

Lesson-End Project

Creating an Alarm Using CloudWatch

Project agenda: To create an alarm using CloudWatch that will allow you to watch CloudWatch metrics (CPU utilization) with a given threshold and receive notifications when the metrics fall outside the threshold levels that you configure.

Description: Launch 3 virtual machine instances (Linux), perform tasks on these VMs of your choice, and set up a dashboard with metrics showing CPU utilization of all 3 VMs.

Tools required: AWS account

Prerequisites: None

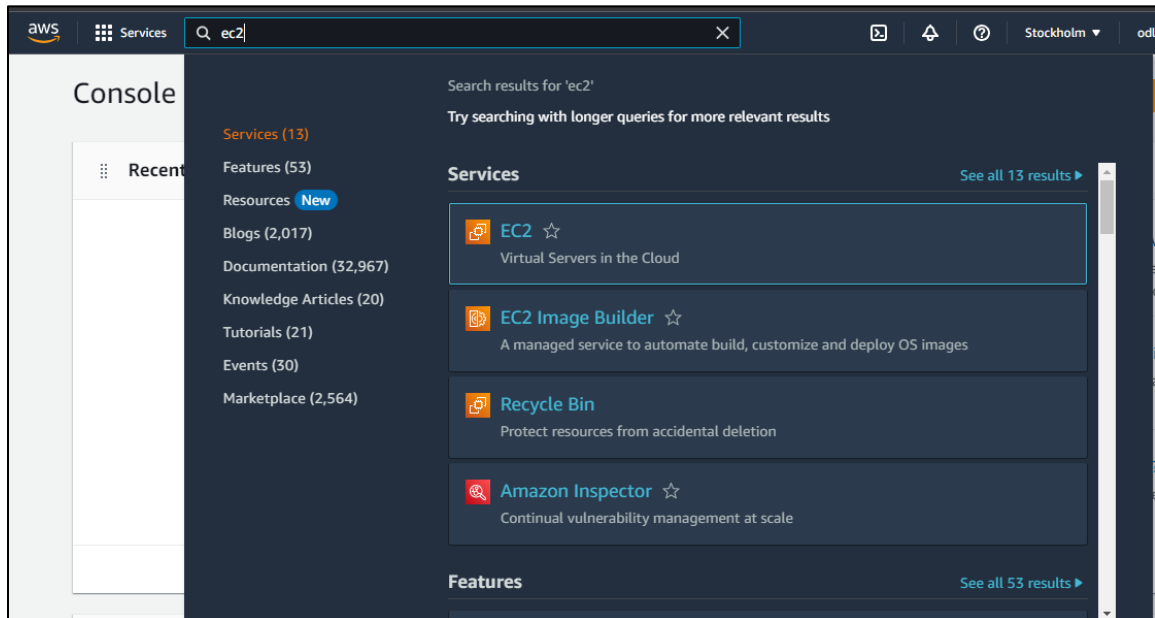
Expected deliverables: CloudWatch metrics

Steps to be followed:

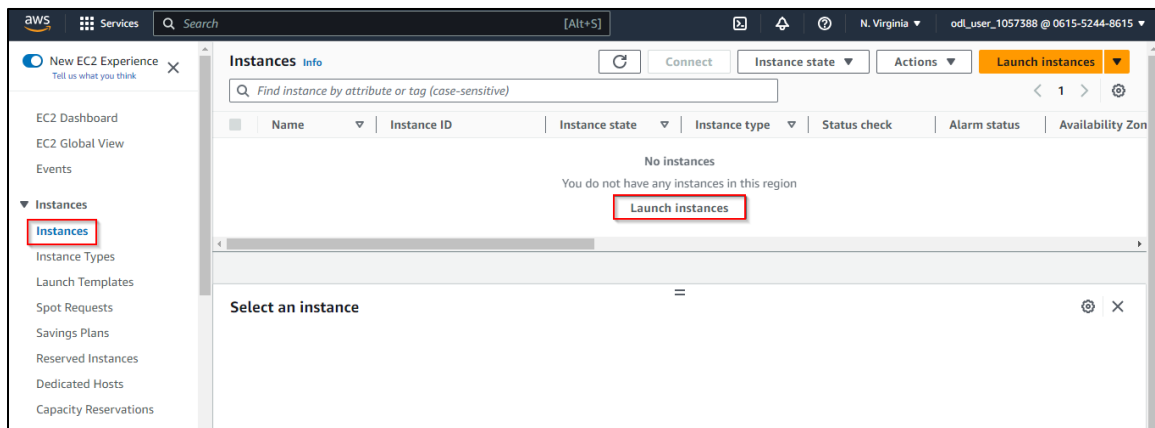
1. Launch Linux VMs
2. Connect SSH to VMs
3. Perform Linux-related tasks on the VMs
4. Configure the CloudWatch services
5. Create metrics for CPU utilization for all VMs
6. Create an alarm and send a notification through SNS

Step 1: Launch Linux VMs

1.1 In the Amazon console, search for and select EC2



1.2 Select Instances and click Launch instances



1.3 Provide a name, select **Amazon Linux** as the machine type, and opt for the **t2.micro** instance type

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 simple steps below.

