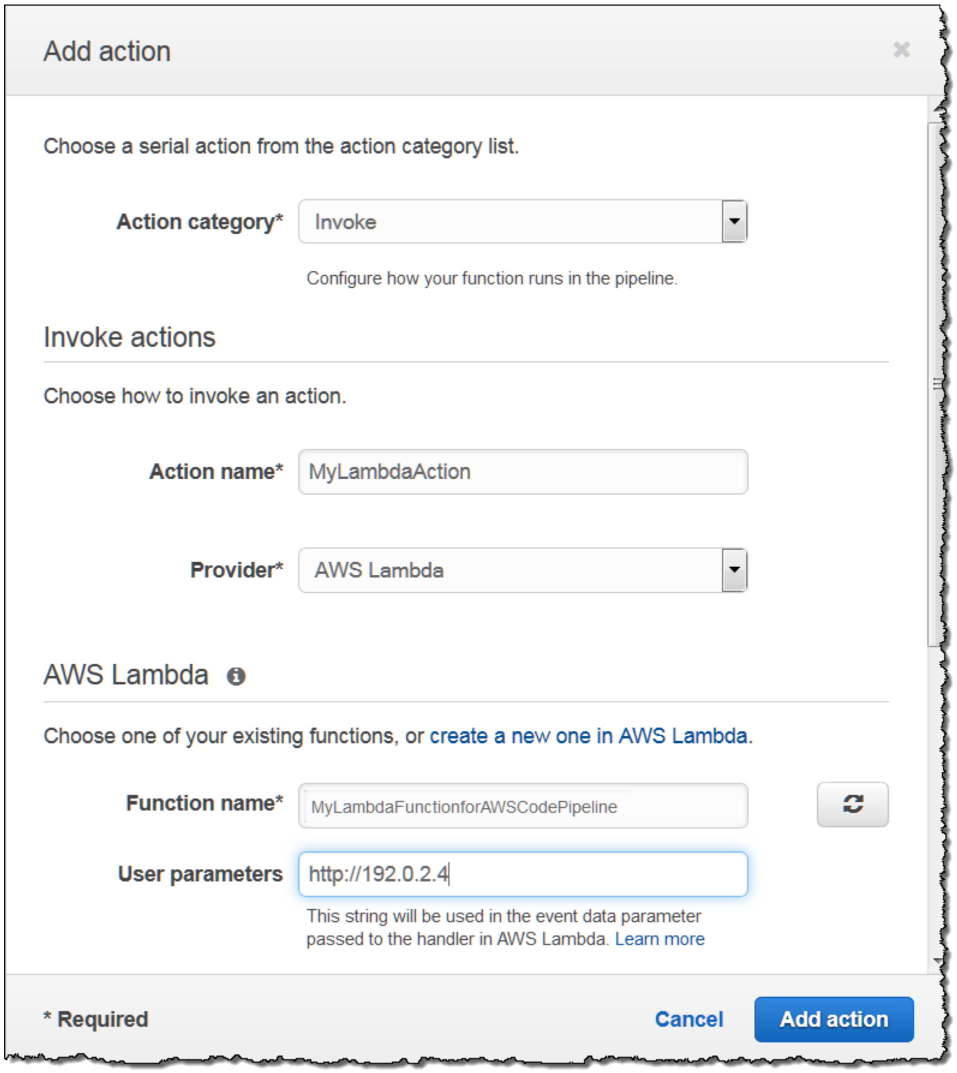
Step 3: Add the Lambda Function to a Pipeline in the AWS CodePipeline Console

In this step, you will add a new stage to your pipeline, and then add an action—a Lambda action that calls your function— to that stage.

To add a stage

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.
2. On the **Welcome** page, choose the pipeline you created from the list of pipelines.
3. On the pipeline view page, choose **Edit**.
4. On the **Edit** page, choose the option to add a stage after the deployment stage with the AWS CodeDeploy action. Type a name for the stage (for example, **`LambdaStage`**), and then choose the option to add an action to the stage.

   Note
   You can also choose to add your Lambda action to an existing stage. For demonstration purposes, we are adding the Lambda function as the only action in a stage to allow you to easily view its progress as artifacts progress through a pipeline.
5. In the **Add action** panel, in **Action category**, choose **Invoke**. In **Invoke actions**, in **Action name**, type a name for your Lambda action (for example, **`MyLambdaAction`**). In **Provider**, choose **AWS Lambda**. In **Function name**, choose or type the name of your Lambda function (for example, **`MyLambdaFunctionForAWSCodePipeline`**). In **User parameters**, specify the IP address for the Amazon EC2 instance you copied earlier (for example, **`http://`*`192.0.2.4`***), and then choose **Add action**.


Add action

Choose a serial action from the action category list.

Action category* Invoke

Configure how your function runs in the pipeline.

Invoke actions

Choose how to invoke an action.

Action name* MyLambdaAction

Provider* AWS Lambda

AWS Lambda

Choose one of your existing functions, or create a new one in AWS Lambda.

Function name* MyLambdaFunctionforAWSCodePipeline

User parameters http://192.0.2.4

This string will be used in the event data parameter passed to the handler in AWS Lambda. Learn more

* Required

Note
This topic uses an IP address, but in a real-world scenario, you could provide your registered website name instead (for example, `http://`*`www.example.com`*). For more information about event data and handlers in AWS Lambda, see Programming Model in the AWS Lambda Developer Guide.

6. On the **Edit** page, choose **Save pipeline changes**.

Step 4: Test the Pipeline with the Lambda function

To test the function, release the most recent change through the pipeline.

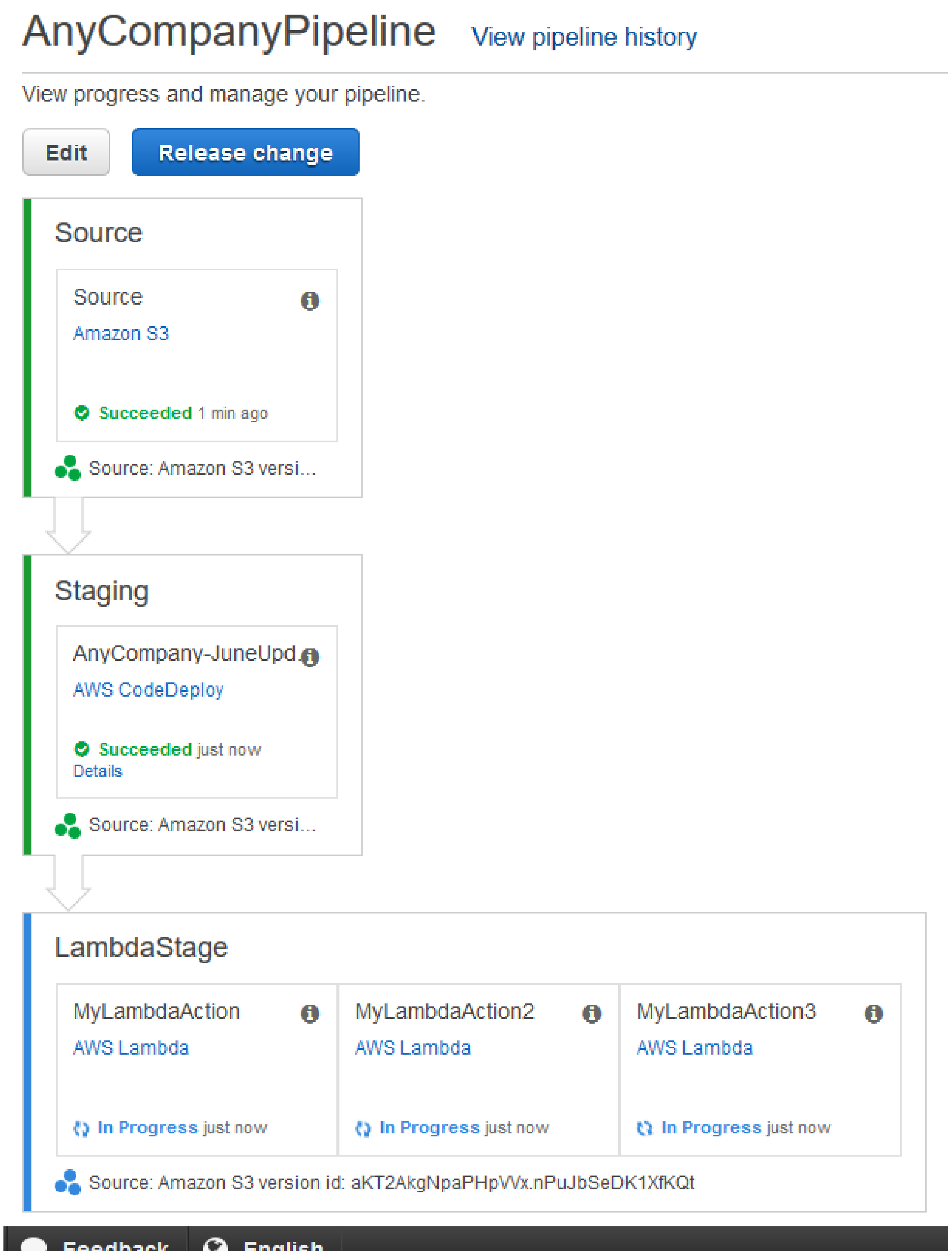
To use the console to run the most recent version of an artifact through a pipeline

1. On the pipeline details page, choose **Release change**. This will run the most recent revision available in each source location specified in a source action through the pipeline.
2. When the Lambda action is complete, choose the **Details** link to view the log stream for the function in Amazon CloudWatch, including the billed duration of the event. If the function failed, the CloudWatch log will provide information about the cause.

Step 5: Next Steps

Now that you've successfully created a Lambda function and added it as an action in a pipeline, you can try the following:

- Add more Lambda actions to your stage to check other web pages.
- Modify the Lambda function to check for a different text string.
- Explore Lambda functions and create and add your own Lambda functions to pipelines.


AnyCompanyPipeline View pipeline history

View progress and manage your pipeline.

Source

Source
Amazon S3
Succeeded 1 min ago

Source: Amazon S3 versi...

Staging

AnyCompany-JuneUpd
AWS CodeDeploy
Succeeded just now
Details

Source: Amazon S3 versi...

LambdaStage

MyLambdaAction
AWS Lambda
In Progress just now

MyLambdaAction2
AWS Lambda
In Progress just now

MyLambdaAction3
AWS Lambda
In Progress just now

Source: Amazon S3 version id: aKT2AkgNpaPHpVVx.nPuJbSeDK1XfKQt

After you have finished experimenting with the Lambda function, consider removing it from your pipeline, deleting it from AWS Lambda, and deleting the role from IAM in order to avoid possible charges. For more information, see Edit a Pipeline in AWS CodePipeline (p. 75), Delete a Pipeline in AWS CodePipeline (p. 95), and Deleting Roles or Instance Profiles.

Example JSON Event

The following example shows a sample JSON event sent to Lambda by AWS CodePipeline. The structure of this event is similar to the response to the GetJobDetails API, but without the `actionTypeId` and `pipelineContext` data types. Two action configuration details, `FunctionName` and `UserParameters`, are included in both the JSON event and the response to the GetJobDetails API. The values in *`red italic text`* are examples or explanations, not real values.

```
{
    "CodePipeline.job": {
        "id": "11111111-abcd-1111-abcd-111111abcdef",
        "accountId": "111111111111",
        "data": {
            "actionConfiguration": {
                "configuration": {
                    "FunctionName": "MyLambdaFunctionForAWSCodePipeline",
                    "UserParameters": "some-input-such-as-a-URL"
                }
            },
            "inputArtifacts": [
                {
                    "location": {
                        "s3Location": {
                            "bucketName": "the name of the bucket configured as the
 pipeline artifact store in Amazon S3, for example codepipeline-us-east-2-1234567890",
                            "objectKey": "the name of the application, for example
 CodePipelineDemoApplication.zip"
                        },
                        "type": "S3"
                    },
                    "revision": null,
                    "name": "ArtifactName"
                }
            ],
            "outputArtifacts": [],
            "artifactCredentials": {
                "secretAccessKey": "wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY",
                "sessionToken": "MIICiTCCAfICCQD6m7oRw0uXOjANBgkqhkiG9w
 0BAQUFADCBiDELMAkGA1UEBhMCVVMxCzAJBgNVBAgTAldBMRAwDgYDVQQHEwdTZ
 WF0dGxlMQ8wDQYDVQQKEwZBbWF6b24xFDASBgNVBAsTC0lBTSBDb25zb2xlMRIw
 EAYDVQQDEwlUZXN0Q2lsYWMxHzAdBgkqhkiG9w0BCQEWEG5vb25lQGFtYXpvbi5
 jb20wHhcNMTEwNDI1MjA0NTIxWhcNMTIwNDI0MjA0NTIxWjCBiDELMAkGA1UEBh
 MCVVMxCzAJBgNVBAgTAldBMRAwDgYDVQQHEwdTZWF0dGxlMQ8wDQYDVQQKEwZBb
 WF6b24xFDASBgNVBAsTC0lBTSBDb25zb2xlMRIwEAYDVQQDEwlUZXN0Q2lsYWMx
 HzAdBgkqhkiG9w0BCQEWEG5vb25lQGFtYXpvbi5jb20wgZ8wDQYJKoZIhvcNAQE
 BBQADgY0AMIGJAoGBAMaK0dn+a4GmWIWJ21uUSfwfEvySWtC2XADZ4nB+BLYgVI
 k60CpiwsZ3G93vUEIO3IyNoH/f0wYK8m9TrDHudUZg3qX4waLG5M43q7Wgc/MbQ
 ITxOUSQv7c7ugFFDzQGBzZswY6786m86gpEIbb3OhjZnzcvQAaRHhdlQWIMm2nr
 AgMBAAEwDQYJKoZIhvcNAQEFBQADgYEAtCu4nUhVVxYUntneD9+h8Mg9q6q+auN
 KyExzyLwaxlAoo7TJHidbtS4J5iNmZgXL0FkbFFBjvSfpJIlJ00zbhNYS5f6Guo
 EDmFJl0ZxBHjJnyp378OD8uTs7fLvjx79LjSTbNYiytVbZPQUQ5Yaxu2jXnimvw
 3rrszlaEXAMPLE=",
                "accessKeyId": "AKIAIOSFODNN7EXAMPLE"
            },
            "continuationToken": "A continuation token if continuing job"
        }
    }
}
```

Additional Sample Functions

The following sample Lambda functions demonstrate additional functionality you can leverage for your pipelines in AWS CodePipeline. To use these functions, you might have to make modifications to the policy for the Lambda execution role, as noted in the introduction for each sample.

Topics

A Sample Python Function That Uses an AWS CloudFormation Template

The following sample shows a function that creates or updates a stack based on a supplied AWS CloudFormation template. The template creates an Amazon S3 bucket. It is for demonstration purposes only, to minimize costs. Ideally, you should delete the stack before you upload anything to the bucket. If you upload files to the bucket, you will not be able to delete the bucket when you delete the stack. You will have to manually delete everything in the bucket before you can delete the bucket itself.

This Python sample assumes you have a pipeline that uses an Amazon S3 bucket as a source action, or that you have access to a versioned Amazon S3 bucket you can use with the pipeline. You will create the AWS CloudFormation template, compress it, and upload it to that bucket as a .zip file. You must then add a source action to your pipeline that retrieves this .zip file from the bucket.

This sample demonstrates:

- The use of JSON-encoded user parameters to pass multiple configuration values to the function (`get_user_params`).
- The interaction with .zip artifacts in an artifact bucket (`get_template`).
- The use of a continuation token to monitor a long-running asynchronous process (`continue_job_later`). This will allow the action to continue and the function to succeed even if it exceeds a five-minute runtime (a limitation in Lambda).

To use this sample Lambda function, the policy for the Lambda execution role must have `Allow` permissions in AWS CloudFormation, Amazon S3, and AWS CodePipeline, as shown in this sample policy:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Action": [
                "logs:*"
            ],
            "Effect": "Allow",
            "Resource": "arn:aws:logs:*:*:*"
        },
        {
            "Action": [
                "codepipeline:PutJobSuccessResult",
                "codepipeline:PutJobFailureResult"
            ],
            "Effect": "Allow",
            "Resource": "*"
        },
        {
            "Action": [
                "cloudformation:DescribeStacks",
                "cloudformation:CreateStack",
                "cloudformation:UpdateStack"
            ],
            "Effect": "Allow",
            "Resource": "*"
        },
        {
            "Action": [
                "s3:*"
            ],
            "Effect": "Allow",
            "Resource": "*"
        }
    ]
}
```

To create the AWS CloudFormation template, open any plain-text editor and copy and paste the following code:

```
{
  "AWSTemplateFormatVersion" : "2010-09-09",
  "Description" : "AWS CloudFormation template which creates an S3 bucket",
  "Resources" : {
    "MySampleBucket" : {
      "Type" : "AWS::S3::Bucket",
      "Properties" : {
      }
    }
  },
  "Outputs" : {
    "BucketName" : {
      "Value" : { "Ref" : "MySampleBucket" },
      "Description" : "The name of the S3 bucket"
    }
  }
}
```

Save this as a JSON file with the name **`template.json`** in a directory named **`template-package`**. Create a compressed (.zip) file of this directory and file named **`template-package.zip`**, and upload the compressed file to a versioned Amazon S3 bucket. If you already have a bucket configured for your pipeline, you can use it. Next, edit your pipeline to add a source action that retrieves the .zip file. Name the output for this action *`MyTemplate`*. For more information, see Edit a Pipeline in AWS CodePipeline (p. 75).

> **Note**
> The sample Lambda function expects these file names and compressed structure. However, you can substitute your own AWS CloudFormation template for this sample. If you choose to use your own template, make sure you modify the policy for the Lambda execution role to allow any additional functionality required by your AWS CloudFormation template.

To add the following code as a function in Lambda

1. Open the Lambda console and choose **Create a Lambda function**.
2. On the **Select blueprint** page, choose **Skip**.
3. On the **Configure function** page, in **Name**, type a name for your Lambda function. Optionally, in **Description**, type a description for the function.
4. In the **Runtime** list, choose **Python 2.7**.
5. Leave the value of **Handler name** at the default value, but change **Role** to your Lambda execution role (for example, **`CodePipelineLambdaExecRole`**).

6. In **Advanced settings**, for **Timeout (s)**, replace the default of 3 seconds with **20**.
7. Copy the following code into the **Lambda function code** code box:

```
from __future__ import print_function
from boto3.session import Session

import json
import urllib
import boto3
import zipfile
import tempfile
import botocore
import traceback

print('Loading function')

cf = boto3.client('cloudformation')
code_pipeline = boto3.client('codepipeline')

def find_artifact(artifacts, name):
    """Finds the artifact 'name' among the 'artifacts'

    Args:
        artifacts: The list of artifacts available to the function
        name: The artifact we wish to use
    Returns:
        The artifact dictionary found
    Raises:
        Exception: If no matching artifact is found

    """
    for artifact in artifacts:
        if artifact['name'] == name:
            return artifact

    raise Exception('Input artifact named "{0}" not found in event'.format(name))

def get_template(s3, artifact, file_in_zip):
    """Gets the template artifact

    Downloads the artifact from the S3 artifact store to a temporary file
    then extracts the zip and returns the file containing the CloudFormation
    template.

    Args:
        artifact: The artifact to download
        file_in_zip: The path to the file within the zip containing the template

    Returns:
        The CloudFormation template as a string

    Raises:
        Exception: Any exception thrown while downloading the artifact or unzipping it

    """
    tmp_file = tempfile.NamedTemporaryFile()
    bucket = artifact['location']['s3Location']['bucketName']
    key = artifact['location']['s3Location']['objectKey']

    with tempfile.NamedTemporaryFile() as tmp_file:
        s3.download_file(bucket, key, tmp_file.name)
        with zipfile.ZipFile(tmp_file.name, 'r') as zip:
            return zip.read(file_in_zip)
```

```
def update_stack(stack, template):
    """Start a CloudFormation stack update

    Args:
        stack: The stack to update
        template: The template to apply

    Returns:
        True if an update was started, false if there were no changes
        to the template since the last update.

    Raises:
        Exception: Any exception besides "No updates are to be performed."

    """
    try:
        cf.update_stack(StackName=stack, TemplateBody=template)
        return True

    except botocore.exceptions.ClientError as e:
        if e.response['Error']['Message'] == 'No updates are to be performed.':
            return False
        else:
            raise Exception('Error updating CloudFormation stack "{0}"'.format(stack),
 e)

def stack_exists(stack):
    """Check if a stack exists or not

    Args:
        stack: The stack to check

    Returns:
        True or False depending on whether the stack exists

    Raises:
        Any exceptions raised .describe_stacks() besides that
        the stack doesn't exist.

    """
    try:
        cf.describe_stacks(StackName=stack)
        return True
    except botocore.exceptions.ClientError as e:
        if "does not exist" in e.response['Error']['Message']:
            return False
        else:
            raise e

def create_stack(stack, template):
    """Starts a new CloudFormation stack creation

    Args:
        stack: The stack to be created
        template: The template for the stack to be created with

    Throws:
        Exception: Any exception thrown by .create_stack()
    """
    cf.create_stack(StackName=stack, TemplateBody=template)

def get_stack_status(stack):
    """Get the status of an existing CloudFormation stack

    Args:
        stack: The name of the stack to check
    Returns:
        The CloudFormation status string of the stack such as CREATE_COMPLETE

    Raises:
        Exception: Any exception thrown by .describe_stacks()

    """
    stack_description = cf.describe_stacks(StackName=stack)
    return stack_description['Stacks'][0]['StackStatus']

def put_job_success(job, message):
    """Notify CodePipeline of a successful job

    Args:
        job: The CodePipeline job ID
        message: A message to be logged relating to the job status

    Raises:
        Exception: Any exception thrown by .put_job_success_result()

    """
    print('Putting job success')
    print(message)
    code_pipeline.put_job_success_result(jobId=job)

def put_job_failure(job, message):
    """Notify CodePipeline of a failed job

    Args:
        job: The CodePipeline job ID
        message: A message to be logged relating to the job status

    Raises:
        Exception: Any exception thrown by .put_job_failure_result()

    """
    print('Putting job failure')
    print(message)
    code_pipeline.put_job_failure_result(jobId=job, failureDetails={'message': message,
 'type': 'JobFailed'})

def continue_job_later(job, message):
    """Notify CodePipeline of a continuing job

    This will cause CodePipeline to invoke the function again with the
    supplied continuation token.

    Args:
        job: The JobID
        message: A message to be logged relating to the job status
        continuation_token: The continuation token

    Raises:
        Exception: Any exception thrown by .put_job_success_result()

    """

    # Use the continuation token to keep track of any job execution state
    # This data will be available when a new job is scheduled to continue the current
 execution
    continuation_token = json.dumps({'previous_job_id': job})

    print('Putting job continuation')
    print(message)
    code_pipeline.put_job_success_result(jobId=job,
 continuationToken=continuation_token)

def start_update_or_create(job_id, stack, template):
    """Starts the stack update or create process

    If the stack exists then update, otherwise create.

    Args:
        job_id: The ID of the CodePipeline job
        stack: The stack to create or update
        template: The template to create/update the stack with

    """
    if stack_exists(stack):
        status = get_stack_status(stack)
        if status not in ['CREATE_COMPLETE', 'ROLLBACK_COMPLETE', 'UPDATE_COMPLETE']:
            # If the CloudFormation stack is not in a state where
            # it can be updated again then fail the job right away.
            put_job_failure(job_id, 'Stack cannot be updated when status is: ' +
 status)
            return

        were_updates = update_stack(stack, template)

        if were_updates:
            # If there were updates then continue the job so it can monitor
            # the progress of the update.
            continue_job_later(job_id, 'Stack update started')

        else:
            # If there were no updates then succeed the job immediately
            put_job_success(job_id, 'There were no stack updates')
    else:
        # If the stack doesn't already exist then create it instead
        # of updating it.
        create_stack(stack, template)
        # Continue the job so the pipeline will wait for the CloudFormation
        # stack to be created.
        continue_job_later(job_id, 'Stack create started')

def check_stack_update_status(job_id, stack):
    """Monitor an already-running CloudFormation update/create

    Succeeds, fails or continues the job depending on the stack status.

    Args:
        job_id: The CodePipeline job ID
        stack: The stack to monitor

    """
    status = get_stack_status(stack)
    if status in ['UPDATE_COMPLETE', 'CREATE_COMPLETE']:
        # If the update/create finished successfully then
        # succeed the job and don't continue.
        put_job_success(job_id, 'Stack update complete')

    elif status in ['UPDATE_IN_PROGRESS', 'UPDATE_ROLLBACK_IN_PROGRESS',
    'UPDATE_ROLLBACK_COMPLETE_CLEANUP_IN_PROGRESS', 'CREATE_IN_PROGRESS',
    'ROLLBACK_IN_PROGRESS']:
        # If the job isn't finished yet then continue it
        continue_job_later(job_id, 'Stack update still in progress')

    else:
        # If the Stack is a state which isn't "in progress" or "complete"
        # then the stack update/create has failed so end the job with
        # a failed result.
        put_job_failure(job_id, 'Update failed: ' + status)

def get_user_params(job_data):
    """Decodes the JSON user parameters and validates the required properties.

