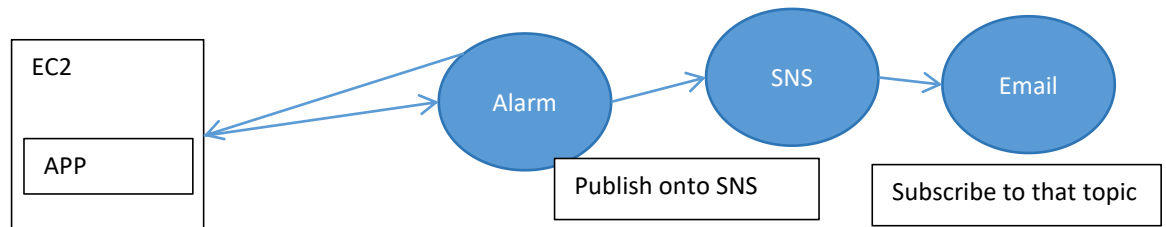


AWS CloudWatch & SNS

What's CloudWatch and SNS (Simple Notification Service)

Assume we have an application on EC2 ---> if something goes wrong in the application, how will you monitor that? You could set some kind of an alarm. Once this alarm is triggered, on your phone or mail, you will get this notification. If something goes wrong, immediately I want to trigger an alarm. I want to trigger if utilization of CPU > 50%. From triggering alarm, I want to publish into a service called as SNS. Using SNS, I will be sending email or sms to inbox. If something went wrong, I will trigger an alarm, based on what's happening, I will publish in SNS. In SNS, I will configure such that to get an email or SMS



Application Integration

Amazon Simple Notification Service

Pub/sub messaging for microservices and serverless applications.

Amazon SNS is a highly available, durable, secure, fully managed pub/sub messaging service that enables you to decouple microservices, distributed systems, and event-driven serverless applications. Amazon SNS provides topics for high-throughput, push-based, many-to-many messaging.

Publishing means sending that message, Subscribing means getting that message.

Netflix is publishing the movies, we subscribe to Netflix to get those movies

We need to create a topic in SNS --> onto that topic we will publish what as gone wrong from the monitoring ---> subscribe to that topic --> send that event via an email.

Summary:

Amazon CloudWatch is a component of AWS that provides monitoring of AWS resources and the customer applications running on AWS infrastructure. It enables real-time monitoring of AWS resources like EC2 instances, Elastic block store, Load balancers, RDS, etc
The application automatically collects and provides metrics for latency, request counts, CPU utilization

Create topic

Topic name
A topic is a message channel. When you publish a message to a topic, it fans out the message to all subscribed endpoints.

Next step

[Start with an overview](#)

Pricing

Select Standard

Create topic

Details

Type | [Info](#)
Topic type cannot be modified after topic is created

☐ **FIFO (first-in, first-out)**

- Strictly-preserved message ordering
- Exactly-once message delivery
- Subscription protocols: SQS

☒ **Standard**

- Best-effort message ordering
- At-least once message delivery
- Subscription protocols: SQS, Lambda, Data Firehose, HTTP, SMS, email, mobile application endpoints

Name

Maximum 256 characters. Can include alphanumeric characters, hyphens (-) and underscores (_).

Display name - optional | [Info](#)
To use this topic with SMS subscriptions, enter a display name. Only the first 10 characters are displayed in an SMS message.

Maximum 100 characters.

► **Encryption - optional**
Amazon SNS provides in-transit encryption by default. Enabling server-side encryption adds at-rest encryption to your topic.

Click Create Topic

Then click Create Subscription

Topic mysnstopic created successfully.
You can create subscriptions and send messages to them from this topic.