Name and tags Info

Name

VM1 [Add additional tags](#)

Summary

Number of instances Info

1

Software Image (AMI)

Amazon Linux 2 Kernel 5.10 AMI...[read more](#)
ami-03972092c42e8c0ca

Virtual server type (instance type)

t2.micro

Firewall (security group)

Quick Start

Amazon Linux

macOS

Ubuntu

Windows

Red Hat

SUSE L

Browse more AMIs
Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type
ami-03972092c42e8c0ca (64-bit (x86)) / ami-047fb6d800866b9fe (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs Free tier eligible

Description

Amazon Linux 2 comes with five years support. It provides Linux kernel 5.10 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. This AMI is the successor of the Amazon Linux AMI that is now under maintenance only mode and has been removed from this wizard.

Architecture

64-bit (x86)

AMI ID

ami-03972092c42e8c0ca Verified provider

Summary

Number of instances Info

1

Software Image (AMI)

Amazon Linux 2 Kernel 5.10 AMI...[read more](#)
ami-03972092c42e8c0ca

Virtual server type (instance type)

t2.micro

Firewall (security group)

New security group

Storage (volumes)

1 volume(s) - 8 GiB

Free tier: In your first year

Cancel Launch instance [Review commands](#)

▼ Instance type
Info

Instance type

t2.micro

Free tier eligible

Family: t2 1 vCPU 1 GiB Memory Current generation: true
On-Demand Windows base pricing: 0.0162 USD per Hour
On-Demand SUSE base pricing: 0.0116 USD per Hour
On-Demand RHEL base pricing: 0.0716 USD per Hour
On-Demand Linux base pricing: 0.0116 USD per Hour

▼
t2.micro

☐ All generations
[Compare instance types](#)

Additional costs apply for AMIs with pre-installed software

1.4 Specify the key pair name as **VM1** and click on **Create key pair**

Create key pair

Key pair name
Key pairs allow you to connect to your instance securely.

VM1

The name can include up to 255 ASCII characters. It can't include leading or trailing spaces.

Key pair type

☒ RSA
RSA encrypted private and public key pair

☐ ED25519
ED25519 encrypted private and public key pair

Private key file format

☒ .pem
For use with OpenSSH

☐ .ppk
For use with PuTTY

⚠ When prompted, store the private key in a secure and accessible location on your computer. **You will need it later to connect to your instance.** [Learn more](#)

Cancel

Create key pair

1.5 Set the Subnet zone to **us-east-1a**

Network settings Info

VPC - required Info
vpc-0779a4b0acd732a5b (default) ↕

Subnet Info
subnet-08bff695703a22127
VPC: vpc-0779a4b0acd732a5b Owner: 152193717461
Availability Zone: us-east-1a Zone type: Availability Zone
IP addresses available: 4091 CIDR: 172.31.32.0/20

Auto-assign public IP Info
Enable

Additional charges apply when outside of free tier allowance

Firewall (security groups) Info
A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.
☒ Create security group ☐ Select existing security group

Security group name - required
launch-wizard-1

Summary

Number of instances Info
1

Software Image (AMI)
Amazon Linux 2 Kernel 5.10 AMI...read more
ami-03972092c42e8c0ca

Virtual server type (instance type)
t2.micro

Firewall (security group)
New security group

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year

Cancel **Launch instance**

1.6 Click on **Launch Instance**

Configure storage Info Advanced

1x 8 GiB gp2 Root volume (Not encrypted)

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage

Add new volume

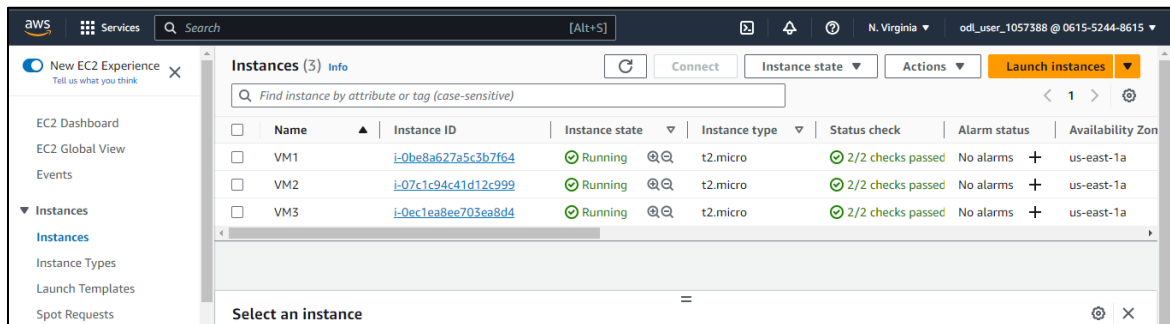
0 x File systems Edit

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Cancel **Launch instance** Review commands

