

2,253 views Sep 6, 2022 #CloudComputing #AWS #AmazonWebServices

The AWS CDK is a multi-language, open source framework that enables developers to harness the full power of familiar programming languages to define and manage reusable cloud components. In this session, explore how AWS CDK will be your best friend to help you manage your cloud resources. We will also discuss some of the high-level concepts of CDK, the workflow, and the best practices of CDK.

GOB203

# Simplifying multi-environment deployment with CDK Pipelines

Jae-Mu Oh  
APAC Migration Lead, GFS  
Amazon Web Services

## Agenda

Infrastructure as code

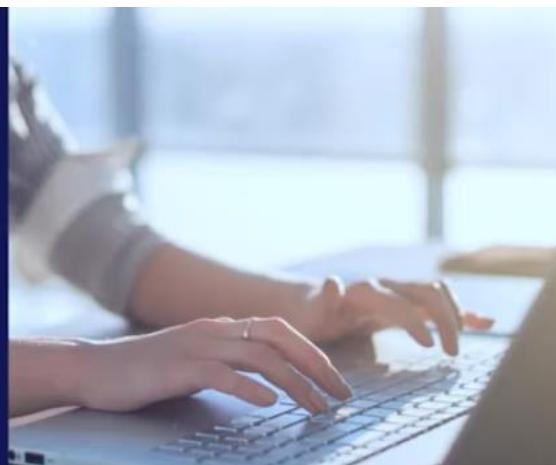
Multi-environment deployment

CDK Pipelines

Demo

Reliably and consistently provisioning and configuring infrastructure is foundational for DevOps and fast software delivery

Manual infrastructure processes can lack consistency, a single source of truth, and reliable detection/remediation of provisioning errors



## Infrastructure as code allows organisations to automate and manage resources consistently



Use version-controlled repositories to create single source of truth



Roll back changes to a previous version as needed



Share and enforce best practices more consistently

## AWS has resources for infrastructure as code



AWS CloudFormation

- ✓ Define templates with YAML or JSON
- ✓ Provision templates quickly and consistently
- ✓ Manage templates throughout lifecycle



AWS CDK

- ✓ Use Python, Java, .NET, or TypeScript class libraries of constructs with sensible defaults
- ✓ Compose and share custom constructs
- ✓ Provision resources consistently

## Multi-environment



Resource isolation



Area of impact



Service quotas



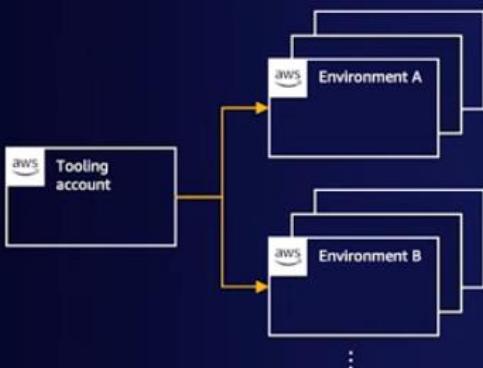
Workload visibility



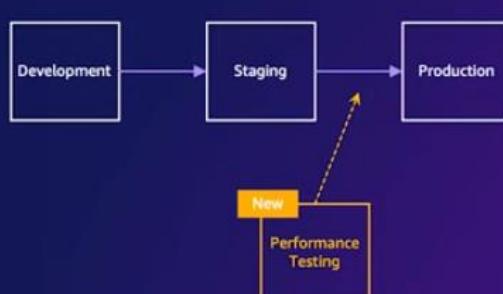
Data isolation

# Considerations

## Access Management

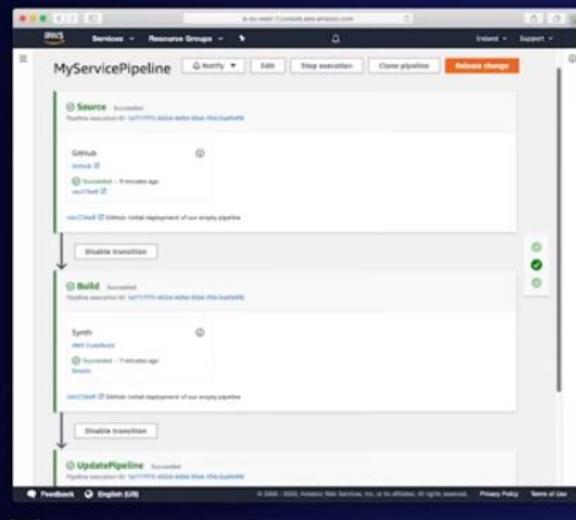


## Pipeline Update



# CDK Pipelines

## CONTINUOUS DELIVERY FOR AWS CDK APPLICATIONS



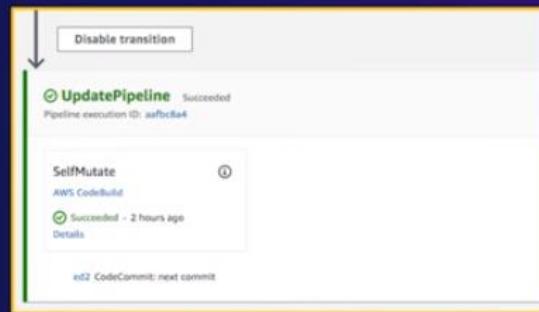
- Model continuous delivery pipelines as part of your infrastructure code
- Easily model cross-account and cross-region pipeline configurations
- Pipelines are self modifying as you push your AWS CDK code to origin

# Painless continuous delivery

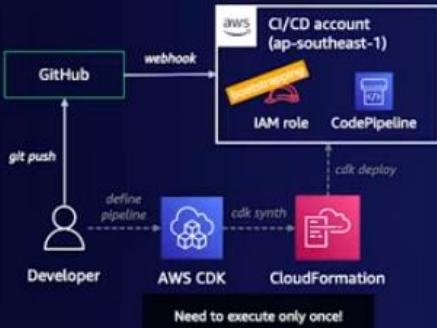
## Bootstrapping

```
export CDK_NEW_BOOTSTRAP=1  
npx cdk bootstrap \  
--profile ADMIN-PROFILE \  
--cloudformation-execution-policies \  
arn:aws:iam::aws:policy/AdministratorAccess \  
--trust PIPELINE-ACCOUNT-ID \  
aws://ACCOUNT-ID/REGION
```

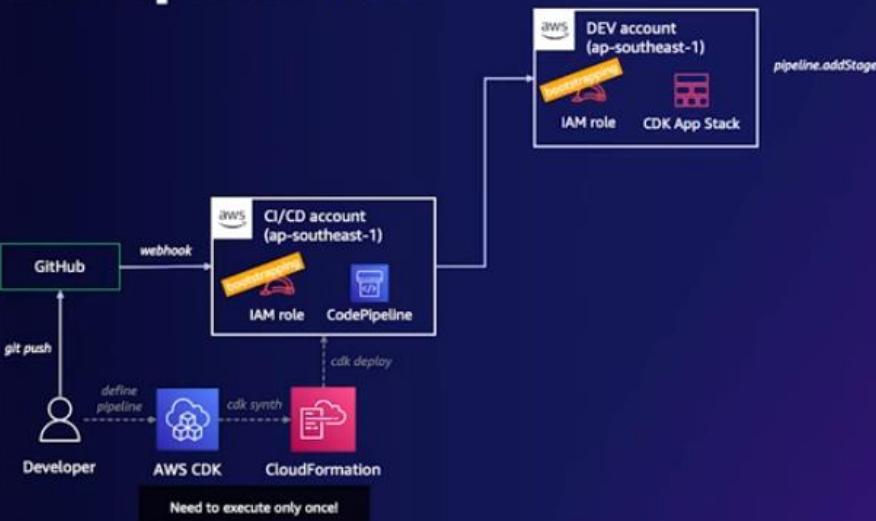
## Self-mutating pipeline



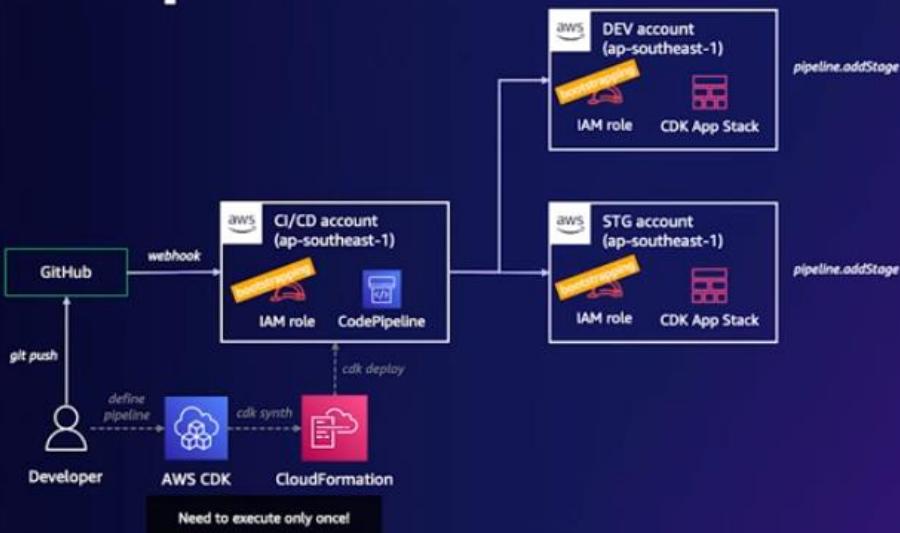
## Demo - Pipeline flow



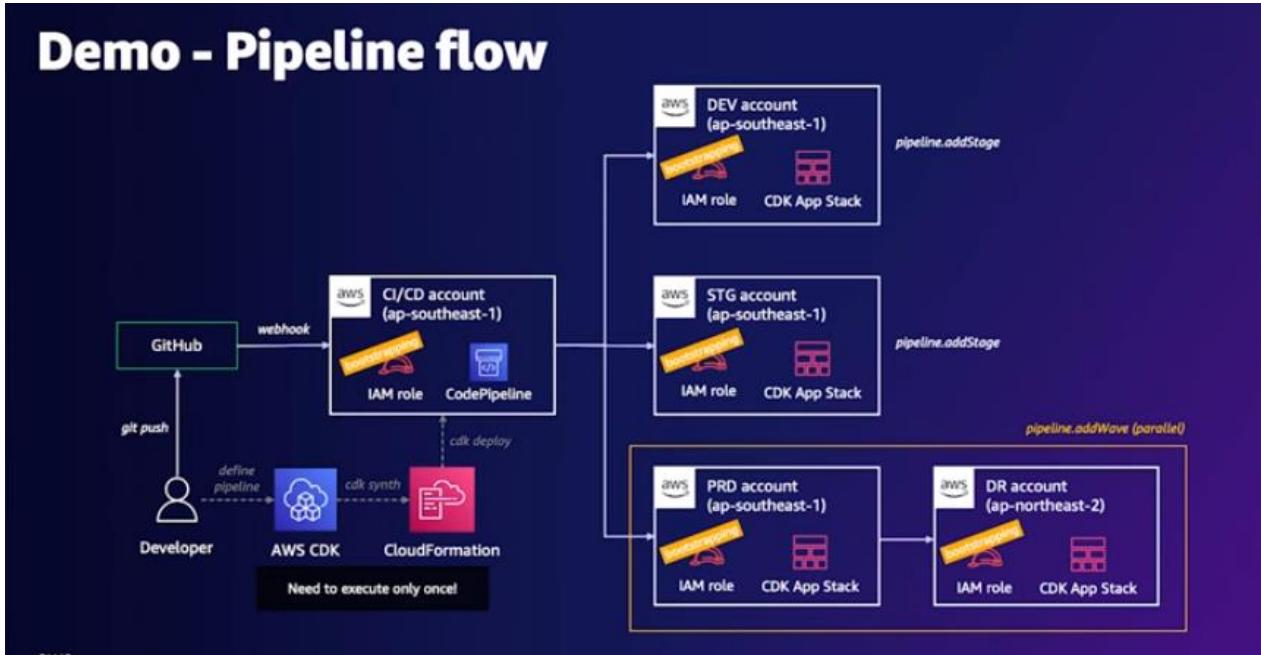
## Demo - Pipeline flow



## Demo - Pipeline flow



# Demo - Pipeline flow



```
demo summit-demo ] aws --version
aws-cli/2.4.19 Python/3.9.10 Darwin/21.3.0 source/x86_64 prompt/off
[ demo summit-demo ] cdk --version
2.13.0 (build b0b744d)
[ demo summit-demo ] aws configure list-profiles
tooling
dev
stg
prd
dr
[ demo summit-demo ]
```

```
demo summit-demo ] export CDK_NEW_BOOTSTRAP=1
[ demo summit-demo ] npx cdk bootstrap --profile tooling \
--cloudformation-execution-policies arn:aws:iam::aws:policy/AdministratorAccess aws:// 2586/ap-southeast-1
Need to install the following packages:
  cdk
Ok to proceed? (y) y
(理想树: e72b144743208263: timing 理想树:#root 完成在 110ms)
```

```
demo summit-demo ] export CDK_NEW_BOOTSTRAP=1
[ demo summit-demo ] npx cdk bootstrap --profile tooling \
--Cloudformation-execution-policies arn:aws:iam::aws:policy/AdministratorAccess aws:// 2586/ap-southeast-1
Need to install the following packages:
  cdk
Ok to proceed? (y) y
  Bootstrapping environment aws:// 2586/ap-southeast-1...
Trusted accounts for deployment: (none)
Trusted accounts for lookup: (none)
Execution policies: arn:aws:iam::aws:policy/AdministratorAccess
CDKToolkit: creating CloudFormation changeset...
[.....] (11/12)
11:56:50 PM | CREATE_IN_PROGRESS | AWS::CloudFormation::Stack | CDKToolkit
```

```
Hyper Shell Edit View Tools Window Help
[ demo summit-demo ] export CDK_NEW_BOOTSTRAP=1
[ demo summit-demo ] npx cdk bootstrap --profile tooling \
--cloudformation-execution-policies arn:aws:iam::aws:policy/AdministratorAccess aws:// 2586/ap-southeast-1
Need to install the following packages:
  cdk
Ok to proceed? (y) y
  Bootstrapping environment aws:// 2586/ap-southeast-1...
Trusted accounts for deployment: (none)
Trusted accounts for lookup: (none)
Execution policies: arn:aws:iam::aws:policy/AdministratorAccess
CDKToolkit: creating CloudFormation changeset...
[...]
[✓] Environment aws:// 2586/ap-southeast-1 bootstrapped.
[ demo summit-demo ]
```

```
Hyper Shell Edit View Tools Window Help
[ demo summit-demo ] npx cdk bootstrap --profile dev \
--cloudformation-execution-policies arn:aws:iam::aws:policy/AdministratorAccess \
--trust 2586 aws:// 2608/ap-southeast-1
  Bootstrapping environment aws:// 2608/ap-southeast-1...
Trusted accounts for deployment: 2586
Trusted accounts for lookup: (none)
Execution policies: arn:aws:iam::aws:policy/AdministratorAccess
CDKToolkit: creating CloudFormation changeset...
[.....] (0/12)

11:58:28 PM | CREATE_IN_PROGRESS | AWS::CloudFormation::Stack | CDKToolkit
11:58:32 PM | CREATE_IN_PROGRESS | AWS::ECR::Repository | ContainerAssetsRepository
11:58:32 PM | CREATE_IN_PROGRESS | AWS::SSM::Parameter | CdkBootstrapVersion
11:58:32 PM | CREATE_IN_PROGRESS | AWS::IAM::Role | ImagePublishingRole
11:58:32 PM | CREATE_IN_PROGRESS | AWS::IAM::Role | LookupRole
11:58:33 PM | CREATE_IN_PROGRESS | AWS::IAM::Role | FilePublishingRole
11:58:33 PM | CREATE_IN_PROGRESS | AWS::S3::Bucket | StagingBucket
11:58:33 PM | CREATE_IN_PROGRESS | AWS::IAM::Role | CloudFormationExecutionRole
```

```
Hyper Shell Edit View Tools Window Help
[ demo summit-demo ] npx cdk bootstrap --profile dev \
--cloudformation-execution-policies arn:aws:iam::aws:policy/AdministratorAccess \
--trust 2586 aws:// 2608/ap-southeast-1
  Bootstrapping environment aws:// 2608/ap-southeast-1...
Trusted accounts for deployment: 2586
Trusted accounts for lookup: (none)
Execution policies: arn:aws:iam::aws:policy/AdministratorAccess
CDKToolkit: creating CloudFormation changeset...
[...]
[✓] Environment aws:// 2608/ap-southeast-1 bootstrapped.
[ demo summit-demo ]
```

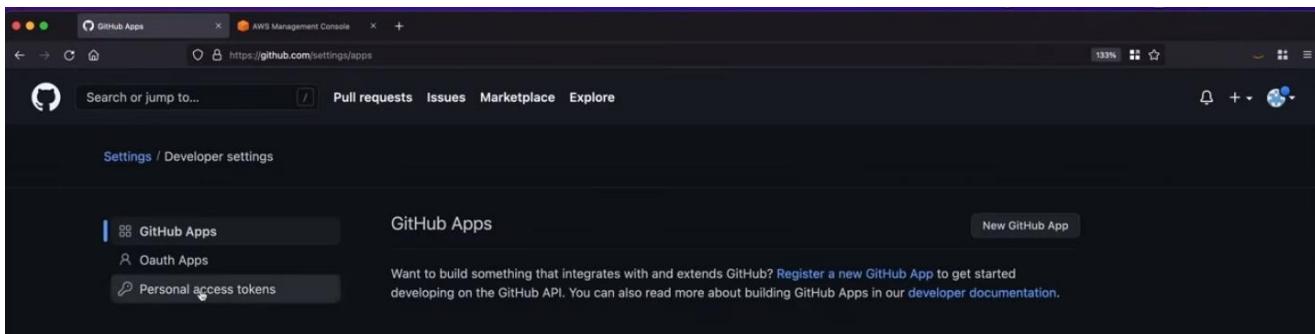
The screenshot shows the AWS CloudFormation console with the URL <https://ap-southeast-1.console.aws.amazon.com/cloudformation/home?region=ap-southeast-1#/stacks?filteringStatus=active&filteringText=&viewNested=true&hideStacks=false>. The left sidebar has sections for Stacks, StackSets, Exports, Designer, Registry (Public extensions, Activated extensions, Publisher), and CloudFormation. The main area shows a table titled 'Stacks (2)' with columns: Stack name, Status, Created time, and Description. It lists two stacks: 'CDKToolkit' (Status: CREATE\_COMPLETE, Created: 2022-02-22 23:56:45 UTC+0800) and 'PVRE' (Status: CREATE\_COMPLETE, Created: 2021-04-23 15:37:21 UTC+0800). A 'Create stack' button is at the top right.