    Args:
        job_data: The job data structure containing the UserParameters string which
 should be a valid JSON structure

    Returns:
        The JSON parameters decoded as a dictionary.

    Raises:
        Exception: The JSON can't be decoded or a property is missing.

    """
    try:
        # Get the user parameters which contain the stack, artifact and file settings
        user_parameters = job_data['actionConfiguration']['configuration']
['UserParameters']
        decoded_parameters = json.loads(user_parameters)

    except Exception as e:
        # We're expecting the user parameters to be encoded as JSON
        # so we can pass multiple values. If the JSON can't be decoded
        # then fail the job with a helpful message.
        raise Exception('UserParameters could not be decoded as JSON')

    if 'stack' not in decoded_parameters:
        # Validate that the stack is provided, otherwise fail the job
        # with a helpful message.
        raise Exception('Your UserParameters JSON must include the stack name')

    if 'artifact' not in decoded_parameters:
        # Validate that the artifact name is provided, otherwise fail the job
        # with a helpful message.
        raise Exception('Your UserParameters JSON must include the artifact name')

    if 'file' not in decoded_parameters:
        # Validate that the template file is provided, otherwise fail the job
        # with a helpful message.
        raise Exception('Your UserParameters JSON must include the template file name')

    return decoded_parameters

def setup_s3_client(job_data):
    """Creates an S3 client

    Uses the credentials passed in the event by CodePipeline. These
    credentials can be used to access the artifact bucket.

    Args:
        job_data: The job data structure

    Returns:
        An S3 client with the appropriate credentials

    """
    key_id = job_data['artifactCredentials']['accessKeyId']
    key_secret = job_data['artifactCredentials']['secretAccessKey']
    session_token = job_data['artifactCredentials']['sessionToken']

    session = Session(aws_access_key_id=key_id,
        aws_secret_access_key=key_secret,
        aws_session_token=session_token)
    return session.client('s3',
 config=botocore.client.Config(signature_version='s3v4'))

def lambda_handler(event, context):
    """The Lambda function handler

    If a continuing job then checks the CloudFormation stack status
    and updates the job accordingly.

    If a new job then kick of an update or creation of the target
    CloudFormation stack.

    Args:
        event: The event passed by Lambda
        context: The context passed by Lambda

    """
    try:
        # Extract the Job ID
        job_id = event['CodePipeline.job']['id']

        # Extract the Job Data
        job_data = event['CodePipeline.job']['data']

        # Extract the params
        params = get_user_params(job_data)

        # Get the list of artifacts passed to the function
        artifacts = job_data['inputArtifacts']

        stack = params['stack']
        artifact = params['artifact']
        template_file = params['file']

        if 'continuationToken' in job_data:
            # If we're continuing then the create/update has already been triggered
            # we just need to check if it has finished.
            check_stack_update_status(job_id, stack)
        else:
            # Get the artifact details
            artifact_data = find_artifact(artifacts, artifact)
            # Get S3 client to access artifact with
            s3 = setup_s3_client(job_data)
            # Get the JSON template file out of the artifact
            template = get_template(s3, artifact_data, template_file)
            # Kick off a stack update or create
            start_update_or_create(job_id, stack, template)

    except Exception as e:
        # If any other exceptions which we didn't expect are raised
        # then fail the job and log the exception message.
        print('Function failed due to exception.')
        print(e)
        traceback.print_exc()
        put_job_failure(job_id, 'Function exception: ' + str(e))

    print('Function complete.')
    return "Complete."
```

8. Save the function.
9. From the AWS CodePipeline console, edit the pipeline to add the function as an action in a stage in your pipeline. In **UserParameters**, you must provide a JSON string including curly braces with three parameters separated by commas: a stack name, the AWS CloudFormation template name and path to the file, and the application name.

For example, to create a stack named *MyTestStack*, for a pipeline with the input artifact *MyTemplate*, in **UserParameters**, you would type: {"stack":"*MyTestStack*","file":"template-package/template.json", "artifact":"*MyTemplate*"}.

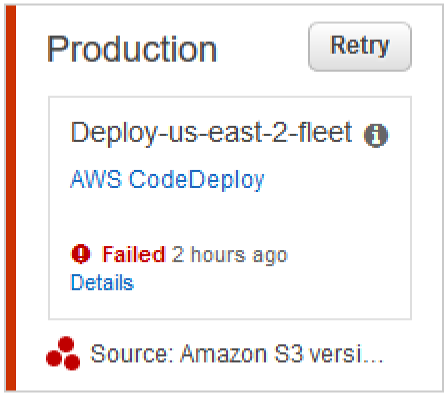
> **Note**
> Even though you have specified the input artifact in **UserParameters**, you must also specify this input artifact for the action in **Input artifacts**.

10. Save your changes to the pipeline, and then manually release a change to test the action and Lambda function.

Retry a Failed Action in AWS CodePipeline

In AWS CodePipeline, an action is a task performed on an artifact in a stage. If an action or a set of parallel actions is not completed successfully, the pipeline stops running.

You can retry the latest failed actions in a stage without having to run a pipeline again from the beginning. If you are using the console to view a pipeline, a **Retry** button will appear on the stage where the failed actions can be retried.



If you are using the AWS CLI, you can use the **get-pipeline-state** command to determine whether any actions have failed.

> **Note**
> In the following cases, you may not be able to retry actions:
>
> - The overall pipeline structure changed after an action failed.
> - One or more actions in the stage are still in progress.
> - Another retry attempt in the stage is already in progress.

Topics

Retry Failed Actions (Console)

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.

The names of all pipelines associated with your AWS account are displayed.

2. In **Name**, choose the name of the pipeline.
3. Locate the stage with the failed action, and then choose **Retry**.

   Note
   To identify which actions in the stage can be retried, hover over the **Retry** button.

   If all retried actions in the stage are completed successfully, the pipeline continues to run.

Retry Failed Actions (CLI)

To use the AWS CLI to retry failed actions, you first create a JSON file that identifies the pipeline, the stage that contains the failed actions, and the latest pipeline execution in that stage. You then run the **retry-stage-execution** command with the `--cli-input-json` parameter. To retrieve the details you need for the JSON file, it's easiest to use the **get-pipeline-state** command.

1. At a terminal (Linux, macOS, or Unix) or command prompt (Windows), run the **get-pipeline-state** command on a pipeline. For example, for a pipeline named MyFirstPipeline, you would type something similar to the following:

```
aws codepipeline get-pipeline-state --name MyFirstPipeline
```

   The response to the command includes pipeline state information for each stage. In the following example, the response indicates that one or more actions failed in the Staging stage:

```
{
    "updated": 1427245911.525,
    "created": 1427245911.525,
    "pipelineVersion": 1,
    "pipelineName": "MyFirstPipeline",
    "stageStates": [
        {
            "actionStates": [...],
            "stageName": "Source",
            "latestExecution": {
                "pipelineExecutionId": "9811f7cb-7cf7-SUCCESS",
                "status": "Succeeded"
            }
        },
        {
            "actionStates": [...],
            "stageName": "Staging",
            "latestExecution": {
                "pipelineExecutionId": "3137f7cb-7cf7-EXAMPLE",
                "status": "Failed"
            }
        }
    ]
}
```

2. In a plain-text editor, create a file where you will record the following, in JSON format:

   - The name of the pipeline that contains the failed actions
   - The name of the stage that contains the failed actions
   - The ID of the latest pipeline execution in the stage
   - The retry mode. (Currently, the only supported value is FAILED_ACTIONS)

For the preceding MyFirstPipeline example, your file would look something like this:

```
{
    "pipelineName": "MyFirstPipeline",
    "stageName": "Staging",
    "pipelineExecutionId": "3137f7cb-7cf7-EXAMPLE",
    "retryMode": "FAILED_ACTIONS"
}
```

3. Save the file with a name like **`retry-failed-actions.json`**.
4. Call the file you created when you run the **retry-stage-execution** command. For example:

   Important
   Be sure to include `file://` before the file name. It is required in this command.

```
aws codepipeline retry-stage-execution --cli-input-json file://retry-failed-
actions.json
```

5. To view the results of the retry attempt, either open the AWS CodePipeline console and choose the pipeline that contains the actions that failed, or use the **get-pipeline-state** command again. For more information, see View Pipeline Details and History in AWS CodePipeline (p. 90).

Manage Approval Actions in AWS CodePipeline

In AWS CodePipeline, you can add an approval action to a stage in a pipeline at the point where you want the pipeline execution to stop so that someone with the required AWS Identity and Access Management permissions can approve or reject the action.

If the action is approved, the pipeline execution resumes. If the action is rejected—or if no one approves or rejects the action within seven days of the pipeline reaching the action and stopping—the result is the same as an action failing, and the pipeline execution does not continue.

You might use manual approvals for a variety of purposes:

- You want someone to perform a code review or change management review before a revision is allowed into the next stage of a pipeline.
- You want someone to perform manual quality assurance testing on the latest version of an application, or to confirm the integrity of a build artifact, before it is released.
- You want someone to review new or updated text before it is published to a company website.

Configuration Options for Manual Approval Actions in AWS CodePipeline

AWS CodePipeline provides three configuration options you can use to tell approvers about the approval action.

Publish Approval Notifications You can configure an approval action to publish a message to an Amazon Simple Notification Service topic when the pipeline stops at the action. Amazon SNS delivers the message to every endpoint subscribed to the topic. You must use a topic created in the same AWS region as the pipeline that will include the approval action. When you create a topic, we recommend you give it a name that will identify its purpose, in formats such as `MyFirstPipeline-us-east-2-approval`.

When you publish approval notifications to Amazon SNS topics, you can choose from formats such as email or SMS recipients, SQS queues, HTTP/HTTPS endpoints, or AWS Lambda functions you invoke using Amazon SNS. For information about Amazon SNS topic notifications, see the following topics:

- What Is Amazon Simple Notification Service?
- Create a Topic in Amazon SNS
- Sending Amazon SNS Messages to Amazon SQS Queues
- Subscribing a Queue to an Amazon SNS Topic
- Sending Amazon SNS Messages to HTTP/HTTPS Endpoints
- Invoking Lambda Functions Using Amazon SNS Notifications

For a look at the structure of the JSON data generated for an approval action notification, see JSON Data Format for Manual Approval Notifications in AWS CodePipeline (p. 146).

Specify a URL for Review As part of the configuration of the approval action, you can specify a URL to be reviewed. The URL might be a link to a Web application you want approvers to test or a page with more information about your approval request. The URL is included in the notification that is published to the Amazon SNS topic. Approvers can use the console or AWS CLI to view it.

Enter Comments for Approvers When you create an approval action, you can also add comments that will be displayed to those who receive the notifications or those who view the action in the console or CLI response.

No Configuration Options You can also choose not to configure any of these three options. You may not need them if, for example, you will directly notify someone that the action is ready for their review, or you simply want the pipeline to stop until you decide to approve the action yourself.

Setup and Workflow Overview for Approval Actions in AWS CodePipeline

The following is an overview for setting up and using manual approvals.

1. You grant the IAM permissions required for approving or rejecting approval actions to one or more IAM users in your organization.
2. (Optional) If you are using Amazon SNS notifications, you ensure that the service role you use in your AWS CodePipeline operations has permission to access Amazon SNS resources.
3. (Optional) If you are using Amazon SNS notifications, you create an Amazon SNS topic and add one or more subscribers or endpoints to it.
4. When you use the AWS CLI to create the pipeline or after you have used the CLI or console to create the pipeline, you add an approval action to a stage in the pipeline.

   If you are using notifications, you include the Amazon Resource Name (ARN) of the Amazon SNS topic in the configuration of the action. (An ARN is a unique identifier for an Amazon resource. ARNs for Amazon SNS topics are structured like `arn:aws:sns:us-east-2:80398EXAMPLE:MyApprovalTopic`. For more information, see Amazon Resource Names (ARNs) and AWS Service Namespaces in the *Amazon Web Services General Reference*.)
5. The pipeline stops when it reaches the approval action. If an Amazon SNS topic ARN was included in the configuration of the action, a notification is published to the Amazon SNS topic, and a message is delivered to any subscribers to the topic or subscribed endpoints, with a link to review the approval action in the console.
6. An approver examines the target URL and reviews comments, if any.
7. Using the console, CLI, or SDK, the approver provides a summary comment and submits a response:
   - Approved: The pipeline execution resumes.

- Rejected: The stage status is changed to "Failed" and the pipeline execution does not resume.

If no response is submitted within seven days, the action is marked as "Failed."

Grant Approval Permissions to an IAM User in AWS CodePipeline

Before IAM users in your organization can approve or reject approval actions, they must be granted permissions to access pipelines and to update the status of approval actions. You can grant permission to access all pipelines and approval actions in your account by attaching the `AWSCodePipelineApproverAccess` managed policy to an IAM user, role, or group; or you can to grant limited permissions by specifying the individual resources that can be accessed by an IAM user, role, or group.

> **Note**
> The permissions described in this topic grant very limited access. To enable a user, role, or group to do more than approve or reject approval actions, you can attach other managed policies. For information about the managed policies available for AWS CodePipeline, see AWS Managed (Predefined) Policies for AWS CodePipeline (p. 179).

Grant Approval Permission to All Pipelines and Approval Actions

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.
2. In the navigation pane, choose **Groups**, **Roles**, or **Users**.
3. Choose the group, role or IAM user to grant permissions to.
4. Choose the **Permissions** tab.
5. Choose **Add permissions**, and then choose **Attach existing policies directly** .
6. Select the check box next to `AWSCodePipelineApproverAccess` managed policy, and then choose **Next: Review**.
7. Choose **Add permissions**.

Specify Approval Permission for Specific Pipelines and Approval Actions

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.

   > **Important**
   > Make sure you are signed in to the AWS Management Console with the same account information you used in Getting Started with AWS CodePipeline (p. 9).
2. In the navigation pane, choose **Groups** or **Users**, as appropriate.
3. Browse to and choose the user or group you want to change.
4. On the summary page, choose the **Permissions** tab, and expand the **Inline Policies** section.
5. Do one of the following:
   - If you chose **Groups**, now choose **Create Group Policy**. If you chose **Users**, now choose **Create User Policy**.
   - If no inline policies have been created yet, choose **click here**.
6. Choose **Custom Policy**, and then choose **Select**.
7. Type a name for this policy in **Policy Name**.

8. Specify the individual resources an IAM user can access. For example, the following policy grants users the authority to approve or reject only the action named `MyApprovalAction` in the `MyFirstPipeline` pipeline in the US East (Ohio) Region (us-east-2):

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Action": [
                "codepipeline:ListPipelines"
            ],
            "Resource": [
                "*"
            ],
            "Effect": "Allow"
        },
        {
            "Action": [
                "codepipeline:GetPipeline",
                "codepipeline:GetPipelineState",
                "codepipeline:GetPipelineExecution"
            ],
            "Effect": "Allow",
            "Resource": "arn:aws:codepipeline:us-east-2:80398EXAMPLE:MyFirstPipeline"
        },
        {
            "Action": [
                "codepipeline:PutApprovalResult"
            ],
            "Effect": "Allow",
            "Resource": "arn:aws:codepipeline:us-east-2:80398EXAMPLE:MyFirstPipeline/
MyApprovalStage/MyApprovalAction"
        }
    ]
}
```

    Note
    The `codepipeline:ListPipelines` permission is required only if IAM users need to access the AWS CodePipeline dashboard to view this list of pipelines. If console access is not required, you can omit `codepipeline:ListPipelines`.

9. Choose **Validate Policy**. Correct any errors displayed in a red box at the top of the page.
10. When you are satisfied with the policy, choose **Apply Policy**.

Grant Amazon SNS Permissions to an AWS CodePipeline Service Role

If you plan to use Amazon SNS to publish notifications to topics when approval actions require review, the service role you use in your AWS CodePipeline operations must be granted permission to access the Amazon SNS resources. You can use the IAM console to add this permission to your service role.

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.

    Important
    Make sure you are signed in to the AWS Management Console with the same account information you used in Getting Started with AWS CodePipeline (p. 9).

2. In the IAM console, in the navigation pane, choose **Roles**.

3. Choose the name of the service role you use in your AWS CodePipeline operations.
4. On the **Permissions** tab, in the **Inline Policies** area, choose **Create Role Policy**.

   –or–

   If the **Create Role Policy** button is not available, expand the **Inline Policies** area, and then choose **click here**.
5. On the **Set Permissions** page, choose **Custom Policy**, and then choose **Select**.
6. On the **Review Policy** page, in the **Policy Name** field, type a name to identify this policy, such as `SNSPublish`.
7. Paste the following into the **Policy Document** field:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": "sns:Publish",
            "Resource": "*"
        }
    ]
}
```

8. Choose **Apply Policy**.

Add a Manual Approval Action to a Pipeline in AWS CodePipeline

You can add an approval action to a stage in an AWS CodePipeline pipeline at the point where you want the pipeline to stop so someone can manually approve or reject the action.

Note
Approval actions can't be added to Source stages. Source stages can contain only source actions.

If you want to use Amazon SNS to send notifications when an approval action is ready for review, you must first complete the following prerequisites:

- Grant permission to your AWS CodePipeline service role to access Amazon SNS resources. For information, see Grant Amazon SNS Permissions to an AWS CodePipeline Service Role (p. 139).
- Grant permission to one or more IAM users in your organization to update the status of an approval action. For information, see Grant Approval Permissions to an IAM User in AWS CodePipeline (p. 138).

Add a Manual Approval Action to an AWS CodePipeline Pipeline (Console)

You can use the AWS CodePipeline console to add an approval action to an existing AWS CodePipeline pipeline. You must use the AWS CLI if you want to add approval actions when you create a new pipeline.

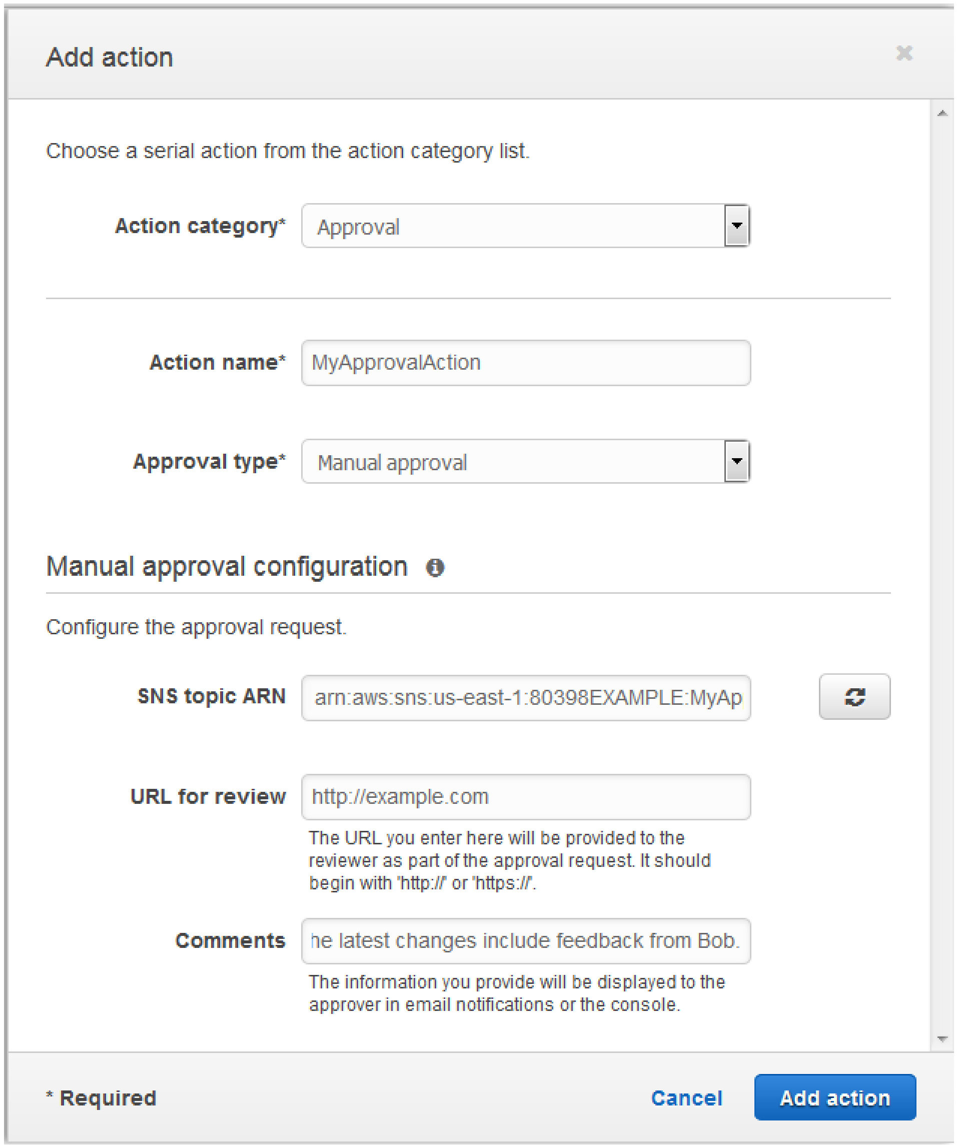
1. Open the AWS CodePipeline console at https://console.aws.amazon.com/codepipeline/.
2. In **Name**, choose the pipeline.
3. On the pipeline details page, choose **Edit**.
4. If you want to add an approval action to a new stage, choose **+ Stage** at the point in the pipeline where you want to add an approval request, and type a name for the stage.

If you want to add an approval action to an existing stage, choose the edit icon ( ) on that stage.

5. Choose the action icon ( ).
6. On the **Add action** page, do the following:

   1. In **Action category**, choose **Approval**.
   2. In **Action name**, type a name to identify the action.
   3. In **Approval type**, choose **Manual approval**.
   4. (Optional) In **SNS topic ARN**, choose the name of the topic you will use to send notifications for the approval action.
   5. (Optional) In **URL for review**, enter the URL of the page or application you want the approver to examine. Approvers can access this URL through a link included in the console view of the pipeline.
   6. (Optional) In **Comments**, type any additional information you want to share with the reviewer.

      Your completed page might look similar to the following:


Add action
×
Choose a serial action from the action category list.
Manual approval configuration
Configure the approval request.
* Required
Cancel
Add action

Action category*: Approval

Action name*: MyApprovalAction

Approval type*: Manual approval

SNS topic ARN: arn:aws:sns:us-east-1:80398EXAMPLE:MyAp

URL for review: http://example.com

The URL you enter here will be provided to the reviewer as part of the approval request. It should begin with 'http://' or 'https://'.

Comments: he latest changes include feedback from Bob.

The information you provide will be displayed to the approver in email notifications or the console.

7. Choose **Add action**.

Add a Manual Approval Action to an AWS CodePipeline Pipeline (CLI)

You can use the CLI to add an approval action to an existing pipeline or when you create a pipeline. You do this by including an approval action, with the Manual approval approval type, in a stage you are creating or editing.

For more information about creating and editing pipelines, see Create a Pipeline in AWS CodePipeline (p. 67) and Edit a Pipeline in AWS CodePipeline (p. 75).

To add a stage to a pipeline that includes only an approval action, you would include something similar to the following example when you create or update the pipeline.

Note
The `configuration` section is optional. This is just a portion, not the entire structure, of the file. For more information, see AWS CodePipeline Pipeline Structure Reference (p. 201).