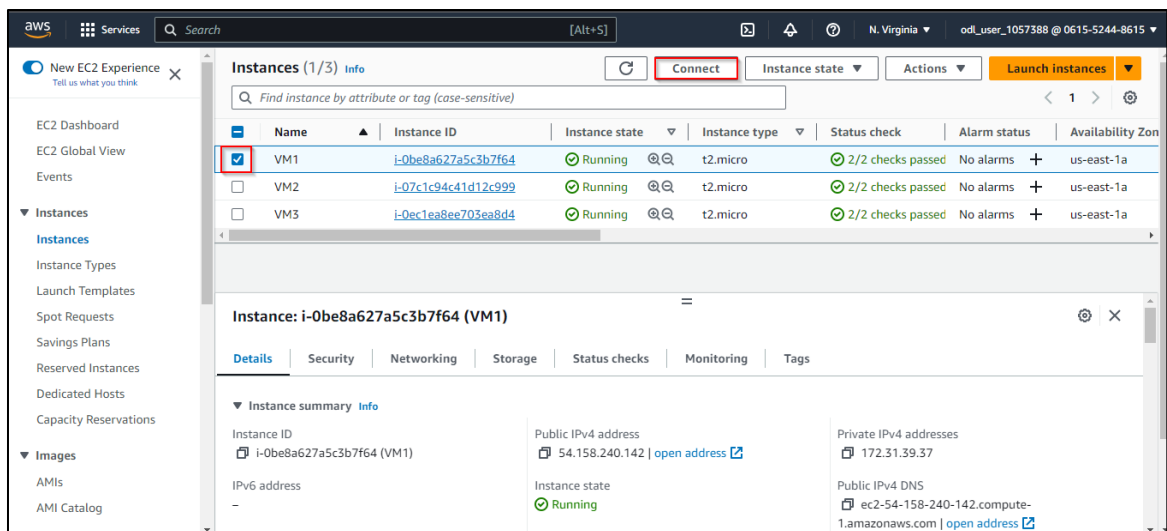
1.7 Repeat steps 1.1 to 1.6 to create two more instances



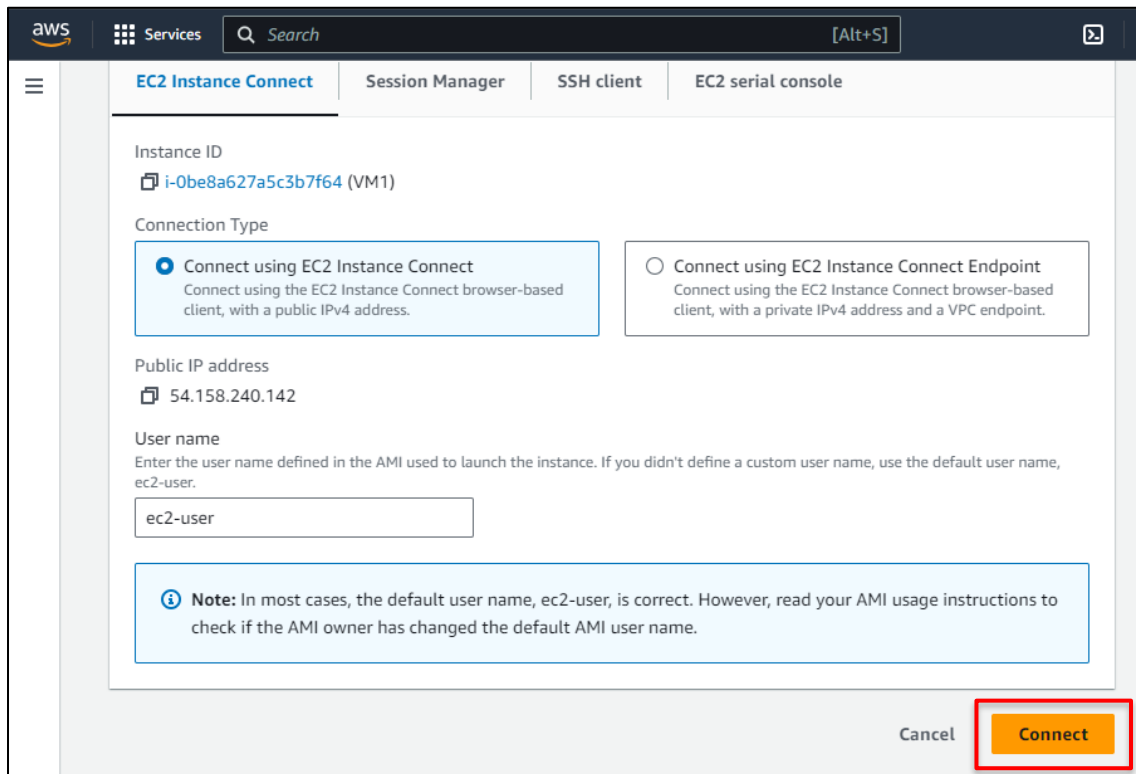
Three VMs have been created successfully.