[Publish message](#) ✕

mysnstopic [Edit](#) [Delete](#) [Publish message](#)

Details

Name mysnstopic	Display name -
ARN arn:aws:sns:ca-central-1:577638386543:mysnstopic	Topic owner 577638386543
Type Standard	

[Subscriptions](#) | [Access policy](#) | [Data protection policy](#) | [Delivery policy \(HTTP/S\)](#) | [Delivery status logging](#) | [Encryption](#) | [Tags](#) | [Integrations](#)

Subscriptions (0) [Edit](#) [Delete](#) [Request confirmation](#) [Confirm subscription](#) [Create subscription](#)

Search

ID	Endpoint	Status	Protocol
----	----------	--------	----------

Protocol select Email
Create subscription

Details

Topic ARN

arn:aws:sns:ca-central-1:577638386543:mysnstopic

X

Protocol

The type of endpoint to subscribe

Select protocol

After your subscription is created, you must confirm it. Info

Enter Email

Create subscription

Details

Topic ARN

arn:aws:sns:ca-central-1:577638386543:mysnstopic

Protocol

The type of endpoint to subscribe

Email

Endpoint

An email address that can receive notifications from Amazon SNS.

sai.toronto8@gmail.com

After your subscription is created, you must confirm it. Info

Click Create Subscription

New Feature

Amazon SNS now supports High Throughput FIFO topics. [Learn more](#)

Subscription to mysnstopic created successfully.

The ARN of the subscription is arn:aws:sns:ca-central-1:577638386543:mysnstopic:08b17bb8-52b9-459f-9c3a-a99e47efb85f.

Subscription: 08b17bb8-52b9-459f-9c3a-a99e47efb85f

Details

ARN

arn:aws:sns:ca-central-1:577638386543:mysnstopic:08b17bb8-52b9-459f-9c3a-a99e47efb85f

Endpoint

sai.toronto8@gmail.com

Topic

mysnstopic

Subscription Principal

arn:aws:iam::577638386543:root

Status

Pending confirmation

Protocol

EMAIL

Go to Email and confirm subscription

AWS Notification - Subscription Confirmation

Inbox x

AWS Notifications <no-reply@sns.amazonaws.com>

to me ▾

You have chosen to subscribe to the topic:
arn:aws:sns:ca-central-1:577638386543:mysnstopic

To confirm this subscription, click or visit the link below (If this was in error no action is necessary):
[Confirm subscription](#)

aws

Simple Notification Service

Subscription confirmed!

You have successfully subscribed.

Your subscription's id is:
arn:aws:sns:ca-central-1:577638386543:mysnstopic:08b17bb8-52b9-459f-9c3a-a99e47efb85f

If it was not your intention to subscribe, [click here to unsubscribe](#).

We have one subscription and it is confirmed

Subscriptions (1)							Edit	Delete	Request confirmation	Confirm subscription				
<div><div>Q Search</div></div>														
ID	Endpoint	Status	Protocol	Topic										
<div><div></div><div>08b17bb8-52b9-459f-9c3a-a99e47efb...</div></div>	sai.toronto8@gmail.com	<div><div></div><div>Confirmed</div></div>	EMAIL	mysnstopic										

Go to EC2 and create an instance

Launch an instance [Info](#)

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the sim

Name and tags [Info](#)

Name

vm_sns

[Add additional tags](#)

▼ Application and OS Images (Amazon Machine Image) [Info](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to
Browse for AMIs if you don't see what you are looking for below

Search our full catalog including 1000s of application and OS images

Recents

Quick Start



Amazon Machine Image (AMI)