The screenshot shows the AWS Console Home page with the URL <https://ap-southeast-1.console.aws.amazon.com/console/home?region=ap-southeast-1>. It features a 'Recently visited' section with links to S3 and CloudFormation, and a 'Welcome to AWS' section with links to 'Getting started with AWS' and 'Training and certification'.

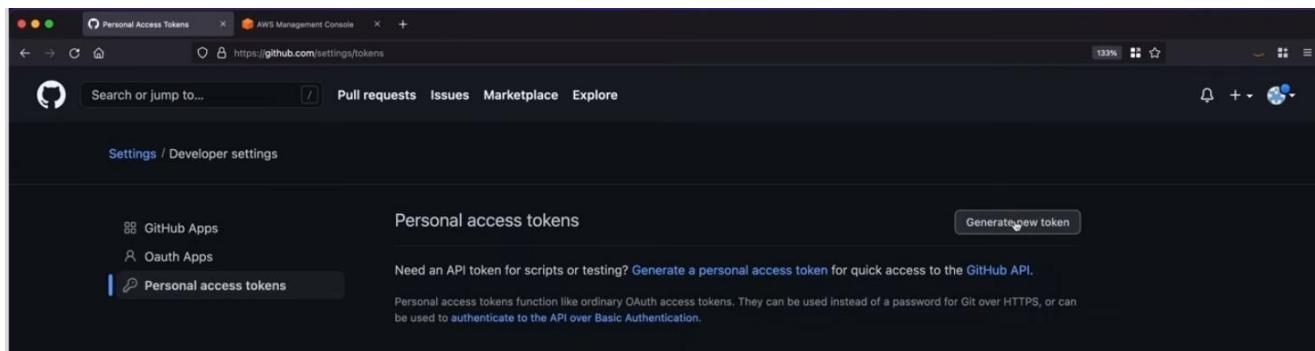
This screenshot is identical to the one above it, showing the AWS CloudFormation console with the same URL and interface. It displays the 'Stacks (2)' list with the same two stacks: 'CDKToolkit' and 'PVRE'.

The screenshot shows the GitHub homepage with the URL <https://github.com>. It includes a search bar, navigation links for Pull requests, Issues, Marketplace, and Explore, and a sidebar with sections for creating a first project, recent activity, and introducing yourself. A modal window titled 'Introduce yourself' is open, providing instructions on how to create a README file and showing a sample README content for the user 'mrtmmgg'.

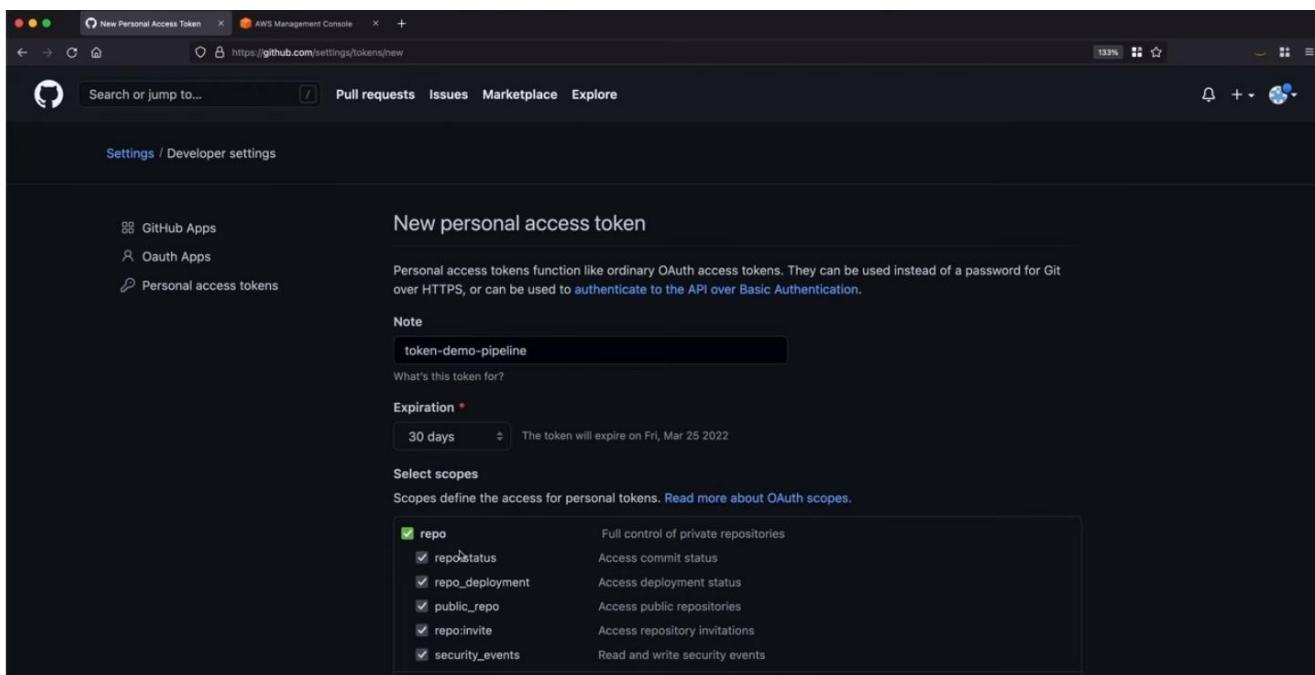
We need to set up



The screenshot shows the GitHub Apps settings page. The navigation bar at the top has tabs for "Pull requests", "Issues", "Marketplace", and "Explore". Below the navigation bar, the main content area has a title "GitHub Apps" and a sub-section "Personal access tokens". A call-to-action button "New GitHub App" is located in the top right corner of this section.



The screenshot shows the Personal access tokens settings page. The navigation bar at the top has tabs for "Pull requests", "Issues", "Marketplace", and "Explore". Below the navigation bar, the main content area has a title "Personal access tokens" and a sub-section "Personal access tokens". A call-to-action button "Generate new token" is located in the top right corner of this section.



The screenshot shows the "New personal access token" creation page. The navigation bar at the top has tabs for "Pull requests", "Issues", "Marketplace", and "Explore". Below the navigation bar, the main content area has a title "New personal access token". It includes fields for "Note" (containing "token-demo-pipeline"), "Expiration" (set to "30 days" with a note about expiration date), and "Select scopes" (a list of GitHub API scopes with checkboxes). The scopes listed are:

Scope	Description
<input checked="" type="checkbox"/> repo	Full control of private repositories
<input checked="" type="checkbox"/> repo:status	Access commit status
<input checked="" type="checkbox"/> repo_deployment	Access deployment status
<input checked="" type="checkbox"/> public_repo	Access public repositories
<input checked="" type="checkbox"/> repo:invite	Access repository invitations
<input checked="" type="checkbox"/> security_events	Read and write security events

Select scopes

Scopes define the access for personal tokens. [Read more about OAuth scopes.](#)

<input checked="" type="checkbox"/> <b>repo</b>	Full control of private repositories
<input checked="" type="checkbox"/> repo:status	Access commit status
<input checked="" type="checkbox"/> repo_deployment	Access deployment status
<input checked="" type="checkbox"/> public_repo	Access public repositories
<input checked="" type="checkbox"/> repo:invite	Access repository invitations
<input checked="" type="checkbox"/> security_events	Read and write security events
<input type="checkbox"/> workflow	Update GitHub Action workflows
<input type="checkbox"/> write:packages	Upload packages to GitHub Package Registry
<input type="checkbox"/> read:packages	Download packages from GitHub Package Registry
<input type="checkbox"/> delete:packages	Delete packages from GitHub Package Registry
<input type="checkbox"/> admin:org	Full control of orgs and teams, read and write org projects
<input type="checkbox"/> write:org	Read and write org and team membership, read and write org projects
<input type="checkbox"/> read:org	Read org and team membership, read org projects
<input type="checkbox"/> admin:public_key	Full control of user public keys
<input type="checkbox"/> write:public_key	Write user public keys
<input type="checkbox"/> read:public_key	Read user public keys
<input checked="" type="checkbox"/> admin:repo_hook	Full control of repository hooks
<input checked="" type="checkbox"/> write:repo_hook	Write repository hooks
<input checked="" type="checkbox"/> read:repo_hook	Read repository hooks
<input type="checkbox"/> admin:org_hook	Full control of organization hooks

The screenshot shows a browser window with two tabs open: 'Personal Access Tokens' and 'AWS Management Console'. The main content area is the GitHub 'Personal Access Tokens' page at <https://github.com/settings/tokens>. The user is in the 'Developer settings' section, specifically under 'Personal access tokens'. On the left, there are links for 'GitHub Apps', 'Oauth Apps', and 'Personal access tokens', with the latter being the active tab. The right side shows a list of generated tokens. One token, 'ghp\_b', is listed with the value 'brRq7'. A message above the tokens says, 'Some of the scopes you've selected are included in other scopes. Only the minimum set of necessary scopes has been saved.' A note below the tokens says, 'Make sure to copy your personal access token now. You won't be able to see it again!' A 'Delete' button is visible next to the token entry.

The screenshot shows the AWS Management Console Home page. On the left, there's a sidebar titled "Recently visited" with links to CloudFormation and Secrets Manager. On the right, there's a "Welcome to AWS" section with two cards: "Getting started with AWS" and "Training and certification".

The screenshot shows the AWS Secrets Manager main page. It features a central heading "AWS Secrets Manager" with a sub-headline "Easily rotate, manage, and retrieve secrets throughout their lifecycle". Below this, a paragraph explains that AWS Secrets Manager helps protect access to applications, services, and IT resources. To the right, there's a "Get started" box with a "Store a new secret" button.

The screenshot shows the "Store a new secret" wizard, Step 1: Choose secret type. The user has selected "Other type of secret" (API key, OAuth token, other). Below this, there's a "Key/value pairs" section with tabs for "Key/value" and "Plain text".

Personal Access Tokens    Secrets Manager

https://ap-southeast-1.console.aws.amazon.com/secretsmanager/home?region=ap-southeast-1#/newSecret?step=selectSecret

Services Search for services, features, blogs, docs, and more [Option+S]

AdministratorAccess/demo

Other type of secret  
API key, OAuth token, other.

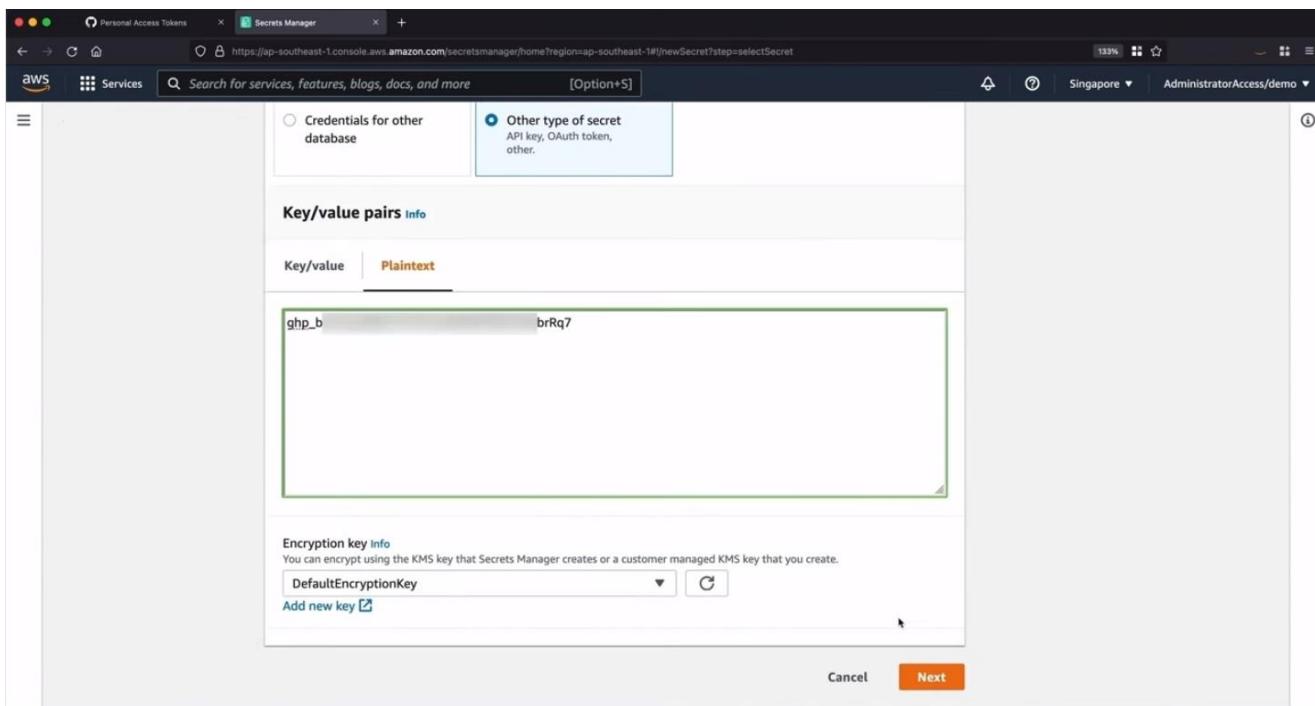
Key/value pairs Info

Key/value Plaintext

ghp\_b brRq7

Encryption key Info  
You can encrypt using the KMS key that Secrets Manager creates or a customer managed KMS key that you create.  
DefaultEncryptionKey Add new key

Cancel Next



Personal Access Tokens    Secrets Manager

https://ap-southeast-1.console.aws.amazon.com/secretsmanager/home?region=ap-southeast-1#/newSecret?step=selectName

Services Search for services, features, blogs, docs, and more [Option+S]

AdministratorAccess/demo

Access to MySQL.prod database for my AppBeta  
Maximum 250 characters.