Step 2: Connect SSH to VMs

2.1 Select the VM1 instance and click on the **Connect** option



2.2 Click on **Connect**



The screenshot shows the AWS Management Console interface for the EC2 Instance Connect service. The top navigation bar includes the AWS logo, a 'Services' menu, a search bar, and a keyboard shortcut '[Alt+S]'. Below the navigation bar, there are four tabs: 'EC2 Instance Connect' (selected), 'Session Manager', 'SSH client', and 'EC2 serial console'. The main content area displays the following information:

- Instance ID:** i-0be8a627a5c3b7f64 (VM1)
- Connection Type:** Two radio buttons are present. The first, 'Connect using EC2 Instance Connect', is selected and highlighted with a blue border. The second, 'Connect using EC2 Instance Connect Endpoint', is unselected.
- Public IP address:** 54.158.240.142
- User name:** A text input field containing 'ec2-user'. Below the field is a note: 'Note: In most cases, the default user name, ec2-user, is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI user name.'
- Buttons:** At the bottom right, there are two buttons: 'Cancel' and 'Connect'. The 'Connect' button is highlighted with a red rectangular box.

Step 3: Perform Linux-related tasks on the VMs

3.1 On clicking the **Connect** button, you will be directed to CloudShell. For instance, execute the following command:

sudo yum install stress -y

```

aws Services Search [Alt+S] N. Virginia odl_user_1057388 @ 0615-5244-8615
Amazon Linux 2 AMI
https://aws.amazon.com/amazon-linux-2/
[ec2-user@ip-172-31-39-37 ~]$ sudo yum install stress -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2-core | 3.7 kB 00:00:00
No package stress available.
Error: Nothing to do
[ec2-user@ip-172-31-39-37 ~]$

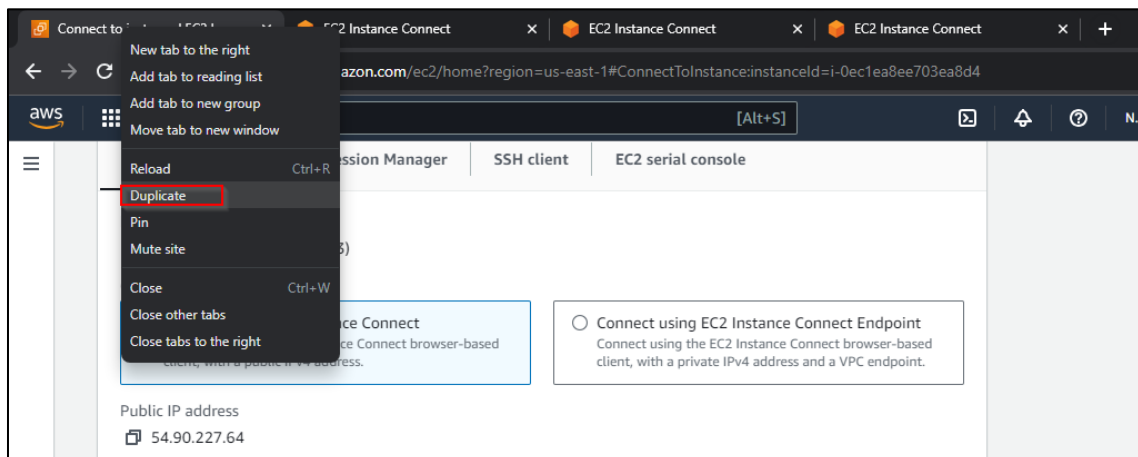
```

i-0be8a627a5c3b7f64 (VM1)
PublicIPs: 54.158.240.142 PrivateIPs: 172.31.39.37

Note: Establish connections to all three VMs and execute the same command on each

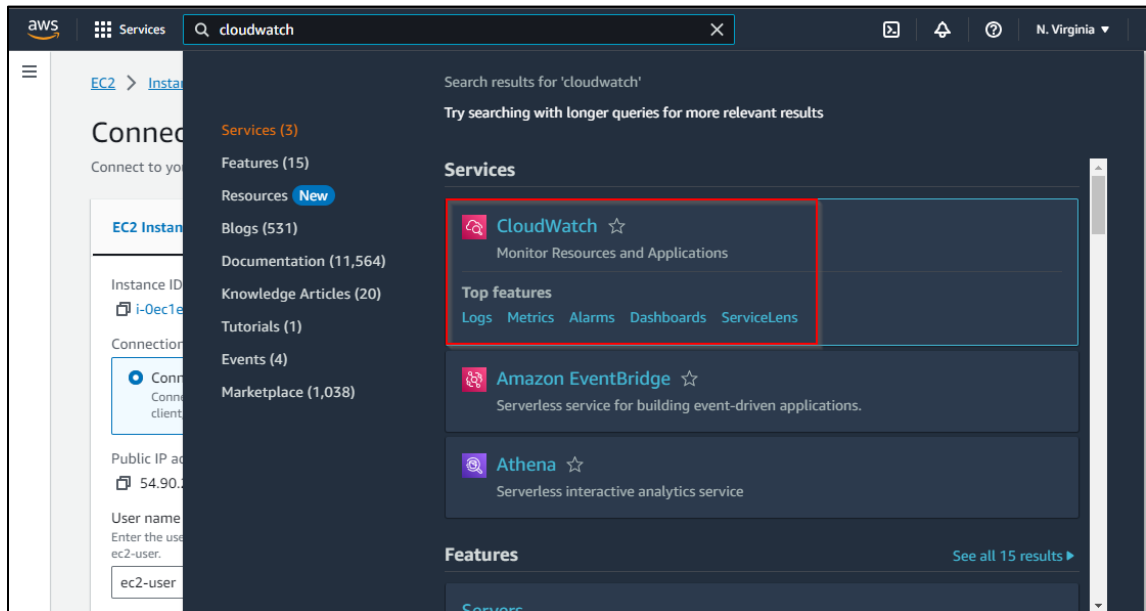
Step 4: Configure the CloudWatch services