Amazon Linux 2023 AMI

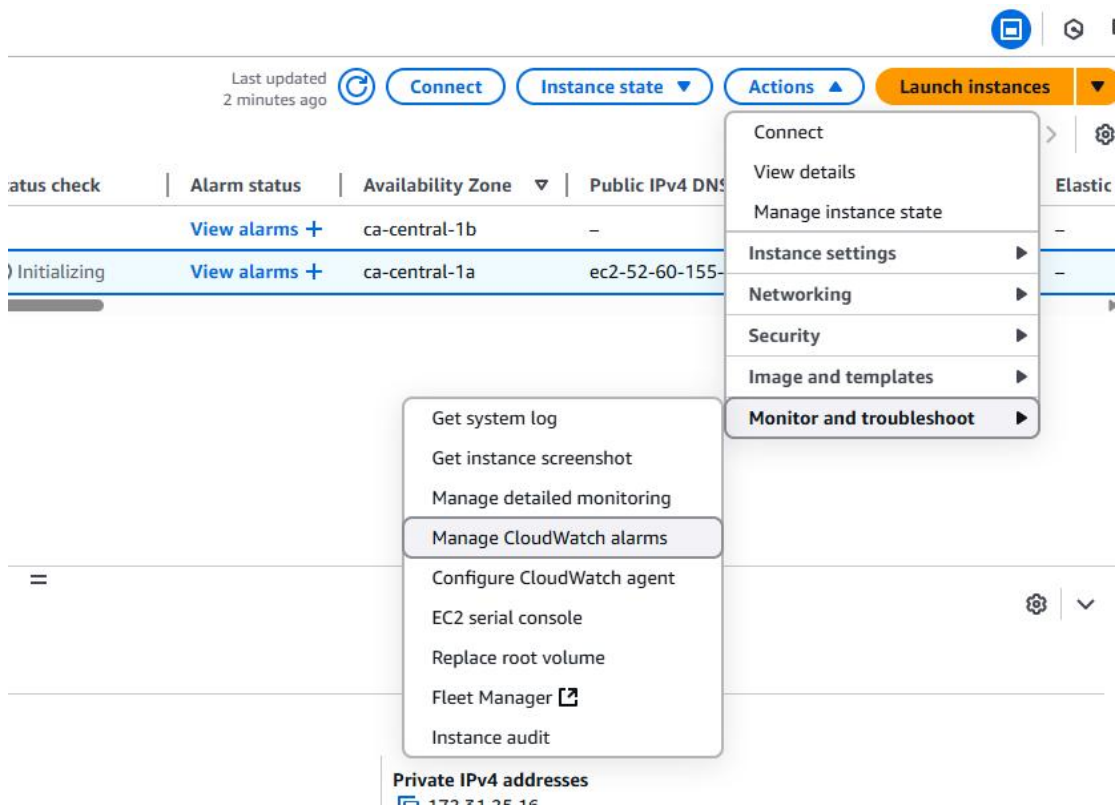
ami-0cc3a9edb87c91b53 (64-bit (x86), uefi-preferred) / ami-092dc7d756444f58e (64-bit (Arm), uefi)

☐ vm_cloudwatch_sns i-08804f738c2752da0 Running t2.micro Initializing

Select instance ---> Actions ---> Monitor and Troubleshoot

The screenshot shows the AWS Management Console 'Instances' page. At the top, there's a search bar and a filter for 'All states'. Below that is a table of instances. The first instance, 'vm_cloudwatch_sns', is selected. To its right, the 'Actions' menu is open, showing options like 'Connect', 'View details', 'Manage instance state', 'Instance settings', 'Networking', 'Security', 'Image and templates', and 'Monitor and troubleshoot'. The 'Monitor and troubleshoot' option is highlighted.

Select Manage CloudWatch alarms



Create an alarm

Select my SNS topic here: mysnstopic

Manage CloudWatch alarms [Info](#)

Create or edit a CloudWatch alarm that monitors CloudWatch metrics for the instance.

Add or edit alarm [Info](#)

You can create a new alarm or edit an existing alarm.

Create an alarm

Create an alarm for i-08804f738c2752da0

Edit an alarm

Edit an existing alarm for i-08804f738c2752da0

Search for alarm

Find an alarm to modify

Q Select an existing alarm to edit

Alarm notification [Info](#)

Configure the alarm to send notifications to an Amazon SNS topic when it is triggered.

Q mysnstopic

Alarm action [Info](#)

Specify the action to take when the alarm is triggered.