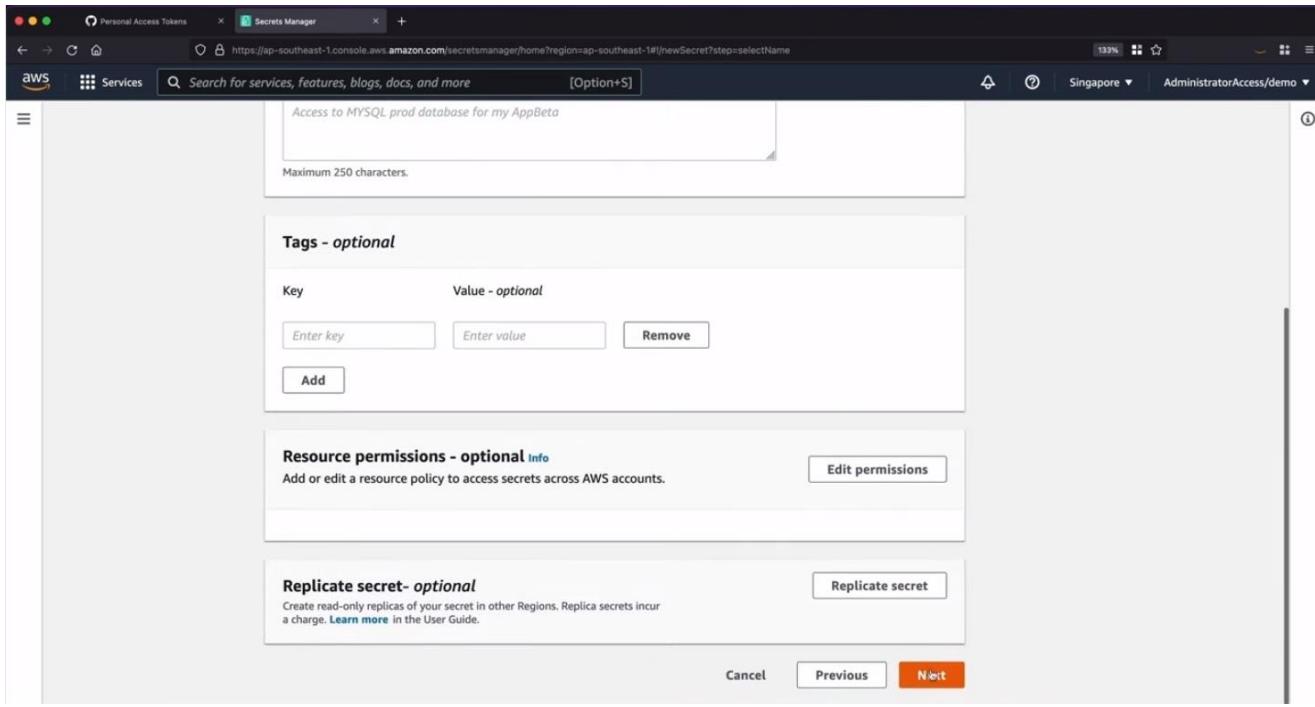
Tags - optional

Key Value - optional  
Enter key Enter value Remove  
Add

Resource permissions - optional Info  
Add or edit a resource policy to access secrets across AWS accounts. Edit permissions

Replicate secret - optional  
Create read-only replicas of your secret in other Regions. Replica secrets incur a charge. Learn more in the User Guide. Replicate secret

Cancel Previous Next



Personal Access Tokens    Secrets Manager

https://ap-southeast-1.console.aws.amazon.com/secretsmanager/home?region=ap-southeast-1#/newSecret?step=selectName

Services Search for services, features, blogs, docs, and more [Option+S]

AdministratorAccess/demo

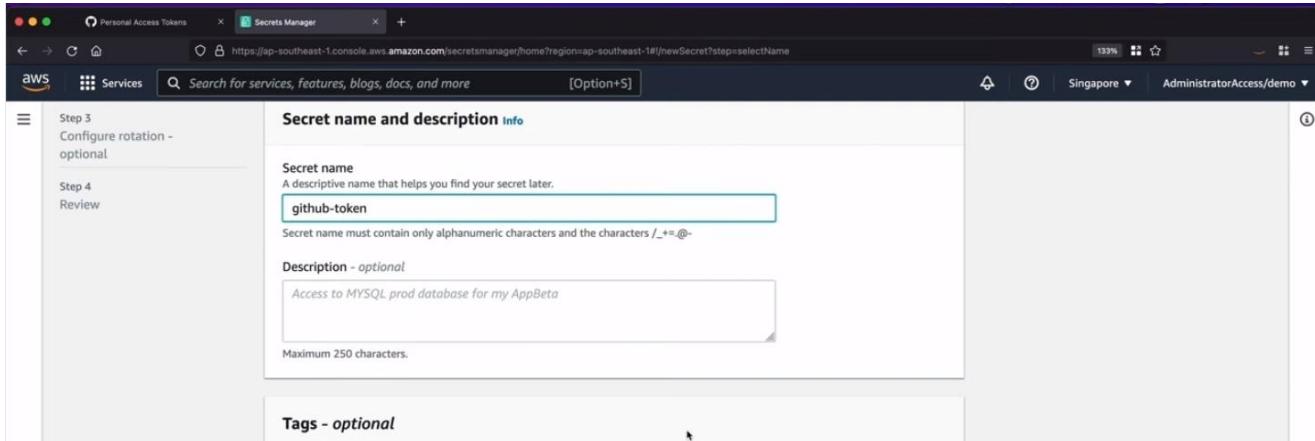
Step 3 Configure rotation - optional  
Step 4 Review

Secret name and description Info

Secret name  
A descriptive name that helps you find your secret later.  
github-token

Description - optional  
Access to MySQL.prod database for my AppBeta  
Maximum 250 characters.

Tags - optional



Personal Access Tokens X Secrets Manager +

https://ap-southeast-1.console.aws.amazon.com/secretsmanager/home?region=ap-southeast-1#/newSecret?step=selectName

Services Search for services, features, blogs, docs, and more [Option+S]

Singapore AdministratorAccess/demo

Access to MySQL prod database for my AppBeta  
Maximum 250 characters.

**Tags - optional**

Key	Value - optional
Enter key	Enter value
<input type="button" value="Remove"/>	
<input type="button" value="Add"/>	

**Resource permissions - optional** Info  
Add or edit a resource policy to access secrets across AWS accounts.

**Replicate secret- optional**  
Create read-only replicas of your secret in other Regions. Replica secrets incur a charge. [Learn more](#) in the User Guide.

Personal Access Tokens X Secrets Manager +

https://ap-southeast-1.console.aws.amazon.com/secretsmanager/home?region=ap-southeast-1#/newSecret?step=configureRotation

Services Search for services, features, blogs, docs, and more [Option+S]

Singapore AdministratorAccess/demo

Schedule expression builder  Schedule expression

Time unit: Days 30 Days

Window duration - optional: 4h  
Enter the time in hours.

Rotate immediately when the secret is stored. The next rotation will begin on your schedule.

**Rotation function**

Lambda rotation function Info  
Choose a Lambda function that can rotate this secret.

The screenshot shows the AWS Secrets Manager interface. A modal window titled 'Review Secret' is open, showing Java sample code for retrieving a secret. The code uses the AWS SDK for Java to create a Secrets Manager client and retrieve a secret named 'github-token' from the 'ap-southeast-1' region. The modal includes tabs for Java, JavaV2, JavaScript, C#, Python3, Ruby, and Go, and a 'Download AWS SDK for Java' button. At the bottom are 'Cancel', 'Previous', and 'Next' buttons.

```

1 // Use this code snippet in your app.
2 // If you need more information about configurations or implementing the sample code
3 // https://docs.aws.amazon.com/sdk-for-java/v1/developer-guide/java-dg-samples.html#
4
5 * public static void getSecret() {
6
7     String secretName = "github-token";
8     String region = "ap-southeast-1";
9
10    // Create a Secrets Manager client
11    AWSSecretsManager client = AWSSecretsManagerClientBuilder.standard()
12        .withRegion(region)
13        .build();
14
15    // In this sample we only handle the specific exceptions for the 'GetSecretValue'
16    // See https://docs.aws.amazon.com/secretsmanager/latest/apireference/API_GetSec
17    // We rethrow the exception by default.

```

The screenshot shows the AWS Secrets Manager 'List Secrets' page. A green banner at the top indicates that the secret 'github-token' has been successfully stored. Below the banner, the 'Secrets' table lists the stored secret. The table has columns for 'Secret name', 'Description', and 'Last retrieved (UTC)'. One row is shown for 'github-token'. At the top right of the table are buttons for 'See sample code' and 'View details'.

Secret name	Description	Last retrieved (UTC)
github-token	-	-

The screenshot shows the GitHub onboarding flow. It starts with a 'Create your first project' section, followed by an 'All activity' section with an 'Introduce yourself' card. The card asks the user to create a README and provides a template. Below it is a 'Discover interesting projects and people to populate your personal news feed' card. The GitHub navigation bar is visible at the top.

Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere? Import a repository.

Owner \* Repository name \*

mrtmmgg / demo-pipeline ✓

Great repository names are short and memorable. Need inspiration? How about [fluffy-journey](#)?

Description (optional)

Public Anyone on the internet can see this repository. You choose who can commit.  
 Private You choose who can see and commit to this repository.

Initialize this repository with:

Skip this step if you're importing an existing repository.

Add a README file This is where you can write a long description for your project. [Learn more](#).

Add .gitignore Choose which files not to track from a list of templates. [Learn more](#).

Choose a license A license tells others what they can and can't do with your code. [Learn more](#).

aws

Create a New Repository

Owner \* Repository name \*

mrtmmgg / demo-pipeline ✓

Great repository names are short and memorable. Need inspiration? How about [fluffy-journey](#)?

Description (optional)

Public Anyone on the internet can see this repository. You choose who can commit.  
 Private You choose who can see and commit to this repository.

Initialize this repository with:

Skip this step if you're importing an existing repository.

Add a README file This is where you can write a long description for your project. [Learn more](#).

Add .gitignore Choose which files not to track from a list of templates. [Learn more](#).

Choose a license A license tells others what they can and can't do with your code. [Learn more](#).

Creating repository...

mrtmmgg/demo-pipeline

Search or jump to... Pull requests Issues Marketplace Explore

Unwatch 1 Fork 0 Star 0

Code Issues Pull requests Actions Projects Security Insights Settings

Quick setup — if you've done this kind of thing before

Set up in Desktop or HTTPS SSH https://github.com/mrtmmgg/demo-pipeline.git

Get started by creating a new file or uploading an existing file. We recommend every repository include a README, LICENSE, and .gitignore.

...or create a new repository on the command line

```
echo "# demo-pipeline" >> README.md  
git init  
git add README.md  
git commit -m "first commit"  
git branch -M main
```

```
Hyper Shell Edit View Tools Window Help
● ● ●
[ demo summit-demo ] mkdir demo-pipeline
[ demo summit-demo ] cd demo-pipeline
[ demo demo-pipeline ] cdk init app --language typescript
Applying project template app for typescript
# Welcome to your CDK TypeScript project

This is a blank project for TypeScript development with CDK.

The 'cdk.json' file tells the CDK Toolkit how to execute your app.

## Useful commands

* 'npm run build'    compile typescript to js
* 'npm run watch'   watch for changes and compile
* 'npm run test'    perform the jest unit tests
* 'cdk deploy'      deploy this stack to your default AWS account/region
* 'cdk diff'        compare deployed stack with current state
* 'cdk synth'       emits the synthesized CloudFormation template

Initializing a new git repository...
hint: Using 'master' as the name for the initial branch. This default branch name
hint: is subject to change. To configure the initial branch name to use in all
hint: of your new repositories, which will suppress this warning, call:
hint:
hint: git config --global init.defaultBranch <name>
hint:
hint: Names commonly chosen instead of 'master' are 'main', 'trunk' and
hint: 'development'. The just-created branch can be renamed via this command:
hint:
hint: git branch -m <name>
```

```
● ● ●
## Useful commands

* 'npm run build'    compile typescript to js
* 'npm run watch'   watch for changes and compile
* 'npm run test'    perform the jest unit tests
* 'cdk deploy'      deploy this stack to your default AWS account/region
* 'cdk diff'        compare deployed stack with current state
* 'cdk synth'       emits the synthesized CloudFormation template

Initializing a new git repository...
hint: Using 'master' as the name for the initial branch. This default branch name
hint: is subject to change. To configure the initial branch name to use in all
hint: of your new repositories, which will suppress this warning, call:
hint:
hint: git config --global init.defaultBranch <name>
hint:
hint: Names commonly chosen instead of 'master' are 'main', 'trunk' and
hint: 'development'. The just-created branch can be renamed via this command:
hint:
hint: git branch -m <name>
Code Defender: Repository has not been setup with git defender
Run git defender --setup to fix
https://w.amazon.com/bin/view/AWS/Teams/Proserve/SI/ACE/CAST/CodeDefender/UserHelp/#5
Unable to initialize git repository for your project.
Executing npm install...
npm WARN deprecated source-map-url@0.4.1: See https://github.com/lydell/source-map-url#deprecated
npm WARN deprecated urix@0.1.0: Please see https://github.com/lydell/urix#deprecated
npm WARN deprecated resolve-url@0.2.1: https://github.com/lydell/resolve-url#deprecated
npm WARN deprecated source-map-resolve@0.5.3: See https://github.com/lydell/source-map-resolve#deprecated
npm WARN deprecated sane@4.1.0: some dependency vulnerabilities fixed, support for node < 10 dropped, and newer ECMAScript syntax/features added
✔ All done!
[ demo demo-pipeline ] clear
```

```
● ● ●
[ demo demo-pipeline ] ls -l
total 1168
-rw-r--r--  1 ojae  staff   536 Feb 23 01:02 README.md
drwxr-xr-x  3 ojae  staff   96 Feb 23 01:02 bin
-rw-r--r--  1 ojae  staff  838 Feb 23 01:02 cdk.json
-rw-r--r--  1 ojae  staff  157 Feb 23 01:02 jest.config.js
drwxr-xr-x  3 ojae  staff   96 Feb 23 01:02 lib
drwxr-xr-x 363 ojae  staff 11616 Feb 23 01:03 node_modules
-rw-r--r--  1 ojae  staff 577506 Feb 23 01:03 package-lock.json
-rw-r--r--  1 ojae  staff  547 Feb 23 01:02 package.json
drwxr-xr-x  3 ojae  staff   96 Feb 23 01:02 test
-rw-r--r--  1 ojae  staff  650 Feb 23 01:02 tsconfig.json
[ demo demo-pipeline ]
```

```
● ● ●
-rw-r--r--  1 ojae  staff   536 Feb 23 01:02 README.md
drwxr-xr-x  3 ojae  staff    96 Feb 23 01:02 bin
-rw-r--r--  1 ojae  staff   838 Feb 23 01:02 cdk.json
-rw-r--r--  1 ojae  staff   157 Feb 23 01:02 jest.config.js
drwxr-xr-x  3 ojae  staff   96 Feb 23 01:02 lib
drwxr-xr-x 363 ojae  staff  11616 Feb 23 01:03 node_modules
-rw-r--r--  1 ojae  staff  577506 Feb 23 01:03 package-lock.json
-rw-r--r--  1 ojae  staff   547 Feb 23 01:02 package.json
drwxr-xr-x  3 ojae  staff   96 Feb 23 01:02 test
-rw-r--r--  1 ojae  staff   650 Feb 23 01:02 tsconfig.json
[ demo demo-pipeline ] git status
On branch master

No commits yet

Changes to be committed:
(use "git rm --cached <file>..." to unstage)
  new file:  .gitignore
  new file:  .npmignore
  new file:  README.md
  new file:  bin/demo-pipeline.ts
  new file:  cdk.json
  new file:  jest.config.js
  new file:  lib/demo-pipeline-stack.ts
  new file:  package.json
  new file:  test/demo-pipeline.test.ts
  new file:  tsconfig.json

Untracked files:
(use "git add <file>..." to include in what will be committed)
  package-lock.json

[ demo demo-pipeline ]
```

```
● ● ●
drwxr-xr-x 363 ojae  staff  11616 Feb 23 01:03 node_modules
-rw-r--r--  1 ojae  staff  577506 Feb 23 01:03 package-lock.json
-rw-r--r--  1 ojae  staff   547 Feb 23 01:02 package.json
drwxr-xr-x  3 ojae  staff   96 Feb 23 01:02 test
-rw-r--r--  1 ojae  staff   650 Feb 23 01:02 tsconfig.json
[ demo demo-pipeline ] git status
On branch master

No commits yet

Changes to be committed:
(use "git rm --cached <file>..." to unstage)
  new file:  .gitignore
  new file:  .npmignore
  new file:  README.md
  new file:  bin/demo-pipeline.ts
  new file:  cdk.json
  new file:  jest.config.js
  new file:  lib/demo-pipeline-stack.ts
  new file:  package.json
  new file:  test/demo-pipeline.test.ts
  new file:  tsconfig.json

Untracked files:
(use "git add <file>..." to include in what will be committed)
  package-lock.json

[ demo demo-pipeline ] git branch -m main
[ demo demo-pipeline ] git remote add origin https://github.com/mrtmmgg/demo-pipeline.git
[ demo demo-pipeline ] git remote -v
origin https://github.com/mrtmmgg/demo-pipeline.git (fetch)
origin https://github.com/mrtmmgg/demo-pipeline.git (push)
[ demo demo-pipeline ]
```

