

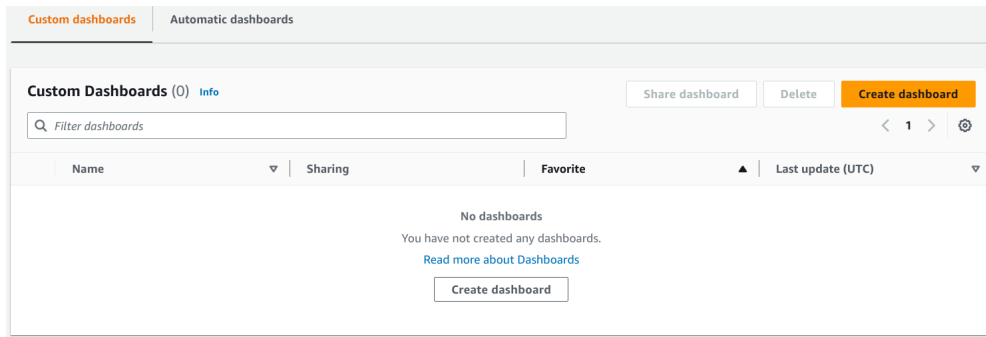
AWS Monitoring

Day 2 - Assignment

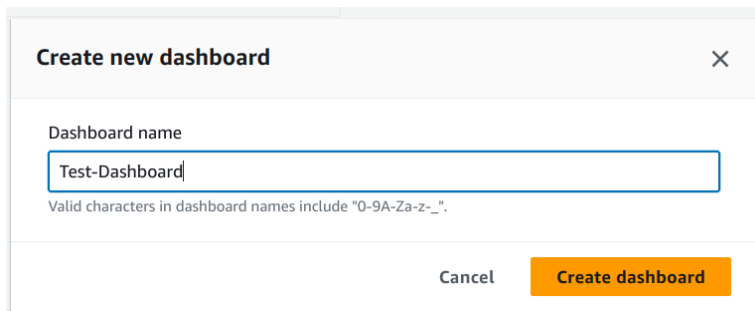
26th July 2023

Assignment 1 - Creating custom CloudWatch dashboard.

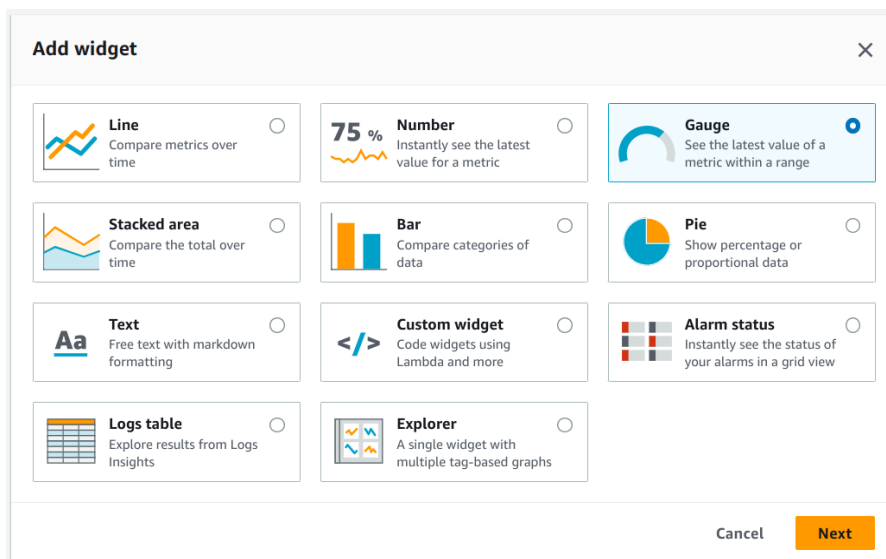
Step 1 - Navigate to the CloudWatch console.



Step 2 - Click on the “Create dashboard” button and give a name to the custom dashboard.



Step 3 - Select a widget for the dashboard.



Step 4 - Select a metric for the widget. Here we select “CPU utilization” of the Auto scaling group.