When load is > 2%, trigger this alarm

Alarm thresholds

Specify the metric thresholds for the alarm.

Group samples by

Average

Alarm when

>=

Consecutive period

1

Alarm name

awsec2-i-08804f738c2752da0-GreaterThanOrEqualToThreshold-CPUUtilization

Alarm description

Alarm on instance i-08804f738c2752da0: Triggered when CPUUtilization >= 0.02 for 1 consecutive 5-minute periods.

Type of data to sample

CPU utilization

Percent

0.02

Period

5 Minutes

What do you want to do if alarm is triggered?
Stop, Terminate, Reboot EC2?

Alarm action [Info](#)

Specify the action to take when the alarm is triggered.

Selection action to alarm fires

Consecutive periods

1

Alarm name

awsec2-i-08804f738c2752da0-GreaterThanOrEqualToThreshold-CPUUtilization

Alarm description

Alarm on instance i-08804f738c2752da0: Triggered when CPUUtilization >= 0.02 for 1 consecutive 5-minute periods.

Sample metric data [Info](#)

Select Create
Click on EC2 instance, View alarms

vm_cloudwatch_sns | i-08804f738c2752da0 | Running | t2.micro | 2/2 checks passed | View alarms + | ca-central-1a | ec2-52-60-155-158.ca...

Alarm details for i-08804f738c2752da0

Find alarms by name

Name	State	Description	Metric name	State reason
awsec2-i-08804f738c2752da0-GreaterThanOrEqualToThres...	INSUFFICIENT_D	Alarm on instance i-08804f738c2752da0: Triggered when ...	CPUUtilization	Unchecked: Initial alarm crea

Go to CloudWatch, click All alarms

Favorites and recents

Dashboards

Alarms 1 0 0

In alarm

All alarms

Search

Alarm

Name	State	Last state update (UTC)
awsec2-i-08804f738c2752da0-GreaterThanOrEqualToThreshold-CPUUtilization	In alarm	2025-03-24 00:49:17

Go to email and check the Alarm report

ALARM: "awsec2-i-08804f738c2752da0-GreaterThanOrEqualToThreshold-CPUUtilization" in Canada (Central) [Inbox x](#)

AWS Notifications <no-reply@sns.amazonaws.com> to me

You are receiving this email because your Amazon CloudWatch Alarm "awsec2-i-08804f738c2752da0-GreaterThanOrEqualToThreshold-CPUUtilization" in the Canada (Central) region has entered the ALARM state, because "Threshold Crossed: 00:44:00] was greater than or equal to the threshold (0.02)." at "Monday 24 March, 2025 00:49:17 UTC".

View this alarm in the AWS Management Console:
<https://ca-central-1.console.aws.amazon.com/cloudwatch/deeplink.js?region=ca-central-1&alarmsV2:alarm/awsec2-i-08804f738c2752da0-GreaterThanOrEqualToThreshold-CPUUtilization>

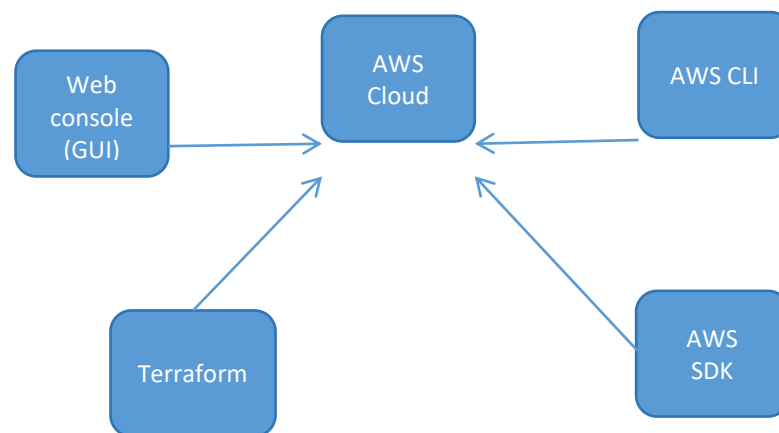
Alarm Details:
- Name: awsec2-i-08804f738c2752da0-GreaterThanOrEqualToThreshold-CPUUtilization
- Description: Alarm on instance i-08804f738c2752da0: Triggered when CPUUtilization >= 0.02 for 1 consecutive 5-minute periods.
- State Change: INSUFFICIENT_DATA-> ALARM