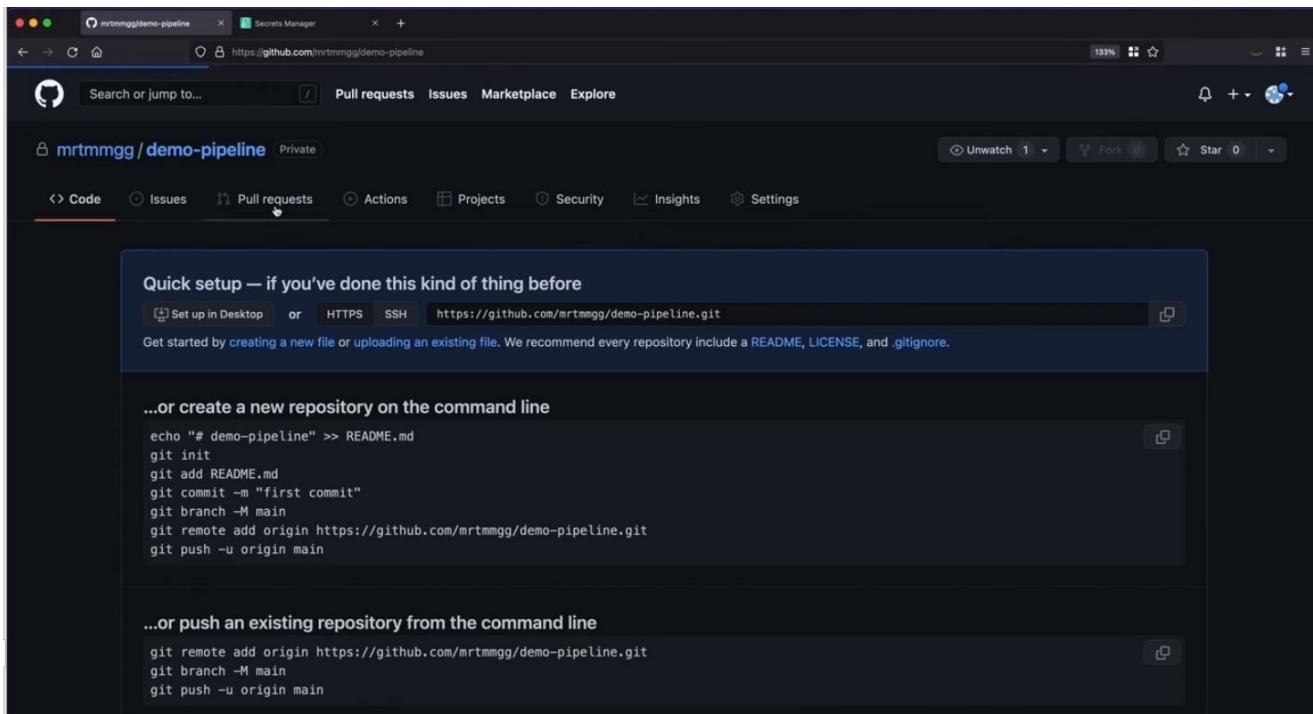
```
[ demo demo-pipeline ] git defender --setup
Setting up /Users/ojae/summit-demo/demo-pipeline
Configure remote repositories allowed for pushing
  Update using the git-config property: defender.allowrepo
Existing remotes:
https://github.com/mrtmmgg/demo-pipeline.git
Should this be used for git defender? (y/N) y
Configure email allowed for commits
Existing email: ojae@amazon.com
Should this be used for git defender? (y/N) y
[ demo demo-pipeline ]
```

```
origin https://github.com/mrtmmgg/demo-pipeline.git (push)
[ demo demo-pipeline ] git defender --setup
Setting up /Users/ojae/summit-demo/demo-pipeline
Configure remote repositories allowed for pushing
  Update using the git-config property: defender.allowrepo
Existing remotes:
https://github.com/mrtmmgg/demo-pipeline.git
Should this be used for git defender? (y/N) y
Configure email allowed for commits
Existing email: ojae@amazon.com
Should this be used for git defender? (y/N) y
[ demo demo-pipeline ] git add .
[ demo demo-pipeline ] git commit -m "initial commit"
The following files have been added, modified, moved, or removed:
*****
A .gitignore
A .npmignore
A README.md
A bin/demo-pipeline.ts
A cdk.json
A jest.config.js
A lib/demo-pipeline-stack.ts
A package-lock.json
A package.json
A test/demo-pipeline.test.ts
A tsconfig.json

*****
Code Defender did not find any AWS credentials, skipping check...
Code Defender did not find any AWS credentials, skipping check...
```

```
create mode 100644 .gitignore
create mode 100644 .npmignore
create mode 100644 README.md
create mode 100644 bin/demo-pipeline.ts
create mode 100644 cdk.json
create mode 100644 jest.config.js
create mode 100644 lib/demo-pipeline-stack.ts
create mode 100644 package-lock.json
create mode 100644 package.json
create mode 100644 test/demo-pipeline.test.ts
create mode 100644 tsconfig.json
[ demo demo-pipeline ] git status
On branch main
nothing to commit, working tree clean
[ demo demo-pipeline ] git push -u origin main
Username for 'https://github.com': mrtmmgg@gmail.com
Password for 'https://mrtmmgg@gmail.com@github.com':
You are pushing to the remote origin at https://github.com/mrtmmgg/demo-pipeline.git
Enumerating objects: 16, done.
Counting objects: 100% (16/16), done.
Delta compression using up to 8 threads
Compressing objects: 100% (14/14), done.
Writing objects: 100% (16/16), 150.28 KiB | 5.37 MiB/s, done.
Total 16 (delta 0), reused 0 (delta 0), pack-reused 0
To https://github.com/mrtmmgg/demo-pipeline.git
 * [new branch]      main -> main
Branch 'main' set up to track remote branch 'main' from 'origin'.
[ demo demo-pipeline ] git status
On branch main
Your branch is up to date with 'origin/main'.

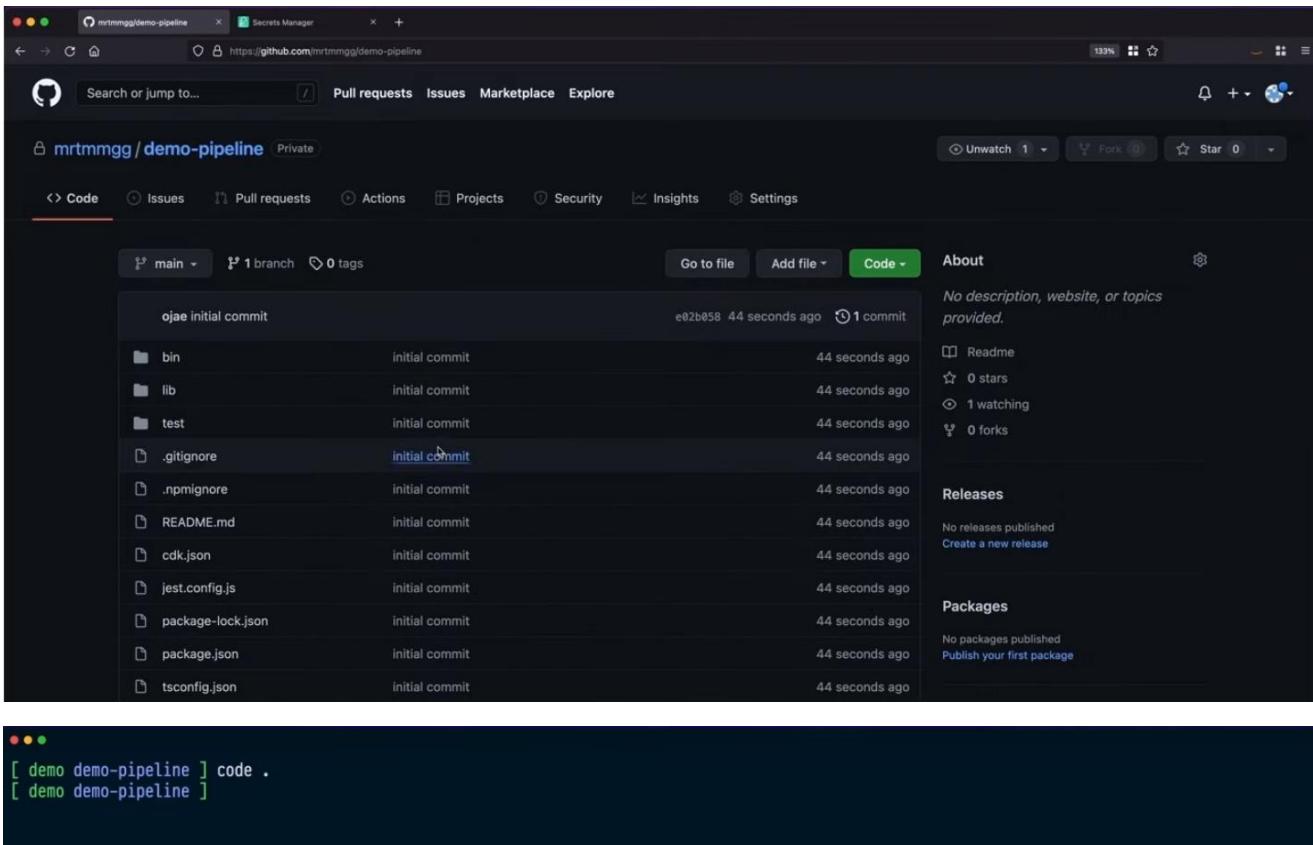
nothing to commit, working tree clean
[ demo demo-pipeline ]
```



The screenshot shows the GitHub repository setup interface for a private repository named "mrtmmgg/demo-pipeline". It includes sections for quick setup via desktop or command line, and instructions for creating a new repository or pushing an existing one.

```
echo "# demo-pipeline" >> README.md
git init
git add README.md
git commit -m "first commit"
git branch -M main
git remote add origin https://github.com/mrtmmgg/demo-pipeline.git
git push -u origin main
```

```
git remote add origin https://github.com/mrtmmgg/demo-pipeline.git
git branch -M main
git push -u origin main
```



The screenshot shows the GitHub repository code view for the "main" branch. It displays a list of files and their initial commit details. The repository has 1 branch and 0 tags.

File	Commit	Time Ago
bin	initial commit	44 seconds ago
lib	initial commit	44 seconds ago
test	initial commit	44 seconds ago
.gitignore	initial commit	44 seconds ago
.npmignore	initial commit	44 seconds ago
README.md	initial commit	44 seconds ago
cdk.json	initial commit	44 seconds ago
jest.config.js	initial commit	44 seconds ago
package-lock.json	initial commit	44 seconds ago
package.json	initial commit	44 seconds ago
tsconfig.json	initial commit	44 seconds ago

Next, we need to define our CDK pipeline using our code editor

```
demo-pipeline-stack.ts // demo-pipeline
lib > demo-pipeline-stack.ts
1 import { Stack, StackProps } from 'aws-cdk-lib';
2 import { Construct } from 'constructs';
3 // Import as SQS from 'aws-cdk-lib/aws-sqs';
4
5 export class DemoPipelineStack extends Stack {
6   constructor(scope: Construct, id: string, props?: StackProps) {
7     super(scope, id, props);
8
9     // The code that defines your stack goes here.
10
11    // Example resource
12    const queue = new SQS.Queue(this, 'DemoPipelineQueue', {
13      visibilityTimeout: cdk.Duration.seconds(300),
14    });
15  }
16}
```

```
demo-pipeline-stack.ts ●
lib > demo-pipeline-stack.ts > DemoPipelineStack > constructor
1 import { Stack, StackProps } from 'aws-cdk-lib';
2 import { Construct } from 'constructs';
3
4 export class DemoPipelineStack extends Stack {
5   constructor(scope: Construct, id: string, props?: StackProps) {
6     super(scope, id, props);
7
8     // Example resource
9     const queue = new SQS.Queue(this, 'DemoPipelineQueue', {
10       visibilityTimeout: cdk.Duration.seconds(300),
11     });
12 }
```

```
demo-pipeline-stack.ts M ✘
lib > demo-pipeline-stack.ts > ...
1 import { Stack, StackProps } from "aws-cdk-lib";
2 import { Construct } from "constructs";
3 import { CodePipeline, CodePipelineSource, ShellStep } from "aws-cdk-lib/pipelines";
4
5 export class DemoPipelineStack extends Stack {
6   constructor(scope: Construct, id: string, props?: StackProps) {
7     super(scope, id, props);
8
9     const pipeline = new CodePipeline(this, "Pipeline", {
10       pipelineName: "DemoPipeline",
11       synth: new ShellStep("Synth", {
12         input: CodePipelineSource.github("mrtmmgg/demo-pipeline", "main"),
13         commands: ["npm ci", "npm run build", "npx cdk synth"],
14       }),
15     });
16   }
17 }
```

```
demo-pipeline.ts -- demo-pipeline
bin > demo-pipeline.ts > ...
1 #!/usr/bin/env node
2 import 'source-map-support/register';
3 import * as cdk from 'aws-cdk-lib';
4 import { DemoPipelineStack } from '../lib/demo-pipeline-stack';
5
6 const app = new cdk.App();
7 new DemoPipelineStack(app, 'DemoPipelineStack', {
8   /* If you don't specify 'env', this stack will be environment-agnostic.
9    * Account/Region-dependent features and context lookups will not work,
10   * but a single synthesized template can be deployed anywhere. */
11
12   /* Uncomment the next line to specialize this stack for the AWS Account
13    * and Region that are implied by the current CLI configuration. */
14   // env: { account: process.env.CDK_DEFAULT_ACCOUNT, region: process.env.CDK_DEFAULT_REGION },
15
16   /* Uncomment the next line if you know exactly what Account and Region you
17    * want to deploy the stack to. */
18   // env: { account: '123456789012', region: 'us-east-1' },
19
20   /* For more information, see https://docs.aws.amazon.com/cdk/latest/guide/environments.html */
21});
```

Next, we need to specify the tooling environment where the pipeline should be created

```
bin > demo-pipeline.ts > ...
1  #!/usr/bin/env node;
2  import "source-map-support/register";
3  import * as cdk from "aws-cdk-lib";
4  import { DemoPipelineStack } from "../lib/demo-pipeline-stack";
5
6  const app = new cdk.App();
7  new DemoPipelineStack(app, "DemoPipelineStack", {
8      /* If you don't specify 'env', this stack will be environment-agnostic.
9      * Account/Region-dependent features and context lookups will not work,
10     * but a single synthesized template can be deployed anywhere. */
11    /* Uncomment the next line to specialize this stack for the AWS Account
12     * and Region that are implied by the current CLI configuration. */
13    // env: { account: process.env.CDK_DEFAULT_ACCOUNT, region: process.env.CDK_DEFAULT_REGION },
14
15    /* Uncomment the next line if you know exactly what Account and Region you
16     * want to deploy the stack to. */
17    // env: { account: '123456789012', region: 'us-east-1' },
18    env: { account: '2586', region: "ap-southeast-1" },
19
20    /* For more information, see https://docs.aws.amazon.com/cdk/latest/guide/environments.html */
21  });
22});
```

```
lib > demo-pipeline-stack.ts > ...
1  import { Stack, StackProps } from "aws-cdk-lib";
2  import { Construct } from "constructs";
3  import { CodePipeline, CodePipelineSource, ShellStep } from "aws-cdk-lib/pipelines";
4
5  export class DemoPipelineStack extends Stack {
6      constructor(scope: Construct, id: string, props?: StackProps) {
7          super(scope, id, props);
8
9          const pipeline = new CodePipeline(this, "Pipeline", {
10              pipelineName: "DemoPipeline",
11              synth: new ShellStep("Synth", {
12                  input: CodePipelineSource.gitHub("mrtmmgg/demo-pipeline", "main"),
13                  commands: ["npm ci", "npm run build", "npx cdk synth"],
14              }),
15          });
16      }
17  }
```

Now push changes to GitHub

```
[ demo demo-pipeline ] code .
[ demo demo-pipeline ] git status
On branch main
Your branch is up to date with 'origin/main'.

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
    modified:   bin/demo-pipeline.ts
    modified:   lib/demo-pipeline-stack.ts

no changes added to commit (use "git add" and/or "git commit -a")
[ demo demo-pipeline ] git add .
[ demo demo-pipeline ] vi .gitallowed
[ demo demo-pipeline ] git add .
[ demo demo-pipeline ] git commit -m "define initial pipeline"
The following files have been added, modified, moved, or removed:
*****
A      .gitallowed
M      bin/demo-pipeline.ts
M      lib/demo-pipeline-stack.ts

*****
Code Defender did not find any AWS credentials, skipping check...
Code Defender did not find any AWS credentials, skipping check...
[main bb52b93] define initial pipeline
  3 files changed, 24 insertions(+), 21 deletions(-)
  create mode 100644 .gitallowed
  rewrite lib/demo-pipeline-stack.ts (69%)
[ demo demo-pipeline ] git push
```

```
[ demo demo-pipeline ] git push
You are pushing to the remote origin at https://github.com/mrtmmgg/demo-pipeline.git
Enumerating objects: 12, done.
Counting objects: 12, done.
Delta compression using up to 8 threads
Compressing objects: 100% (5/5), done.
Writing objects: 100% (7/7), 931 bytes | 931.00 KiB/s, done.
Total 7 (delta 2), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (2/2), completed with 2 local objects.
To https://github.com/mrtmmgg/demo-pipeline.git
  e02b058..bb52b93  main -> main
[ demo demo-pipeline ] cdk deploy --profile tooling
+ Synthesis time: 10.98s

This deployment will make potentially sensitive changes according to your current security approval level (--require-approval broadening).
Please confirm you intend to make the following modifications:

IAM Statement Changes
```

Then we deploy using CDK

-southeast-1: [REDACTED] 2586:log		logs:CreateLogStream logs:PutLogEvents	/Synth/CdkBuildProject/Role}	
+ arn:\${AWS::Partition}:logs:ap-southeast-1: [REDACTED] 2586:log	Allow	logs:CreateLogGroup logs:CreateLogStream logs:PutLogEvents	AWS:\${Pipeline/UpdatePipeline/SelfMutation/Role}	
+ arn:\${AWS::Partition}:logs:ap-southeast-1: [REDACTED] 2586:log	Allow	sts:AssumeRole	AWS:\${Pipeline/UpdatePipeline/SelfMutation/Role}	"ForAnyValue:StringEquals": { "iam:ResourceTag/aws-cdk:bootstrap-role": [ "image-publishing", "file-publishing", "deploy" ] }

				"image-publishing", "file-publishing", "deploy" ]
--	--	--	--	--

(NOTE: There may be security-related changes not in this list. See <https://github.com/aws/aws-cdk/issues/1299>)

```
Do you wish to deploy these changes (y/n)? y
DemoPipelineStack: deploying...
[0%] start: Publishing 48
[100%] success: Published 48
2586-ap-southeast-1
2586-ap-southeast-1
DemoPipelineStack: creating CloudFormation changeset...
```

```
✓ DemoPipelineStack
+ Deployment time: 113.56s

Stack ARN:
arn:aws:cloudformation:ap-southeast-1: 2586:stack/DemoPipelineStack/bc8ef160-9403-11ec-bc53-020292bd8458

+ Total time: 124.54s
[ demo demo-pipeline ]
```

The screenshot shows the AWS Secrets Manager search results for the term 'cloudformation'. The left sidebar has a 'Secrets' section with a 'CloudFormation' link. The main search results page displays a card for 'CloudFormation' with a star icon, followed by a list of 'Top features' including StackSets, Resource import, Stacks, Exports, and Designer.