Add metric graph

<input type="checkbox"/>	Test-ASG	NetworkOut
<input type="checkbox"/>	Test-ASG	DiskReadBytes
<input type="checkbox"/>	Test-ASG	DiskWriteBytes
<input type="checkbox"/>	Test-ASG	DiskReadOps
<input type="checkbox"/>	Test-ASG	DiskWriteOps
<input type="checkbox"/>	Test-ASG	NetworkPacketsIn
<input type="checkbox"/>	Test-ASG	NetworkPacketsOut
<input checked="" type="checkbox"/>	Test-ASG	CPUUtilization
<input type="checkbox"/>	Test-ASG	CPUCreditUsage
<input type="checkbox"/>	Test-ASG	CPUCreditBalance
<input type="checkbox"/>	Test-ASG	CPUSurplusCreditBalance
<input type="checkbox"/>	Test-ASG	CPUSurplusCreditsCharged
<input type="checkbox"/>	Test-ASG	NetworkIn
<input type="checkbox"/>	Test-ASG	StatusCheckFailed_System

Cancel Create widget

Step 5 - Set the minimum and maximum range for the “gauge” widget.

Add metric graph

Browse Query Graphed metrics (1) Options Source

Widget type

Line Stacked area Number Gauge Bar Pie

Legend position

☐ Hidden ☒ Bottom

Gauge range

Min 0 Max 100

Horizontal annotations / thresholds - New

Add threshold

Value

☒ Latest value shows the value from the most recent period of your chosen time range.

☐ Time range value shows the value from the entire time range.

Live data

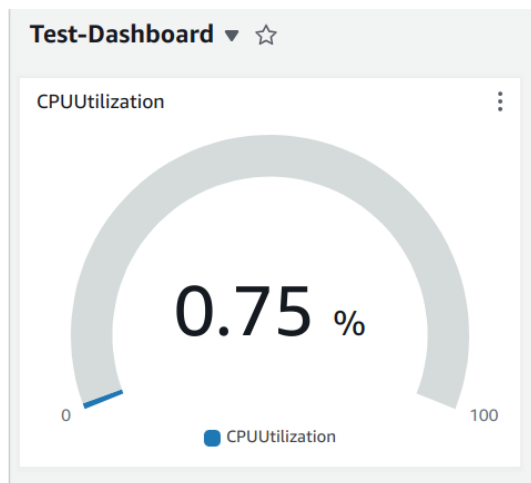
☐ Display most recent data point, even when not yet fully aggregated.

Number widget format

☐ Show as many digits as can fit, before rounding

Cancel Create widget

Step 6 - Click on “Create widget”. The widget is created in the dashboard.






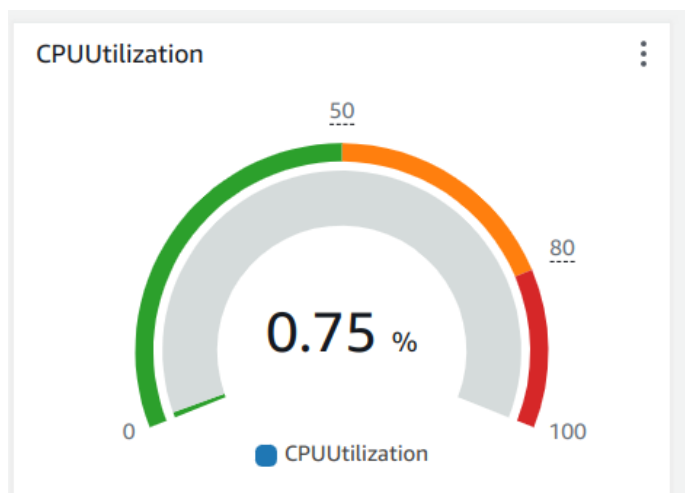
Step 7 - Configuring the gauge widget. Edit the threshold for the gauge widget.