Summary:

1. Create SNS topic with Email notification (Standard create)
2. Configure Email subscription in SNS topic (We have to confirm subscription received in email)
3. To demonstrate, we have taken EC2 resource so create EC2 VM after which Select EC2 instance ---> Action ---> Monitor and troubleshoot ---> Manage CloudWatch alarms ---> Create CloudWatch alarm
4. Alarm notification : Select SNS topic which we have created
5. Alarm Threshold: AVG CPU \geq 2%
6. Try to connect to VM and increase the load
7. Observe the behavior of CloudWatch / SNS (We should be getting an Email notification)
8. When alarm is triggered its status will change to "In Alarm" in CloudWatch

If you want to monitor Alarm history --> Select Alarm --> Click Alarm --> Click on History

We are able to access AWS Cloud from Web console



For DevOps Engineer, which option is trending in industry, it is Terraform

AWS CLI: Command-line interface

Ways for infrastructure configuration: AWS management web console, AWS CLI (Command-Line Interface)

AWS CLI ---> Usually the script provides you with flexibility to manage AWS resources and infrastructure

We need an AccessKey and SecretKey

Go to : <https://docs.aws.amazon.com/cli/latest/userguide/getting-started-install.html>

Click on this link:

▼ Windows

Install and update requirements

- We support the AWS CLI on Microsoft-supported versions of 64-bit Windows.
- Admin rights to install software

Install or update the AWS CLI

To update your current installation of AWS CLI on Windows, download a new installer each time you update to overwrite previous versions. AWS CLI is updated regularly. To see when the latest version was released, see the [AWS CLI version 2 Changelog](#) on GitHub.

1. Download and run the AWS CLI MSI installer for Windows (64-bit):

<https://awscli.amazonaws.com/AWSCLIV2.msi>

Alternatively, you can run the `msiexec` command to run the MSI installer.

```
C:\> msiexec.exe /i https://awscli.amazonaws.com/AWSCLIV2.msi
```

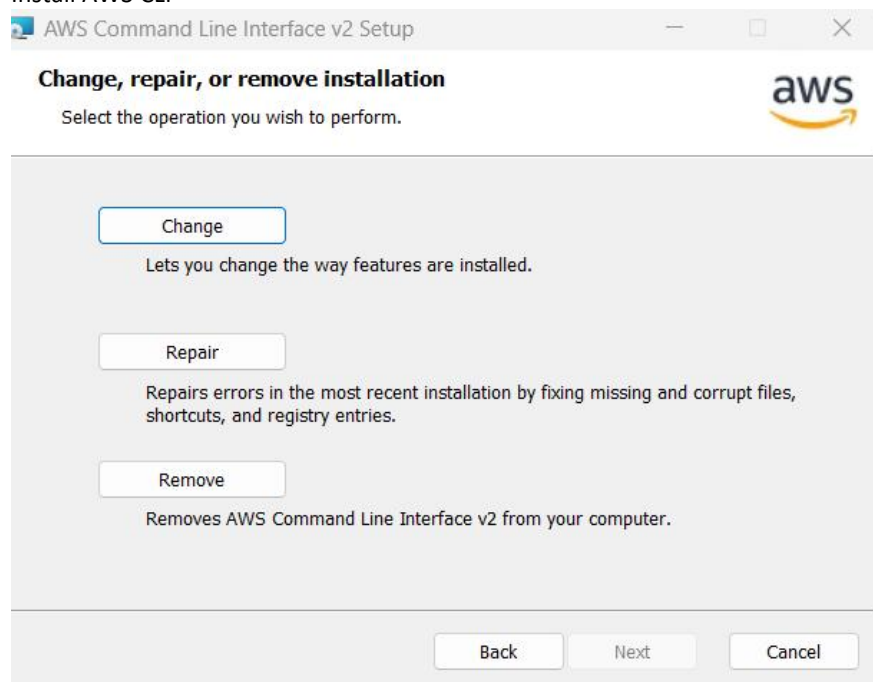
For various parameters that can be used with `msiexec`, see [msiexec](#) on the Microsoft Docs website. For example, you can use the `/q`