4.1 Right-click on any tab and choose the **Duplicate** option

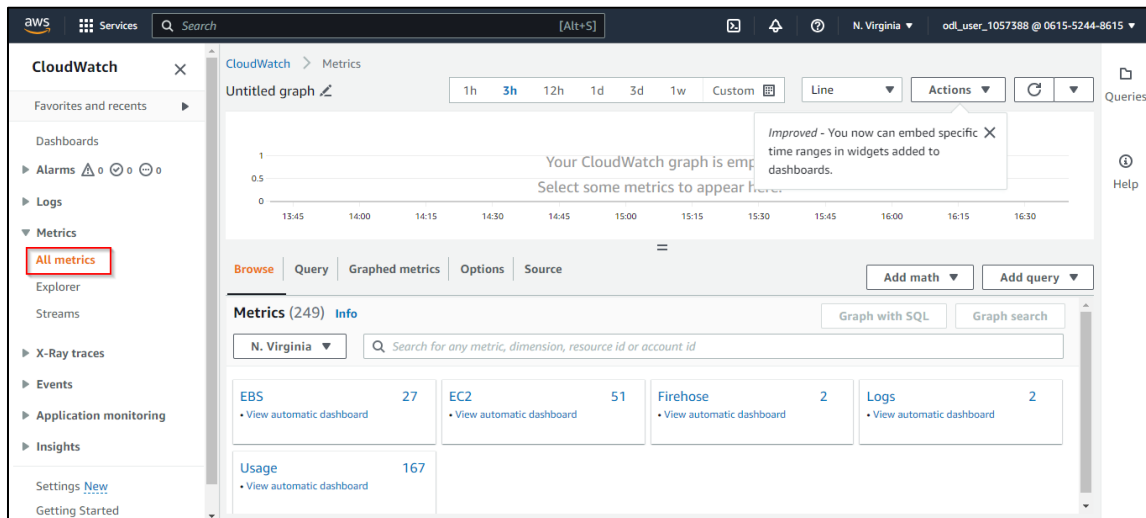


Step 5: Create metrics for CPU utilization for all VMs

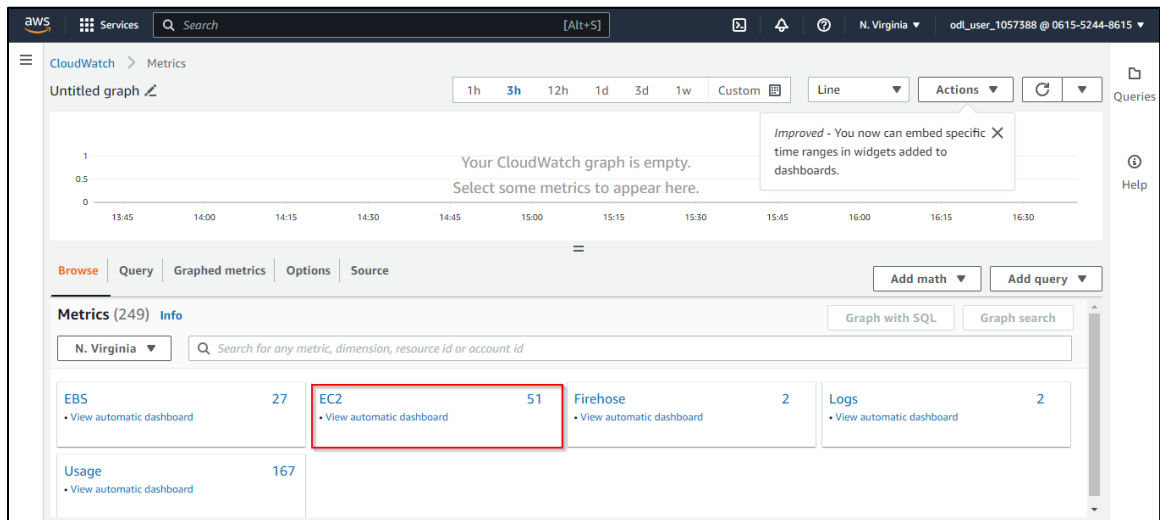
5.1 In the new tab, search for and select **CloudWatch**