The gauge will be divided in three parts -

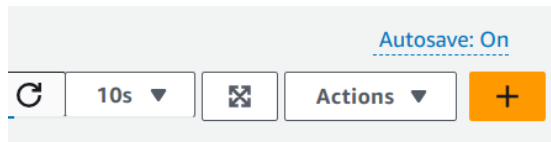
- **Normal** - It will be shown in green, representing normal or expected CPU utilization.
- **Need Attention** - It is shown in orange, representing high CPU utilization which can be handled but needs some attention.
- **Critical** - It is shown in red, representing critical CPU utilization and some action needs to be taken to reduce it or remediate it.

Horizontal annotations / thresholds - **New** [?](#)

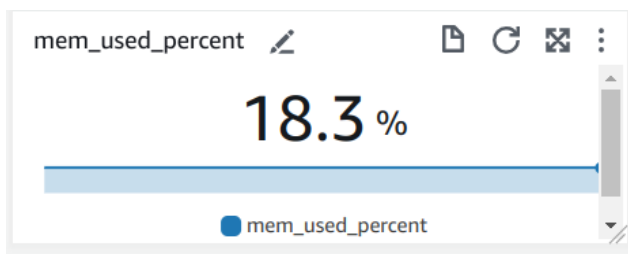
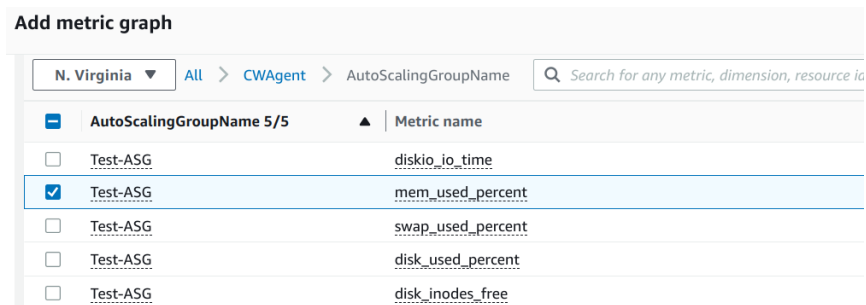
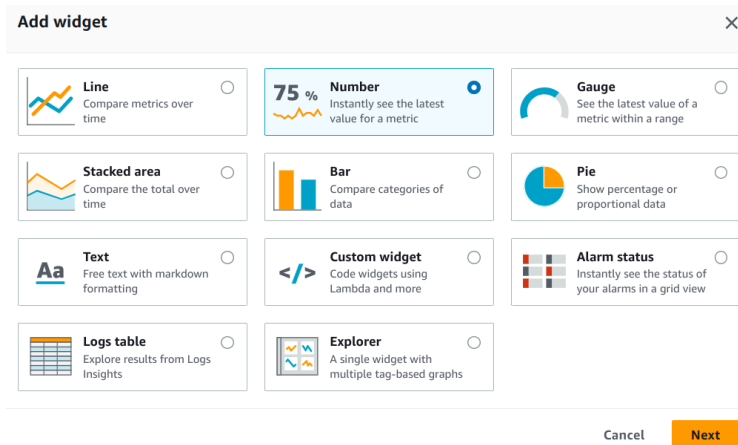
		Label	Value	Fill	Actions
<input checked="" type="checkbox"/>		Need Attention ✎	50 ✎	Between ▼	✕
		Need Attention ✎	80 ✎		
<input checked="" type="checkbox"/>		Critical ✎	80 ✎	Above ▼	✕
<input checked="" type="checkbox"/>		Normal ✎	50 ✎	Below ▼	✕



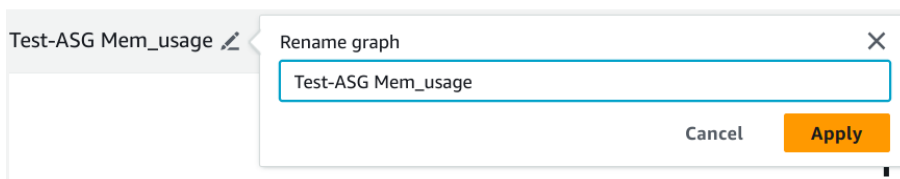
Step 8 - Create more widgets in the dashboard. Click on the plus button.



1. Number widget for displaying memory utilization based on ASG.





Updating the name of the graph.