```
{
    "name": "MyApprovalStage",
    "actions": [
        {
            "name": "MyApprovalAction",
            "actionTypeId": {
                "category": "Approval",
                "owner": "AWS",
                "version": "1",
                "provider": "Manual"
            },
            "inputArtifacts": [],
            "outputArtifacts": [],
            "configuration": {
                "NotificationArn": "arn:aws:sns:us-east-2:80398EXAMPLE:MyApprovalTopic",
                "ExternalEntityLink": "http://example.com",
                "CustomData": "The latest changes include feedback from Bob."},
            "runOrder": 1
        }
    ]
}
```

If the approval action is in a stage with other actions, the section of your JSON file that contains the stage might look similar instead to the following example.

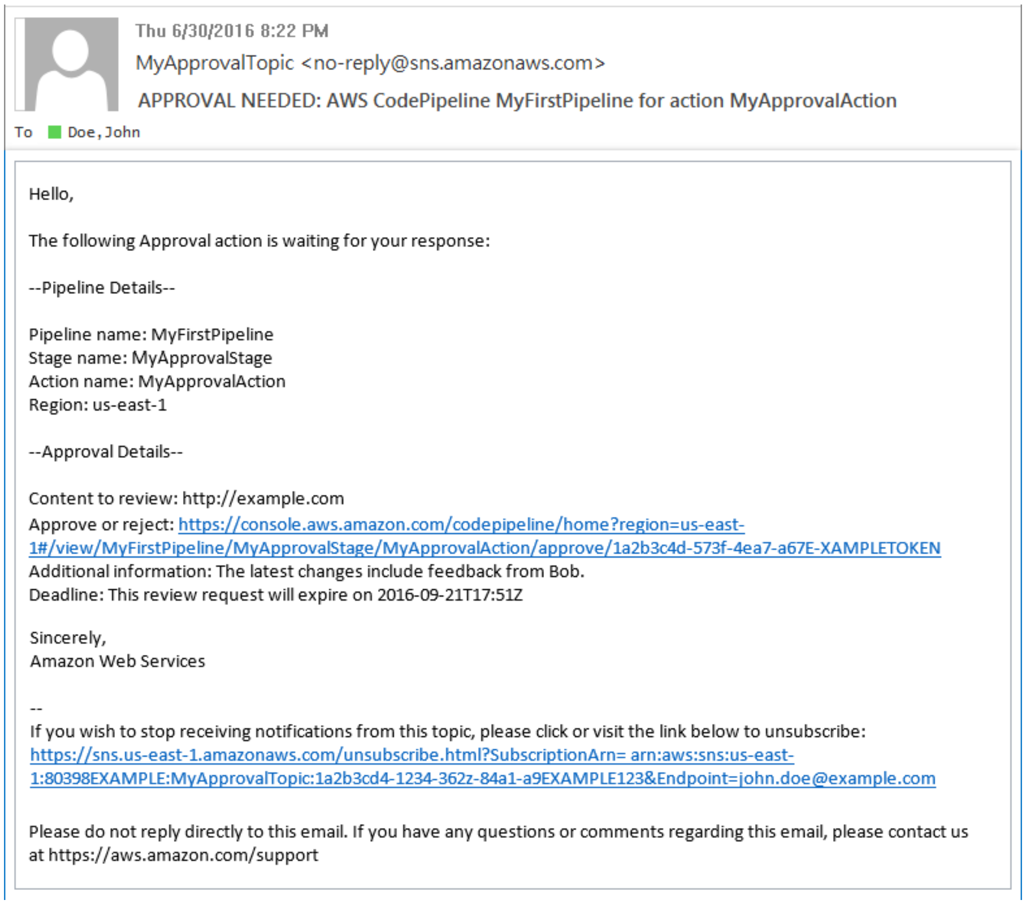
Note
The `configuration` section is optional. This is just a portion, not the entire structure, of the file. For more information, see AWS CodePipeline Pipeline Structure Reference (p. 201).

```
,
{
    "name": "Production",
    "actions": [
        {
            "inputArtifacts": [],
            "name": "MyApprovalStage",
            "actionTypeId": {
                "category": "Approval",
                "owner": "AWS",
                "version": "1",
                "provider": "Manual"
            },
            "outputArtifacts": [],
            "configuration": {
                "NotificationArn": "arn:aws:sns:us-east-2:80398EXAMPLE:MyApprovalTopic",
                "ExternalEntityLink": "http://example.com",
                "CustomData": "The latest changes include feedback from Bob."
            },
            "runOrder": 1
        },
        {
            "inputArtifacts": [
                {
                    "name": "MyApp"
                }
            ],
            "name": "MyDeploymentStage",
            "actionTypeId": {
                "category": "Deploy",
                "owner": "AWS",
                "version": "1",
                "provider": "CodeDeploy"
            },
            "outputArtifacts": [],
            "configuration": {
                "ApplicationName": "MyDemoApplication",
                "DeploymentGroupName": "MyProductionFleet"
            },
            "runOrder": 2
        }
    ]
}
```

Approve or Reject an Approval Action in AWS CodePipeline

When a pipeline includes an approval action, the pipeline execution stops at the point where the action has been added. The pipeline won't resume unless someone manually approves the action. If an approver rejects the action, or if no approval response is received within seven days of the pipeline stopping for the approval action, the pipeline status becomes "Failed."

If the person who added the approval action to the pipeline configured notifications, you might receive an email that looks similar to the following:



Thu 6/30/2016 8:22 PM
MyApprovalTopic <no-reply@sns.amazonaws.com>
APPROVAL NEEDED: AWS CodePipeline MyFirstPipeline for action MyApprovalAction
To Doe, John

Hello,

The following Approval action is waiting for your response:

--Pipeline Details--

Pipeline name: MyFirstPipeline
Stage name: MyApprovalStage
Action name: MyApprovalAction
Region: us-east-1

--Approval Details--

Content to review: http://example.com
Approve or reject: https://console.aws.amazon.com/codepipeline/home?region=us-east-1#/view/MyFirstPipeline/MyApprovalStage/MyApprovalAction/approve/1a2b3c4d-573f-4ea7-a67E-XAMPLETOKEN
Additional information: The latest changes include feedback from Bob.
Deadline: This review request will expire on 2016-09-21T17:51Z

Sincerely,
Amazon Web Services

--
If you wish to stop receiving notifications from this topic, please click or visit the link below to unsubscribe:
https://sns.us-east-1.amazonaws.com/unsubscribe.html?SubscriptionArn= arn:aws:sns:us-east-1:80398EXAMPLE:MyApprovalTopic:1a2b3cd4-1234-362z-84a1-a9EXAMPLE123&Endpoint=john.doe@example.com

Please do not reply directly to this email. If you have any questions or comments regarding this email, please contact us at https://aws.amazon.com/support

Approve or Reject an Approval Action (Console)

If you receive a notification that includes a direct link to an approval action, choose the **Approve or reject** link, sign in to the console if necessary, and then continue with step 7 below. Otherwise, use all the following steps.

1. Open the AWS CodePipeline console at https://console.aws.amazon.com/codepipeline/.
2. On the **All Pipelines** page, choose the name of the pipeline.
3. Locate the stage with the approval action.
4. Hover over the information icon to view the comments and URL, if any. The information pop-up message will also display the URL of content for you to review, if one was included.
5. If a URL was provided, choose the **Manual approval** link in the action to open the target Web page, and then review the content.
6. Return to the pipeline details view, and then choose the **Review** button.
7. In the **Approve or reject the revision** window, type comments related to your review, such as why you are approving or rejecting the action, and then choose the **Approve** or **Reject** button.

Approve or Reject an Approval Request (CLI)

To use the CLI to respond to an approval action, you must first use the **get-pipeline-state** command to retrieve the token associated with latest execution of the approval action.

1. At a terminal (Linux, macOS, or Unix) or command prompt (Windows), run the get-pipeline-state command on the pipeline that contains the approval action. For example, for a pipeline named MyFirstPipeline, you would type the following:

```
aws codepipeline get-pipeline-state --name MyFirstPipeline
```

2. In the response to the command, locate the `token` value, which appears in `latestExecution` in the `actionStates` section for the approval action. For example:

```
{
    "created": 1467929497.204,
    "pipelineName": "MyFirstPipeline",
    "pipelineVersion": 1,
    "stageStates": [
        {
            "actionStates": [
                {
                    "actionName": "MyApprovalAction",
                    "currentRevision": {
                        "created": 1467929497.204,
                        "revisionChangeId": "CEM7d6Tp7zfelUSLCPPwo234xEXAMPLE",
                        "revisionId": "HYGp7zmwbCPPwo23xCMdTeqIlEXAMPLE"
                    },
                    "latestExecution": {
                        "lastUpdatedBy": "arn:aws:iam::123456789012:user/Bob",
                        "summary": "The new design needs to be reviewed before
 release.",
                        "token": "1a2b3c4d-573f-4ea7-a67E-XAMPLETOKEN"
                    }
                }
//More content might appear here
}
```

3. In a plain-text editor, create a file where you will record the following, in JSON format:

- The name of the pipeline that contains the approval action.
- The name of the stage that contains the approval action.
- The name of the approval action.
- The token value you collected in the previous step.
- Your response to the action, either Approved or Rejected. (The response must be capitalized.)
- Your summary comments.

For the preceding MyFirstPipeline example, your file would look something like this:

```
{
  "pipelineName": "MyFirstPipeline",
  "stageName": "MyApprovalStage",
  "actionName": "MyApprovalAction",
  "token": "1a2b3c4d-573f-4ea7-a67E-XAMPLETOKEN",
  "result": {
    "status": "Approved",
    "summary": "The new design looks good. Ready to release to customers."
  }
}
```

4. Save the file with a name like **`approvalstage-approved.json`**.
5. Run the put-approval-result command, specifying the name of the approval JSON file, similar to the following:

   Important
   Be sure to include `file://` before the file name. It is required in this command.

```
aws codepipeline put-approval-result --cli-input-json file://approvalstage-
approved.json
```

JSON Data Format for Manual Approval Notifications in AWS CodePipeline

For approval actions that use Amazon SNS notifications, JSON data about the action is created and published to Amazon SNS when the pipeline stops. You can use the JSON output to send messages to Amazon SQS queues or invoke functions in AWS Lambda.

Note
This guide does not address how to configure notifications using JSON. For information about using Amazon SNS to send messages to Amazon SQS queues, see Sending Amazon SNS Messages to Amazon SQS Queues. For information about using Amazon SNS to invoke a Lambda function, see Invoking Lambda Functions Using Amazon SNS Notifications.

The following example shows the structure of the JSON output available with AWS CodePipeline approvals.

```
{
    "region": "us-east-2",
    "consoleLink": "https://console.aws.amazon.com/codepipeline/home?region=us-east-2#/
view/MyFirstPipeline",
    "approval": {
        "pipelineName": "MyFirstPipeline",
        "stageName": "MyApprovalStage",
        "actionName": "MyApprovalAction",
        "token": "1a2b3c4d-573f-4ea7-a67E-XAMPLETOKEN",
        "expires": "2016-07-07T20:22Z",
        "externalEntityLink": "http://example.com",
        "approvalReviewLink": "https://console.aws.amazon.com/codepipeline/home?region=us-
east-2#/view/MyFirstPipeline/MyApprovalStage/MyApprovalAction/approve/1a2b3c4d-573f-4ea7-
a67E-XAMPLETOKEN",
        "customData": "Review the latest changes and approve or reject within seven days."
    }
}
```

Working with Stage Transitions in AWS CodePipeline

Transitions are links between pipeline stages that can be disabled or enabled. They are enabled by default. When you re-enable a disabled transition, the latest revision will run through the remaining stages of the pipeline unless more than 30 days have passed. Pipeline execution won't resume for a transition that has been disabled more than 30 days unless a new change is detected or you manually rerun the pipeline.

> **Note**
> You can use an approval action to pause the run of a pipeline until it is manually approved to continue. For more information, see Manage Approval Actions in AWS CodePipeline (p. 136).

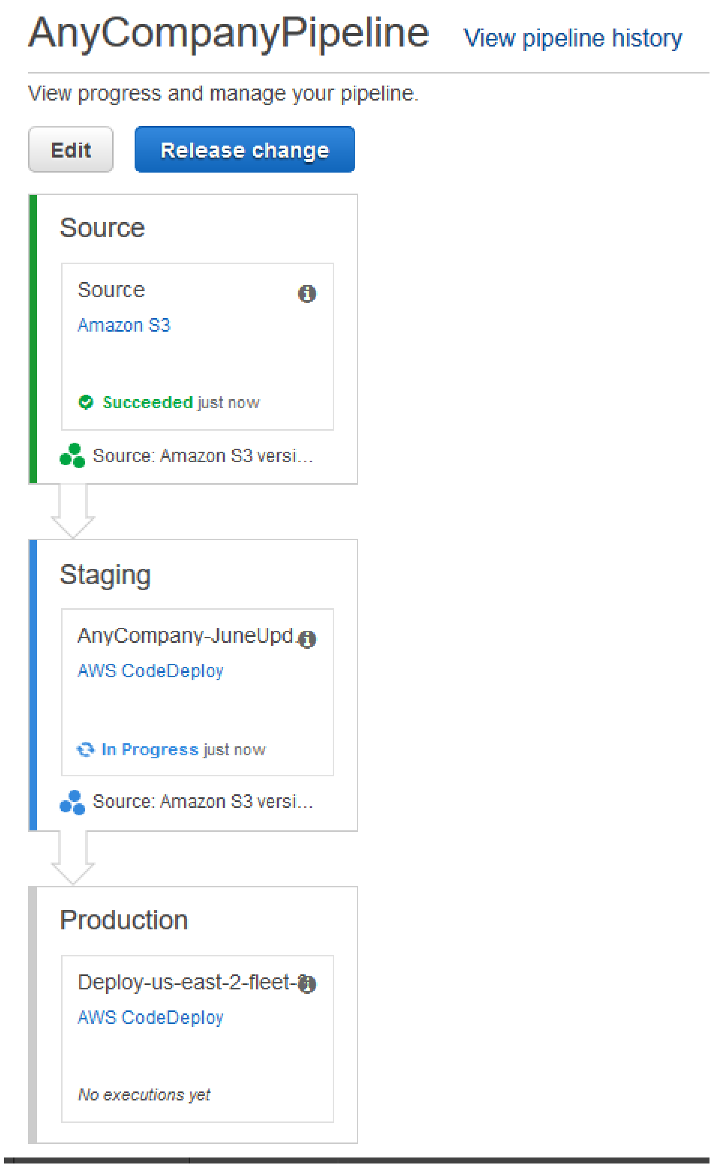
Topics

Disable or Enable Transitions (Console)

To disable or enable transitions in a pipeline

1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.

   The names of all pipelines associated with your AWS account are displayed.
2. In **Name**, choose the name of the pipeline for which you want to enable or disable transitions. This opens a detailed view of the pipeline, including the transitions between the stages of the pipeline.
3. Find the arrow after the last stage that you want to run, and then choose it. For example, in the following example pipeline, if you want the actions in the *`Staging`* stage to run, but not the actions in the stage named *`Production`*, you would choose the arrow between those two stages:


AnyCompanyPipeline

View progress and manage your pipeline.

Source

Source
Amazon S3
Succeeded just now
Source: Amazon S3 versi...

Staging

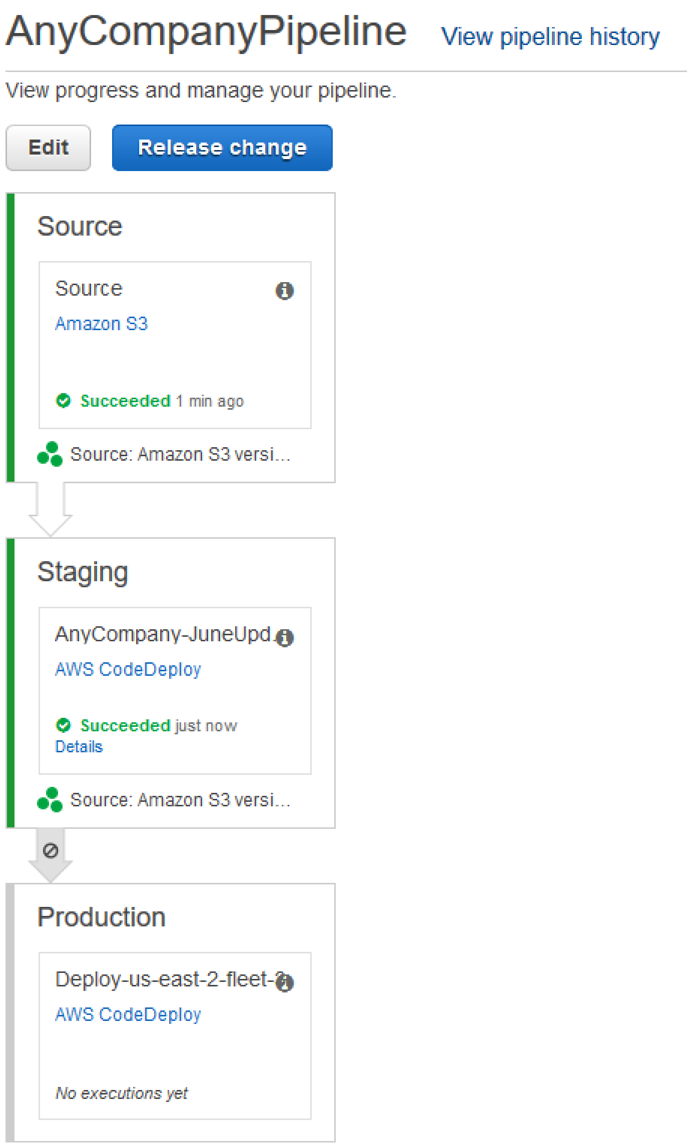
AnyCompany-JuneUpd
AWS CodeDeploy
In Progress just now
Source: Amazon S3 versi...

Production

Deploy-us-east-2-fleet-
AWS CodeDeploy
No executions yet

4. In the **Disable transition** dialog box, type a reason for disabling the transition, and then choose **Disable**.

   The arrow changes to show that transitions are disabled between the stage preceding the arrow and the stage following the arrow. Any revisions that were already running in the stages that come after the disabled transition will continue through the pipeline, but any subsequent revisions will not continue past the disabled transition.



5. To enable transitions, choose the disabled transition arrow. In the **Enable transition** dialog box, choose **Enable**. The pipeline will immediately enable the transition between the two stages. If any revisions have been run through the prior stages after the transition was disabled, in a few moments, the pipeline will start running the latest revision through the stages after the formerly disabled transition. The pipeline will run the revision through all remaining stages in the pipeline.

   Note
   It might take a few seconds for changes to appear in the AWS CodePipeline console after you enable the transition.

Disable or Enable Transitions (CLI)

To disable a transition between stages by using the AWS CLI, run the **disable-stage-transition** command. To enable a disabled transition, run the **enable-stage-transition** command.

To disable a transition

1. Open a terminal (Linux, macOS, or Unix) or command prompt (Windows) and use the AWS CLI to run the disable-stage-transition command, specifying the name of the pipeline, the name of the stage to which you want to disable transitions, the transition type, and the reason you are disabling transitions to that stage. Unlike using the console, you must also specify whether you are disabling transitions into the stage (inbound) or transitions out of the stage after all actions complete (outbound).

   For example, to disable the transition to a stage named *Staging* in a pipeline named *MyFirstPipeline*, you would type a command similar to the following:

   ```
   aws codepipeline disable-stage-transition --pipeline-name MyFirstPipeline --stage-
   name Staging --transition-type Inbound --reason "My Reason"
   ```

   The command returns nothing.
2. To verify the transition has been disabled, either view the pipeline in the AWS CodePipeline console or run the **get-pipeline-state** command. For more information, see View Pipeline Details and History (Console) (p. 90) and View Pipeline Details and History (CLI) (p. 93).

To enable a transition

1. Open a terminal (Linux, macOS, or Unix) or command prompt (Windows) and use the AWS CLI to run the enable-stage-transition command, specifying the name of the pipeline, the name of the stage to which you want to enable transitions, and the transition type.

   For example, to enable the transition to a stage named *Staging* in a pipeline named *MyFirstPipeline*, you would type a command similar to the following:

   ```
   aws codepipeline enable-stage-transition --pipeline-name MyFirstPipeline --stage-
   name Staging  --transition-type Inbound
   ```

   The command returns nothing.
2. To verify the transition has been disabled, either view the pipeline in the AWS CodePipeline console or run the **get-pipeline-state** command. For more information, see View Pipeline Details and History (Console) (p. 90) and View Pipeline Details and History (CLI) (p. 93).

Monitoring Pipelines with AWS CodePipeline

Monitoring is an important part of maintaining the reliability, availability, and performance of AWS CodePipeline. You should collect monitoring data from all parts of your AWS solution so that you can more easily debug a multi-point failure, if one occurs. Before you start monitoring, you should create a monitoring plan that answers the following questions:

- What are your monitoring goals?
- Which resources will you monitor?
- How often will you monitor these resources?
- Which monitoring tools are available for you to use?
- Who will perform the monitoring tasks?
- Who should be notified if something goes wrong?

You can use the following tools to monitor your AWS CodePipeline pipelines and their resources:

- **Amazon CloudWatch Events** — Use Amazon CloudWatch Events to detect and react to pipeline execution state changes (for example, send an Amazon SNS notification or invoke a Lambda function).
- **AWS CloudTrail** — Use CloudTrail to capture API calls made by or on behalf of AWS CodePipeline in your AWS account and deliver the log files to an Amazon S3 bucket. You can choose to have CloudWatch publish Amazon SNS notifications when new log files are delivered so you can take quick action.
- **Console and CLI** — You can use the AWS CodePipeline console and CLI to view details about the status of a pipeline or a particular pipeline execution.

Topics

Detect and React to Changes in Pipeline State with Amazon CloudWatch Events

Amazon CloudWatch Events is a web service that monitors your AWS resources and the applications you run on AWS. You can use Amazon CloudWatch Events to detect and react to changes in the state of a pipeline, stage, or action. Then, based on rules you create, CloudWatch Events invokes one or more target actions when a pipeline, stage, or action enters the state you specify in a rule. Depending on the type of state change, you might want to send notifications, capture state information, take corrective action, initiate events, or take other actions.

Amazon CloudWatch Events are composed of:

- **Rules.** An event in Amazon CloudWatch Events is configured by first creating a rule with a selected service as the event source.
- **Targets.** The new rule receives a selected service as the event target. For a list of services available as Amazon CloudWatch Events targets, see What Is Amazon CloudWatch Events.

Examples of Amazon CloudWatch Events rules and targets:

- A rule that sends a notification when the instance state changes, where an EC2 instance is the event source and Amazon SNS is the event target.
- A rule that sends a notification when the build phase changes, where an AWS CodeBuild configuration is the event source and Amazon SNS is the event target.
- A rule that detects pipeline changes and invokes an AWS Lambda function.

To configure AWS CodePipeline as an event source:

1. Create an Amazon CloudWatch Events rule that uses AWS CodePipeline as an event source.
2. Create a target for your rule that uses one of the services available as targets in Amazon CloudWatch Events, such as AWS Lambda or Amazon SNS.
3. Grant permissions to Amazon CloudWatch Events to allow it to invoke the selected target service.

Understand How a Pipeline Execution State Change Rule Works

You build rules for detecting and reacting to pipeline state changes using the **Events** window in Amazon CloudWatch. As you build your rule, the **Event Pattern Preview** box in the console (or the `--event-pattern` output in the CLI) displays the event fields, in JSON format.

You can configure notifications to be sent when the state changes for:

- Specified pipelines or all your pipelines. You control this by using `"detail-type": "CodePipeline Pipeline Execution State Change"`.
- Specified stages or all your stages, within a specified pipeline or all your pipelines. You control this by using `"detail-type": "CodePipeline Stage Execution State Change"`.
- Specified actions or all actions, within a specified stage or all stages, within a specified pipeline or all your pipelines. You control this by using `"detail-type": "CodePipeline Action Execution State Change"`.

Each type of execution state change event emits notifications with specific message content, where:

- The initial `version` entry shows the version number for the CloudWatch event.
- The `version` entry under pipeline `detail` shows the pipeline structure version number.
- The `execution-id` entry under pipeline `detail` shows the execution ID for the pipeline execution that caused the state change. Refer to the **GetPipelineExecution** API call in the AWS CodePipeline API Reference.

Pipeline execution state change message content: When a pipeline execution starts, it emits an event that sends notifications with the following content. This example is for the pipeline named `"myPipeline"` in the `us-east-1` region.

```
{
    "version": "0",
    "id": event_Id,
    "detail-type": "CodePipeline Pipeline Execution State Change",
    "source": "aws.codepipeline",
    "account": Pipeline_Account,
    "time": TimeStamp,
    "region": "us-east-1",
    "resources": [
        "arn:aws:codepipeline:us-east-1:account_ID:pipeline:myPipeline"
    ],
    "detail": {
        "pipeline": "myPipeline",
        "version": "1",
        "state": "STARTED",
        "execution-id": execution_Id
    }
}
```

Stage execution state change message content: When a stage execution starts, it emits an event that sends notifications with the following content. This example is for the pipeline named `"myPipeline"` in the `us-east-1` region, for the stage `"Prod"`.

```
{
    "version": "0",
    "id": event_Id,
    "detail-type": "CodePipeline Stage Execution State Change",
    "source": "aws.codepipeline",
    "account": Pipeline_Account,
    "time": TimeStamp,
    "region": "us-east-1",
    "resources": [
        "arn:aws:codepipeline:us-east-1:account_ID:pipeline:myPipeline"
    ],
    "detail": {
        "pipeline": "myPipeline",
        "version": "1",
        "execution-id": execution_Id,
        "stage": "Prod",
        "state": "STARTED"
    }
}
```

Action execution state change message content: When an action execution starts, it emits an event that sends notifications with the following content. This example is for the pipeline named `"myPipeline"` in the `us-east-1` region, for the action `"myAction"`.