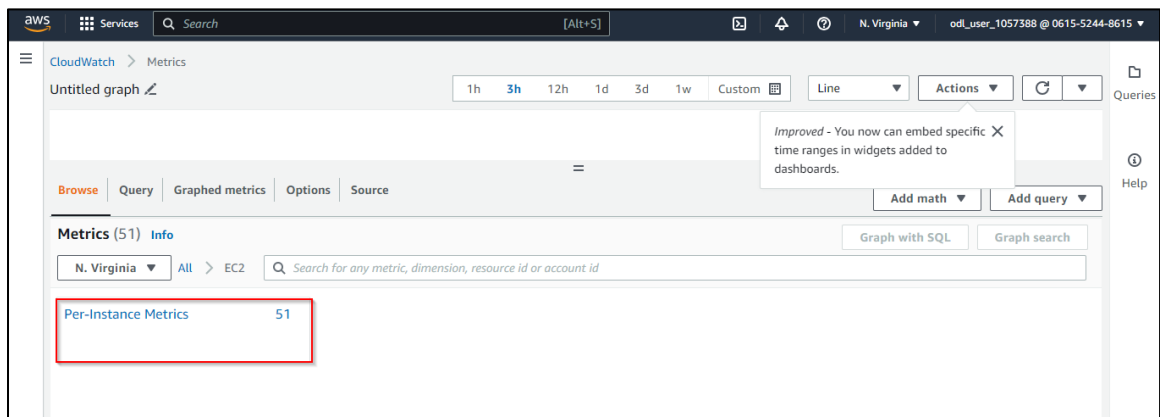
5.2 Navigate to **Metrics** and choose **All Metrics**



5.3 Select the EC2 option



5.4 Under **Per-Instance Metrics**, search for **CPUUtilization** in the search bar



The screenshot shows the AWS CloudWatch Metrics console. At the top, there's a search bar with 'CPUUtilization' entered. Below the search bar, a table lists three EC2 instances (VM1, VM2, VM3) with their Instance IDs and the metric name 'CPUUtilization'. The 'Actions' button is highlighted in the top right corner.

Instance name 3/3	Instanceld	Metric name
VM1	i-0be8a627a5c3b7f64	CPUUtilization
VM2	i-07c1c94c41d12c999	CPUUtilization
VM3	i-0ec1ea8ee703ea8d4	CPUUtilization

5.5 Choose all the VMs, click on **Actions**, and select **Add to dashboard**

The screenshot shows the same AWS CloudWatch Metrics console. The 'Actions' button is now open, and the 'Add to dashboard - Improved' option is selected. The three EC2 instances (VM1, VM2, VM3) are highlighted with a red box, indicating they are selected for the action.

Instance name 3/3	Instanceld	Metric name
VM1	i-0be8a627a5c3b7f64	CPUUtilization
VM2	i-07c1c94c41d12c999	CPUUtilization
VM3	i-0ec1ea8ee703ea8d4	CPUUtilization

5.6 Click on **Create new**

Add to dashboard

Select a dashboard

Select an existing dashboard or create a new one.

Create new

Widget type

Select a widget type to add to the dashboard.

Line

Customize widget title

Widgets get an automatic title. You can optionally customize the title here.

Persist widget time range - *new* ⓘ

☐ Persist this time range for this widget in the dashboard (Last 3 hours)

Cancel

Add to dashboard

Preview

This is how your chart will appear in your dashboard.

CPUUtilization

Percent

Legend:

- i-0be8a627a5c3b7f64 (VM1)
- i-07c1c94c41d12c999 (VM2)
- i-0ec1ea8ee703ea8d4 (VM3)

5.7 Provide a name for the dashboard and click **Create**

Select an existing dashboard or create a new one.

Create new dashboard

Mydashboard

Remove

Valid characters in dashboard names include "0-9A-Za-z-_"

Create

Widget type

Select a widget type to add to the dashboard.

Line

This is how your chart will appear in your dashboard.

CPUUtilization

Percent

Legend:

- i-0be8a627a5c3b7f64 (VM1)
- i-07c1c94c41d12c999 (VM2)
- i-0ec1ea8ee703ea8d4 (VM3)

5.8 Click on **Add to dashboard**

Add to dashboard

Select a dashboard

Select an existing dashboard or create a new one.

Create new

Widget type

Select a widget type to add to the dashboard.

Line

Customize widget title

Widgets get an automatic title. You can optionally customize the title here.

CPUUtilization

Persist widget time range - *new* ⓘ

☐ Persist this time range for this widget in the dashboard (Last 3 hours)

Cancel

Add to dashboard

Preview

This is how your chart will appear in your dashboard.

CPUUtilization

Percent

0.959

0.546

0.133

14:30 15:30 16:30

- i-0be8a627a5c3b7f64 (VM1)
- i-07c1c94c41d12c999 (VM2)
- i-0ec1ea8ee703ea8d4 (VM3)

5.9 Click the **Save** button

aws

Services

Search

[Alt+S]