The screenshot shows the AWS CloudFormation Stacks list. The left sidebar has a 'CloudFormation' section with a 'Stacks' link. The main page shows a table titled 'Stacks (3)' with columns for Stack name, Status, Created time, and Description. The table lists three stacks: 'DemoPipelineStack' (Status: CREATE\_COMPLETE, Created: 2022-02-23), 'CDKToolkit' (Status: CREATE\_COMPLETE, Created: 2022-02-22), and 'PVRE' (Status: CREATE\_COMPLETE, Created: 2021-04-23). A note next to 'CDKToolkit' states: 'This stack includes resources needed to deploy AWS CDK apps into this environment'.

The screenshot shows the AWS CloudFormation search results for the term 'codepipeline'. The left sidebar has a 'CloudFormation' section with a 'Stacks' link. The main search results page displays a card for 'CodePipeline' with a star icon, followed by a list of 'Services' including Blogs, Documentation, Knowledge Articles, and Tutorials.

The screenshot shows the AWS CodePipeline Pipelines list. The left sidebar has a 'CodePipeline' section with a 'Pipelines' link. The main page shows a table titled 'Pipelines' with columns for Name, Most recent execution, Latest source revisions, and Last executed. It lists one pipeline named 'DemoPipeline' which is currently 'In progress'.

Screenshot of the AWS CodePipeline console showing the initial state of the "DemoPipeline".

The pipeline consists of three stages:

- Source**: GitHub (Version 1) - Succeeded (Pipeline execution ID: d170d5b6-d566-4e6c-a5e6-85b81fbfeaf6). Status: Succeeded - Just now (bb52b933).
- Build**: Synth (AWS CodeBuild) - In progress (Pipeline execution ID: d170d5b6-d566-4e6c-a5e6-85b81fbfeaf6). Status: In progress - Just now.
- Deploy**: mrtmmgg\_demo-pipeline: define initial pipeline (AWS Lambda) - Not Started.

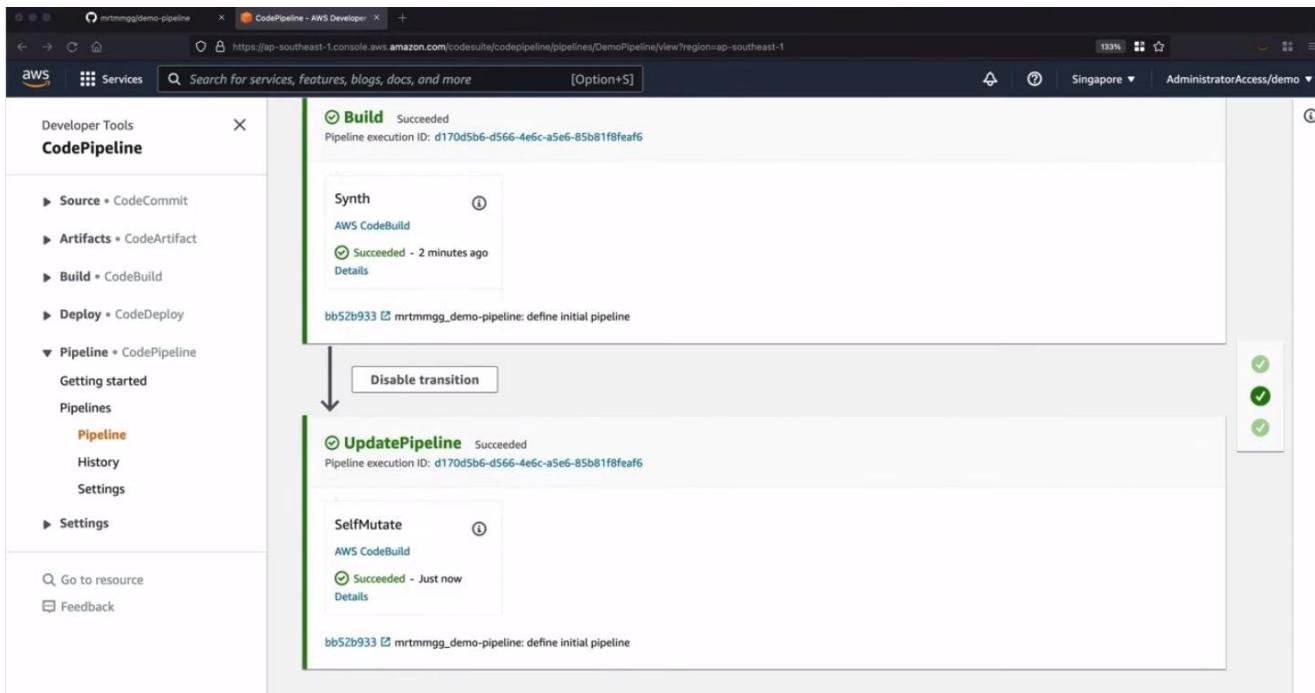
Buttons at the top right include: Notify, Edit, Stop execution, Clone pipeline, and Release change.

Screenshot of the AWS CodePipeline console showing the state of the pipeline after the "Build" stage has completed.

The pipeline stages are:

- Source**: GitHub (Version 1) - Succeeded (Pipeline execution ID: d170d5b6-d566-4e6c-a5e6-85b81fbfeaf6). Status: Succeeded - Just now (bb52b933).
- Build**: Synth (AWS CodeBuild) - In progress (Pipeline execution ID: d170d5b6-d566-4e6c-a5e6-85b81fbfeaf6). Status: In progress - Just now.
- Deploy**: mrtmmgg\_demo-pipeline: define initial pipeline (AWS Lambda) - Didn't Run. Status: Didn't Run. No executions yet.

Buttons at the top right include: Disable transition, Notify, Edit, Stop execution, Clone pipeline, and Release change.



The empty pipeline has been successfully defined. Next, let's check the CDK application and deploy the application to our first target **dev** environment. The CDK app has Lambda functions with an API Gateway.

[ demo demo-pipeline ] code .

demo-pipeline

```

[ demo demo-pipeline ] lib
[ demo demo-pipeline ] lib
  lib
    demo-pipeline-stack.ts
  node_modules
  test
  .gitallowed

```

demo-lambda-stack.ts - demo-pipeline

```

lib > demo-lambda-stack.ts ...
1 import { Stack, StackProps } from "aws-cdk-lib";
2 import { Construct } from "constructs";
3 import { Function, Code, Runtime } from "aws-cdk-lib/aws-lambda";
4 import { LambdaRestApi } from "aws-cdk-lib/aws-apigateway";
5
6 export class DemoLambdaStack extends Stack {
7   constructor(scope: Construct, id: string, props?: StackProps) {
8     super(scope, id, props);
9
10    const index = new Function(this, "LambdaFunction", {
11      runtime: Runtime.NODEJS_14_X,
12      code: Code.fromAsset("lambda"),
13      handler: "index.handler",
14      environment: {
15        accid: Stack.of(this).account,
16        region: Stack.of(this).region,
17      },
18    });
19
20    const api = new LambdaRestApi(this, "DemoApiGWEndpoint", {
21      handler: index,
22    });
23  }
24}

```

index.js — demo-pipeline

```
lambda > index.js > ...
1 exports.handler = async function (event) {
2   console.log("request:", JSON.stringify(event, undefined, 2));
3
4   json_data = {
5     account: `${process.env.acctid.replace(/\d{4}/g, "*")}`,
6     region: `${process.env.region}`
7   };
8
9   return {
10     statusCode: 200,
11     headers: {
12       "Content-Type": "application/json",
13     },
14     body: JSON.stringify(json_data),
15   };
16 }
17 }
```

gitignore — demo-pipeline

```
*.js
!jest.config.js
!lambda/*.js
*.d.ts
node_modules
# CDK asset staging directory
.cdk.staging
.cdk.out
```

demo-app-stage.ts — demo-pipeline

```
lib > demo-app-stage.ts > ...
1 import { Stage, StageProps } from "aws-cdk-lib";
2 import { Construct } from "constructs";
3 import { DemoLambdaStack } from "./demo-lambda-stack";
4
5 export class DemoPipelineAppStage extends Stage {
6   constructor(scope: Construct, id: string, props?: StageProps) {
7     super(scope, id, props);
8
9     const LambdaStack = new DemoLambdaStack(this, "LambdaStack");
10   }
11 }
```

demo-pipeline-stack.ts — demo-pipeline

```
lib > demo-pipeline-stack.ts > ...
1 import { Stack, StackProps } from "aws-cdk-lib";
2 import { Construct } from "constructs";
3 import { CodePipeline, CodePipelineSource, ShellStep } from "aws-cdk-lib/pipelines";
4 import { DemoLambdaStack } from "./demo-lambda-stack";
5
6 export class DemoPipelineAppStage extends Stage {
7   constructor(scope: CfnDetectorModelProps, id: string, props?: StackSetDeploymentModelBindRequirements) {
8     super(scope, id, props);
9     const pipeline = new StackSetDeploymentModelBindRequirements();
10    pipeline.setAwsLogDriverMode(AwsLogDriverMode.constants.MAIN);
11    pipeline.setSynth(SSL_OP_NETSCAPE_DEMO_CIPHER_CHANGE_BUG);
12    pipeline.setInputMethodDeploymentOptions(MethodDeploymentOptions.constants.MAIN);
13    pipeline.setDeploymentController(DeploymentController.constants.MAIN);
14    pipeline.setDeploymentSourceContext(DeploymentSourceContext.constants.MAIN);
15    pipeline.setDockerImageOptions(DockerImageOptions.constants.MAIN);
16  }
17 }
18 }
```

```

lib > demo-pipeline-stack.ts - demo-pipeline
1 import { Stack, StackProps } from "aws-cdk-lib";
2 import { Construct } from "constructs";
3 import { CodePipeline, CodePipelineSource, ShellStep } from "aws-cdk-lib/pipelines";
4 import { DemoPipelineAppStage } from "./demo-app-stage";
5
6 export class DemoPipelineStack extends Stack {
7   constructor(scope: Construct, id: string, props?: StackProps) {
8     super(scope, id, props);
9
10    const pipeline = new CodePipeline(this, "Pipeline", {
11      pipelineName: "DemoPipeline",
12      crossAccountKeys: true, // multi-account deployment
13      synth: new ShellStep("Synth", {
14        input: CodePipelineSource.github("mrtmmgg/demo-pipeline", "main"),
15        commands: ["npm ci", "npm run build", "npx cdk synth"],+
16      }),
17    });
18
19    pipeline.addStage(
20      new DemoPipelineAppStage(this, "DEV", {
21        env: { account: "2608", region: "ap-southeast-1" },
22      })
23    );
24  }
25}

```

```

lib > demo-lambda-stack.ts - demo-pipeline
1 import { Stack, StackProps } from "aws-cdk-lib";
2 import { Construct } from "constructs";
3 import { Function, Code, Runtime } from "aws-cdk-lib/aws-lambda";
4 import { LambdaRestApi } from "aws-cdk-lib/aws-apigateway";
5
6 export class DemolambdaStack extends Stack {
7   constructor(scope: Construct, id: string, props?: StackProps) {
8     super(scope, id, props);
9
10    const index = new Function(this, "LambdaFunction", {
11      runtime: Runtime.NODEJS_14_X,
12      code: Code.fromAsset("lambda"),
13      handler: "index.handler",
14      environment: {
15        accid: Stack.of(this).account,
16        region: Stack.of(this).region,
17      },
18    });
19
20    const api = new LambdaRestApi(this, "DemoApiGwEndpoint", {
21      handler: index,
22    });
23  }
24}

```

```

[ demo demo-pipeline ] code .
[ demo demo-pipeline ] git status
On branch main
Your branch is up to date with 'origin/main'.

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
    modified:  .gitignore
    modified:  lib/demo-pipeline-stack.ts

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    lambda/
    lib/demo-app-stage.ts
    lib/demo-lambda-stack.ts

no changes added to commit (use "git add" and/or "git commit -a")
[ demo demo-pipeline ] git add .
[ demo demo-pipeline ] git commit -m "added lambda function and DEV deployment"
The following files have been added, modified, moved, or removed:
*****
M      .gitignore
A      lambda/index.js
A      lib/demo-app-stage.ts
A      lib/demo-lambda-stack.ts
M      lib/demo-pipeline-stack.ts

*****
Code Defender did not find any AWS credentials, skipping check...

```

```

Code Defender did not find any AWS credentials, skipping check...
Code Defender did not find any AWS credentials, skipping check...
[main 39f4069] added lambda function and DEV deployment
 5 files changed, 60 insertions(+)
 create mode 100644 lambda/index.js
 create mode 100644 lib/demo-app-stage.ts
 create mode 100644 lib/demo-lambda-stack.ts
[ demo demo-pipeline ] git push
You are pushing to the remote origin at https://github.com/mrtmmgg/demo-pipeline.git
Enumerating objects: 13, done.
Counting objects: 100% (13/13), done.
Delta compression using up to 8 threads
Compressing objects: 100% (8/8), done.
Writing objects: 100% (9/9), 1.58 KiB | 810.00 KiB/s, done.
Total 9 (delta 3), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (3/3), completed with 3 local objects.
To https://github.com/mrtmmgg/demo-pipeline.git
 bb52b93..39f4069 main -> main
[ demo demo-pipeline ]

```

Developer Tools > CodePipeline > Pipelines

Name	Most recent execution	Latest source revisions	Last executed
DemoPipeline	In progress	mrtmmgg_demo-pipeline - 39f40693 added lambda function and DEV deployment	Just now

Developer Tools > CodePipeline > Pipelines > DemoPipeline

**DemoPipeline**

Source Succeeded Pipeline execution ID: 787171b2-61e7-48eb-9b78-99b0328beb63

mrtmmgg\_demo-pipeline GitHub (Version 1)  
Succeeded - Just now 39f40693

39f40693 mrtmmgg\_demo-pipeline: added lambda function and DEV deployment

Disable transition

Build In progress Pipeline execution ID: 787171b2-61e7-48eb-9b78-99b0328beb63

Synth AWS CodeBuild

Screenshot of the AWS CodePipeline console showing a pipeline named "mrtmmgg\_demo-pipeline". The pipeline consists of three stages: "Build", "UpdatePipeline", and "SelfMutate".

- Build Stage:** In progress. Pipeline execution ID: 787171b2-61e7-48eb-9b78-99b0328beb63. Task: Synth (AWS CodeBuild). Status: In progress - Just now.
- UpdatePipeline Stage:** Succeeded. Pipeline execution ID: d170d5b6-d566-4e6c-a5e6-85b81f8feaf6. Task: SelfMutate (AWS CodeBuild). Status: Succeeded - 1 day ago.
- SelfMutate Stage:** Succeeded. Pipeline execution ID: 39f40693. Task: SelfMutate (AWS CodeBuild). Status: Succeeded - 1 day ago.

On the right side, there is a vertical toolbar with three green checkmark icons.

Screenshot of the AWS CodePipeline console showing a pipeline named "mrtmmgg\_demo-pipeline". The pipeline consists of three stages: "DEV", "Prepare", and "Deploy".

- DEV Stage:** Succeeded. Pipeline execution ID: 4544f6b1-889c-4312-a3de-a9a4a06aad0. Task: DEV (AWS CloudFormation). Status: Succeeded - 1 minute ago.
- Prepare Stage:** Succeeded. Pipeline execution ID: 39f40693. Task: Prepare (AWS CloudFormation). Status: Succeeded - 1 minute ago.
- Deploy Stage:** Succeeded. Pipeline execution ID: 39f40693. Task: Deploy (AWS CloudFormation). Status: Succeeded - Just now.

On the right side, there is a vertical toolbar with six green checkmark icons.

Screenshot of the AWS Management Console search results for "cloudformation".

- CloudFormation:** Create and Manage Resources with Templates. Top features: StackSets, Resource Import, Stacks, Exports, Designer.

The search bar shows "Search results for 'cloudformation'".