```
{
    "version": "0",
    "id": event_Id,
    "detail-type": "CodePipeline Action Execution State Change",
    "source": "aws.codepipeline",
    "account": Pipeline_Account,
    "time": TimeStamp,
    "region": "us-east-1",
    "resources": [
        "arn:aws:codepipeline:us-east-1:account_ID:pipeline:myPipeline"
    ],
    "detail": {
        "pipeline": "myPipeline",
        "version": "1",
        "execution-id": execution_Id,
        "stage": "Prod",
        "action": "myAction",
        "state": "STARTED",
        "type": {
            "owner": "AWS",
            "category": "Deploy",
            "provider": "CodeDeploy",
            "version": 1
        }
    }
}
```

Valid state values:

Pipeline-level states

Pipeline State	Description
STARTED	The pipeline execution is currently running.
SUCCEEDED	The pipeline execution was completed successfully.
RESUMED	A failed pipeline execution has been retried in response to the `RetryStageExecution` API call.
FAILED	The pipeline execution was not completed successfully.
CANCELED	The pipeline execution was canceled because the pipeline structure was updated.
SUPERSEDED	While this pipeline execution was waiting for the next stage to be completed, a newer pipeline execution advanced and continued through the pipeline instead.

Stage-level states

Stage State	Description
STARTED	The stage is currently running.
SUCCEEDED	The stage was completed successfully.
RESUMED	A failed stage has been retried in response to the `RetryStageExecution` API call.
FAILED	The stage was not completed successfully.
CANCELED	The stage was canceled because the pipeline structure was updated.

Action-level states

Action State	Description
STARTED	The action is currently running.
SUCCEEDED	The action was completed successfully.
FAILED	For Approval actions, the FAILED state means the action was either rejected by the reviewer or failed due to an incorrect action configuration.

Action State	Description
CANCELED	The action was canceled because the pipeline structure was updated.

Prerequisites

Before you create event rules for use in your AWS CodePipeline operations, you should do the following:

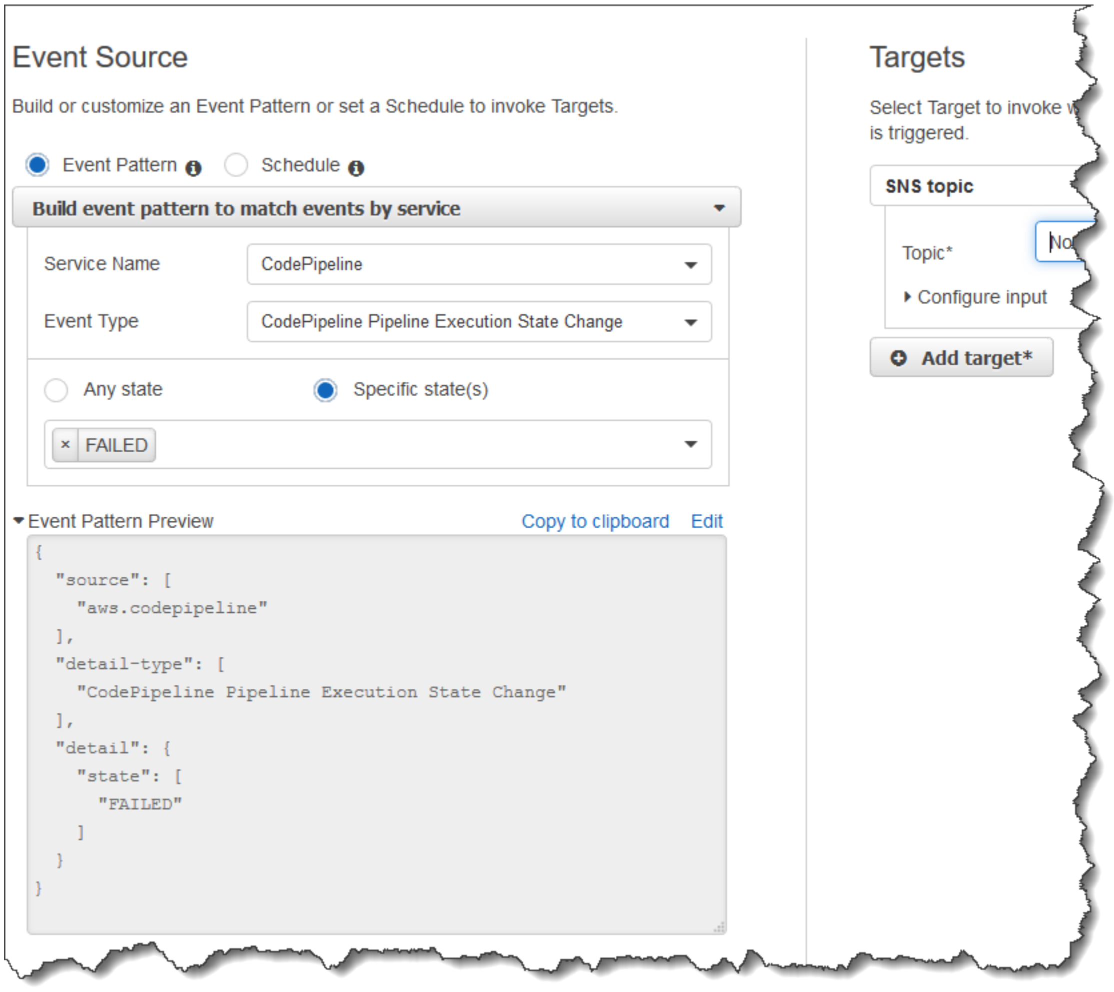
- Complete the CloudWatch Events prerequisites. For information, see Amazon CloudWatch Events Prerequisites.
- Familiarize yourself with events, rules, and targets in CloudWatch Events. For more information, see What Is Amazon CloudWatch Events.
- Create the target or targets you will use in your event rules, such as an Amazon SNS notification topic.

Send a Notification Whenever Pipeline State Changes (Console)

These steps show how to use the CloudWatch console to create a rule to send notifications of changes in AWS CodePipeline.

To create a CloudWatch Events rule with AWS CodePipeline as the event source

1. Open the CloudWatch console at https://console.aws.amazon.com/cloudwatch/.
2. In the navigation pane, choose **Events**.
3. Choose **Create rule**. Under **Event source**, from the **Service Name** drop-down list, choose **CodePipeline**.
4. From the **Event Type** drop-down list, choose the level of state change for the notification.
    - For a rule that applies to pipeline-level events, choose **CodePipeline Pipeline Execution State Change**.
    - For a rule that applies to stage-level events, choose **CodePipeline Stage Execution State Change**.
    - For a rule that applies to action-level events, choose **CodePipeline Action Execution State Change**.
5. Specify the state changes the rule applies to:
    - For a rule that applies to all state changes, choose **Any state**.
    - For a rule that applies to some state changes only, choose **Specific state(s)**, and then choose one or more state values from the list.



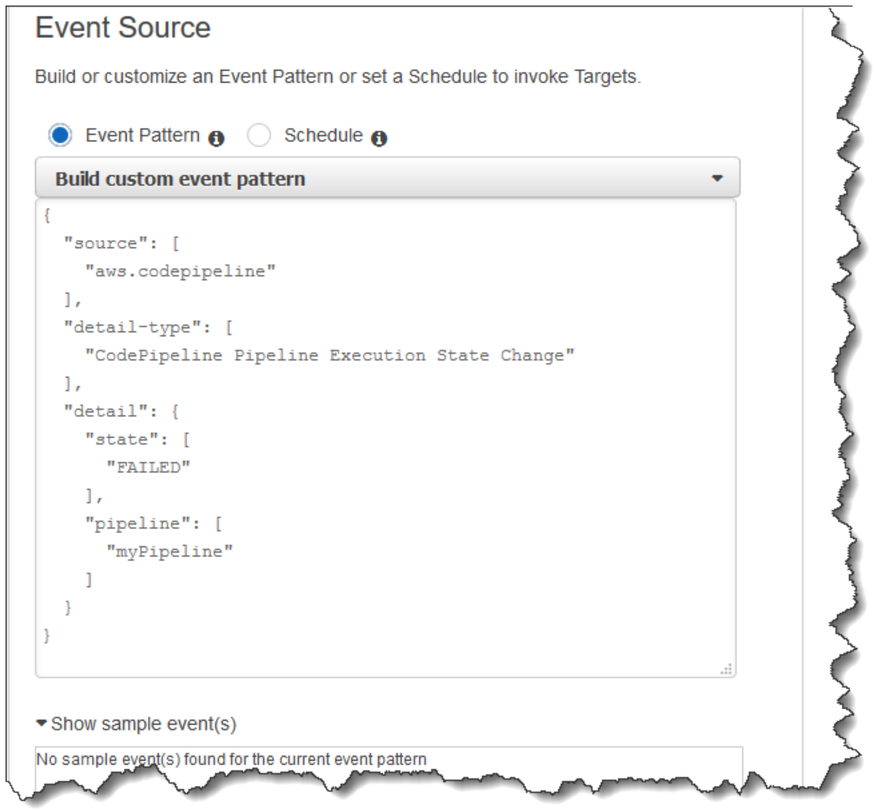
Service Name: CodePipeline

Event Type: CodePipeline Pipeline Execution State Change

Specific state(s): FAILED

```
{
  "source": [
    "aws.codepipeline"
  ],
  "detail-type": [
    "CodePipeline Pipeline Execution State Change"
  ],
  "detail": {
    "state": [
      "FAILED"
    ]
  }
}
```

6. For event patterns that are more detailed than the selectors allow, you can also use the **Edit** option in the **Event Pattern Preview** window to designate an event pattern in JSON format. The following example shows the JSON structure edited manually to specify a pipeline named "myPipeline."


Event Source
Build or customize an Event Pattern or set a Schedule to invoke Targets.
Event Pattern
Schedule
Build custom event pattern
Show sample event(s)

```
{
  "source": [
    "aws.codepipeline"
  ],
  "detail-type": [
    "CodePipeline Pipeline Execution State Change"
  ],
  "detail": {
    "state": [
      "FAILED"
    ],
    "pipeline": [
      "myPipeline"
    ]
  }
}
```

No sample event(s) found for the current event pattern

Note
If not otherwise specified, then the event pattern is created for all pipelines/stages/actions and states.

For more detailed event patterns, you can copy and paste the following example event patterns into the **Edit** window.

- **Example**

  Use this sample event pattern to capture failed deploy and build actions across all the pipelines.

```
{
"source": [
    "aws.codepipeline"
  ],
  "detail-type": [
    "CodePipeline Action Execution State Change"
  ],
  "detail": {
    "state": [
      "FAILED"
    ],
    "type": {
      "category": ["Deploy", "Build"]
    }
  }
}
```

- **Example**

  Use this sample event pattern to capture all rejected or failed approval actions across all the pipelines.

  ```
  {
   "source": [
      "aws.codepipeline"
    ],
    "detail-type": [
      "CodePipeline Action Execution State Change"
    ],
    "detail": {
      "state": [
        "FAILED"
      ],
      "type": {
        "category": ["Approval"]
      }
    }
  }
  ```

- **Example**

  Use this sample event pattern to capture all the events from the specified pipelines.

  ```
  {
  "source": [
      "aws.codepipeline"
    ],
    "detail-type": [
      "CodePipeline Pipeline Execution State Change",
      "CodePipeline Action Execution State Change",
      "CodePipeline Stage Execution State Change"
    ],
    "detail": {
      "pipeline": ["myPipeline", "my2ndPipeline"]
    }
  }
  ```

7. In the **Targets** area, choose **Add target***.
8. In the **Select target type** list, choose the type of target for this rule, and then configure options required by that type.
9. Choose **Configure details**.
10. On the **Configure rule details** page, type a name and description for the rule, and then select the **State** box to enable to rule now.
11. Choose **Create rule**.

Send a Notification Whenever Pipeline State Changes (CLI)

These steps show how to use the CLI to create a CloudWatch Events rule to send notifications of changes in AWS CodePipeline.

To use the AWS CLI to create a rule, call the **put-rule** command, specifying:

- A name that uniquely identifies the rule you are creating. This name must be unique across all of the pipelines you create with AWS CodePipeline associated with your AWS account.

- The event pattern for the source and detail fields used by the rule. For more information, see Amazon CloudWatch Events and Event Patterns.

To create a CloudWatch Events rule with AWS CodePipeline as the event source

1. Call the **put-rule** command to create a rule specifying the event pattern. (See the preceding tables for valid states.)

   The following sample command uses **--event-pattern** to create a rule called "`MyPipelineStateChanges`" that emits the CloudWatch event when a pipeline execution fails for the pipeline named "myPipeline."

   ```
   aws events put-rule --name "MyPipelineStateChanges" --event-pattern "{\"source\":
   [\"aws.codepipeline\"],\"detail-type\":[\"CodePipeline Pipeline Execution State Change
   \"],\"detail\":{\"pipeline\":[\"myPipeline\"],\"state\":[\"FAILED\"]}}"
   ```

2. Call the **put-targets** command to add a target to your new rule, as shown in this example for an Amazon SNS topic:

   ```
   aws events put-targets --rule MyPipelineStateChanges --targets Id=1,Arn=arn:aws:sns:us-
   west-2:11111EXAMPLE:MyNotificationTopic
   ```

3. Add permissions for Amazon CloudWatch Events to use the designated target service to invoke the notification. For more information, see Using Resource-Based Policies for Amazon CloudWatch Events.

Log AWS CodePipeline API Calls with AWS CloudTrail

AWS CodePipeline is integrated with CloudTrail, a service that captures API calls made by or on behalf of AWS CodePipeline in your AWS account and delivers the log files to an Amazon S3 bucket you specify. CloudTrail captures API calls from the AWS CodePipeline console, from AWS CodePipeline commands through the AWS CLI, or from the AWS CodePipeline APIs. Using the information collected by CloudTrail, you can determine which request was made to AWS CodePipeline, the source IP address from which the request was made, who made the request, when it was made, and so on. To learn more about CloudTrail, including how to configure and enable it, see the AWS CloudTrail User Guide.

AWS CodePipeline Information in CloudTrail

When CloudTrail logging is enabled in your AWS account, API calls made to AWS CodePipeline are tracked in log files. AWS CodePipeline records are written together with other AWS service records in a log file. CloudTrail determines when to create and write to a new file based on a time period and file size.

All of the AWS CodePipeline actions are logged and documented in the AWS CodePipeline API Reference and the AWS CodePipeline Command Line Reference. For example, calls to create, delete, and edit pipelines and create custom actions generate entries in CloudTrail log files.

Every log entry contains information about who generated the request. The user identity information in the log helps you determine whether the request was made with root or IAM user credentials, with temporary security credentials for a role or federated user, or by another AWS service. For more information, see the **userIdentity** field in the CloudTrail Event Reference.

You can store your log files in your bucket for as long as you want, but you can also define Amazon S3 lifecycle rules to archive or delete log files automatically. By default, your log files are encrypted by using Amazon S3 server-side encryption (SSE).

You can choose to have CloudTrail publish Amazon SNS notifications when new log files are delivered if you want to take quick action upon log file delivery. For more information, see Configuring Amazon SNS Notifications.

You can also aggregate AWS CodePipeline log files from multiple AWS regions and multiple AWS accounts into a single Amazon S3 bucket. For more information, see Aggregating CloudTrail Log Files to a Single Amazon S3 Bucket.

Understanding AWS CodePipeline Log File Entries

CloudTrail log files can contain one or more log entries where each entry is made up of multiple JSON-formatted events. A log entry represents a single request from any source and includes information about the requested action, any parameters, the date and time of the action, and so on. The log entries are not guaranteed to be in any particular order (that is, they are not an ordered stack trace of the public API calls).

The following example shows a CloudTrail log entry for an update pipeline event, where a pipeline named MyFirstPipeline has been edited by the user named JaneDoe-CodePipeline with the account ID 80398EXAMPLE. The user changed the name of the source stage of a pipeline from `Source` to `MySourceStage`. Because both the `requestParameters` and the `responseElements` elements in the CloudTrail log contain the entire structure of the edited pipeline, those elements have been abbreviated in the following example. **Emphasis** has been added to the `requestParameters` portion of the pipeline where the change occurred, the previous version number of the pipeline, and the `responseElements` portion, which shows the version number incremented by 1. Edited portions are marked with ellipses (...) to illustrate where more data appears in a real log entry.

```
{
 "eventVersion":"1.03",
  "userIdentity": {
   "type":"IAMUser",
   "principalId":"AKIAI44QH8DHBEXAMPLE",
   "arn":"arn:aws:iam::80398EXAMPLE:user/JaneDoe-CodePipeline",
   "accountId":"80398EXAMPLE",
   "accessKeyId":"AKIAIOSFODNN7EXAMPLE",
   "userName":"JaneDoe-CodePipeline",
   "sessionContext": {
   "attributes":{
    "mfaAuthenticated":"false",
    "creationDate":"2015-06-17T14:44:03Z"
    }
   },
 "invokedBy":"signin.amazonaws.com"},
 "eventTime":"2015-06-17T19:12:20Z",
 "eventSource":"codepipeline.amazonaws.com",
 "eventName":"UpdatePipeline",
 "awsRegion":"us-east-2",
 "sourceIPAddress":"192.0.2.64",
 "userAgent":"signin.amazonaws.com",
 "requestParameters":{
   "pipeline":{
   "version":1,
   "roleArn":"arn:aws:iam::80398EXAMPLE:role/AWS-CodePipeline-Service",
   "name":"MyFirstPipeline",
   "stages":[
     {
     "actions":[
      {
          "name":"MySourceStage",
        "actionType":{
        "owner":"AWS",
        "version":"1",
        "category":"Source",
        "provider":"S3"
     },
    "inputArtifacts":[],
    "outputArtifacts":[
     {"name":"MyApp"}
     ],
    "runOrder":1,
    "configuration":{
     "S3Bucket":"awscodepipeline-demobucket-example-date",
     "S3ObjectKey":"sampleapp_linux.zip"
      }
      }
     ],
       "name":"Source"
     },
     (...)
               },
 "responseElements":{
   "pipeline":{
     "version":2,
     (...)
           },
     "requestID":"2c4af5c9-7ce8-EXAMPLE",
     "eventID":""c53dbd42-This-Is-An-Example"",
     "eventType":"AwsApiCall",
     "recipientAccountId":"80398EXAMPLE"
     }
      ]
}
```

View Current Source Revision Details in a Pipeline in AWS CodePipeline

You can use the AWS CodePipeline console or the AWS CLI to view details about source artifacts (output artifact that originated in the first stage of a pipeline) that are used in an execution of a pipeline. The details include identifiers, such as commit IDs, check-in comments, time since the artifact was created or updated and, when you use the CLI, version numbers of build actions. For some revision types, you can view and open the URL of the commit for the artifact version.

Topics

View Current Source Revision Details in a Pipeline (Console)

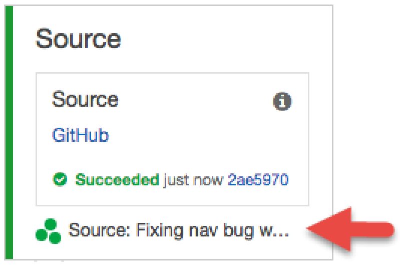
You can use the AWS CodePipeline console to view information about the most recent source revisions that were included in a pipeline execution.

To view source revisions in a pipeline

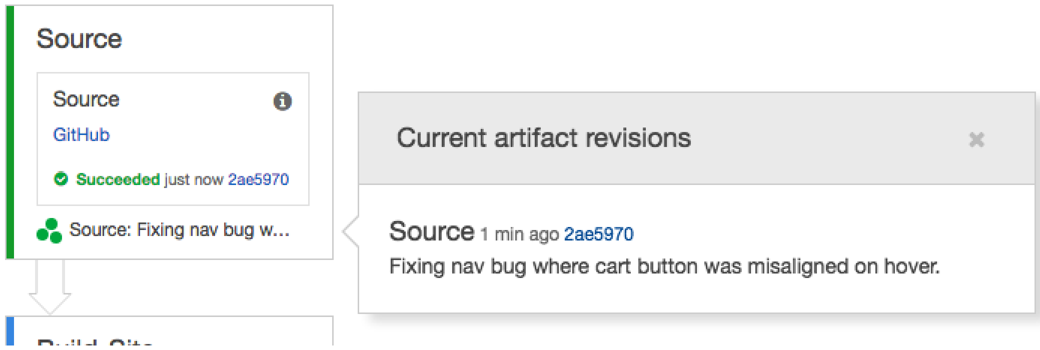
1. Sign in to the AWS Management Console and open the AWS CodePipeline console at http://console.aws.amazon.com/codepipeline.

   The names of all pipelines associated with your AWS account will be displayed.

2. Choose the name of the pipeline for which you want to view source revision details.
3. Locate an action for which you want to view source revision details, and then find the revision information at the bottom of its stage:



4. Click in the details area to view more information about the artifact, including the length of time since the artifact was committed. With the exception of artifacts stored in Amazon S3 buckets, identifiers such as commit IDs in this information detail view are linked to source information pages for the artifacts.


Source
Source
GitHub
Succeeded just now 2ae5970
Source: Fixing nav bug w...
Current artifact revisions
Source 1 min ago 2ae5970

Fixing nav bug where cart button was misaligned on hover.

View Current Source Revision Details in a Pipeline (CLI)

You can run the **get-pipeline-execution** command to view information about the most recent source revisions that were included in a pipeline execution. After you first run the **get-pipeline-state** command to get details about all stages in a pipeline, you identify the execution ID that applies to a particular stage for which you want source revision details, and then use that execution ID in the **get-pipeline-execution** command. (Stages in a pipeline might have been last successfully completed during different pipeline runs and can therefore have different execution IDs.)

In other words, if you want to view details about artifacts currently in the Staging stage, run the **get-pipeline-state** command, identify the current execution ID of the Staging stage, and then run the **get-pipeline-execution** command using that execution ID.

To view source revisions in a pipeline

1. Open a terminal (Linux, macOS, or Unix) or command prompt (Windows) and use the AWS CLI to run the **get-pipeline-state** command. For a pipeline named *MyFirstPipeline*, you would type:

```
aws codepipeline get-pipeline-state --name MyFirstPipeline
```

   This command returns the most recent state of a pipeline, including the latest pipeline execution ID for each stage.

2. To view details about a pipeline execution, run the **get-pipeline-execution** command, specifying the unique name of the pipeline and the pipeline execution ID of the particular execution for which you want to view artifact details. For example, to view details about the execution of a pipeline named *MyFirstPipeline*, with the execution ID 3137f7cb-7cf7-039j-s83l-d7eu3EXAMPLE, you would type the following:

   ```
   aws codepipeline get-pipeline-execution --pipeline-name MyFirstPipeline --pipeline-
   execution-id 3137f7cb-7cf7-039j-s83l-d7eu3EXAMPLE
   ```

   This command returns information about each source revision that is part of the pipeline execution and identifying information about the pipeline. Only information about pipeline stages that were included in that execution are included. There might be other stages in the pipeline that were not part of that pipeline execution.

   The following example shows the returned data for a portion of pipeline named *MyFirstPipeline*, where an artifact named "MyApp" is stored in a GitHub repository:

3.
   ```
   {
       "pipelineExecution": {
           "artifactRevisions": [
               {
                   "created": 1427298837.7689769,
                   "name": "MyApp",
                   "revisionChangeIdentifier": "1427298921.3976923",
                   "revisionId": "7636d59f3c461cEXAMPLE8417dbc6371",
                   "revisionSummary": "Updating the application for feature 12-4820",
                   "revisionUrl": "https://api.github.com/repos/anycompany/MyApp/git/
   commits/7636d59f3c461cEXAMPLE8417dbc6371"
               }
               //More revisions might be listed here
           ],
           "pipelineExecutionId": "3137f7cb-7cf7-039j-s83l-d7eu3EXAMPLE",
           "pipelineName": "MyFirstPipeline",
           "pipelineVersion": 2,
           "status": "Succeeded"
       }
   }
   ```

Troubleshooting AWS CodePipeline

The following information might help you troubleshoot common issues in AWS CodePipeline.

Topics

Pipeline Error: A pipeline configured with AWS Elastic Beanstalk returns an error message: "Deployment failed. The provided role does not have sufficient permissions: Service:AmazonElasticLoadBalancing"

Problem: The service role for AWS CodePipeline does not have sufficient permissions for AWS Elastic Beanstalk, including, but not limited to, some operations in Elastic Load Balancing. The service role for AWS CodePipeline was updated on August 6, 2015 to address this issue. Customers who created their service role before this date must modify the policy statement for their service role to add the required permissions.

Possible fixes: The easiest solution is to copy the updated policy statement for service roles from Review the Default AWS CodePipeline Service Role Policy (p. 180), edit your service role, and overwrite the old policy statement with the current policy. This portion of the policy statement applies to Elastic Beanstalk:

```
{
 "Action": [
  "elasticbeanstalk:*",
  "ec2:*",
  "elasticloadbalancing:*",
  "autoscaling:*",
  "cloudwatch:*",
  "s3:*",
  "sns:*",
  "cloudformation:*",
  "rds:*",
  "sqs:*",
  "ecs:*",
  "iam:PassRole"
  ],
  "Resource": "*",
  "Effect": "Allow"
},
```

After you apply the edited policy, follow the steps in Start a Pipeline Manually in AWS CodePipeline (p. 81) to manually rerun any pipelines that use Elastic Beanstalk.

Depending on your security needs, you can modify the permissions in other ways, too.

Pipeline Error: A source action returns the insufficient permissions message: "Could not access the AWS CodeCommit repository `repository-name`. Make sure that the pipeline IAM role has sufficient permissions to access the repository."

Problem: The service role for AWS CodePipeline does not have sufficient permissions for AWS CodeCommit and likely was created before support for using AWS CodeCommit repositories was added on April 18, 2016. Customers who created their service role before this date must modify the policy statement for their service role to add the required permissions.

Possible fixes: Add the required permissions for AWS CodeCommit to your AWS CodePipeline service role's policy. For more information, see Add Permissions for Other AWS Services (p. 181).

Pipeline Error: A Jenkins build or test action runs for a long time and then fails due to lack of credentials or permissions

Problem: If the Jenkins server is installed on an Amazon EC2 instance, the instance might not have been created with an instance role that has the permissions required for AWS CodePipeline. If you are using an IAM user on a Jenkins server, an on-premises instance, or an Amazon EC2 instance created without the required IAM role, the IAM user either does not have the required permissions, or the Jenkins server cannot access those credentials through the profile configured on the server.

Possible fixes: Make sure that Amazon EC2 instance role or IAM user is configured with the `AWSCodePipelineCustomActionAccess` managed policy or with the equivalent permissions. For more information, see AWS Managed (Predefined) Policies for AWS CodePipeline (p. 179).

If you are using an IAM user, make sure the AWS profile configured on the instance uses the IAM user configured with the correct permissions. You might have to provide the IAM user credentials you configured for integration between Jenkins and AWS CodePipeline directly into the Jenkins UI. This is not a recommended best practice. If you must do so, be sure the Jenkins server is secured and uses HTTPS instead of HTTP.

Pipeline Error: My GitHub source stage contains Git submodules, but AWS CodePipeline doesn't initialize them

Problem: AWS CodePipeline does not support git submodules. AWS CodePipeline relies on the archive link API from GitHub, which does not support submodules.

Possible fixes: Consider cloning the GitHub repository directly as part of a separate script. For example, you could include a clone action in a Jenkins script.

Pipeline Error: I receive a pipeline error that includes the following message: "PermissionError: Could not access the GitHub repository"

Problem: AWS CodePipeline uses OAuth tokens to integrate with GitHub. You might have revoked the permissions of the OAuth token for AWS CodePipeline. Additionally, the number of tokens is limited (see the GitHub documentation for details). If AWS CodePipeline reaches that limit, older tokens will stop working, and actions in pipelines that rely upon that token will fail.

Possible fixes: Check to see if the permission for AWS CodePipeline has been revoked. Sign in to GitHub, go to **Applications**, and choose **Authorized OAuth Apps**. If you do not see AWS CodePipeline in the list, open the AWS CodePipeline console, edit the pipeline, and choose **Connect to GitHub** to restore the authorization.

If AWS CodePipeline is present in the list of authorized applications for GitHub, you might have exceeded the allowed number of tokens. To fix this issue, you can manually configure one OAuth token as a personal access token, and then configure all pipelines in your AWS account to use that token.

It is a security best practice to rotate your personal access token on a regular basis. For more information, see Use GitHub and the AWS CodePipeline CLI to Create and Rotate Your GitHub Personal Access Token on a Regular Basis (p. 197).

To configure a pipeline to use a personal access token from GitHub

1. Sign in to your GitHub account and follow the instructions in the GitHub documentation for creating a personal access token. Make sure the token is configured to have the following GitHub scopes: `admin:repo_hook` and `repo`. Copy the token.
2. At a terminal (Linux, macOS, or Unix) or command prompt (Windows), run the **get-pipeline** command on the pipeline where you want to change the OAuth token, and then copy the output of the command to a JSON file. For example, for a pipeline named MyFirstPipeline, you would type something similar to the following:

```
aws codepipeline get-pipeline --name MyFirstPipeline >pipeline.json
```

The output of the command is sent to the *pipeline.json* file.

3. Open the file in a plain-text editor and edit the value in the `OAuthTokenField` of your GitHub action. Replace the asterisks (****) with the token you copied from GitHub. For example:

```
"configuration": {
                            "Owner": "MyGitHubUserName",
                            "Repo": "test-repo",
                            "Branch": "master",
                            "OAuthToken": "Replace the **** with your personal access
 token"
                        },
```

4. Save the file, and then run the **update-pipeline** with the `--cli-input-json` parameter to specify the JSON file you just edited. For example, to update a pipeline named MyFirstPipeline, you would type something similar to the following:

   Important
   Be sure to include `file://` before the file name. It is required in this command.

```
aws codepipeline update-pipeline --cli-input-json file://pipeline.json
```

5. Repeat steps 2 through 4 for every pipeline that contains a GitHub action.
6. When you have finished updating your pipelines, delete the .json files used to update those pipelines.

Pipeline Error: A pipeline created in one AWS region using a bucket created in another AWS region returns an "InternalError" with the code "JobFailed"

Problem: The download of an artifact stored in an Amazon S3 bucket will fail if the pipeline and bucket are created in different AWS regions.

Possible fixes: Make sure the Amazon S3 bucket where your artifact is stored is in the same AWS region as the pipeline you have created.

Deployment Error: A ZIP file that contains a WAR file is deployed successfully to AWS Elastic Beanstalk, but the application URL reports a 404 Not Found error

Problem: A WAR file is deployed successfully to an AWS Elastic Beanstalk environment, but the application URL returns a 404 Not Found error.

Possible fixes: AWS Elastic Beanstalk can unpack a ZIP file, but not a WAR file contained in a ZIP file. Instead of specifying a WAR file in your `buildspec.yml` file, specify a folder that contains the content to be deployed. For example:

```
version: 0.1

phases:
  post_build:
    commands:
      - mvn package
      - mv target/my-web-app ./
artifacts:
  files:
    - my-web-app/**/*
 discard-paths: yes
```

For an example, see AWS Elastic Beanstalk Sample for AWS CodeBuild.

File permissions are not retained on source files from GitHub when ZIP does not preserve external attributes

Problem: Users with source files from GitHub may experience an issue where the input artifact loses file permissions when stored in the Amazon S3 artifact bucket for the pipeline. The AWS CodePipeline source action that zips the files from GitHub uses a ZIP file process that does not preserve external attributes, so the files do not retain file permissions.

Possible fixes: You must modify the file permissions via a chmod command from where the artifacts are consumed. Update the build spec file in the build provider, such as AWS CodeBuild, to restore file permissions each time the build stage is run. The following example shows a build spec for AWS CodeBuild with a chmod command under the `build:` section:

```
version: 0.2

phases:
  build:
    commands:
      - dotnet restore
      - dotnet build
      - chmod a+x bin/Debug/myTests
      - bin/Debug/myTests
artifacts:
  files:
    - bin/Debug/myApplication
```

Note
To use the AWS CodePipeline console to confirm the name of the build input artifact, display the pipeline and then, in the **Build** action, rest your mouse pointer on the tooltip. Make a note of the value for **Input artifact** (for example, **MyApp**). To use the AWS CLI to get the name of the S3 artifact bucket, run the AWS CodePipeline `get-pipeline` command. The output contains an `artifactStore` object with a `location` field that displays the name of the bucket.

Need Help with a Different Issue?

Try these other resources:

- Contact AWS Support.

- Ask a question in the AWS CodePipeline forum.
- Request a limit increase. For more information, see Limits in AWS CodePipeline (p. 207).

  Note
  It can take up to two weeks to process requests for a limit increase.

Authentication, Access Control, and Security Best Practices for AWS CodePipeline

Access to AWS CodePipeline requires credentials. Those credentials must have permissions to access AWS resources, such as retrieving artifacts from Amazon S3 buckets; accessing information about applications and deployment groups in AWS CodeDeploy; and granting permission to approve or reject a manual approval action. The following sections provide details on how you can use AWS Identity and Access Management (IAM) and AWS CodePipeline to help secure access to your resources:

Authentication

You can access AWS as any of the following types of identities:

- **AWS account root user** – When you sign up for AWS, you provide an email address and password that is associated with your AWS account. These are your *root credentials* and they provide complete access to all of your AWS resources.

  Important
  For security reasons, we recommend that you use the root credentials only to create an *administrator user*, which is an *IAM user* with full permissions to your AWS account. Then, you can use this administrator user to create other IAM users and roles with limited permissions. For more information, see IAM Best Practices and Creating an Admin User and Group in the *IAM User Guide*.
- **IAM user** – An IAM user is simply an identity within your AWS account that has specific custom permissions (for example, permissions to send event data to a target in AWS CodePipeline). You can use an IAM user name and password to sign in to secure AWS webpages like the AWS Management Console, AWS Discussion Forums, or the AWS Support Center.

  In addition to a user name and password, you can also generate access keys for each user. You can use these keys when you access AWS services programmatically, either through one of the several SDKs or by using the AWS Command Line Interface (AWS CLI). The SDK and CLI tools use the access keys to cryptographically sign your request. If you don't use the AWS tools, you must sign the request yourself. AWS CodePipeline supports *Signature Version 4*, a protocol for authenticating inbound API requests. For more information about authenticating requests, see Signature Version 4 Signing Process in the *AWS General Reference*.
- **IAM role** – An IAM role is another IAM identity you can create in your account that has specific permissions. It is similar to an *IAM user*, but it is not associated with a specific person. An IAM role

enables you to obtain temporary access keys that can be used to access AWS services and resources. IAM roles with temporary credentials are useful in the following situations:

- **Federated user access** – Instead of creating an IAM user, you can use preexisting user identities from AWS Directory Service, your enterprise user directory, or a web identity provider. These are known as *federated users*. AWS assigns a role to a federated user when access is requested through an identity provider. For more information about federated users, see Federated Users and Roles in the *IAM User Guide*.

- **Cross-account access** – You can use an IAM role in your account to grant another AWS account permissions to access your account's resources. For an example, see Tutorial: Delegate Access Across AWS Accounts Using IAM Roles in the *IAM User Guide*.

- **AWS service access** – You can use an IAM role in your account to grant an AWS service permissions to access your account's resources. For example, you can create a role that allows Amazon Redshift to access an Amazon S3 bucket on your behalf and then load data stored in the bucket into an Amazon Redshift cluster. For more information, see Creating a Role to Delegate Permissions to an AWS Service in the *IAM User Guide*.

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

Access Control with IAM Policies

You can have valid credentials to authenticate your requests, but unless you have permissions you cannot create or access AWS CodePipeline resources. For example, you must have permissions to create, view, or delete pipelines; to retrieve information about applications and deployment groups in AWS CodeDeploy, and about stacks, apps and layers in AWS OpsWorks Stacks; to add or retrive artifacts from Amazon Simple Storage Service buckets; and so on.

The following sections describe how to manage permissions for AWS CodePipeline. We recommend that you read the overview first.

- Overview of Managing Access Permissions to Your AWS CodePipeline Resources (p. 172)
- Using Identity-Based Policies (IAM Policies) for AWS CodePipeline (p. 178)
- AWS CodePipeline Permissions Reference (p. 191)

Overview of Managing Access Permissions to Your AWS CodePipeline Resources

Every AWS resource is owned by an AWS account, and permissions to create or access a resource are governed by permissions policies. An account administrator can attach permissions policies to IAM identities (that is, users, groups, and roles), and some services (such as AWS Lambda) also support attaching permissions policies to resources.

Note
An *account administrator* (or administrator user) is a user with administrator privileges. For more information, see IAM Best Practices in the *IAM User Guide*.

When granting permissions, you decide who is getting the permissions, the resources they get permissions for, and the specific actions that you want to allow on those resources.

Topics

AWS CodePipeline Resources and Operations

In AWS CodePipeline, the primary resource is a pipeline. In a policy, you use an Amazon Resource Name (ARN) to identify the resource that the policy applies to. AWS CodePipeline supports other resources that can be used with the primary resource, such as stages, actions, and custom actions. These are referred to as subresources. These resources and subresources have unique Amazon Resource Names (ARNs) associated with them. For more information about ARNs, see Amazon Resource Names (ARN) and AWS Service Namespaces in the *Amazon Web Services General Reference*. To get the pipeline ARN associated with your pipeline, use the CLI to run the **get-pipeline** command. For more information, see GetPipeline in the AWS CodePipeline API Reference.

Resource Type	ARN Format
Pipeline	arn:aws:codepipeline:*region*:*account*:*pipeline-name*
Stage	arn:aws:codepipeline:*region*:*account*:*pipeline-name*/*stage-name*
Action	arn:aws:codepipeline:*region*:*account*:*pipeline-name*/*stage-name*/*action-name*
Custom action	arn:aws:codepipeline:*region*:*account*:actionType:*owner*/*category*/*provider*/*version*
All AWS CodePipeline resources	arn:aws:codepipeline:*
All AWS CodePipeline resources owned by the specified account in the specified region	arn:aws:codepipeline:*region*:*account*:*

Note
Most services in AWS treat a colon (:) or a forward slash (/) as the same character in ARNs. However, AWS CodePipeline uses an exact match in event patterns and rules. Be sure to use the correct ARN characters when creating event patterns so that they match the ARN syntax in the pipeline you want to match.

For example, you can indicate a specific pipeline (*myPipeline*) in your statement using its ARN as follows:

```
"Resource": "arn:aws:codepipeline:us-east-2:111222333444:myPipeline"
```

You can also specify all pipelines that belong to a specific account by using the (*) wildcard character as follows:

```
"Resource": "arn:aws:codepipeline:us-east-2:111222333444:*"
```

To specify all resources, or if a specific API action does not support ARNs, use the (*) wildcard character in the Resource element as follows:

```
"Resource": "*"
```

Some AWS CodePipeline API actions accept multiple resources (for example, GetPipeline). To specify multiple resources in a single statement, separate their ARNs with commas, as follows:

```
"Resource": ["arn1", "arn2"]
```

AWS CodePipeline provides a set of operations to work with the AWS CodePipeline resources. For a list of available operations, see AWS CodePipeline Permissions Reference (p. 191).

Understanding Resource Ownership

The AWS account owns the resources that are created in the account, regardless of who created the resources. Specifically, the resource owner is the AWS account of the principal entity (that is, the root account, an IAM user, or an IAM role) that authenticates the resource creation request. The following examples illustrate how this works:

- If you use the root account credentials of your AWS account to create a rule, your AWS account is the owner of the AWS CodePipeline resource.
- If you create an IAM user in your AWS account and grant permissions to create AWS CodePipeline resources to that user, the user can create AWS CodePipeline resources. However, your AWS account, to which the user belongs, owns the AWS CodePipeline resources.
- If you create an IAM role in your AWS account with permissions to create AWS CodePipeline resources, anyone who can assume the role can create AWS CodePipeline resources. Your AWS account, to which the role belongs, owns the AWS CodePipeline resources.

Managing Access to Resources

A *permissions policy* describes who has access to what. The following section explains the available options for creating permissions policies.

Note
This section discusses using IAM in the context of AWS CodePipeline. It doesn't provide detailed information about the IAM service. For complete IAM documentation, see What Is IAM? in the *IAM User Guide*. For information about IAM policy syntax and descriptions, see IAM Policy Reference in the *IAM User Guide*.

Policies attached to an IAM identity are referred to as identity-based policies (IAM polices) and policies attached to a resource are referred to as resource-based policies. AWS CodePipeline supports only identity-based (IAM policies).

Topics

Identity-Based Policies (IAM Policies)

You can attach policies to IAM identities. For example, you can do the following:

- **Attach a permissions policy to a user or a group in your account** – To grant a user permissions to view pipelines in the AWS CodePipeline console, you can attach a permissions policy to a user or group that the user belongs to.
- **Attach a permissions policy to a role (grant cross-account permissions)** – You can attach an identity-based permissions policy to an IAM role to grant cross-account permissions. For example, the administrator in Account A can create a role to grant cross-account permissions to another AWS account (for example, Account B) or an AWS service as follows:
  1. Account A administrator creates an IAM role and attaches a permissions policy to the role that grants permissions on resources in Account A.
  2. Account A administrator attaches a trust policy to the role identifying Account B as the principal who can assume the role.
  3. Account B administrator can then delegate permissions to assume the role to any users in Account B. Doing this allows users in Account B to create or access resources in Account A. The principal in the trust policy an also be an AWS service principal if you want to grant an AWS service permissions to assume the role.

  For more information about using IAM to delegate permissions, see Access Management in the *IAM User Guide*.

The following example shows a policy in the 111222333444 account that allows users to view, but not change, the pipeline named *MyFirstPipeline* in the AWS CodePipeline console. This policy is based on the **AWSCodePipelineReadOnlyAccess** managed policy, but because it is specific to the *MyFirstPipeline* pipeline, it cannot use the managed policy directly. If you do not want to restrict the policy to a specific pipeline, strongly consider using one of the managed policies created and maintained by AWS CodePipeline. For more information, see Working with Managed Policies. You must attach this policy to an IAM role you create for access, for example a role named *CrossAccountPipelineViewers*:

```
{
    "Statement": [
        {
            "Action": [
                "codepipeline:GetPipeline",
                "codepipeline:GetPipelineState",
                "codepipeline:GetPipelineExecution",
                "codepipeline:ListPipelineExecutions",
                "codepipeline:ListActionTypes",
                "codepipeline:ListPipelines",
                "iam:ListRoles",
                "s3:GetBucketPolicy",
                "s3:GetObject",
                "s3:ListAllMyBuckets",
                "s3:ListBucket",
                "codecommit:ListBranches",
                "codecommit:ListRepositories",
                "codedeploy:GetApplication",
                "codedeploy:GetDeploymentGroup",
                "codedeploy:ListApplications",
                "codedeploy:ListDeploymentGroups",
                "elasticbeanstalk:DescribeApplications",
                "elasticbeanstalk:DescribeEnvironments",
                "lambda:GetFunctionConfiguration",
                "lambda:ListFunctions",
                "opsworks:DescribeApps",
                "opsworks:DescribeLayers",
                "opsworks:DescribeStacks"
            ],
            "Effect": "Allow",
            "Resource": "*"
        }
    ],
    "Version": "2012-10-17"
}
```

Once you create this policy, create the IAM role in the 111222333444 account and attach the policy to that role. In the role's trust relationships, you must add the AWS account that will assume this role. The following example shows a policy that allows users from the *111111111111* AWS account to assume roles defined in the 111222333444 account:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Principal": {
                "AWS": "arn:aws:iam::111111111111:root"
            },
            "Action": "sts:AssumeRole"
        }
    ]
}
```

The following example shows a policy created in the *111111111111* AWS account that allows users to assume the role named *CrossAccountPipelineViewers* in the 111222333444 account:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": "sts:AssumeRole",
            "Resource": "arn:aws:iam::111222333444:role/CrossAccountPipelineViewers"
        }
    ]
}
```

You can create specific IAM policies to restrict the calls and resources that users in your account have access to, and then attach those policies to IAM users. For more information about how to create IAM roles and to explore example IAM policy statements for AWS CodePipeline, see Overview of Managing Access Permissions to Your AWS CodePipeline Resources (p. 172).

Resource-Based Policies

Other services, such as Amazon S3, also support resource-based permissions policies. For example, you can attach a policy to an S3 bucket to manage access permissions to that bucket. Although AWS CodePipeline doesn't support resource-based policies, it does store artifacts to be used in pipelines in versioned S3 buckets.

Example To create a policy for an Amazon S3 bucket to use as the artifact store for AWS CodePipeline

You can use any versioned Amazon S3 bucket as the artifact store for AWS CodePipeline. If you use the **Create Pipeline** wizard to create your first pipeline, this Amazon S3 bucket is created for you automatically to ensure that all objects uploaded to the artifact store are encrypted and connections to the bucket are secure. As a best practice, if you create your own Amazon S3 bucket, consider adding the following policy or its elements to the bucket. In this policy, the ARN for the Amazon S3 bucket is *codepipeline-us-east-2-1234567890*. Replace this ARN with the ARN for your Amazon S3 bucket:

```
{
    "Version": "2012-10-17",
    "Id": "SSEAndSSLPolicy",
    "Statement": [
        {
            "Sid": "DenyUnEncryptedObjectUploads",
            "Effect": "Deny",
            "Principal": "*",
            "Action": "s3:PutObject",
            "Resource": "arn:aws:s3:::codepipeline-us-east-2-1234567890/*",
            "Condition": {
                "StringNotEquals": {
                    "s3:x-amz-server-side-encryption": "aws:kms"
                }
            }
        },
        {
            "Sid": "DenyInsecureConnections",
            "Effect": "Deny",
            "Principal": "*",
            "Action": "s3:*",
            "Resource": "arn:aws:s3:::codepipeline-us-east-2-1234567890/*",
            "Condition": {
                "Bool": {
                    "aws:SecureTransport": false
                }
            }
        }
    ]
}
```

Specifying Policy Elements: Actions, Effects, and Principals

For each AWS CodePipeline resource, the service defines a set of API operations. To grant permissions for these API operations, AWS CodePipeline defines a set of actions that you can specify in a policy. Some API operations can require permissions for more than one action in order to perform the API operation. For more information about resources and API operations, see AWS CodePipeline Resources and Operations (p. 173) and AWS CodePipeline Permissions Reference (p. 191).

The following are the basic policy elements:

- **Resource** – You use an Amazon Resource Name (ARN) to identify the resource that the policy applies to. For more information, see AWS CodePipeline Resources and Operations (p. 173).
- **Action** – You use action keywords to identify resource operations that you want to allow or deny. For example, the `codepipeline:GetPipeline` permission allows the user permissions to perform the `GetPipeline` operation.
- **Effect** – You specify the effect, either allow or deny, when the user requests the specific action. If you don't explicitly grant access to (allow) a resource, access is implicitly denied. You can also explicitly deny access to a resource, which you might do to make sure that a user cannot access it, even if a different policy grants access.
- **Principal** – In identity-based policies (IAM policies), the user that the policy is attached to is the implicit principal. For resource-based policies, you specify the user, account, service, or other entity that you want to receive permissions (applies to resource-based policies only).

To learn more about IAM policy syntax and descriptions, see AWS IAM Policy Reference in the *IAM User Guide*.

For a table showing all of the AWS CodePipeline API actions and the resources that they apply to, see AWS CodePipeline Permissions Reference (p. 191).

Specifying Conditions in a Policy

When you grant permissions, you can use the access policy language to specify the conditions when a policy should take effect. For example, you might want a policy to be applied only after a specific date. For more information about specifying conditions in a policy language, see Condition in the *IAM User Guide*.

To express conditions, you use predefined condition keys. There are no condition keys specific to AWS CodePipeline. However, there are AWS-wide condition keys that you can use as appropriate. For a complete list of AWS-wide keys, see Available Keys for Conditions in the *IAM User Guide*.

Using Identity-Based Policies (IAM Policies) for AWS CodePipeline

This topic provides examples of identity-based policies that demonstrate how an account administrator can attach permissions policies to IAM identities (that is, users, groups, and roles).

Important
We recommend that you first review the introductory topics that explain the basic concepts and options available to manage access to your AWS CodePipeline resources. For more information, see Overview of Managing Access Permissions to Your AWS CodePipeline Resources (p. 172)

The following sections provide instructions for working with IAM policies specific to AWS CodePipeline.

The following shows an example of a permissions policy that allows a user to enable and disable all stage transitions in the pipeline named **MyFirstPipeline** in the us-west-2 region:

```
{
  "Version": "2012-10-17",
  "Statement" : [
    {
      "Effect" : "Allow",
      "Action" : [
        "codepipeline:EnableStageTransition",
        "codepipeline:DisableStageTransition"
      ],
      "Resource" : [
        "arn:aws:codepipeline:us-west-2:111222333444:MyFirstPipeline"
      ]
    }
  ]
}
```

Permissions Required to Use the AWS CodePipeline Console

For a user to work with AWS CodePipeline in the AWS CodePipeline console, that user must have a minimum set of permissions that allows the user to describe other AWS resources for their AWS account. In order to use AWS CodePipeline in the AWS CodePipeline console, you must have permissions from the following services:

- AWS Identity and Access Management

- Amazon Simple Storage Service

Depending on the other services you incorporate into your pipelines, you may need permissions from one or more of the following:

- AWS CodeCommit
- AWS CodeBuild
- AWS CloudFormation
- AWS CodeDeploy
- AWS Elastic Beanstalk
- AWS Lambda
- AWS OpsWorks

If you create an IAM policy that is more restrictive than the minimum required permissions, the console won't function as intended for users with that IAM policy. To ensure that those users can still use the AWS CodePipeline console, also attach the `AWSCodePipelineReadOnlyAccess` managed policy to the user, as described in AWS Managed (Predefined) Policies for AWS CodePipeline (p. 179).

You don't need to allow minimum console permissions for users that are making calls only to the AWS CLI or the AWS CodePipeline API.

AWS Managed (Predefined) Policies for AWS CodePipeline

AWS addresses many common use cases by providing standalone IAM policies that are created and administered by AWS. Managed policies grant necessary permissions for common use cases so you can avoid having to investigate what permissions are needed. For more information, see AWS Managed Policies in the *IAM User Guide*.

The following AWS managed policies, which you can attach to users in your account, are specific to AWS CodePipeline:

- **AWSCodePipelineFullAccess** – Grants full access to AWS CodePipeline.
- **AWSCodePipelineCustomActionAccess** – Grants permission to an IAM user to create custom actions in AWS CodePipeline or integrate Jenkins resources for build or test actions.
- **AWSCodePipelineReadOnlyAccess** – Grants read-only access to AWS CodePipeline.
- **AWSCodePipelineApproverAccess** – Grants permission to an IAM user to approve or reject a manual approval action.

Manage the AWS CodePipeline Service Role

Permissions for some aspects of the pipeline execution process are granted to another role type that acts on behalf of AWS CodePipeline, rather than to IAM users. The **Service role** is an IAM role that gives AWS CodePipeline permission to use resources in your account. Service role creation is only required the first time you create a pipeline in AWS CodePipeline.

AWS CodePipeline uses this service role when processing revisions through the stages and actions in a pipeline. That role is configured with one or more policies that control access to the AWS resources used by the pipeline. You might want to attach additional policies to this role, edit the policy attached to the role, or configure policies for other service roles in AWS. You might also want to attach a policy to a role when configuring cross-account access to your pipeline.

Important
Modifying a policy statement or attaching another policy to the role can prevent your pipelines from functioning. Be sure that you understand the implications before you modify the service role for AWS CodePipeline in any way. Make sure you test your pipelines after making any changes to the service role.

Topics

Review the Default AWS CodePipeline Service Role Policy

By default, the policy statement for the IAM service role for AWS CodePipeline, AWS-CodePipeline-Service, includes permissions needed for AWS CodePipeline to use other resources in your account.

AWS-CodePipeline-Service currently includes the following policy statement:

```
{
    "Statement": [
        {
            "Action": [
                "s3:GetObject",
                "s3:GetObjectVersion",
                "s3:GetBucketVersioning"
            ],
            "Resource": "*",
            "Effect": "Allow"
        },
        {
            "Action": [
                "s3:PutObject"
            ],
            "Resource": [
                "arn:aws:s3:::codepipeline*",
                "arn:aws:s3:::elasticbeanstalk*"
            ],
            "Effect": "Allow"
        },
        {
            "Action": [
                "codedeploy:CreateDeployment",
                "codedeploy:GetApplicationRevision",
                "codedeploy:GetDeployment",
                "codedeploy:GetDeploymentConfig",
                "codedeploy:RegisterApplicationRevision"
            ],
            "Resource": "*",
            "Effect": "Allow"
        },
        {
            "Action": [
                "elasticbeanstalk:CreateApplicationVersion",
                "elasticbeanstalk:DescribeApplicationVersions",
                "elasticbeanstalk:DescribeEnvironments",
                "elasticbeanstalk:DescribeEvents",
                "elasticbeanstalk:UpdateEnvironment",
                "autoscaling:DescribeAutoScalingGroups",
                "autoscaling:DescribeLaunchConfigurations",
                "autoscaling:DescribeScalingActivities",
                "autoscaling:ResumeProcesses",
                "autoscaling:SuspendProcesses",
                "cloudformation:GetTemplate",
                "cloudformation:DescribeStackResource",
                "cloudformation:DescribeStackResources",
                "cloudformation:DescribeStackEvents",
                "cloudformation:DescribeStacks",
                "cloudformation:UpdateStack",
                "ec2:DescribeInstances",
                "ec2:DescribeImages",
                "ec2:DescribeAddresses",
                "ec2:DescribeSubnets",
                "ec2:DescribeVpcs",
                "ec2:DescribeSecurityGroups",
                "ec2:DescribeKeyPairs",
                "elasticloadbalancing:DescribeLoadBalancers",
                "rds:DescribeDBInstances",
                "rds:DescribeOrderableDBInstanceOptions",
                "sns:ListSubscriptionsByTopic"
            ],
            "Resource": "*",
            "Effect": "Allow"
        },
        {
            "Action": [
                "lambda:invokefunction",
                "lambda:listfunctions"
            ],
            "Resource": "*",
            "Effect": "Allow"
        },
        {
            "Action": [
                "s3:ListBucket",
                "s3:GetBucketPolicy",
                "s3:GetObjectAcl",
                "s3:PutObjectAcl",
                "s3:DeleteObject"
            ],
            "Resource": "arn:aws:s3:::elasticbeanstalk*",
            "Effect": "Allow"
        }
    ],
    "Version": "2012-10-17"
}
```

Add Permissions for Other AWS Services

You must update your service role policy statement with permissions for an AWS service not already included in the default service role policy statement before you can use it in your pipelines.

This is especially important if the service role you use for your pipelines was created before support was added to AWS CodePipeline for an AWS service.

The following table shows when support was added for other AWS services.

AWS Service	AWS CodePipeline Support Date
Amazon ECS	December 12, 2017
AWS CodeCommit	April 18, 2016

AWS Service	AWS CodePipeline Support Date
AWS OpsWorks	June 2, 2016
AWS CloudFormation	November 3, 2016
AWS CodeBuild	December 1, 2016

To add permissions for an additional supported service, follow these steps:

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.
2. In the IAM console, in the navigation pane, choose **Roles**, and then choose your `AWS-CodePipeline-Service` role from the list of roles.
3. On the **Permissions** tab, in **Inline Policies**, in the row for your service role policy, choose **Edit Policy**.

   Note
   Your service role has a name in a format similar to `oneClick_AWS-CodePipeline-1111222233334`.
4. Add the required permissions in the **Policy Document** box. For example, for AWS CodeCommit support, add the following to your policy statement:

```
{
  "Action": [
      "codecommit:GetBranch",
      "codecommit:GetCommit",
      "codecommit:UploadArchive",
      "codecommit:GetUploadArchiveStatus",
      "codecommit:CancelUploadArchive"
            ],
  "Resource": "*",
  "Effect": "Allow"
},
```

   For AWS OpsWorks support, add the following to your policy statement:

```
{
    "Action": [
        "opsworks:CreateDeployment",
        "opsworks:DescribeApps",
        "opsworks:DescribeCommands",
        "opsworks:DescribeDeployments",
        "opsworks:DescribeInstances",
        "opsworks:DescribeStacks",
        "opsworks:UpdateApp",
        "opsworks:UpdateStack"
    ],
    "Resource": "*",
    "Effect": "Allow"
},
```

   For AWS CloudFormation support, add the following to your policy statement:

```
{
    "Action": [
        "cloudformation:CreateStack",
        "cloudformation:DeleteStack",
        "cloudformation:DescribeStacks",
        "cloudformation:UpdateStack",
        "cloudformation:CreateChangeSet",
        "cloudformation:DeleteChangeSet",
        "cloudformation:DescribeChangeSet",
        "cloudformation:ExecuteChangeSet",
        "cloudformation:SetStackPolicy",
        "cloudformation:ValidateTemplate",
        "iam:PassRole"
    ],
    "Resource": "*",
    "Effect": "Allow"
},
```

For AWS CodeBuild support, add the following to your policy statement:

```
{
    "Action": [
        "codebuild:BatchGetBuilds",
        "codebuild:StartBuild"
    ],
    "Resource": "*",
    "Effect": "Allow"
},
```

5. For Amazon ECS, the following are the minimum permissions needed to create pipelines with an Amazon ECS deploy action.

```
{
    "Action": [
        "ecs:DescribeServices",
        "ecs:DescribeTaskDefinition",
        "ecs:DescribeTasks",
        "ecs:ListTasks",
        "ecs:RegisterTaskDefinition",
        "ecs:UpdateService"
    ],
    "Resource": "*",
    "Effect": "Allow"
},
```

Note
When you create IAM policies, follow the standard security advice of granting least privilege —that is, granting only the permissions required to perform a task. Certain API calls support resource-based permissions and allow access to be limited. For example, in this case, to limit permissions when calling `DescribeTasks` and `ListTasks`, you can replace the wildcard character (*) with a specific resource ARN or with a wildcard character (*) in a resource ARN.

6. Choose **Validate Policy** to ensure the policy contains no errors. When the policy is error-free, choose **Apply Policy**.

Remove Permissions for Unused AWS Services

You can edit the service role statement to remove access to resources you do not use. For example, if none of your pipelines include Elastic Beanstalk, you could edit the policy statement to remove the section that grants Elastic Beanstalk resources. For example, you could remove the following section from the policy statement:

```
  {
  "Action": [
      "elasticbeanstalk:*",
        "ec2:*",
        "elasticloadbalancing:*",
        "autoscaling:*",
        "cloudwatch:*",
        "s3:*",
        "sns:*",
        "cloudformation:*",
        "rds:*",
        "sqs:*",
        "ecs:*",
        "iam:PassRole"
    ],
    "Resource": "*",
    "Effect": "Allow"
},
```

Similarly, if none of your pipelines includes AWS CodeDeploy, you can edit the policy statement to remove the section that grants AWS CodeDeploy resources:

```
    {
    "Action": [
        "codedeploy:CreateDeployment",
        "codedeploy:GetApplicationRevision",
        "codedeploy:GetDeployment",
        "codedeploy:GetDeploymentConfig",
        "codedeploy:RegisterApplicationRevision"
    ],
    "Resource": "*",
    "Effect": "Allow"
},
```

For more information about IAM roles, see IAM Roles.

Customer Managed Policy Examples

In this section, you can find example user policies that grant permissions for various AWS CodePipeline actions. These policies work when you are using the AWS CodePipeline API, AWS SDKs, or the AWS CLI. When you are using the console, you need to grant additional permissions specific to the console, which is discussed in Permissions Required to Use the AWS CodePipeline Console (p. 178).

Note
All examples use the US West (Oregon) Region (us-west-2) and contain fictitious account IDs.

Examples

Example 1: Grant Permissions to Get the State of a Pipeline

The following example grants permissions to get the state of the pipeline named `MyFirstPipeline`:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "codepipeline:GetPipelineState"
            ],
            "Resource": "arn:aws:codepipeline:us-west-2:111222333444:MyFirstPipeline"
        }
    ]
}
```

Example 2: Grant Permissions to Enable and Disable Transitions Between Stages

The following example grants permissions to disable and enable transitions between all stages in the pipeline named `MyFirstPipeline`:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "codepipeline:DisableStageTransition",
                "codepipeline:EnableStageTransition"
            ],
            "Resource": "arn:aws:codepipeline:us-west-2:111222333444:MyFirstPipeline/*"
        }
    ]
}
```

To allow the user to disable and enable transitions for a single stage in a pipeline, you must specify the stage. For example, to allow the user to enable and disable transitions for a stage named Staging in a pipeline named *`MyFirstPipeline`*:

```
"Resource": "arn:aws:codepipeline:us-west-2:111222333444:MyFirstPipeline/Staging"
```

Example 3: Grant Permissions to Get a List of All Available Action Types

The following example grants permissions to get a list of all available action types available for pipelines in the `us-west-2` region:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "codepipeline:ListActionTypes"
            ],
            "Resource": "arn:aws:codepipeline:us-west-2:111222333444:actiontype:*"
        }
    ]
}
```

Example 4: Grant Permissions to Approve or Reject Manual Approval Actions

The following example grants permissions to approve or reject manual approval actions in a stage named Staging in a pipeline named *MyFirstPipeline*:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "codepipeline:PutApprovalResult"
            ],
            "Resource": "arn:aws:codepipeline:us-west-2:111222333444:MyFirstPipeline/
Staging/*"
        }
    ]
}
```

Example 5: Grant Permissions to Poll for Jobs for a Custom Action

The following example grants permissions to poll for jobs for the custom action named *TestProvider*, which is a *Test* action type in its first version, across all pipelines:

Note
The job worker for a custom action might be configured under a different AWS account or require a specific IAM role in order to function.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "codepipeline:PollForJobs"
            ],
            "Resource": [
                "arn:aws:codepipeline:us-
west-2:111222333444:actionType:Custom/Test/TestProvider/1"
            ]
        }
    ]
}
```

Example 6: Attach or Edit a Policy for Jenkins Integration with AWS CodePipeline

If you configure a pipeline to use Jenkins for build or test, create a separate IAM user for that integration and attach an IAM policy that has the minimum permissions required for integration between Jenkins and AWS CodePipeline. This policy is the same as the **AWSCodePipelineCustomActionAccess** managed policy. The following example shows a policy to attach to an IAM user that will be used for Jenkins integration:

```
{
    "Statement": [
        {
            "Action": [
                "codepipeline:AcknowledgeJob",
                "codepipeline:GetJobDetails",
                "codepipeline:PollForJobs",
                "codepipeline:PutJobFailureResult",
                "codepipeline:PutJobSuccessResult"
            ],
            "Effect": "Allow",
            "Resource": "*"
        }
    ],
    "Version": "2012-10-17"
}
```

Example 7: Configure Cross-Account Access to a Pipeline

You can configure access to pipelines for users and groups in another AWS account. The recommended way of doing so is to create a role in the account where the pipeline was created that allows users from the other AWS account to assume that role and access the pipeline. For more information, see Walkthrough: Cross-Account Access Using Roles.

The following example shows a policy in the 80398EXAMPLE account that allows users to view, but not change, the pipeline named *MyFirstPipeline* in the AWS CodePipeline console. This policy is based on the **AWSCodePipelineReadOnlyAccess** managed policy, but because it is specific to the *MyFirstPipeline* pipeline, it cannot use the managed policy directly. If you do not want to restrict the policy to a specific pipeline, strongly consider using one of the managed policies created and maintained by AWS CodePipeline. For more information, see Working with Managed Policies. You must attach this policy to an IAM role you create for access, for example a role named *CrossAccountPipelineViewers*:

```
{
   "Statement": [
        {
            "Action": [
                "codepipeline:GetPipeline",
                "codepipeline:GetPipelineState",
                "codepipeline:ListActionTypes",
                "codepipeline:ListPipelines",
                "iam:ListRoles",
                "s3:GetBucketPolicy",
                "s3:GetObject",
                "s3:ListAllMyBuckets",
                "s3:ListBucket",
                "codedeploy:GetApplication",
                "codedeploy:GetDeploymentGroup",
                "codedeploy:ListApplications",
                "codedeploy:ListDeploymentGroups",
                "elasticbeanstalk:DescribeApplications",
                "elasticbeanstalk:DescribeEnvironments",
                "lambda:GetFunctionConfiguration",
                "lambda:ListFunctions"
            ],
            "Effect": "Allow",
            "Resource": "arn:aws:codepipeline:us-east-2:80398EXAMPLE:MyFirstPipeline"
        }
    ],
    "Version": "2012-10-17"
}
```

Once you create this policy, create the IAM role in the 80398EXAMPLE account and attach the policy to that role. In the role's trust relationships, you must add the AWS account that will assume this role. The following example shows a policy that allows users from the *111111111111* AWS account to assume roles defined in the 80398EXAMPLE account:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Principal": {
                "AWS": "arn:aws:iam::111111111111:root"
            },
            "Action": "sts:AssumeRole"
        }
    ]
}
```

The following example shows a policy created in the *111111111111* AWS account that allows users to assume the role named *CrossAccountPipelineViewers* in the 80398EXAMPLE account:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": "sts:AssumeRole",
            "Resource": "arn:aws:iam::80398EXAMPLE:role/CrossAccountPipelineViewers"
        }
    ]
}
```

Example 8: Use AWS Resources Associated with Another Account in a Pipeline

You can configure policies that allow a user to create a pipeline that uses resources in another AWS account. This requires configuring policies and roles in both the account that will create the pipeline (AccountA) and the account that created the resources to be used in the pipeline (AccountB). You must also create a customer-managed key in AWS Key Management Service to use for cross-account access. For more information and step-by-step examples, see Create a Pipeline in AWS CodePipeline That Uses Resources from Another AWS Account (p. 97) and Security Best Practices (p. 194).

The following example shows a policy configured by AccountA for an Amazon S3 bucket used to store pipeline artifacts that grants access to AccountB (where the ARN for AccountB. In the following example, the ARN is for *AccountB* is *012ID_ACCOUNT_B*. The ARN for the Amazon S3 bucket is *codepipeline-us-east-2-1234567890*. Replace these ARNs with the ARN for the account you want to allow access and for the Amazon S3 bucket:

```
{
    "Version": "2012-10-17",
    "Id": "SSEAndSSLPolicy",
    "Statement": [
        {
            "Sid": "DenyUnEncryptedObjectUploads",
            "Effect": "Deny",
            "Principal": "*",
            "Action": "s3:PutObject",
            "Resource": "arn:aws:s3:::codepipeline-us-east-2-1234567890/*",
            "Condition": {
                "StringNotEquals": {
                    "s3:x-amz-server-side-encryption": "aws:kms"
                }
            }
        },
        {
            "Sid": "DenyInsecureConnections",
            "Effect": "Deny",
            "Principal": "*",
            "Action": "s3:*",
            "Resource": "arn:aws:s3:::codepipeline-us-east-2-1234567890/*",
            "Condition": {
                "Bool": {
                    "aws:SecureTransport": false
                }
            }
        },
        {
            "Sid": "",
            "Effect": "Allow",
            "Principal": {
                "AWS": "arn:aws:iam::012ID_ACCOUNT_B:root"
            },
            "Action": [
                "s3:Get*",
                "s3:Put*"
            ],
            "Resource": "arn:aws:s3:::codepipeline-us-east-2-1234567890/*"
        },
        {
            "Sid": "",
            "Effect": "Allow",
            "Principal": {
                "AWS": "arn:aws:iam::012ID_ACCOUNT_B:root"
            },
            "Action": "s3:ListBucket",
            "Resource": "arn:aws:s3:::codepipeline-us-east-2-1234567890"
        }
    ]
}
```

The following example shows a policy configured by AccountA that allows AccountB to assume a role. This policy must be applied to the service role for AWS CodePipeline (`AWS-CodePipeline-Service`). For more information about how to apply policies to roles in IAM, see Modifying a Role. In the following example, `012ID_ACCOUNT_B` is the ARN for `AccountB`:

```
{
    "Version": "2012-10-17",
    "Statement": {
        "Effect": "Allow",
        "Action": "sts:AssumeRole",
        "Resource": [
            "arn:aws:iam::012ID_ACCOUNT_B:role/*"
        ]
    }
}
```

The following example shows a policy configured by AccountB and applied to the Amazon EC2 instance role for AWS CodeDeploy. This policy grants access to the Amazon S3 bucket used by AccountA to store pipeline artifacts (`codepipeline-us-east-2-1234567890`):

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "s3:Get*"
            ],
            "Resource": [
                "arn:aws:s3:::codepipeline-us-east-2-1234567890/*"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "s3:ListBucket"
            ],
            "Resource": [
                "arn:aws:s3:::codepipeline-us-east-2-1234567890"
            ]
        }
    ]
}
```

The following example shows a policy for AWS KMS where ***`arn:aws:kms:us-east-1:012ID_ACCOUNT_A:key/2222222-3333333-4444-556677EXAMPLE`*** is the ARN of the customer-managed key created in *`AccountA`* and configured to allow *`AccountB`* to use it:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "kms:DescribeKey",
                "kms:GenerateDataKey*",
                "kms:Encrypt",
                "kms:ReEncrypt*",
                "kms:Decrypt"
            ],
            "Resource": [
                "arn:aws:kms:us-
east-1:012ID_ACCOUNT_A:key/2222222-3333333-4444-556677EXAMPLE"
            ]
        }
    ]
}
```

The following example shows an inline policy for an IAM role (*`CrossAccount_Role`*) created by AccountB that allows access to AWS CodeDeploy actions required by the pipeline in AccountA.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "codedeploy:CreateDeployment",
                "codedeploy:GetDeployment",
                "codedeploy:GetDeploymentConfig",
                "codedeploy:GetApplicationRevision",
                "codedeploy:RegisterApplicationRevision"
            ],
            "Resource": "*"
        }
    ]
}
```

The following example shows an inline policy for an IAM role (*CrossAccount_Role*) created by AccountB that allows access to the Amazon S3 bucket in order to download input artifacts and upload output artifacts:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "s3:GetObject*",
                "s3:PutObject",
                "s3:PutObjectAcl"
            ],
            "Resource": [
                "arn:aws:s3:::codepipeline-us-east-2-1234567890/*"
            ]
        }
    ]
}
```

For more information about how to edit a pipeline for cross-account access to resources after you have created the necessary policies, roles, and AWS Key Management Service customer-managed key, see Step 2: Edit the Pipeline (p. 103).

AWS CodePipeline Permissions Reference

When you are setting up Access Control with IAM Policies (p. 172) and writing permissions policies that you can attach to an IAM identity (identity-based policies), you can use the following table as a reference. The table lists each AWS CodePipeline API operation and the corresponding actions for which you can grant permissions to perform the action. You specify the actions in the policy's `Action` field, and you specify a wildcard character (*) as the resource value in the policy's `Resource` field.

You can use AWS-wide condition keys in your AWS CodePipeline policies to express conditions. For a complete list of AWS-wide keys, see Available Keys in the *IAM User Guide*.

Note
To specify an action, use the `codepipeline:` prefix followed by the API operation name. For example: `codepipeline:GetPipeline`, `codepipeline:CreatePipeline`, or `codepipeline:*` (for all AWS CodePipeline actions).

To specify multiple actions in a single statement, separate them with commas as follows:

```
"Action": ["codepipeline:action1", "codepipeline:action2"]
```

You can also specify multiple actions using wildcards. For example, you can specify all actions whose name begins with the word "Get" as follows:

```
"Action": "codepipeline:Get*"
```

To specify all AWS CodePipeline API actions, use the * wildcard as follows:

```
"Action": "codepipeline:*"
```

The actions you can specify in an IAM policy for use with AWS CodePipeline are listed below.

AWS CodePipeline API Operations and Required Permissions for Actions

AcknowledgeJob

Action(s): `codepipeline:AcknowledgeJob`

Required to view information about a specified job and whether that job has been received by the job worker. Only used for custom actions.

AcknowledgeThirdPartyJob

Action(s): `codepipeline:AcknowledgeThirdPartyJob`

Required to confirms a job worker has received the specified job. Only used for partner actions.

CreateCustomActionType

Action(s): `codepipeline:CreateCustomActionType`

Required to create a new custom action that can be used in all pipelines associated with the AWS account. Only used for custom actions.

CreatePipeline

Action(s): `codepipeline:CreatePipeline`

Required to create a pipeline.

DeleteCustomActionType

Action(s): `codepipeline:DeleteCustomActionType`

Required to mark a custom action as deleted. PollForJobs for the custom action will fail after the action is marked for deletion. Only used for custom actions.

DeletePipeline

Action(s): `codepipeline:DeletePipeline`

Required to delete a pipeline.

DisableStageTransition

Action(s): `codepipeline:DisableStageTransition`

Required to prevent artifacts in a pipeline from transitioning to the next stage in the pipeline.

EnableStageTransition

Action(s): `codepipeline:EnableStageTransition`

Required to enable artifacts in a pipeline to transition to a stage in a pipeline.

GetJobDetails

Action(s): `codepipeline:GetJobDetails`

Required to retrieve information about a job. Only used for custom actions.

GetPipeline

Action(s): `codepipeline:GetPipeline`

Required to retrieve the structure, stages, actions, and metadata of a pipeline, including the pipeline ARN.

GetPipelineExecution

Action(s): `codepipeline:GetPipelineExecution`

Required to retrieve information about an execution of a pipeline, including details about artifacts, the pipeline execution ID, and the name, version, and status of the pipeline.

GetPipelineState

Action(s): `codepipeline:GetPipelineState`

Required to retrieve information about the state of a pipeline, including the stages and actions.

GetThirdPartyJobDetails

Action(s): `codepipeline:GetThirdPartyJobDetails`

Required to request the details of a job for a third party action. Only used for partner actions.

ListActionTypes

Action(s): `codepipeline:ListActionTypes`

Required to generate a summary of all AWS CodePipeline action types associated with your account.

ListPipelineExecutions

Action(s): `codepipeline:ListPipelineExecutions`

Required to generate a summary of the most recent executions for a pipeline.

ListPipelines

Action(s): `codepipeline:ListPipelines`

Required to generate a summary of all of the pipelines associated with your account.

PollForJobs

Action(s): `codepipeline:PollForJobs`

Required to retrieve information about any jobs for AWS CodePipeline to act upon.

PollForThirdPartyJobs

Action(s): `codepipeline:PollForThirdPartyJobs`

Required to determine whether there are any third party jobs for a job worker to act on. Only used for partner actions.

PutActionRevision

Action(s): `codepipeline:PutActionRevision`

Required to report information to AWS CodePipeline about new revisions to a source.

PutApprovalResult

Action(s): `codepipeline:PutApprovalResult`

Required to report the response to a manual approval request to AWS CodePipeline. Valid responses include Approved and Rejected.

PutJobFailureResult

Action(s): `codepipeline:PutJobFailureResult`

Required to report the failure of a job as returned to the pipeline by a job worker. Only used for custom actions.