N. Virginia

odl_user_1057388 @ 0615-5244-8615

CloudWatch > Dashboards > Mydashboard

Mydashboard

1h 3h 12h 1d 3d 1w Custom

Autosave Off

Save

CPUUtilization

Percent

0.959

0.546

0.133

13:45 16:45

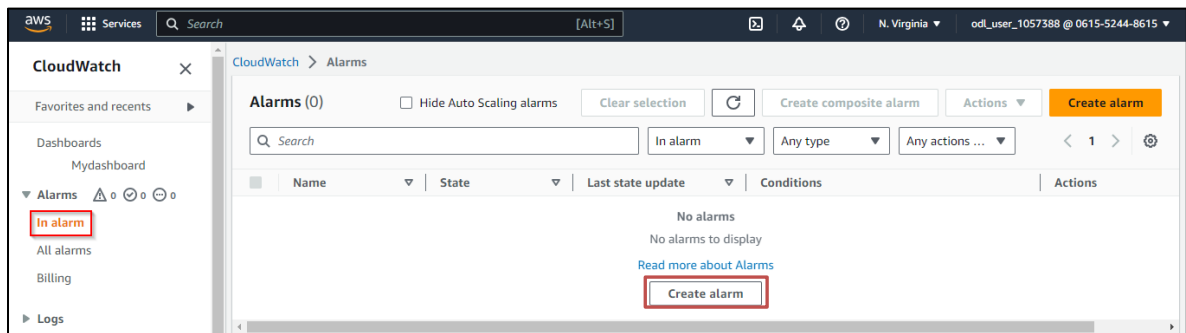
i-0be8a627a5c3b7f64 (VM1)

i-07c1c94c41d12c999 (VM2)

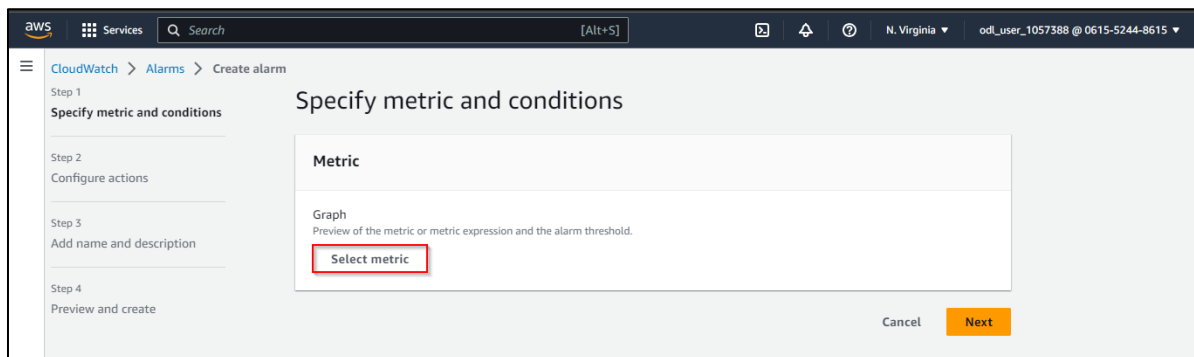
i-0ec1ea8ee703ea8d4 (VM3)

Step 6: Create an alarm and send a notification through SNS

6.1 Navigate to **Alarms**, select **In alarm**, and click **Create alarm**



6.2 Click on **Select metric** and on **Next**



6.3 Choose **EC2**, select **Per-Instance Metrics**, and search for **CPUUtilization** in the search bar

Select metric

Select some metrics to appear here.

0 14:00 14:15 14:30 14:45 15:00 15:15 15:30 15:45 16:00 16:15 16:30 16:45

Browse Query Graphed metrics Options Source

Add math Add query

Metrics (3)

N. Virginia All > EC2 > Per-Instance Metrics

Search for any metric, dimension, resource id or account id

CPUUtilization

Instance name 3/3	Instanceld	Metric name
VM1	i-0be8a627a5c3b7f64	CPUUtilization
VM2	i-07c1c94c41d12c999	CPUUtilization
VM3	i-0ec1ea8ee703ea8d4	CPUUtilization

Cancel Select a single metric to continue

6.4 Select one metric at a time and click **Select Metric**

Select metric

Select some metrics to appear here.

0.134 14:00 14:15 14:30 14:45 15:00 15:15 15:30 15:45 16:00 16:15 16:30 16:45

Browse Query Graphed metrics (1) Options Source

Add math Add query

Metrics (3)

N. Virginia All > EC2 > Per-Instance Metrics

Search for any metric, dimension, resource id or account id

CPUUtilization

Instance name 3/3	Instanceld	Metric name
<input checked="" type="checkbox"/> VM1	i-0be8a627a5c3b7f64	CPUUtilization
<input type="checkbox"/> VM2	i-07c1c94c41d12c999	CPUUtilization
<input type="checkbox"/> VM3	i-0ec1ea8ee703ea8d4	CPUUtilization

Cancel Select metric

6.5 Set the threshold value to **60** and click **Next**

Conditions

Threshold type

☒ **Static**
Use a value as a threshold

☐ **Anomaly detection**
Use a band as a threshold

Whenever CPUUtilization is...
Define the alarm condition.

☒ **Greater**
> threshold

☐ **Greater/Equal**
>= threshold

☐ **Lower/Equal**
<= threshold

☐ **Lower**
< threshold

than...
Define the threshold value.

Must be a number

► **Additional configuration**

Cancel
Next

6.6 Select **Create new topic**, add an email address, and click **Create topic**

aws

Services

Search

[Alt+S]

N. Virginia

odl_user_10

Step 3

Add name and description

Step 4

Preview and create

Alarm state trigger
Define the alarm state that will trigger this action.

☒ **In alarm**
The metric or expression is outside of the defined threshold.

☐ **OK**
The metric or expression is within the defined threshold.

☐ **Insufficient data**
The alarm has just started or not enough data is available.