Screenshot of the AWS CloudFormation console showing the Stacks page. The sidebar shows 'Stacks' selected. The main area displays a table of stacks:

Stack name	Status	Created time	Description
DEV-LambdaStack	CREATE_COMPLETE	2022-02-24 19:23:15 UTC+0800	-
CDKToolkit	CREATE_COMPLETE	2022-02-22 23:58:22 UTC+0800	This stack includes resources needed to deploy AWS CDK apps into this environment
PVRE	CREATE_COMPLETE	2021-04-20 15:42:04 UTC+0800	-

Screenshot of the AWS CloudFormation console showing the details for the DEV-LambdaStack. The sidebar shows 'Stack details' selected. The main area shows the Overview tab of the DEV-LambdaStack:

Stack ID	Description
arn:aws:cloudformation:ap-southeast-1:897133272608:stack/DEV-LambdaStack/28b65930-9564-11ec-b4ce-0a03a2731132	-
Status	Status reason
CREATE_COMPLETE	-
Root stack	Parent stack
-	-
Created time	Deleted time
2022-02-24 19:23:15 UTC+0800	-
Updated time	Last drift check time
2022-02-24 19:23:50 UTC+0800	-
Drift status	NOT_CHECKED

Screenshot of the AWS CloudFormation console showing the Outputs tab for the DEV-LambdaStack. The sidebar shows 'Stack details' selected. The main area shows the Outputs tab of the DEV-LambdaStack:

Key	Value	Description	Export name
DemoApiGwEndpoint62E35432	https://677t7ffjqb.execute-api.ap-southeast-1.amazonaws.com/prod/	-	-

```
account: "*****2608"
region: "ap-southeast-1"
```

We can see that the CDK app is now running in the DEV environment. Next, let's add a new environment to the pipeline

```
[ demo demo-pipeline ] export CDK_NEW_BOOTSTRAP=1
[ demo demo-pipeline ] npx cdk bootstrap --cloudformation-execution-policies arn:aws:iam::aws:policy/AdministratorAccess \
--trust 2586 aws:// 6633/ap-southeast-1

Bootstrapping environment aws:// 6633/ap-southeast-1...
Trusted accounts for deployment: 2586
Trusted accounts for lookup: (none)
Execution policies: arn:aws:iam::aws:policy/AdministratorAccess
CDKToolkit: creating CloudFormation changeset...
```

✓ Environment aws:// 6633/ap-southeast-1 bootstrapped.

```
lib > demo-lambda-stack.ts ...
1 import { Stack, StackProps } from "aws-cdk-lib";
2 import { Construct } from "constructs";
3 import { Function, Code, Runtime } from "aws-cdk-lib/aws-lambda";
4 import { LambdaRestApi } from "aws-cdk-lib/aws-apigateway";
5
6 export class DemoLambdaStack extends Stack {
7   constructor(scope: Construct, id: string, props?: StackProps) {
8     super(scope, id, props);
9
10    const index = new Function(this, "LambdaFunction", {
11      runtime: Runtime.NODEJS_14_X,
12      code: Code.fromAsset("Lambda"),
13      handler: "index.handler",
14      environment: {
15        Account: Stack.of(this).account,
16        Region: Stack.of(this).region,
17      },
18    });
19
20    const api = new LambdaRestApi(this, "DemoApiGwEndpoint", {
21      handler: index,
22    });
23  }
24}
```

```
import { Stack, StackProps } from "aws-cdk-lib";
import { Construct } from "constructs";
import { CodePipeline, CodePipelineSource, ShellStep } from "aws-cdk-lib/pipelines";
import { DemoPipelineAppStage } from "./demo-app-stage";

export class DemoPipelineStack extends Stack {
  constructor(scope: Construct, id: string, props?: StackProps) {
    super(scope, id, props);

    const pipeline = new CodePipeline(this, "Pipeline", {
      pipelineName: "DemoPipeline",
      crossAccountKeys: true, // multi-account deployment
      synth: new ShellStep("Synth", {
        input: CodePipelineSource.github("mrtmmgg/demo-pipeline", "main"),
        commands: ["npm ci", "npm run build", "npx cdk synth"],
      }),
    });

    pipeline.addStage(
      new DemoPipelineAppStage(this, "DEV", {
        env: { account: "2608", region: "ap-southeast-1" },
      })
    );
  }
}
```

We need to add a new code block for the new STG environment to the CDK deployment pipeline

```
import { Stack, StackProps } from "aws-cdk-lib";
import { Construct } from "constructs";
import { CodePipeline, CodePipelineSource, ShellStep } from "aws-cdk-lib/pipelines";
import { DemoPipelineAppStage } from "./demo-app-stage";

export class DemoPipelineStack extends Stack {
  constructor(scope: Construct, id: string, props?: StackProps) {
    super(scope, id, props);

    const pipeline = new CodePipeline(this, "Pipeline", {
      pipelineName: "DemoPipeline",
      crossAccountKeys: true, // multi-account deployment
      synth: new ShellStep("Synth", {
        input: CodePipelineSource.github("mrtmmgg/demo-pipeline", "main"),
        commands: ["npm ci", "npm run build", "npx cdk synth"],
      }),
    });

    pipeline.addStage(
      new DemoPipelineAppStage(this, "DEV", {
        env: { account: "2608", region: "ap-southeast-1" },
      })
    );

    pipeline.addStage(
      new DemoPipelineAppStage(this, "STG", {
        env: { account: "6633", region: "ap-southeast-1" },
      })
    );
  }
}
```

```
import { Stack, StackProps } from "aws-cdk-lib";
import { Construct } from "constructs";
import { Function, Code, Runtime } from "aws-cdk-lib/aws-lambda";
import { LambdaRestApi } from "aws-cdk-lib/aws-apigateway";

export class DemoLambdaStack extends Stack {
  constructor(scope: Construct, id: string, props?: StackProps) {
    super(scope, id, props);

    const index = new Function(this, "LambdaFunction", {
      runtime: Runtime.NODEJS_14_X,
      code: Code.fromAsset("Lambda"),
      handler: "index.handler",
      environment: {
        acctid: Stack.of(this).account,
        region: Stack.of(this).region,
      },
    });

    const api = new LambdaRestApi(this, "DemoApiGwEndpoint", {
      handler: index,
    });
  }
}
```

```

[ demo demo-pipeline ] git status
On branch main
Your branch is up to date with 'origin/main'.

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
    modified:   lib/demo-pipeline-stack.ts

no changes added to commit (use "git add" and/or "git commit -a")
[ demo demo-pipeline ] git add .
[ demo demo-pipeline ] git commit -m "adding STG deployment"
The following files have been added, modified, moved, or removed:
*****
M     lib/demo-pipeline-stack.ts

*****
Code Defender did not find any AWS credentials, skipping check...
Code Defender did not find any AWS credentials, skipping check...
[main 50ccbbf] adding STG deployment
  1 file changed, 6 insertions(+)
[ demo demo-pipeline ] git push
You are pushing to the remote origin at https://github.com/mrtmmgg/demo-pipeline.git

```

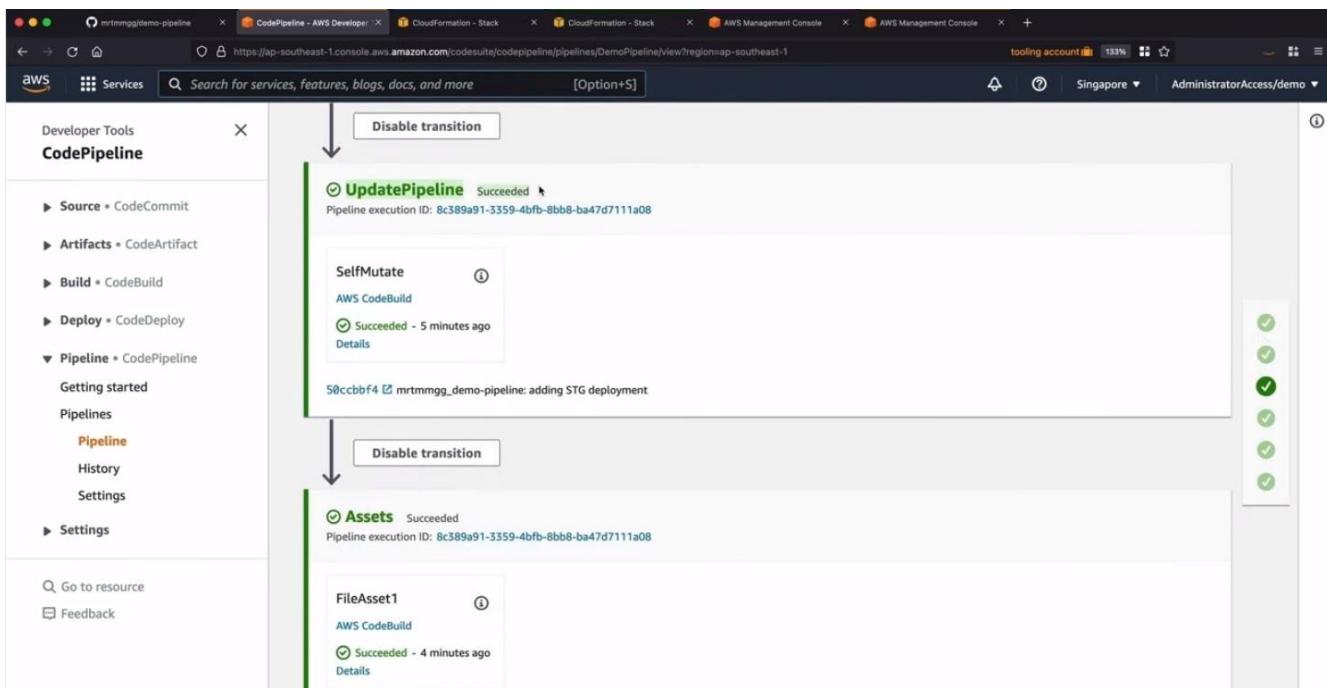
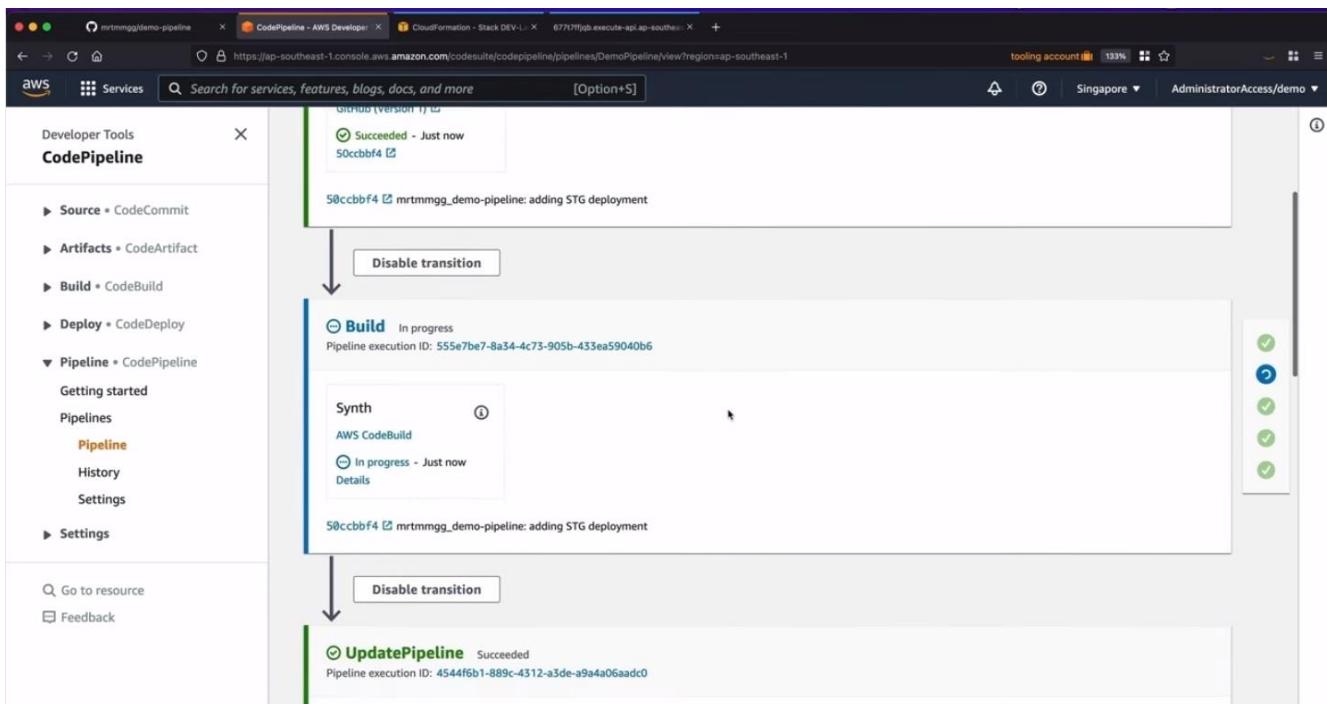
```

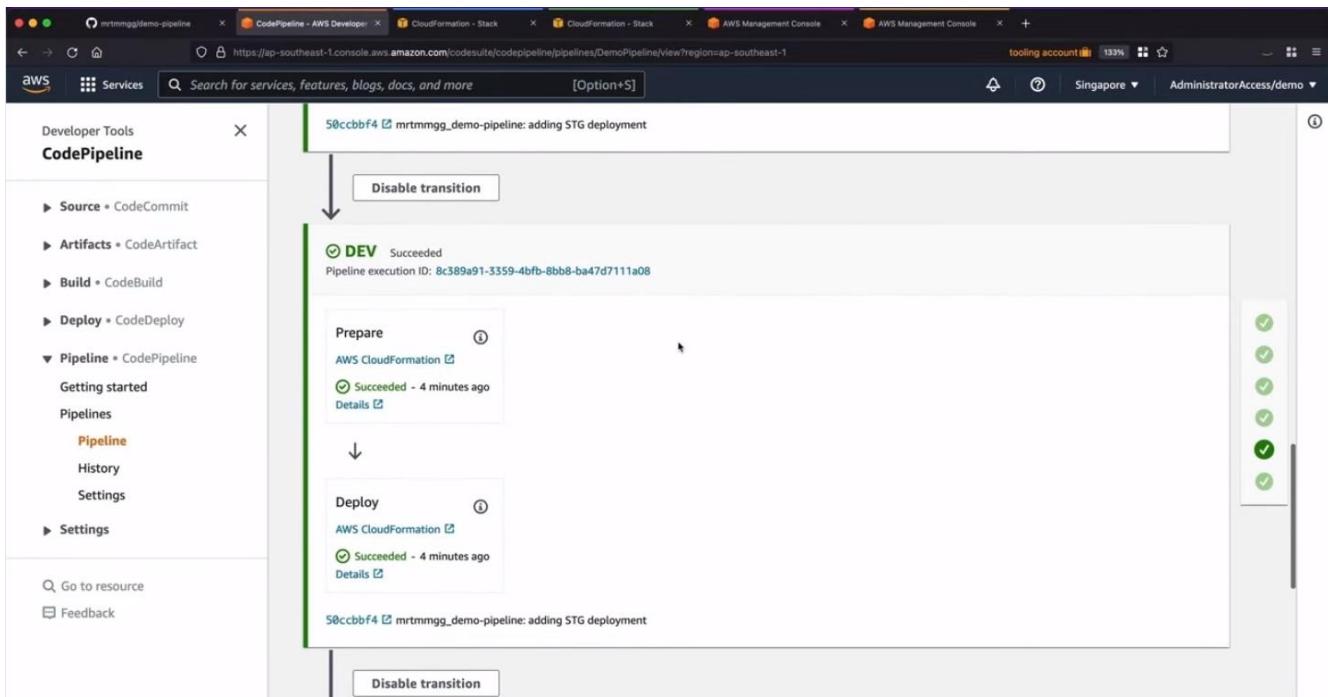
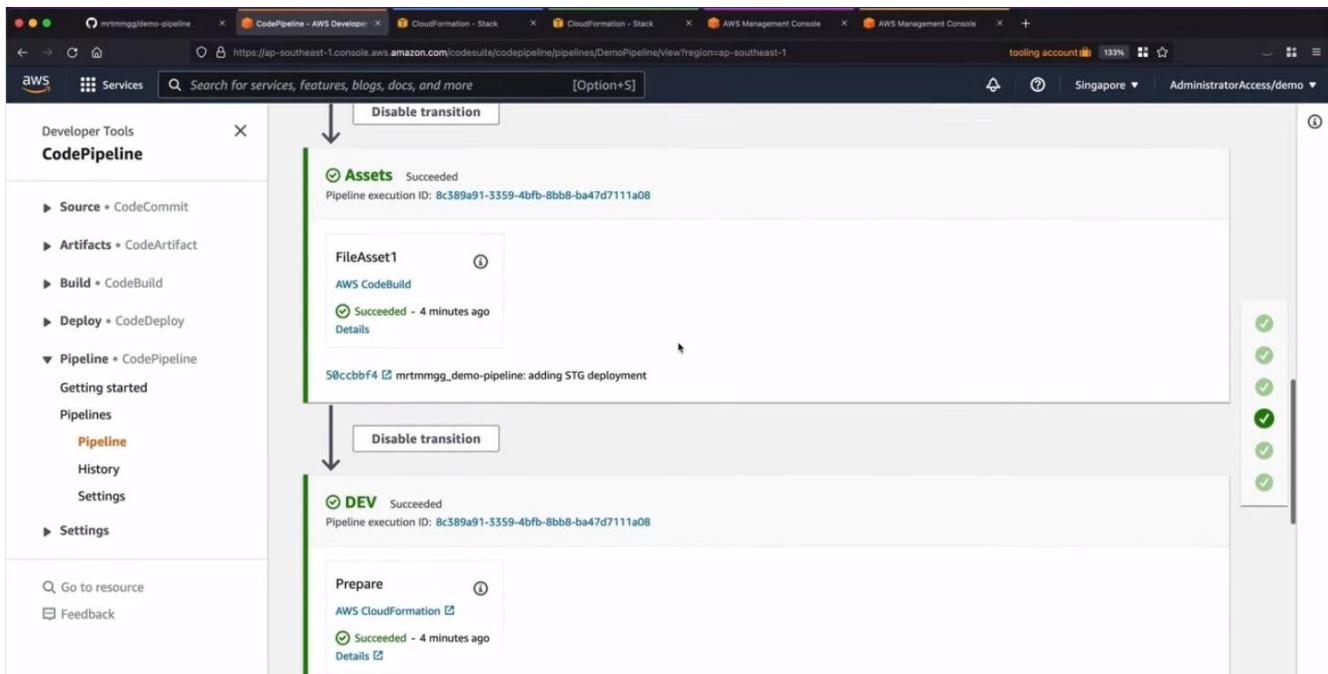
+ write changes, 0 insertions(+)
[ demo demo-pipeline ] git push
You are pushing to the remote origin at https://github.com/mrtmmgg/demo-pipeline.git
Enumerating objects: 7, done.
Counting objects: 100% (7/7), done.
Delta compression using up to 8 threads
Compressing objects: 100% (4/4), done.
Writing objects: 100% (4/4), 397 bytes | 397.00 KiB/s, done.
Total 4 (delta 3), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (3/3), completed with 3 local objects.
To https://github.com/mrtmmgg/demo-pipeline.git
  39f4069..50ccbbf  main -> main
[ demo demo-pipeline ]

```

The screenshot shows the AWS CloudFormation console with the following details:

- Pipeline Status:** Success (green checkmark)
- Execution ID:** 555e7be7-8a34-4c73-905b-433ea59040b6
- Step Details:**
  - Source:** GitHub (Version 1) - Succeeded (Just now)
  - Build:** In progress (AWS CodeBuild) - Pipeline execution ID: 555e7be7-8a34-4c73-905b-433ea59040b6
- Actions:** Notify, Edit, Stop execution, Clone pipeline, Release change.