PutJobSuccessResult

Action(s): `codepipeline:PutJobSuccessResult`

Required to report the success of a job as returned to the pipeline by a job worker. Only used for custom actions.

PutThirdPartyJobFailureResult

Action(s): `codepipeline:PutThirdPartyJobFailureResult`

Required to report the failure of a third party job as returned to the pipeline by a job worker. Only used for partner actions.

PutThirdPartyJobSuccessResult

Action(s): `codepipeline:PutThirdPartyJobSuccessResult`

Required to report the success of a third party job as returned to the pipeline by a job worker. Only used for partner actions.

RetryStageExecution

Action(s): `codepipeline:RetryStageExecution`

Required to resume the pipeline execution by retrying the last failed actions in a stage.

StartPipelineExecution

Action(s): `codepipeline:StartPipelineExecution`

Required to start the specified pipeline. Specifically, it begins processing the latest commit to the source location specified as part of the pipeline.

UpdatePipeline

Action(s): `codepipeline:UpdatePipeline`

Required to update a specified pipeline with edits or changes to its structure.

Security Best Practices

This section describes security best practices for the following:

- S3 artifacts server side encryption (SSE)
- GitHub personal access tokens
- Configuration parameter tracking in Parameter Store

Topics

Configure Server Side Encryption for Artifacts Stored in Amazon S3 for AWS CodePipeline

There are two ways to configure server side encryption for Amazon S3 artifacts:

- AWS CodePipeline creates an Amazon S3 artifact bucket and default AWS-managed SSE-KMS encryption keys when you create a pipeline using the Create Pipeline wizard. The master key is encrypted along with object data and managed by AWS.

- You can create and manage your own customer-managed SSE-KMS keys.

If you are using the default Amazon S3 key, you cannot change or delete this AWS-managed key. If you are using a customer-managed key in AWS KMS to encrypt or decrypt artifacts in the Amazon S3 bucket, you can change or rotate this key as necessary.

Amazon S3 supports bucket policies that you can use if you require server-side encryption for all objects that are stored in your bucket. For example, the following bucket policy denies upload object (`s3:PutObject`) permission to everyone if the request does not include the `x-amz-server-side-encryption` header requesting server-side encryption with SSE-KMS.

```
{
    "Version": "2012-10-17",
    "Id": "SSEAndSSLPolicy",
    "Statement": [
        {
            "Sid": "DenyUnEncryptedObjectUploads",
            "Effect": "Deny",
            "Principal": "*",
            "Action": "s3:PutObject",
            "Resource": "arn:aws:s3:::codepipeline-us-west-2-890506445442/*",
            "Condition": {
                "StringNotEquals": {
                    "s3:x-amz-server-side-encryption": "aws:kms"
                }
            }
        },
        {
            "Sid": "DenyInsecureConnections",
            "Effect": "Deny",
            "Principal": "*",
            "Action": "s3:*",
            "Resource": "arn:aws:s3:::codepipeline-us-west-2-890506445442/*",
            "Condition": {
                "Bool": {
                    "aws:SecureTransport": "false"
                }
            }
        }
    ]
}
```

For more information about server-side encryption and AWS KMS, see Protecting Data Using Server-Side Encryption and .

For more information about AWS KMS, see the AWS Key Management Service Developer Guide and and http://docs.aws.amazon.com/AmazonS3/latest/dev/UsingKMSEncryption.html

Topics

View Your Default Amazon S3 SSE-KMS Encryption Keys

When you use the Create Pipeline wizard to create your first pipeline, an Amazon S3 bucket is created for you in the same region you created the pipeline. The bucket is used to store pipeline artifacts. When a pipeline runs, artifacts are put into and retrieved from the Amazon S3 bucket. By default, AWS CodePipeline uses server-side encryption with the AWS KMS-managed keys (SSE-KMS) using the default key for Amazon S3 (the `aws/s3` key). This key is created and stored in your AWS account. When artifacts are retrieved from the Amazon S3 bucket, AWS CodePipeline uses the same SSE-KMS process to decrypt the artifact.

To view information about your default AWS KMS key, do the following:

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.
2. In the service navigation pane, choose **Encryption Keys**. (If a welcome page appears, choose **Get Started Now**.)
3. In **Filter**, choose the region for your pipeline. For example, if the pipeline was created in `us-east-2`, make sure the filter is set to US East (Ohio).

   For more information about the regions and endpoints available for AWS CodePipeline, see Regions and Endpoints.
4. In the list of encryption keys, choose the key with the alias used for your pipeline (by default, **aws/s3**). Basic information about the key will be displayed.

Configure Server Side Encryption for S3 Buckets when Using AWS CloudFormation or the CLI

When you create a pipeline using AWS CloudFormation or the CLI, you must configure server side encryption manually. Use the sample bucket policy above, and then create your own customer-managed SSE-KMS encryption keys. You can also choose to use your own keys instead of the default Amazon S3 key in general. Some reasons for doing so include:

- You want to rotate the key on a schedule to meet business or security requirements for your organization.
- You want to create a pipeline that uses resources associated with another AWS account. This requires the use of a customer-managed key. For more information, see Create a Pipeline in AWS CodePipeline That Uses Resources from Another AWS Account (p. 97).

Cryptographic best practices discourage extensive reuse of encryption keys. As a best practice, rotate your key on a regular basis. To create new cryptographic material for your AWS Key Management Service (AWS KMS) customer master keys (CMKs), you can create new CMKs, and then change your applications or aliases to use the new CMKs. Or, you can enable automatic key rotation for an existing CMK.

To rotate your SSE-KMS customer master key, see Rotating Customer Master Keys.

Configure GitHub Authentication

AWS CodePipeline uses GitHub OAuth tokens and personal access tokens to access your GitHub repositories and retrieve the latest changes. There are two ways to configure authentication in GitHub:

- AWS creates a default AWS-managed OAuth token when you use the console to create or update pipelines.
- You can create and manage your own customer-generated personal access tokens. You need personal access tokens when you use the CLI, SDK, or AWS CloudFormation to create or update your pipeline.

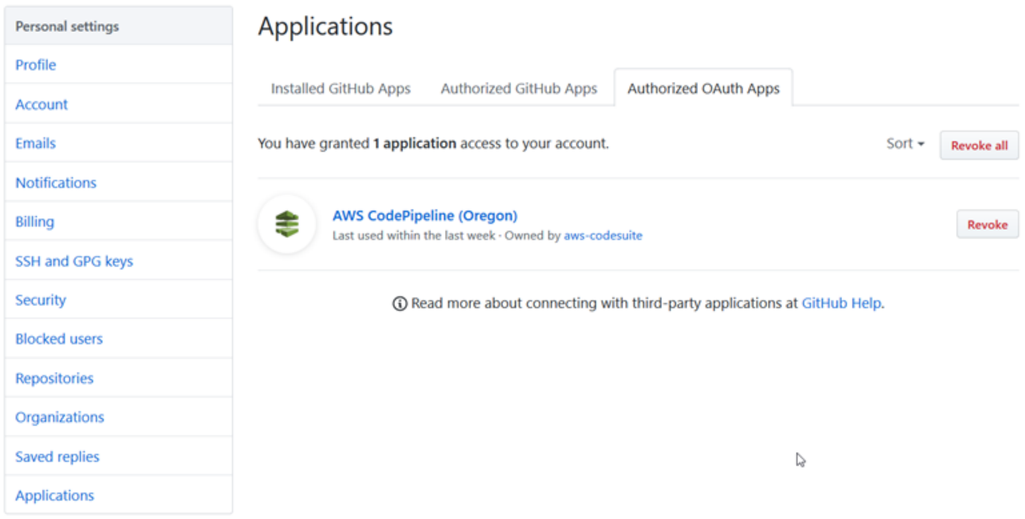
Topics

View Your Authorized OAuth Apps

AWS CodePipeline uses OAuth tokens to integrate with GitHub. GitHub tracks the permissions of the OAuth token for AWS CodePipeline.

Use these steps to review your authorized integrations in GitHub.

1. In GitHub, from the drop-down option on your profile photo, choose **Settings**.
2. Choose **Applications** and then choose **Authorized OAuth Apps**.
3. Review your authorized apps.



You have granted **1 application** access to your account.

AWS CodePipeline (Oregon)
Last used within the last week · Owned by aws-codesuite

Read more about connecting with third-party applications at GitHub Help.

Use GitHub and the AWS CodePipeline CLI to Create and Rotate Your GitHub Personal Access Token on a Regular Basis

The advantage of using tokens instead of passwords in a script is that tokens can be revoked or rotated. You are also able to grant specific privileges and permissions to a personal access token. Tokens should be stored securely and rotated or regenerated routinely. Token rotation is recommended by RFC-6819 (OAuth 2.0 Threat Model and Security Considerations), section 5.1.5.3.

For more information, see Creating a personal access token for the command line on the GitHub website.

Once you have regenerated a new personal access token, you can rotate it by using the CLI or API or by using AWS CloudFormation and calling `UpdatePipeline`.

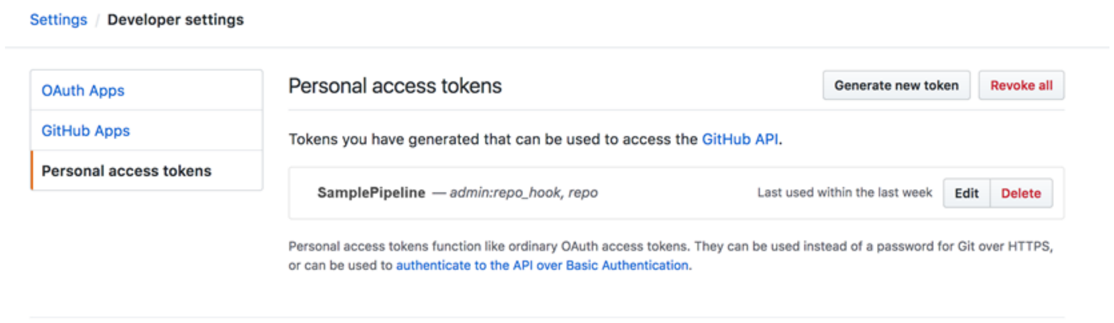
> **Note**
> You might have to update other applications if they are using the same personal access token. As a security best practice, do not share a single token across multiple applications. Create a new personal access token for each application.

Use these steps to rotate your GitHub personal access token and then update the pipeline structure with the new token.

> **Note**
> After you rotate your personal access token, remember to update any CLI scripts or AWS CloudFormation templates containing the old token information.

1. In GitHub, from the drop-down option on your profile photo, choose **Settings**.
2. Choose **Developer settings** and then choose **Personal access tokens**.

3. Next to your GitHub personal access token, choose **Edit**.



Settings / Developer settings

- OAuth Apps
- GitHub Apps
- Personal access tokens

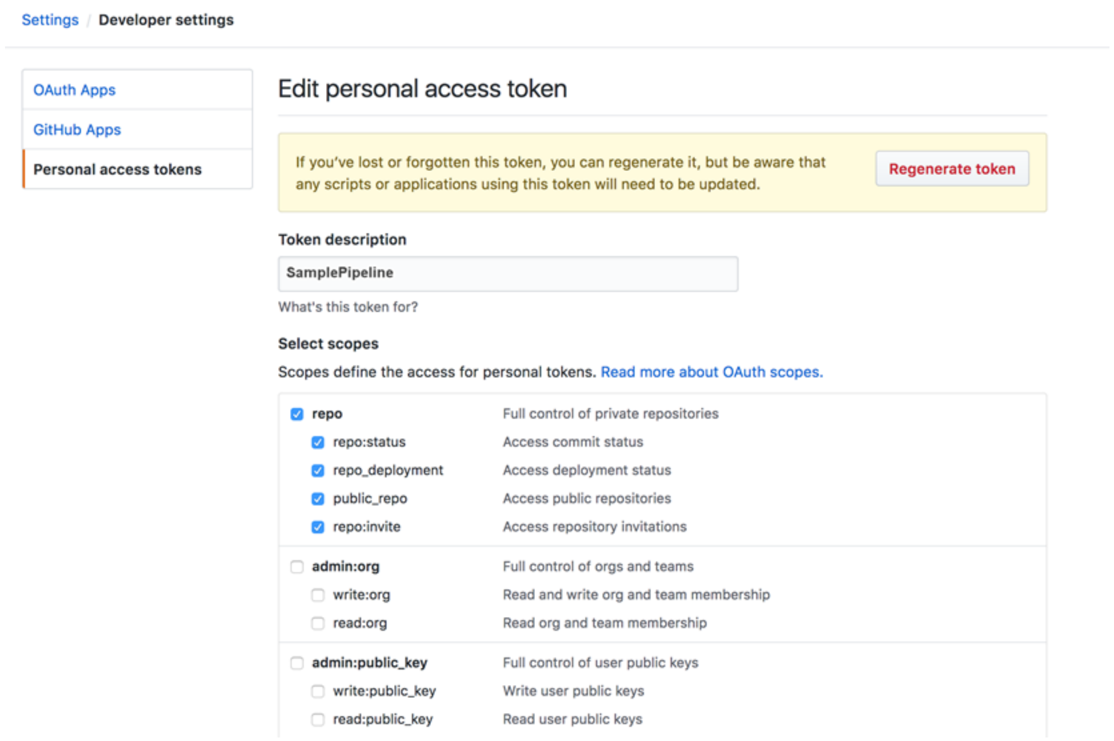
Personal access tokens

Tokens you have generated that can be used to access the GitHub API.

SamplePipeline — *admin:repo_hook, repo* Last used within the last week

Personal access tokens function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to authenticate to the API over Basic Authentication.

4. Choose **Regenerate token**.



Settings / Developer settings

- OAuth Apps
- GitHub Apps
- Personal access tokens

Edit personal access token

If you've lost or forgotten this token, you can regenerate it, but be aware that any scripts or applications using this token will need to be updated.

Token description

SamplePipeline

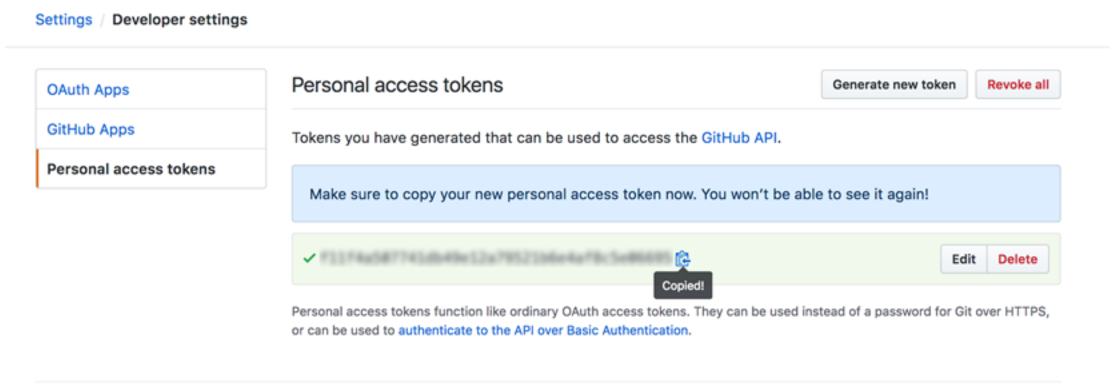
What's this token for?

Select scopes

Scopes define the access for personal tokens. Read more about OAuth scopes.

✓ repo	Full control of private repositories
✓ repo:status	Access commit status
✓ repo_deployment	Access deployment status
✓ public_repo	Access public repositories
✓ repo:invite	Access repository invitations
☐ admin:org	Full control of orgs and teams
☐ write:org	Read and write org and team membership
☐ read:org	Read org and team membership
☐ admin:public_key	Full control of user public keys
☐ write:public_key	Write user public keys
☐ read:public_key	Read user public keys

5. Next to the regenerated token, choose the copy icon.



Settings / Developer settings

- OAuth Apps
- GitHub Apps
- Personal access tokens

Personal access tokens

Tokens you have generated that can be used to access the GitHub API.

Make sure to copy your new personal access token now. You won't be able to see it again!

✓ [redacted]

Personal access tokens function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to authenticate to the API over Basic Authentication.

6. At a terminal (Linux, macOS, or Unix) or command prompt (Windows), run the **get-pipeline** command on the pipeline where you want to change the personal access token, and then copy the

output of the command to a JSON file. For example, for a pipeline named MyFirstPipeline, you would type something similar to the following:

```
aws codepipeline get-pipeline --name MyFirstPipeline >pipeline.json
```

The output of the command is sent to the *pipeline.json* file.

7. Open the file in a plain-text editor and edit the value in the `OAuthTokenField` of your GitHub action. Replace the asterisks (****) with the token you copied from GitHub. For example:

```
{
    "configuration": {
        "Owner": "MyGitHubUserName",
        "Repo": "test-repo",
        "Branch": "master",
        "OAuthToken": "Replace the **** with your personal access token"
    },
```

8. Save the file, and then run the **update-pipeline** with the `--cli-input-json` parameter to specify the JSON file you just edited. For example, to update a pipeline named MyFirstPipeline, you would type something similar to the following:

   Important
   Be sure to include `file://` before the file name. It is required in this command.

```
aws codepipeline update-pipeline --cli-input-json file://pipeline.json
```

9. When you have finished updating your pipelines, delete the JSON files.

For more information, see Pipeline Error: I receive a pipeline error that includes the following message: "PermissionError: Could not access the GitHub repository" (p. 167).

Use Parameter Store to Track Database Passwords or Third Party API Keys

You can use Parameter Store to track and update configuration secrets such as database passwords. This procedure describes using Parameter Store to manually create a secret parameter. You can also create automated scripts to use Parameter Store to securely set and manage your passwords and keys automatically. See an example of build spec automation for AWS CodeDeploy at this blog post.

Manually create a parameter in Parameter Store

1. Sign in to your AWS account and go to the Amazon EC2 console.
2. Under the **Systems Manager Shared Resources** section, click **Parameter Store**.
3. Click **Get Started Now** or **Create Parameter** and enter the following information:
   a. Type a name for your parameter in the **Name** field.
   b. Under **Type**, choose **Secure String**. This encrypts sensitive data using your default AWS KMS key.
   c. Paste the parameter into the **Value** field.
4. Click **Create Parameter**, and it will bring you to the Parameter Store console where you can see your newly created parameter.

AWS CodePipeline Command Line Reference

Use this reference when working with the AWS CodePipeline commands and as a supplement to information documented in the AWS CLI User Guide and the AWS CLI Reference.

Before you use the AWS CLI, make sure you complete the prerequisites in Getting Started with AWS CodePipeline (p. 9).

To view a list of all available AWS CodePipeline commands, run the following command:

```
aws codepipeline help
```

To view information about a specific AWS CodePipeline command, run the following command, where *command-name* is the name of one of the commands listed below (for example, **create-pipeline**):

```
aws codepipeline command-name help
```

To begin learning how to use the commands in the AWS CodePipeline extension to the AWS CLI, go to one or more of the following sections:

- Create a Custom Action (CLI) (p. 107)
- Create a Pipeline (CLI) (p. 72)
- Delete a Pipeline (CLI) (p. 96)
- Disable or Enable Transitions (CLI) (p. 150)
- View Pipeline Details and History (CLI) (p. 93)
- Retry Failed Actions (CLI) (p. 135)
- Start a Pipeline Manually (CLI) (p. 81)>
- Edit a Pipeline (AWS CLI) (p. 77)

You can also view examples of how to use most of these commands in AWS CodePipeline Tutorials (p. 26).

AWS CodePipeline Pipeline Structure Reference

By default, any pipeline you successfully create in AWS CodePipeline will have a valid structure. However, if you manually create or edit a JSON file to create a pipeline or update a pipeline from the AWS CLI, you might inadvertently create a structure that is not valid. The following reference can help you better understand the requirements for your pipeline structure and how to troubleshoot issues. Refer also to the constraints documented in Limits in AWS CodePipeline (p. 207), which apply to all pipelines.

Topics

Pipeline and Stage Structure Requirements in AWS CodePipeline

A two-stage pipeline has the following basic structure:

```
{
    "roleArn": "An IAM ARN for a service role, such as arn:aws:iam::80398EXAMPLE:role/AWS-
CodePipeline-Service",
    "stages": [
        {
            "name": "SourceStageName",
            "actions": [
            ... See Action Structure Requirements in AWS CodePipeline ...
            ]
        },
        {
            "name": "NextStageName",
            "actions": [
            ... See Action Structure Requirements in AWS CodePipeline ...
            ]
        }
    ],
    "artifactStore": {
        "type": "S3",
        "location": "The name of the Amazon S3 bucket automatically generated for you the
 first time you create a pipeline
            using the console, such as codepipeline-us-east-2-1234567890, or any Amazon S3
 bucket you provision for this purpose"
    },
    "name": "YourPipelineName",
    "version": 1
}
```

The pipeline structure has the following requirements:

- A pipeline must contain at least two stages.

- The first stage of a pipeline must contain at least one source action, and can only contain source actions.
- Only the first stage of a pipeline may contain source actions.
- At least one stage in each pipeline must contain an action that is not a source action.
- All stage names within a pipeline must be unique.
- Stage names cannot be edited within the AWS CodePipeline console. If you edit a stage name by using the AWS CLI, and the stage contains an action with one or more secret parameters (such as an OAuth token), the value of those secret parameters will not be preserved. You must manually type the value of the parameters (which are masked by four asterisks in the JSON returned by the AWS CLI) and include them in the JSON structure.
- The pipeline metadata fields are distinct from the pipeline structure and cannot be edited. When you update a pipeline, the date in the `updated` metadata field changes automatically.
- When you edit or update a pipeline, the pipeline name cannot be changed.

  Note
  If you want to rename an existing pipeline, you can use the CLI `get-pipeline` command to build a JSON file containing your pipeline's structure. Then you can use the CLI `create-pipeline` command to create a new pipeline with that structure and give it a new name.

The version number of a pipeline is automatically generated and updated every time you update the pipeline.

Action Structure Requirements in AWS CodePipeline

An action has the following high-level structure:

```
[
                {
                   "inputArtifacts": [
                        An input artifact structure, if supported for the action category
                    ],
                   "name": "ActionName",
                    "actionTypeId": {
                        "category": "An action category",
                        "owner": "AWS",
                        "version": "1"
                        "provider": "A provider type for the action category",
                    },
                    "outputArtifacts": [
                        An output artifact structure, if supported for the action category
                    ],
                    "configuration": {
                        Configuration details appropriate to the provider type
                    },
                    "runOrder": A positive integer that indicates the run order within the
 stage,
                }
            ]
```

The action structure has the following requirements:

- All action names within a stage must be unique.
- The input artifact of an action must exactly match the output artifact declared in a preceding action. For example, if a preceding action includes the following declaration:

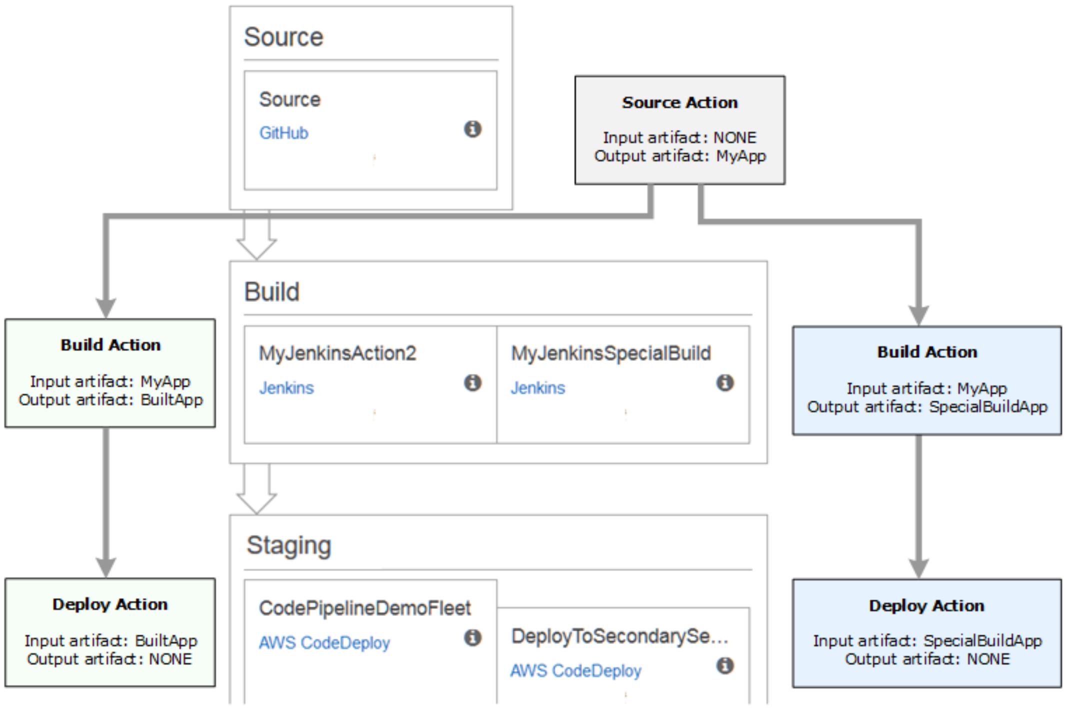
```
"outputArtifacts": [
    {
    "MyApp"
    }
],
```

and there are no other output artifacts, then the input artifact of a following action must be:

```
"inputArtifacts": [
    {
    "MyApp"
    }
],
```

This is true for all actions, whether they are in the same stage or in following stages, but the input artifact does not have to be the next action in strict sequence from the action that provided the output artifact. Actions in parallel can declare different output artifact bundles, which are in turn consumed by different following actions.