2. Line widget for disk usage.


Add widget ×


**Line**
Compare metrics over time


**Number**
Instantly see the latest value for a metric


**Gauge**
See the latest value of a metric within a range


**Stacked area**
Compare the total over time


**Bar**
Compare categories of data


**Pie**
Show percentage or proportional data

**Text**
Free text with markdown formatting

**Custom widget**
Code widgets using Lambda and more

**Alarm status**
Instantly see the status of your alarms in a grid view

**Logs table**
Explore results from Logs Insights

**Explorer**
A single widget with multiple tag-based graphs

From which data source would you like to create the widget?

☒ **Metrics**
Add widget based on Metrics and configure your widget on the next step.

☐ **Logs**
Add widget based on query results from CloudWatch Logs Insights.

Cancel Next

Add metric graph

Browse | Query | Graphed metrics (1) | Options | Source

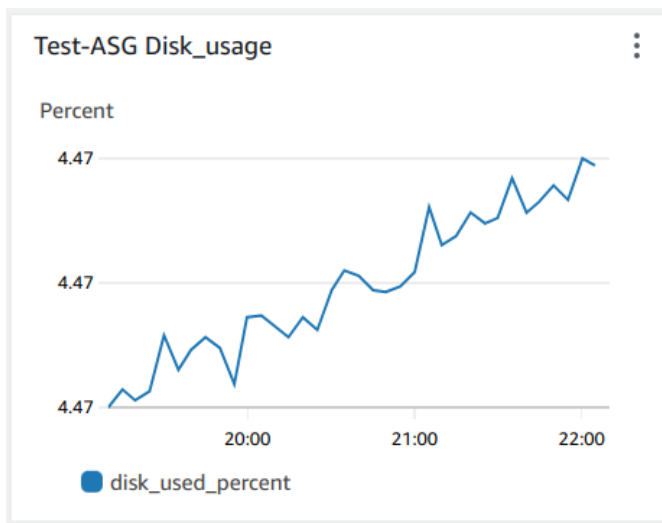
Metrics (5)

N. Virginia ▾

All > CWAgent > AutoScalingGroupName

Q Search for any metric, dimension, resource id or

<input checked="" type="checkbox"/>	AutoScalingGroupName 5/5	Metric name
<input checked="" type="checkbox"/>	Test-ASG	disk_used_percent
<input type="checkbox"/>	Test-ASG	disk_inodes_free
<input type="checkbox"/>	Test-ASG	diskio_io_time
<input type="checkbox"/>	Test-ASG	mem_used_percent
<input type="checkbox"/>	Test-ASG	swap_used_percent



The line widget can be configured to show labels for X and Y axis as required. The values on both the axes can be configured.

Widget type

Line	Stacked area	Number	Gauge	Bar	Pie
------	--------------	--------	-------	-----	-----

Legend position

☐ Hidden
 ☒ Bottom
 ☐ Right

Left Y axis

Label

Limits Min Max

☒ Show units

Live data

☐ Display most recent data point, even when not yet fully aggregated.

Right Y axis

Label

Limits Min Max

☒ Show units

Adding horizontal annotation can help to display certain limits and values.

Horizontal annotations / thresholds - New

	Label	Value	Fill	Axis	Actions
<input checked="" type="checkbox"/>	■ Disk utilization threshold	10	Above	< >	×

[Add horizontal annotation](#)

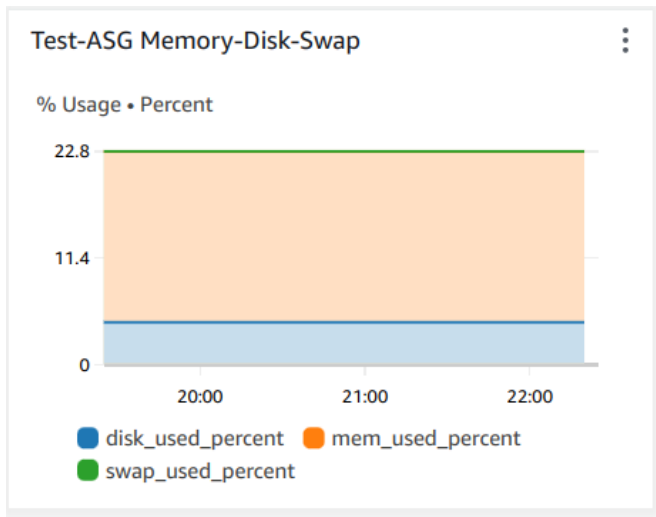
3. Stacked area widget to display and compare trends for related metrics.