Screenshot of the AWS CodePipeline console showing a pipeline named "mrtmmgg\_demo-pipeline". The pipeline has three stages: Source, Build, and Deploy. The Deploy stage is currently active and shows a successful execution of an AWS CloudFormation stack named "STG". The pipeline status is "Succeeded".

The pipeline details are as follows:

- Source**: CodeCommit
- Build**: CodeBuild
- Deploy**: CodeDeploy

**Pipeline**: Pipeline

**History**: History

**Settings**: Settings

**Details**: 50ccbfb4 mrtmmgg\_demo-pipeline: adding STG deployment

**Disable transition**

**STG** Succeeded  
Pipeline execution ID: 8c389a91-3359-4fb8-8bb8-ba47d7111a08

**Prepare**: AWS CloudFormation Succeeded - 3 minutes ago

**Deploy**: AWS CloudFormation Succeeded - Just now

50ccbfb4 mrtmmgg\_demo-pipeline: adding STG deployment

Screenshot of the AWS CloudFormation console showing the "Stacks" page. There are two stacks listed:

- STG-LambdaStack**: Status: CREATE\_COMPLETE, Created time: 2022-02-24 19:48:25 UTC+0800
- CDKToolkit**: Status: CREATE\_COMPLETE, Created time: 2022-02-24 19:34:36 UTC+0800. Description: This stack includes resources needed to deploy AWS CDK apps into this environment.

**CloudFormation**

**Stacks**: StackSets, Exports

**Designer**

**Registry**: Public extensions, Activated extensions, Publisher

**CloudFormation** > Stacks

**Stacks (2)**

Filter by stack name

View nested Active

Stack name	Status	Created time	Description
STG-LambdaStack	CREATE_COMPLETE	2022-02-24 19:48:25 UTC+0800	-
CDKToolkit	CREATE_COMPLETE	2022-02-24 19:34:36 UTC+0800	This stack includes resources needed to deploy AWS CDK apps into this environment

Screenshot of the AWS CloudFormation console showing the "STG-LambdaStack" stack details page. The stack was created successfully on 2022-02-24 19:48:25 UTC+0800.

**CloudFormation**

**Stacks**: Stack details, Drifts, StackSets, Exports

**Designer**

**Registry**: Public extensions, Activated extensions, Publisher

**Feedback**

**CloudFormation** > Stacks > STG-LambdaStack

**STG-LambdaStack**

Stack ID: arn:aws:cloudformation:ap-southeast-1:799596786633:stack/STG-LambdaStack/ac665340-9567-11ec-b4b1-061faf40705e

Status: CREATE\_COMPLETE

Root stack: -

Created time: 2022-02-24 19:48:25 UTC+0800

Updated time: 2022-02-24 19:49:00 UTC+0800

Drift status: NOT\_CHECKED

Description: -

Status reason: -

Parent stack: -

Deleted time: -

Last drift check time: -

**CloudFormation**

**CloudFormation > Stacks > STG-LambdaStack**

**STG-LambdaStack**

**Outputs (1)**

Key	Value	Description	Export name
DemoApiGwEndpoint62E35432	<a href="https://soz9h5m9ei.execute-api.ap-southeast-1.amazonaws.com/prod/">https://soz9h5m9ei.execute-api.ap-southeast-1.amazonaws.com/prod/</a>	-	-

```

account: "*****633"
region: "ap-southeast-1"
  
```

We can see that the application is also deployed and working properly within the STG environment

**CloudFormation**

**CloudFormation > Stacks**

**Stacks (3)**

Stack name	Status	Created time	Description
DEV-LambdaStack	CREATE_COMPLETE	2022-02-24 19:23:15 UTC+0800	-
CDKToolkit	CREATE_COMPLETE	2022-02-22 23:58:22 UTC+0800	This stack includes resources needed to deploy AWS CDK apps into this environment
PVRE	CREATE_COMPLETE	2021-04-20 15:42:04 UTC+0800	-

**CloudFormation**

**Stacks**

- Stack details
- Drifts
- StackSets
- Exports

**Designer**

**Registry**

- Public extensions
- Activated extensions
- Publisher

**Feedback**

**CloudFormation > Stacks > DEV-LambdaStack**

### DEV-LambdaStack

Stack info Events Resources Outputs Parameters Template Change sets

**Overview**

Stack ID	Description
arn:aws:cloudformation:ap-southeast-1:897133272608:stack/DEV-LambdaStack/28b65930-9564-11ec-b4ce-0a03a2731132	-
Status	Status reason
CREATE_COMPLETE	-
Root stack	Parent stack
-	-
Created time	Deleted time
2022-02-24 19:23:15 UTC+0800	-
Updated time	-
2022-02-24 19:23:50 UTC+0800	-
Drift status	Last drift check time
NOT_CHECKED	-

**CloudFormation**

**Stacks**

- Stack details
- Drifts
- StackSets
- Exports

**Designer**

**Registry**

- Public extensions
- Activated extensions
- Publisher

**CloudFormation > Stacks > DEV-LambdaStack**

### DEV-LambdaStack

Stack info Events Resources Outputs Parameters Template Change sets

**Outputs (1)**

Key	Value	Description	Export name
DemoApiGwEndpoint62E35432	<a href="https://677t7ffjqb.execute-api.ap-southeast-1.amazonaws.com/prod/">https://677t7ffjqb.execute-api.ap-southeast-1.amazonaws.com/prod/</a>	-	-

**JSON**

```

account: "*****2608"
region: "ap-southeast-1"
  
```

We can see that the application is also deployed and working properly within the DEV environment. Next, let us add the code for the PROD and DR (for a different region!) environments.

```
[ demo demo-pipeline ] export CDK_NEW_BOOTSTRAP=1
[ demo demo-pipeline ] npx cdk bootstrap --cloudformation-execution-policies arn:aws:iam::aws:policy/AdministratorAccess \
--trust [REDACTED] 2586 aws:// 3000/ap-southeast-1
  ✘ Bootstrapping environment aws:// 3000/ap-southeast-1...
Trusted accounts for deployment: [REDACTED] 2586
Trusted accounts for lookup: (none)
Execution policies: arn:aws:iam::aws:policy/AdministratorAccess
CDKToolkit: creating CloudFormation changeset...
[██████████] (11/12)

7:44:49 PM | CREATE_IN_PROGRESS | AWS::CloudFormation::Stack | CDKToolkit
```

```
[ demo demo-pipeline ] export CDK_NEW_BOOTSTRAP=1
[ demo demo-pipeline ] npx cdk bootstrap --cloudformation-execution-policies arn:aws:iam::aws:policy/AdministratorAccess \
--trust [REDACTED] 2586 aws:// 3000/ap-southeast-1
  ✘ Bootstrapping environment aws:// 3000/ap-southeast-1...
Trusted accounts for deployment: [REDACTED] 2586
Trusted accounts for lookup: (none)
Execution policies: arn:aws:iam::aws:policy/AdministratorAccess
CDKToolkit: creating CloudFormation changeset...

[✓] Environment aws:// [REDACTED] 3000/ap-southeast-1 bootstrapped.
[ demo demo-pipeline ]
```

```
[ demo demo-pipeline ] export CDK_NEW_BOOTSTRAP=1
[ demo demo-pipeline ] npx cdk bootstrap --cloudformation-execution-policies arn:aws:iam::aws:policy/AdministratorAccess aws:// [REDACTED] 2586/ap-no
rtheast-2
  ✘ Bootstrapping environment aws:// 2586/ap-northeast-2...
Trusted accounts for deployment: (none)
Trusted accounts for lookup: (none)
Execution policies: arn:aws:iam::aws:policy/AdministratorAccess
CDKToolkit: creating CloudFormation changeset...
[██████████] (12/12)
```

```
[ demo demo-pipeline ] export CDK_NEW_BOOTSTRAP=1
[ demo demo-pipeline ] npx cdk bootstrap --cloudformation-execution-policies arn:aws:iam::aws:policy/AdministratorAccess aws:// [REDACTED] 2586/ap-no
rtheast-2
  ✘ Bootstrapping environment aws:// 2586/ap-northeast-2...
Trusted accounts for deployment: (none)
Trusted accounts for lookup: (none)
Execution policies: arn:aws:iam::aws:policy/AdministratorAccess
CDKToolkit: creating CloudFormation changeset...

[✓] Environment aws:// [REDACTED] 2586/ap-northeast-2 bootstrapped.
[ demo demo-pipeline ]
```

```
[ demo demo-pipeline ] export CDK_NEW_BOOTSTRAP=1
[ demo demo-pipeline ] npx cdk bootstrap --cloudformation-execution-policies arn:aws:iam::aws:policy/AdministratorAccess \
--trust [REDACTED] 2586 aws:// 1021/ap-northeast-2

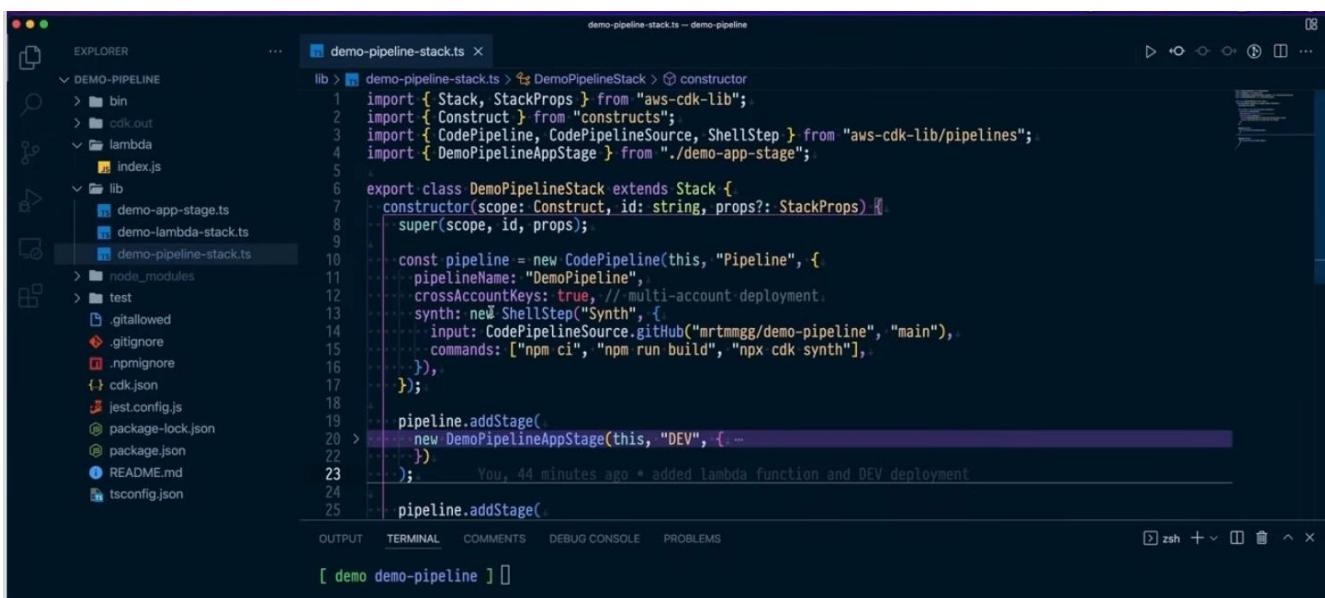
  Bootstrapping environment aws:// 1021/ap-northeast-2...
Trusted accounts for deployment: 2586
Trusted accounts for lookup: (none)
Execution policies: arn:aws:iam::aws:policy/AdministratorAccess
CDKToolkit: creating CloudFormation changeset...
[██████████] ..... (10/12)

7:48:30 PM | CREATE_IN_PROGRESS | AWS::CloudFormation::Stack | CDKToolkit
7:49:37 PM | CREATE_IN_PROGRESS | AWS::IAM::Role | DeploymentActionRole
```

```
[ demo demo-pipeline ] export CDK_NEW_BOOTSTRAP=1
[ demo demo-pipeline ] npx cdk bootstrap --cloudformation-execution-policies arn:aws:iam::aws:policy/AdministratorAccess \
--trust [REDACTED] 2586 aws:// 1021/ap-northeast-2

  Bootstrapping environment aws:// 1021/ap-northeast-2...
Trusted accounts for deployment: 2586
Trusted accounts for lookup: (none)
Execution policies: arn:aws:iam::aws:policy/AdministratorAccess
CDKToolkit: creating CloudFormation changeset...

✓ Environment aws:// [REDACTED] 1021/ap-northeast-2 bootstrapped.
[ demo demo-pipeline ]
```



```
demo-pipeline-stack.ts -- demo-pipeline
lib > demo-pipeline-stack.ts > DemoPipelineStack > constructor
1 import { Stack, StackProps } from "aws-cdk-lib";
2 import { Construct } from "constructs";
3 import { CodePipeline, CodePipelineSource, ShellStep } from "aws-cdk-lib/pipelines";
4 import { DemoPipelineAppStage } from "./demo-app-stage";
5
6 export class DemoPipelineStack extends Stack {
7   constructor(scope: Construct, id: string, props?: StackProps) {
8     super(scope, id, props);
9
10    const pipeline = new CodePipeline(this, "Pipeline", {
11      pipelineName: "DemoPipeline",
12      crossAccountKeys: true, // multi-account deployment
13      synth: new ShellStep("Synth", {
14        input: CodePipelineSource.github("mrtmmgg/demo-pipeline", "main"),
15        commands: ["npm ci", "npm run build", "npx cdk synth"],
16      }),
17    });
18
19    pipeline.addStage(
20      new DemoPipelineAppStage(this, "DEV", {
21        ...
22      })
23    );
24    You, 44 minutes ago * added lambda function and DEV deployment
25    pipeline.addStage(
26      ...
27    );
28  }
29}
```

```
demo-pipeline-stack.ts -- demo-pipeline
lib > demo-pipeline-stack.ts > DemoPipelineStack > constructor
  ...
  1 const pipeline = new CodePipeline(this, "Pipeline", {
  2   pipelineName: "DemoPipeline",
  3   crossAccountKeys: true, // multi-account deployment
  4   synth: new ShellStep("Synth", {
  5     input: CodePipelineSource.gitHub("mrtmmgg/demo-pipeline", "main"),
  6     commands: ["npm ci", "npm run build", "npx cdk synth"],
  7   }),
  8 });
  ...
  pipeline.addStage(
  9   new DemoPipelineAppStage(this, "DEV", { ... })
 10 );
  ...
  pipeline.addStage(
 11   new DemoPipelineAppStage(this, "STG", { ... })
 12 );
  ...
  You, 44 minutes ago * added lambda function and DEV deployment
  ...
  23   ...
 24
 25   pipeline.addStage(
 26     new DemoPipelineAppStage(this, "STG", { ... })
 27   );
 28
 29   ...
 30
 31 }
 32
```

```
demo-pipeline-stack.ts -- demo-pipeline
lib > demo-pipeline-stack.ts > DemoPipelineStack > constructor > env > account
  ...
  20   new DemoPipelineAppStage(this, "DEV", { ... })
 21   ...
 22   ...
 23   ...
 24
 25   pipeline.addStage(
 26     new DemoPipelineAppStage(this, "STG", { ... })
 27   );
 28
 29   ...
 30
 31   const waveprd = pipeline.addWave("PRD");
 32
 33   waveprd.addStage(
 34     new DemoPipelineAppStage(this, "PRD-SG", {
 35       env: { account: "3000", region: "ap-southeast-1" },
 36     })
 37   );
 38
 39   waveprd.addStage(
 40     new DemoPipelineAppStage(this, "DR-KR", {
 41       env: { account: "1021", region: "ap-northeast-2" },
 42     })
 43   );
 44
 45 }
```

```
demo-pipeline-stack.ts -- demo-pipeline
lib > demo-pipeline-stack.ts > DemoPipelineStack > constructor
  ...
  20   new DemoPipelineAppStage(this, "DEV", { ... })
 21   ...
 22   ...
 23   ...
 24
 25   pipeline.addStage(
 26     new DemoPipelineAppStage(this, "STG", { ... })
 27   );
 28
 29   ...
 30
 31   const waveprd = pipeline.addWave("PRD");
 32
 33   waveprd.addStage(
 34     new DemoPipelineAppStage(this, "PRD-SG", { ... })
 35   );
 36
 37   waveprd.addStage(
 38     new DemoPipelineAppStage(this, "DR-KR", { ... })
 39   );
 40
 41   ...
 42   ...
 43   ...
 44
 45 }
```

Changes not staged for commit:  
(use "git add <file>..." to update what will be committed)  
(use "git restore <file>..." to discard changes in working directory)  
modified: lib/demo-pipeline-stack.ts

no changes added to commit (use "git add" and/or "git commit -a")  
[ demo demo-pipeline ] git add .