The following illustration provides an example of input and output artifacts in actions in a pipeline:



- Output artifact names must be unique within a pipeline. For example, a pipeline can include one action that has an output artifact named `"MyApp"` and another action that has an output artifact named `"MyBuiltApp"`. However, a pipeline cannot include two actions that both have an output artifact named `"MyApp"`.
- If an action contains a parameter whose value is secret, such as the OAuth token for a GitHub source action, the value of that parameter is masked in the JSON by a series of four asterisks (****). The actual value is stored, and as long as you do not edit that value, or change the name of the action or the name of the stage where that action runs, you do not have to supply that value when editing the JSON using the AWS CLI or AWS CodePipeline API. However, if you do change the name of the action, or the

name of the stage in which the action runs, the value of any secret parameters will be lost. You must manually type the values for any secret parameters in the JSON, or the action will fail the next time the pipeline runs.

- For all currently supported action types, the only valid version string is "1".
- For all currently supported action types, the only valid owner string is "AWS", "ThirdParty", or "Custom". For more information, see the AWS CodePipeline API Reference.
- The default `runOrder` value for an action is 1. The value must be a positive integer (natural number). You cannot use fractions, decimals, negative numbers, or zero. To specify a serial sequence of actions, use the smallest number for the first action and larger numbers for each of the rest of the actions in sequence. To specify parallel actions, use the same integer for each action you want to run in parallel.

  For example, if you want three actions to run in sequence in a stage, you would give the first action the `runOrder` value of 1, the second action the `runOrder` value of 2, and the third the `runOrder` value of 3. However, if you want the second and third actions to run in parallel, you would give the first action the `runOrder` value of 1 and both the second and third actions the `runOrder` value of 2.

  Note
  The numbering of serial actions do not have to be in strict sequence. For example, if you have three actions in a sequence and decide to remove the second action, you do not need to renumber the `runOrder` value of the third action. Because the `runOrder` value of that action (3) is higher than the `runOrder` value of the first action (1), it will run serially after the first action in the stage.
- Depending on the action type, you can have the following number of input and output artifacts:

Action Type Constraints for Artifacts

Owner	Type of Action	Provider	Valid Number of Input Artifacts	Valid Number of Output Artifacts
AWS	Source	Amazon S3	0	1
AWS	Source	AWS CodeCommit	0	1
ThirdParty	Source	GitHub	0	1
AWS	Build	AWS CodeBuild	1	1
AWS	Test	AWS CodeBuild	1	0-1
AWS	Approval	Manual	0	0
AWS	Deploy	AWS CloudFormation	0-10	0-1
AWS	Deploy	AWS CodeDeploy	1	0
AWS	Deploy	AWS Elastic Beanstalk	1	0
AWS	Deploy	AWS OpsWorks Stacks	1	0
AWS	Deploy	Amazon ECS	1	0
AWS	Invoke	AWS Lambda	0 to 5	0 to 5
Custom	Build	Jenkins	0 to 5	0 to 5
Custom	Test	Jenkins	0 to 5	0 to 5

Owner	**Type of Action**	**Provider**	**Valid Number of Input Artifacts**	**Valid Number of Output Artifacts**
Custom	Any supported category	As specified in the custom action	0 to 5	0 to 5

- Valid action categories include values similar to the following:
  - Source
  - Build
  - Approval
  - Deploy
  - Test
  - Invoke

  For a full list of valid action types, see the AWS CodePipeline API Reference.
- Valid provider types for an action category depend on the category. For example, for a source action type, a valid provider type is:

```
S3
```

  For a full list of valid provider types, see the AWS CodePipeline API Reference.
- Every action must have a valid action configuration, which depends on the provider type for that action. The following table lists the required action configuration elements for each valid provider type:

Action Configuration Properties for Provider Types

Name of Provider	**Provider Name in Action Type**	**Configuration Properties**	**Required Property?**
Amazon S3	`S3`	`S3Bucket`	Required
		`PollForSourceChanges`[1]	Optional
		`S3ObjectKey`	Required
AWS CodeCommit	`CodeCommit`	`PollForSourceChanges`[1]	Optional
		`RepositoryName`	Required
		`BranchName`	Required
GitHub	`GitHub`	`Owner`	Required
		`Repo`	Required
		`PollForSourceChanges`[1]	Optional
		`Branch`	Required
		`OAuthToken`	Required
AWS CloudFormation[2]	`CloudFormation`	`ActionMode`	Required
		`StackName`	Required
AWS CodeBuild	`CodeBuild`	`ProjectName`	Required

Name of Provider	Provider Name in Action Type	Configuration Properties	Required Property?
AWS CodeDeploy	`CodeDeploy`	`ApplicationName`	Required
		`DeploymentGroupName`	Required
AWS Elastic Beanstalk	`ElasticBeanstalk`	`ApplicationName`	Required
		`EnvironmentName`	Required
AWS Lambda	`Lambda`	`FunctionName`	Required
		`UserParameters`	Optional
AWS OpsWorks Stacks	`OpsWorks`	`Stack`	Required
		`Layer`	Optional
		`App`	Required
Amazon ECS	`ECS`	`ClusterName`	Required
		`ServiceName`	Required
		`FileName`	Optional
Jenkins	The name of the action you provided in the AWS CodePipeline Plugin for Jenkins (for example *`MyJenkinsProviderName`*)	`ProjectName`	Required

[1] By default, AWS CodePipeline periodically checks the location of your source content and runs the pipeline if changes are detected. You can set this to false to turn off these checks if you prefer to run the pipeline manually. Valid values are true/false. This parameter does not display if it has never been explicitly set.

[2] The third and fourth required properties for AWS CloudFormation depend on the selected `ActionMode` property. For more information, see Continuous Delivery with AWS CodePipeline in *AWS CloudFormation User Guide*.

The following example shows a valid action configuration for a source action that uses Amazon S3:

```
"configuration": {
  "S3Bucket": "awscodepipeline-demobucket-example-date",
  "S3ObjectKey": "CodePipelineDemoApplication.zip",
}
```

The following example shows a valid configuration for a deploy action that uses Amazon ECS:

```
"configuration": {
  "ClusterName": "my-ecs-cluster",
  "ServiceName": "sample-app-service",
  "FileName": "imagedefinitions.json",
}
```

Limits in AWS CodePipeline

The following table lists current limits in AWS CodePipeline. Structural requirements are discussed in AWS CodePipeline Pipeline Structure Reference (p. 201). For information about limits that can be changed, see AWS Service Limits.

Maximum number of pipelines per region in an AWS account	US East (N. Virginia) (us-east-1): 40 US West (Oregon) (us-west-2): 60 EU (Ireland) (eu-west-1): 60 All other supported regions: 20
Number of stages in a pipeline	Minimum of 2, maximum of 10
Number of actions in a stage	Minimum of 1, maximum of 20
Maximum number of custom actions per region in an AWS account	Maximum of 50
Maximum number of parallel actions in a stage	Maximum of 5
Maximum number of sequential actions in a stage	Maximum of 10
Length of time before an action times out	Approval action: 7 days AWS CloudFormation deployment action: 3 days AWS CodeBuild build action and test action: 8 hours All other actions: 1 hour
Number of days before a stage execution times out	40 **Note** The sum total of timeout periods for consecutive actions you add to a stage cannot exceed 40 days.
Number of revisions running across all pipelines in an AWS account, per region	Five times the number of pipelines in the region
Maximum number of prior months for which pipeline execution history information can be viewed	12
Regions where you can create a pipeline	US East (Ohio) (us-east-2) US East (N. Virginia) (us-east-1) US West (N. California) (us-west-1) US West (Oregon) (us-west-2) Canada (Central) (ca-central-1)

	EU (Ireland) (eu-west-1) EU (London) (eu-west-2) EU (Frankfurt) (eu-central-1) Asia Pacific (Mumbai) (ap-south-1) Asia Pacific (Tokyo) (ap-northeast-1) Asia Pacific (Seoul) (ap-northeast-2) Asia Pacific (Singapore) (ap-southeast-1) Asia Pacific (Sydney) (ap-southeast-2) South America (São Paulo) (sa-east-1)
Maximum size of artifacts in a source stage	Artifacts stored in Amazon S3 buckets: 2 GB Artifacts stored in AWS CodeCommit or GitHub repositories: 1 GB Exception: If you are using Amazon EBS to deploy applications, the maximum artifact size is always 512 MB. Exception: If you are using AWS CloudFormation to deploy applications, the maximum artifact size is always 256 MB.
Uniqueness of names	Within a single AWS account, each pipeline you create in a region must have a unique name. Names can be reused for pipelines in different regions. Stage names must be unique within a pipeline. Action names must be unique within a stage.
Characters allowed in pipeline name	Pipeline names cannot exceed 100 characters. Allowed characters include: The letter characters `a` through `z`, inclusive. The letter characters `A` through `Z`, inclusive. The number characters `0` through `9`, inclusive. The special characters `.` (period), `@` (at sign), `-` (minus sign), and `_` (underscore). Any other characters, such as spaces, are not allowed.

Characters allowed in stage name	Stage names cannot exceed 100 characters. Allowed characters include: The letter characters `a` through `z`, inclusive. The letter characters `A` through `Z`, inclusive. The number characters `0` through `9`, inclusive. The special characters `.` (period), `@` (at sign), - (minus sign), and _ (underscore). Any other characters, such as spaces, are not allowed.
Characters allowed in action name	Action names cannot exceed 100 characters. Allowed characters include: The letter characters `a` through `z`, inclusive. The letter characters `A` through `Z`, inclusive. The number characters `0` through `9`, inclusive. The special characters `.` (period), `@` (at sign), - (minus sign), and _ (underscore). Any other characters, such as spaces, are not allowed.
Characters allowed in action types	Action type names cannot exceed 25 characters. Allowed characters include: The letter characters `a` through `z`, inclusive. The letter characters `A` through `Z`, inclusive. The number characters `0` through `9`, inclusive. The special characters `.` (period), `@` (at sign), - (minus sign), and _ (underscore). Any other characters, such as spaces, are not allowed.

Characters allowed in partner action names	Partner action names must follow the same naming conventions and restrictions as other action names in AWS CodePipeline. Specifically, they cannot exceed 100 characters, and the following characters are allowed: The letter characters `a` through `z`, inclusive. The letter characters `A` through `Z`, inclusive. The number characters `0` through `9`, inclusive. The special characters `.` (period), `@` (at sign), - (minus sign), and _ (underscore). Any other characters, such as spaces, are not allowed.
Maximum size of the JSON object that can be stored in the `ParameterOverrides` property	For an AWS CodePipeline deploy action with AWS CloudFormation as the provider, the `ParameterOverrides` property is used to store a JSON object that specifies values for the AWS CloudFormation template configuration file. There is a maximum size limit of 1 kilobyte for the JSON object that can be stored in the `ParameterOverrides` property.
Maximum size of the image definitions JSON file used in pipelines deploying Amazon ECS containers and images	100 KB

AWS CodePipeline User Guide Document History

The following table describes the important changes to the documentation since the last release of the AWS CodePipeline User Guide.

- **API version: 2015-07-09**
- **Latest documentation update: 2017-06-29**

Change	Description	Date Changed
Updated topics	You can now use AWS CodePipeline and Amazon ECS for continuous deployment of container-based applications. When you create a pipeline, you can select Amazon ECS as a deployment provider. A change to code in your source control repository triggers your pipeline to build a new Docker image, push it to your container registry, and then deploy the updated image to an Amazon ECS service. The topics Product and Service Integrations with AWS CodePipeline (p. 11), Create a Pipeline in AWS CodePipeline (p. 67), and AWS CodePipeline Pipeline Structure Reference (p. 201) have been updated to reflect this support for Amazon ECS.	December 12, 2017
Updated topics	When you create or edit a pipeline in the console, AWS CodePipeline now creates an Amazon CloudWatch Events rule that detects changes to your AWS CodeCommit repository and then automatically starts your pipeline. For information about migrating your existing pipeline, see Migrate to Amazon CloudWatch Events Change Detection for Pipelines with an AWS CodeCommit Repository (p. 89). The Tutorial: Create a Simple Pipeline (AWS CodeCommit Repository) (p. 40) has been updated to show how the Amazon CloudWatch Events rule and role are created when you select an AWS CodeCommit repository and branch. Create a Pipeline in AWS CodePipeline (p. 67) and Edit a Pipeline in AWS CodePipeline (p. 75) have also been updated. For more information, see How to Start a Pipeline Execution in AWS CodePipeline (p. 65).	October 11, 2017
New and updated topics	AWS CodePipeline now provides built-in support for pipeline state change notifications through Amazon CloudWatch Events and Amazon Simple Notification Service (Amazon SNS). A new tutorial Tutorial: Set Up a CloudWatch Events Rule to Receive Email Notifications for Pipeline State Changes (p. 60) has been added. For more information, see Detect and React to Changes in Pipeline State with Amazon CloudWatch Events (p. 152).	September 8, 2017

Change	Description	Date Changed
New and updated topics	You can now add AWS CodePipeline as a target for Amazon CloudWatch Events actions. Amazon CloudWatch Events rules can be set up to detect source changes so that the pipeline starts as soon as those changes occur, or they can be set up to run scheduled pipeline executions. Information has been added for the PollForSourceChanges source action configuration option. For more information, see How to Start a Pipeline Execution in AWS CodePipeline (p. 65).	September 5, 2017
New regions	AWS CodePipeline is now available in Asia Pacific (Seoul) and Asia Pacific (Mumbai). The Limits in AWS CodePipeline (p. 207) topic and Regions and Endpoints topic have been updated.	July 27, 2017
New regions	AWS CodePipeline is now available in US West (N. California), Canada (Central), and EU (London). The Limits in AWS CodePipeline (p. 207) topic and Regions and Endpoints topic have been updated.	June 29, 2017
Updated topics	You can now view details about past executions of a pipeline, not just the most recent execution. These details include start and end times, duration, and execution ID. Details are available for a maximum of 100 pipeline executions during the most recent 12-month period. The topics View Pipeline Details and History in AWS CodePipeline (p. 90), AWS CodePipeline Permissions Reference (p. 191), and Limits in AWS CodePipeline (p. 207) have been updated to reflect this support.	June 22, 2017
Updated topic	Nouvola has been added to the list of available actions in Test Action Integrations (p. 15).	May 18, 2017
Updated topics	In the AWS CodePipeline wizard, the page **Step 4: Beta** has been renamed **Step 4: Deploy**. The default name of the stage created by this step has been changed from "Beta" to "Staging". Numerous topics and screenshots have been updated to reflect these changes.	April 7, 2017
Updated topics	You can now add AWS CodeBuild as a test action to any stage of a pipeline. This allows you to more easily use AWS CodeBuild to run unit tests against your code. Prior to this release, you could use AWS CodeBuild to run unit tests only as part of a build action. A build action requires a build output artifact, which unit tests typically do not produce. The topics Product and Service Integrations with AWS CodePipeline (p. 11), Edit a Pipeline in AWS CodePipeline (p. 75), and AWS CodePipeline Pipeline Structure Reference (p. 201) have been updated to reflect this support for AWS CodeBuild.	March 8, 2017

Change	Description	Date Changed
New and updated topics	The table of contents has been reorganized to include sections for pipelines, actions, and stage transitions. A new section has been added for AWS CodePipeline tutorials. For better usability, Product and Service Integrations with AWS CodePipeline (p. 11) has been divided into shorter topics. A new section, Authentication, Access Control, and Security Best Practices for AWS CodePipeline (p. 171), provides comprehensive information about using AWS Identity and Access Management (IAM) and AWS CodePipeline to help secure access to your resources through the use of credentials. These credentials provide the permissions required to access AWS resources, such as putting and retrieving artifacts from Amazon S3 buckets and integrating AWS OpsWorks stacks into your pipelines.	February 8, 2017
New region	AWS CodePipeline is now available in Asia Pacific (Tokyo). The Limits in AWS CodePipeline (p. 207) topic and Regions and Endpoints topic have been updated.	December 14, 2016
New region	AWS CodePipeline is now available in South America (São Paulo). The Limits in AWS CodePipeline (p. 207) topic and Regions and Endpoints topic have been updated.	December 7, 2016
Updated topics	You can now add AWS CodeBuild as a build action to any stage of a pipeline. AWS CodeBuild is a fully managed build service in the cloud that compiles your source code, runs unit tests, and produces artifacts that are ready to deploy. You can use an existing build project or create one in the AWS CodePipeline console. The output of the build project can then be deployed as part of a pipeline. The topics Product and Service Integrations with AWS CodePipeline (p. 11), Create a Pipeline in AWS CodePipeline (p. 67), Authentication, Access Control, and Security Best Practices for AWS CodePipeline (p. 171), and AWS CodePipeline Pipeline Structure Reference (p. 201) have been updated to reflect this support for AWS CodeBuild. You can now use AWS CodePipeline with AWS CloudFormation and the AWS Serverless Application Model to continuously deliver your serverless applications. The topic Product and Service Integrations with AWS CodePipeline (p. 11) has been updated to reflect this support. Product and Service Integrations with AWS CodePipeline (p. 11) has been reorganized to group AWS and partner offerings by action type.	December 1, 2016
New region	AWS CodePipeline is now available in EU (Frankfurt). The Limits in AWS CodePipeline (p. 207) topic and Regions and Endpoints topic have been updated.	November 16, 2016

Change	Description	Date Changed
Updated topics	AWS CloudFormation can now be selected as a deployment provider in pipelines, enabling you to take action on AWS CloudFormation stacks and change sets as part of a pipeline execution. The topics Product and Service Integrations with AWS CodePipeline (p. 11), Create a Pipeline in AWS CodePipeline (p. 67), Authentication, Access Control, and Security Best Practices for AWS CodePipeline (p. 171), and AWS CodePipeline Pipeline Structure Reference (p. 201) have been updated to reflect this support for AWS CloudFormation.	November 3, 2016
New region	AWS CodePipeline is now available in the Asia Pacific (Sydney) Region. The Limits in AWS CodePipeline (p. 207) topic and Regions and Endpoints topic have been updated.	October 26, 2016
New region	AWS CodePipeline is now available in Asia Pacific (Singapore). The Limits in AWS CodePipeline (p. 207) topic and Regions and Endpoints topic have been updated.	October 20, 2016
New region	AWS CodePipeline is now available in the US East (Ohio) Region. The Limits in AWS CodePipeline (p. 207) topic and Regions and Endpoints topic have been updated.	October 17, 2016
Updated topic	Create a Pipeline in AWS CodePipeline (p. 67) has been updated to reflect support for displaying version identifiers of custom actions in the **Source provider** and **Build provider** lists.	September 22, 2016
Updated topic	The Manage Approval Actions in AWS CodePipeline (p. 136) section has been updated to reflect an enhancement that lets Approval action reviewers open the **Approve or reject the revision** form directly from an email notification.	September 14, 2016
New and updated topics	A new topic, View Current Source Revision Details in a Pipeline in AWS CodePipeline (p. 162), describes how to view details about code changes currently flowing through your software release pipeline. Quick access to this information information can be useful when reviewing manual approval actions or troubleshooting failures in your pipeline. A new section, Monitoring Pipelines with AWS CodePipeline (p. 152), provides a central location for all topics related to monitoring the status and progress of your pipelines.	September 08, 2016
New and updated topics	A new section, Manage Approval Actions in AWS CodePipeline (p. 136), provides information about configuring and using manual approval actions in pipelines. Topics in this section provide conceptual information about the approval process; instructions for setting up required IAM permissions, creating approval actions, and approving or rejecting approval actions; and samples of the JSON data generated when an approval action is reached in a pipeline.	July 06, 2016

Change	Description	Date Changed
New region	AWS CodePipeline is now available in the EU (Ireland) Region. The Limits in AWS CodePipeline (p. 207) topic and Regions and Endpoints topic have been updated.	June 23, 2016
New topic	A new topic, Retry a Failed Action in AWS CodePipeline (p. 134), has been added to describe how to retry a failed action or a group of parallel failed actions in stage.	June 22, 2016
Updated topics	A number of topics, including Create a Pipeline in AWS CodePipeline (p. 67), Authentication, Access Control, and Security Best Practices for AWS CodePipeline (p. 171), AWS CodePipeline Pipeline Structure Reference (p. 201), and Product and Service Integrations with AWS CodePipeline (p. 11), have been updated to reflect support for configuring a pipeline to deploy code in conjunction with custom Chef cookbooks and applications created in AWS OpsWorks. AWS CodePipeline support for AWS OpsWorks is currently available in the US East (N. Virginia) Region (us-east-1) only.	June 2, 2016
New and updated topics	A new topic, Tutorial: Create a Simple Pipeline (AWS CodeCommit Repository) (p. 40), has been added. This topic provides a sample walkthrough showing how to use an AWS CodeCommit repository and branch as the source location for a source action in a pipeline. Several other topics have been updated to reflect this integration with AWS CodeCommit, including Authentication, Access Control, and Security Best Practices for AWS CodePipeline (p. 171), Product and Service Integrations with AWS CodePipeline (p. 11), Tutorial: Create a Four-Stage Pipeline (p. 53), and Troubleshooting AWS CodePipeline (p. 165).	April 18, 2016
New topic	A new topic, Invoke an AWS Lambda Function in a Pipeline in AWS CodePipeline (p. 116), has been added. This topic contains sample AWS Lambda functions and steps for adding Lambda functions to pipelines.	January 27, 2016
Updated topic	A new section has been added to Authentication, Access Control, and Security Best Practices for AWS CodePipeline (p. 171), Resource-Based Policies (p. 176).	January 22, 2016
New topic	A new topic, Product and Service Integrations with AWS CodePipeline (p. 11), has been added. Information about integrations with partners and other AWS services has been moved to this topic. Links to blogs and videos have also been added.	December 17, 2015
Updated topic	Details of integration with Solano CI (p. 14) have been added to Product and Service Integrations with AWS CodePipeline (p. 11).	November 17, 2015

Change	Description	Date Changed
Updated topic	The AWS CodePipeline Plugin for Jenkins is now available through the Jenkins Plugin Manager as part of the library of plugins for Jenkins. The steps for installing the plugin have been updated in Tutorial: Create a Four-Stage Pipeline (p. 53).	November 9, 2015
New region	AWS CodePipeline is now available in the US West (Oregon) Region. The Limits in AWS CodePipeline (p. 207) topic has been updated. Links have been added to Regions and Endpoints.	October 22, 2015
New topic	Two new topics,Configure Server Side Encryption for Artifacts Stored in Amazon S3 for AWS CodePipeline (p. 194) and Create a Pipeline in AWS CodePipeline That Uses Resources from Another AWS Account (p. 97), have been added. A new section has been added to Authentication, Access Control, and Security Best Practices for AWS CodePipeline (p. 171), Example 8: Use AWS Resources Associated with Another Account in a Pipeline (p. 188).	August 25, 2015
Updated topic	The Create and Add a Custom Action in AWS CodePipeline (p. 106) topic has been updated to reflect changes in the structure, including `inputArtifactDetails` and `outputArtifactDetails`.	August 17, 2015
Updated topic	The Troubleshooting AWS CodePipeline (p. 165) topic has been updated with revised steps for troubleshooting problems with the service role and Elastic Beanstalk.	August 11, 2015
Updated topic	The Authentication, Access Control, and Security Best Practices for AWS CodePipeline (p. 171) topic has been updated with the latest changes to the service role for AWS CodePipeline (p. 179).	August 6, 2015
New topic	A Troubleshooting AWS CodePipeline (p. 165) topic has been added. Updated steps have been added for IAM roles and Jenkins in Tutorial: Create a Four-Stage Pipeline (p. 53).	July 24, 2015
Topic update	Updated steps have been added for downloading the sample files in Tutorial: Create a Simple Pipeline (Amazon S3 Bucket) (p. 26) and Tutorial: Create a Four-Stage Pipeline (p. 53).	July 22, 2015
Topic update	A temporary workaround for download issues with the sample files was added in Tutorial: Create a Simple Pipeline (Amazon S3 Bucket) (p. 26).	July 17, 2015
Topic update	A link was added in Limits in AWS CodePipeline (p. 207) to point to information about which limits can be changed.	July 15, 2015
Topic update	The managed policies section in Authentication, Access Control, and Security Best Practices for AWS CodePipeline (p. 171) was updated.	July 10, 2015
Initial Public Release	This is the initial public release of the AWS CodePipeline User Guide.	July 9, 2015

AWS Glossary

For the latest AWS terminology, see the AWS Glossary in the *AWS General Reference*.