Install AWS CLI on Windows

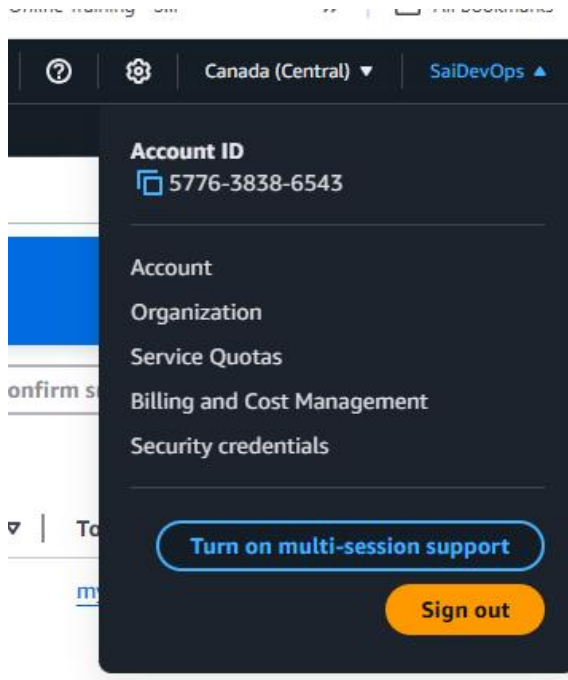
`msiexec.exe /i https://awscli.amazonaws.com/AWSCLIV2.msi`

Or click on <https://awscli.amazonaws.com/AWSCLIV2.msi>

Install AWS CLI



Go to AWS Console ---> Security credentials



Create access key --> What's recommended is. Create an IAM user first then create access key for that IAM user

Access keys (0)
Use access keys to send programmatic calls to AWS from the AWS CLI, AWS Tools for PowerShell, AWS SDKs, or direct AWS API calls. You can have a maximum of two access keys per IAM user.

Access key ID	Created on	Access key last used	Region last used
No access keys			

As a best practice, avoid using long-term credentials like access keys. Instead, use tools which provide short-term credentials.

Create access key

CloudFront key pairs (0)
You use key pairs in Amazon CloudFront to create signed URLs. You can have a maximum of two CloudFront key pairs (active or inactive) at a time.

I will delete access key right after using it

Alternatives to root user access keys [Info](#)

⚠ Root user access keys are not recommended

We don't recommend that you create root user access keys. Because you can't specify the root user in a permissions policy, you can't limit its permissions, which is a best practice.

Instead, use alternatives such as an IAM role or a user in IAM Identity Center, which provide temporary rather than long-term credentials. [Learn More](#)

If your use case requires an access key, create an IAM user with an access key and apply least privilege permissions for that user. [Learn More](#)

Continue to create access key?
☒ I understand creating a root access key is not a best practice, but I still want to create one.