OUTPUT TERMINAL COMMENTS DEBUG CONSOLE PROBLEMS

```
(use "git add <file>..." to update what will be committed)
(use "git restore <file>..." to discard changes in working directory)
modified: lib/demo-pipeline-stack.ts

no changes added to commit (use "git add" and/or "git commit -a")
[ demo demo-pipeline ] git add .
[ demo demo-pipeline ] git commit -m "adding PRD and DR environments in parallel using addWave"
```

You, seconds ago Ln 40, Col 48 Spaces: 2 UTF-8 LF ⓘ TypeScript ⓘ Go Live ⓘ GraphQL ⓘ Prettier ⓘ AWS

OUTPUT TERMINAL COMMENTS DEBUG CONSOLE PROBLEMS

```
M lib/demo-pipeline-stack.ts

*****
Code Defender did not find any AWS credentials, skipping check...
Code Defender did not find any AWS credentials, skipping check...
```

You, seconds ago Ln 40, Col 48 Spaces: 2 UTF-8 LF ⓘ TypeScript ⓘ Go Live ⓘ GraphQL ⓘ Prettier ⓘ AWS

OUTPUT TERMINAL COMMENTS DEBUG CONSOLE PROBLEMS

```
*****
Code Defender did not find any AWS credentials, skipping check...
Code Defender did not find any AWS credentials, skipping check...
[main c34fe59] adding PRD and DR environments in parallel using addWave
  1 file changed, 14 insertions(+)
[ demo demo-pipeline ] git push
```

You, seconds ago Ln 40, Col 48 Spaces: 2 UTF-8 LF ⓘ TypeScript ⓘ Go Live ⓘ GraphQL ⓘ Prettier ⓘ AWS

OUTPUT TERMINAL COMMENTS DEBUG CONSOLE PROBLEMS

```
Delta compression using up to 8 threads
Compressing objects: 100% (4/4), done.
Writing objects: 100% (4/4), 504 bytes | 504.00 KiB/s, done.
Total 4 (delta 3), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (3/3), completed with 3 local objects.
To https://github.com/mrtmmgg/demo-pipeline.git
  50ccbff..c34fe59 main -> main
[ demo demo-pipeline ]
```

You, seconds ago Ln 40, Col 48 Spaces: 2 UTF-8 LF ⓘ TypeScript ⓘ Go Live ⓘ GraphQL ⓘ Prettier ⓘ AWS

mrtmmgg/demo-pipeline CodePipeline - AWS Developer CloudFormation - Stack CloudFormation - Stack CloudFormation - Stack CloudFormation - Stack AWS Management Console

Search for services, features, blogs, docs, and more [Option+S]

Developer Tools Services Search for services, features, blogs, docs, and more [Option+S]

Developer Tools > CodePipeline > Pipelines > DemoPipeline

DemoPipeline

Source In progress Pipeline execution ID: 32482b2d-5e44-4ae0-83e7-80e297daf10b

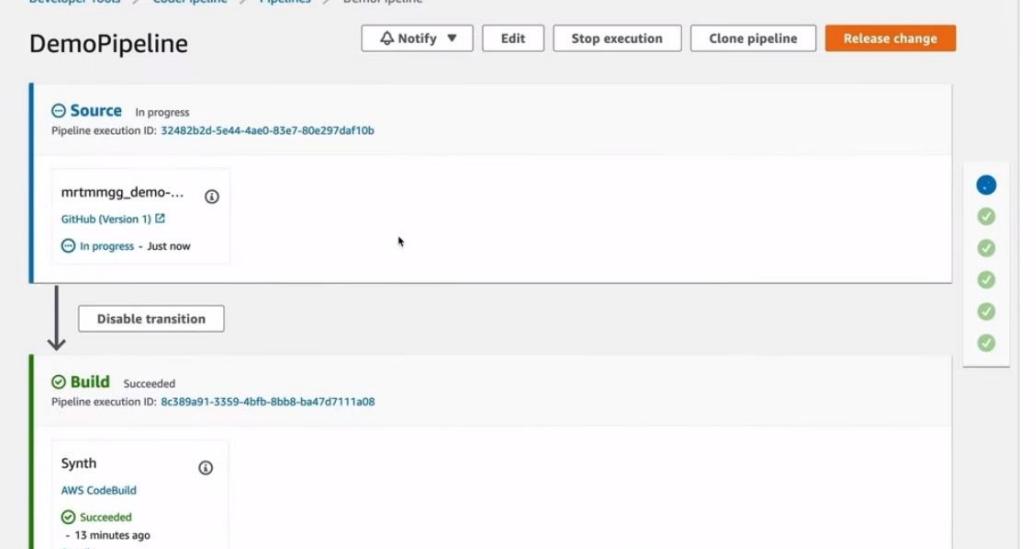
mrtmmgg\_demo... GitHub (Version 1) In progress - Just now

Disable transition

Build Succeeded Pipeline execution ID: 8c389a91-3359-4bfb-8bb8-ba47d7111a08

Synth AWS CodeBuild Succeeded - 15 minutes ago Details

Go to resource Feedback



Screenshot of the AWS CodePipeline console showing the "DemoPipeline" pipeline.

The pipeline consists of the following stages:

- Source**: GitHub (Version 1) - Succeeded (20 minutes ago, commit c34fe591)
- Build**: AWS CodeBuild - Succeeded (Pipeline execution ID: 9a26546a-1475-4702-adbd-c7f30f4e5bc6)
- Synth**: AWS CodeBuild - Succeeded (Pipeline execution ID: 9a26546a-1475-4702-adbd-c7f30f4e5bc6)

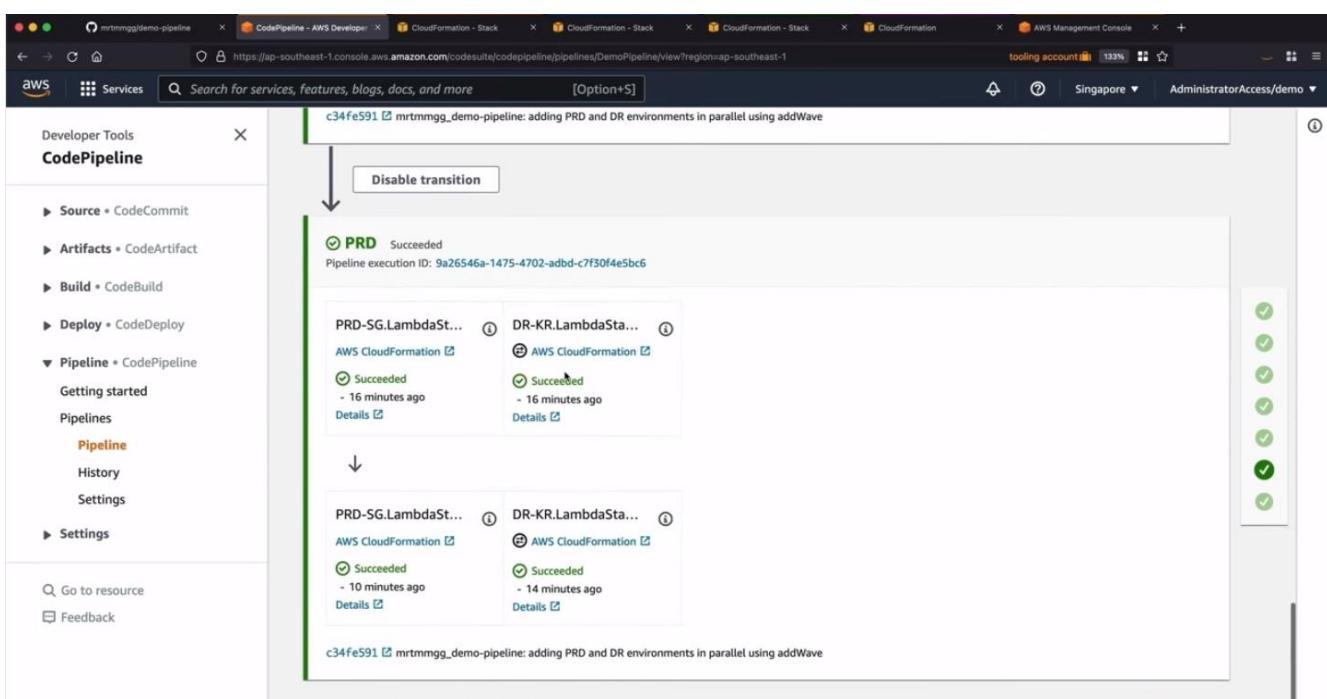
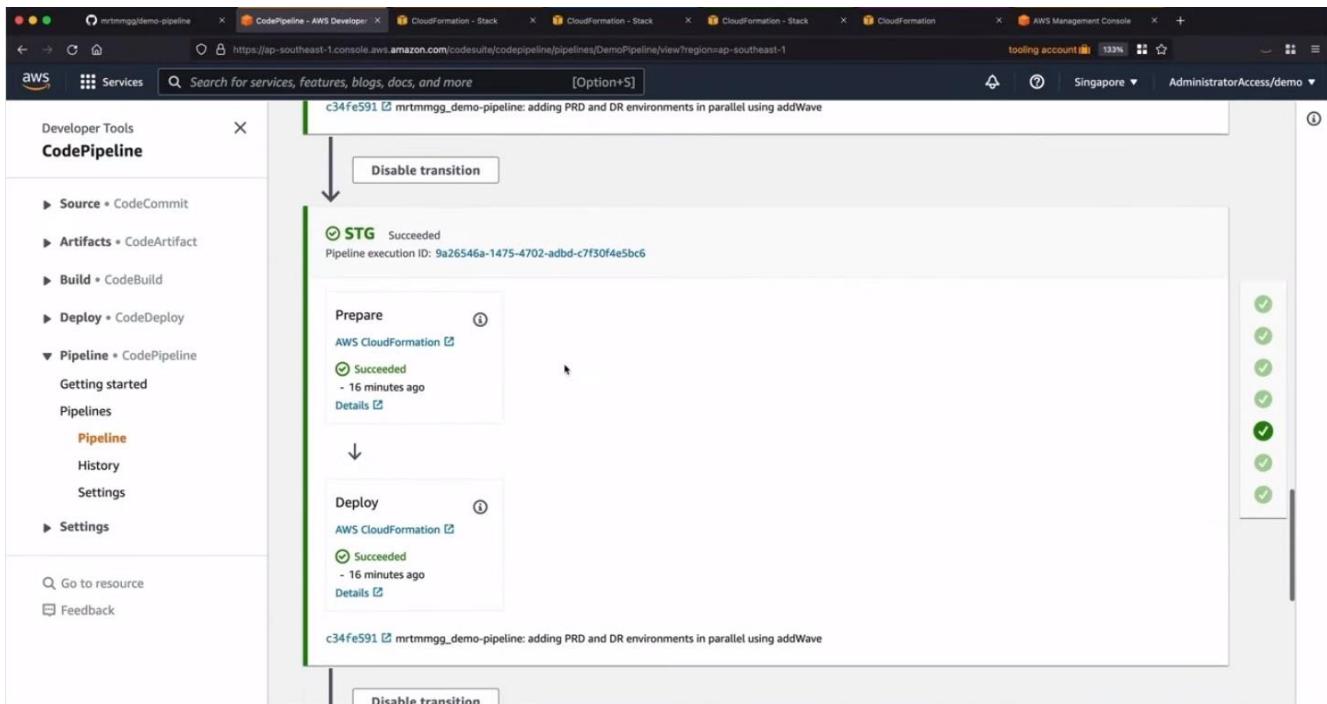
A "Disable transition" button is present between the Source and Build stages. A vertical green bar on the right indicates the progress of the pipeline execution.

Screenshot of the AWS CodePipeline console showing the "DemoPipeline" pipeline.

The pipeline consists of the following stages:

- Source**: GitHub (Version 1) - Succeeded (20 minutes ago, commit c34fe591)
- Build**: AWS CodeBuild - Succeeded (Pipeline execution ID: 9a26546a-1475-4702-adbd-c7f30f4e5bc6)
- DEV**: AWS CloudFormation - Succeeded (16 minutes ago, Details)
- Prepare**: AWS CloudFormation - Succeeded (16 minutes ago, Details)
- Deploy**: AWS CloudFormation - Succeeded (16 minutes ago, Details)

A "Disable transition" button is present between the Source and Build stages, and another one between the DEV stage and the Prepare stage. A vertical green bar on the right indicates the progress of the pipeline execution.



Let us check if the app is working in the PRD and DR environments now

Screenshot of the AWS CloudFormation console showing the Stacks page. It lists three stacks: PRD-SG-LambdaStack, CDKToolkit, and PVRE, all in CREATE\_COMPLETE status.

Stack name	Status	Created time	Description
PRD-SG-LambdaStack	CREATE_COMPLETE	2022-02-24 20:35:15 UTC+0800	-
CDKToolkit	CREATE_COMPLETE	2022-02-24 19:44:44 UTC+0800	This stack includes resources needed to deploy AWS CDK apps into this environment
PVRE	CREATE_COMPLETE	2021-04-20 15:57:34 UTC+0800	-

Screenshot of the AWS CloudFormation console showing the details for the PRD-SG-LambdaStack. The stack is in CREATE\_COMPLETE status and was created on 2022-02-24 20:35:15 UTC+0800.

**Stack ID:** arn:aws:cloudformation:ap-southeast-1:3000:stack/PRD-SG-LambdaStack/37a19400-956e-11ec-b24f-0a449dbe96a

**Status:** CREATE\_COMPLETE

**Root stack:** -

**Created time:** 2022-02-24 20:35:15 UTC+0800

**Updated time:** 2022-02-24 20:35:56 UTC+0800

**Drift status:** NOT\_CHECKED

Screenshot of the AWS Lambda execute API endpoint. The request body contains the account and region information.

```
account: "*****3000"
region: "ap-southeast-1"
```

PROD is working

Screenshot of the AWS Management Console home page. It shows the recently visited services (CloudFormation, S3) and a welcome message about getting started with AWS.

Screenshot of the AWS CloudFormation console showing the Stacks page. It displays two stacks: DR-KR-LambdaStack (CREATE\_COMPLETE) and CDKToolkit (CREATE\_COMPLETE). The DR-KR-LambdaStack has a detailed description indicating it includes resources needed to deploy AWS CDK apps.

Screenshot of the AWS CloudFormation console showing the details for the DR-KR-LambdaStack. The Overview tab is selected, displaying information such as Stack ID, Status, Root stack, Created time, Updated time, and Drift status.

Screenshot of the AWS CloudFormation console showing the Outputs tab for the DR-KR-LambdaStack. It lists one output: DemoApiGwEndpoint62E35432 with the value <https://azvxuspy12.execute-api.ap-northeast-2.amazonaws.com/prod/>.

```
account: "*****1021"
region: "ap-northeast-2"
```

DR is working also

## Resources

**Get started with the AWS CDK**

- AWS CDK online workshop – <https://cdkworkshop.com>
- AWS CDK samples on GitHub – <https://github.com/aws-samples/aws-cdk-examples>

**CDK Pipelines**

- [CDK Pipelines: Continuous delivery for AWS CDK applications](#)
- [AWS Online Tech Talk: Enhanced CI/CD with AWS CDK](#)

## Learn in-demand AWS Cloud skills

**AWS Skill Builder**

Access **500+** free digital courses and Learning Plans

Explore resources with a variety of skill levels and **16+** languages to meet your learning needs

Deepen your skills with digital learning on demand

Train now

**AWS Certifications**

Earn an industry-recognized credential

Receive Foundational, Associate, Professional, and Specialty certifications

Join the **AWS Certified** community and get exclusive benefits

Access new exam guides

Thank you for attending **AWS Summit Online ASEAN 2022**.

Please **complete the session survey** to help us improve your Summit experience in the future.

- [aws-asean-marketing@amazon.com](mailto:aws-asean-marketing@amazon.com)
- [twitter.com/AWSCloudSEAsia](https://twitter.com/AWSCloudSEAsia)
- [linkedin.com/company/amazon-web-services](https://linkedin.com/company/amazon-web-services)
- [facebook.com/AmazonWebServices](https://facebook.com/AmazonWebServices)
- [instagram.com/amazonwebservices](https://instagram.com/amazonwebservices)
- [youtube.com/user/AmazonWebServices](https://youtube.com/user/AmazonWebServices)
- [twitch.tv/aws](https://twitch.tv/aws)