Send a notification to the following SNS topic
Define the SNS (Simple Notification Service) topic that will receive the notification.

☐ Select an existing SNS topic

☒ **Create new topic**

☐ Use topic ARN to notify other accounts

Create a new topic...
The topic name must be unique.

SNS topic names can contain only alphanumeric characters, hyphens (-) and underscores (_).

Email endpoints that will receive the notification...
Add a comma-separated list of email addresses. Each address will be added as a subscription to the topic above.

user1@example.com, user2@example.com

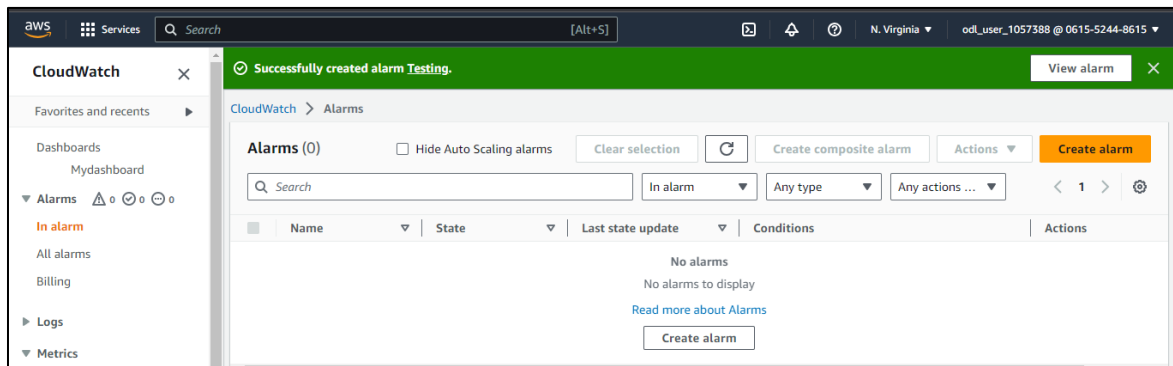
Create topic

6.7 Provide a name for the alarm and click **Next**

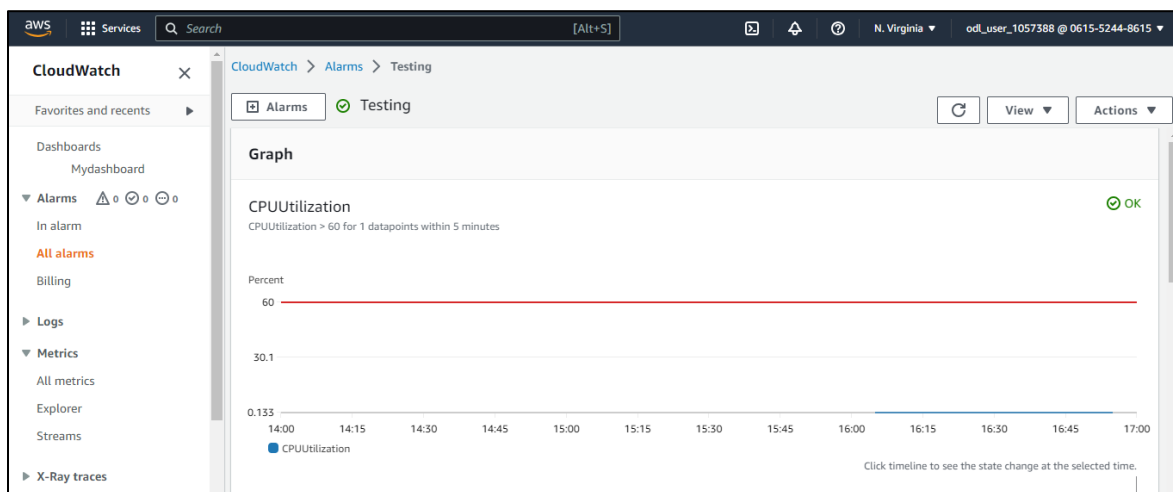
The screenshot shows the AWS IAM console interface. On the left, a sidebar lists the steps: Step 2 (Configure actions), Step 3 (Add name and description), and Step 4 (Preview and create). The main panel is titled 'Name and description'. It contains an 'Alarm name' text box with the value 'Testing' and a red border. Below it is an 'Alarm description' text box with a red border, containing the text: '# This is an H1', '**double asterisks will produce strong character**', and 'This is [an example](https://example.com/) inline link.' Below the description box is a note: 'Up to 1024 characters (0/1024)'. At the bottom right, there are three buttons: 'Cancel', 'Previous', and 'Next'. The 'Next' button is highlighted with a red border.

6.8 Click on **Create alarm**

The screenshot shows a summary view of the alarm configuration. The title is 'Step 3: Add name and description'. Below the title, there is a 'Name' field with the value 'Testing' and a 'Description' field with a hyphen. At the bottom right, there are three buttons: 'Cancel', 'Previous', and 'Create alarm'. The 'Create alarm' button is highlighted with a red border.



The alarm has been successfully created with the expected result.



By following these steps, you have successfully gained hands-on experience in setting up, monitoring, and alerting systems for CPU utilization.