[Cancel](#) Create access key

Configuring AWS CLI

1. Create an AWS account in order to configure AWS CLI (Use existing if you already have one)
2. Create IAM user with Security credentials (Access key and Secret key)
3. Open Command prompt and connect

```
C:\Users\saito>
C:\Users\saito>aws --version
aws-cli/2.24.22 Python/3.12.9 Windows/11 exe/AMD64

C:\Users\saito>
```

Next type --> aws configure

Enter AWS Access key and secret key

Correct the region to ca-central-1

```
C:\Users\saito>
C:\Users\saito>aws s3 ls
2025-03-22 12:32:58 elasticbeanstalk-ca-central-1-577638386543
2025-03-22 12:23:05 elasticbeanstalk-us-east-1-577638386543
```

Go to AWS CLI Command Reference

<https://docs.aws.amazon.com/cli/latest/>

AWS CLI Command Reference ¶

The AWS Command Line Interface is a unified tool that provides a consistent interface for interacting with all parts of AWS.

- Command Reference
 - accessanalyzer
 - account
 - acm
 - acm-pca
 - amp
 - amplify
 - amplifybackend
 - amplifyuibuilder
 - apigateway
 - apigatewaymanagementapi
 - apigatewayv2
 - appconfig

CLI Documentation: <https://docs.aws.amazon.com/cli/latest/>

Example for EC2: <https://docs.aws.amazon.com/cli/latest/reference/ec2/>

Example to attach volume to EC2

[[aws](#) . [ec2](#)]

attach-volume ¶

Description ¶

Attaches an EBS volume to a running or stopped instance and exposes it to the instance with the specific device name.

Encrypted EBS volumes must be attached to instances that support Amazon EBS encryption. For more information, see [Amazon EBS encryption](#) in the *Amazon EBS User Guide* .

After you attach an EBS volume, you must make it available. For more information, see [Make an EBS volume available for use](#) .

If a volume has an Amazon Web Services Marketplace product code:

- The volume can be attached only to a stopped instance.
- Amazon Web Services Marketplace product codes are copied from the volume to the instance.
- You must be subscribed to the product.
- The instance type and operating system of the instance must support the product. For example, you can't detach a volume from a Windows instance and attach it to a Linux instance.

For more information, see [Attach an Amazon EBS volume to an instance](#) in the *Amazon EBS User Guide*

See also: [AWS API Documentation](#)

Example 1: Create a bucket

The following `mb` command creates a bucket. In this example, the user makes the bucket `amzn-s3-demo-bucket` . The bucket is created in the region specified in the user's configuration file:

```
aws s3 mb s3://amzn-s3-demo-bucket
```

Output:

Create a new bucket

```
C:\Users\saito>
C:\Users\saito>aws s3 mb s3://devops-test
make_bucket failed: s3://devops-test An error occurred (BucketAlreadyExists) when calling the
make_bucket action: The requested bucket name is not available. The bucket namespace is shared by all users of the
region. Please choose a different name and try again.

C:\Users\saito>aws s3 mb s3://devops-test-567
make_bucket: devops-test-567
```

One more bucket is there

General purpose buckets

Directory buckets

General purpose buckets (3) Info All AWS Regions

Buckets are containers for data stored in S3.

Find buckets by name

Name
devops-test-567
elasticbeanstalk-ca-central-1-577638386543
elasticbeanstalk-us-east-1-577638386543

```
C:\Users\saito>aws s3 rb s3://devops-test-567
remove_bucket: devops-test-567
```

For every action we need to use commands and which command to run those details are available in AWS documentation

For example:

To Display bucket list: `aws s3 ls`

Create a new bucket: `aws mb s3://<new_bucket>`

Delete an empty bucket: `aws rb s3://<bucket_name>`

```
C:\Users\saito>aws ec2 describe-instances
```

DescribeInstances	
Reservations	
OwnerId	577638386543
ReservationId	r-0747843728a336750
Instances	
AmiLaunchIndex	0
Architecture	x86_64
BootMode	uefi-preferred
ClientToken	7721b732-ec8e-461b-a77c-3ee640ab8682
CurrentInstanceBootMode	legacy-bios
EbsOptimized	False
EnaSupport	True

-- More --