<p>Line Compare metrics over time</p>	<p>75 % Number Instantly see the latest value for a metric</p>
<p>Stacked area Compare the total over time</p>	<p>Bar Compare categories of data</p>
<p>Aa Text Free text with markdown formatting</p>	<p>Custom widget Code widgets using Lambda and more</p>

Add metric graph

N. Virginia ▾ All > CWAgent > AutoScalingGroupName 🔍 Search for any metric, dimension, r

<input type="checkbox"/>	AutoScalingGroupName 5/5	Metric name
<input type="checkbox"/>	Test-ASG	diskio_io_time
<input checked="" type="checkbox"/>	Test-ASG	mem_used_percent
<input checked="" type="checkbox"/>	Test-ASG	swap_used_percent
<input checked="" type="checkbox"/>	Test-ASG	disk_used_percent
<input type="checkbox"/>	Test-ASG	disk_inodes_free

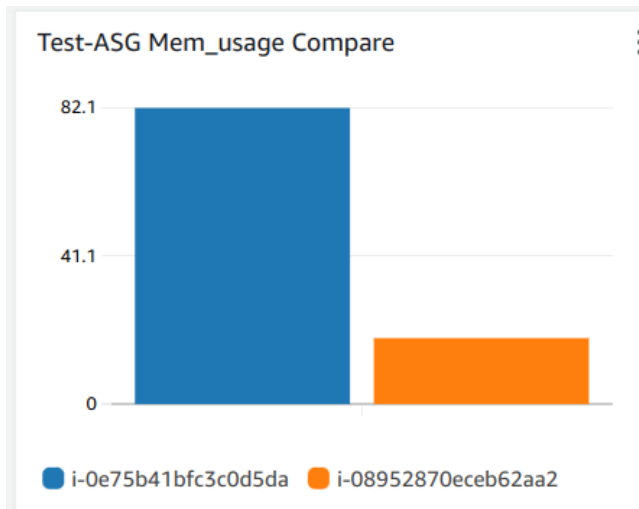


4. Bar graph to compare different metrics.

Line Compare metrics over time	75 % Number Instantly see the latest value for a metric	Gauge See the latest value of a metric within a range
Stacked area Compare the total over time	Bar Compare categories of data	Pie Show percentage or proportional data
Aa Text Free text with markdown formatting	Custom widget Code widgets using Lambda and more	Alarm status Instantly see the status of your alarms in a grid view

Taking memory usage metrics of the two instances running in the ASG.

<input checked="" type="checkbox"/>	No name specified	Test-ASG	i-0e75b41bfc3c0d5da	mem_used_percent
<input type="checkbox"/>	No name specified	Test-ASG	i-0e75b41bfc3c0d5da	swap_used_percent
<input checked="" type="checkbox"/>	No name specified	Test-ASG	i-08952870eceb62aa2	mem_used_percent
<input type="checkbox"/>	No name specified	Test-ASG	i-08952870eceb62aa2	swap_used_percent



5. Pie chart to display proportional data.

Add widget ✕

Line
Compare metrics over time

75 % Number
Instantly see the latest value for a metric

Gauge
See the latest value of a metric within a range

Stacked area
Compare the total over time

Bar
Compare categories of data

Pie
Show percentage or proportional data

Aa Text
Free text with markdown formatting

Custom widget
Code widgets using Lambda and more

Alarm status
Instantly see the status of your alarms in a grid view

Logs table
Explore results from Logs Insights

Explorer
A single widget with multiple tag-based graphs

From which data source would you like to create the widget?

☒ **Metrics**
Add widget based on Metrics and configure your widget on the next step.

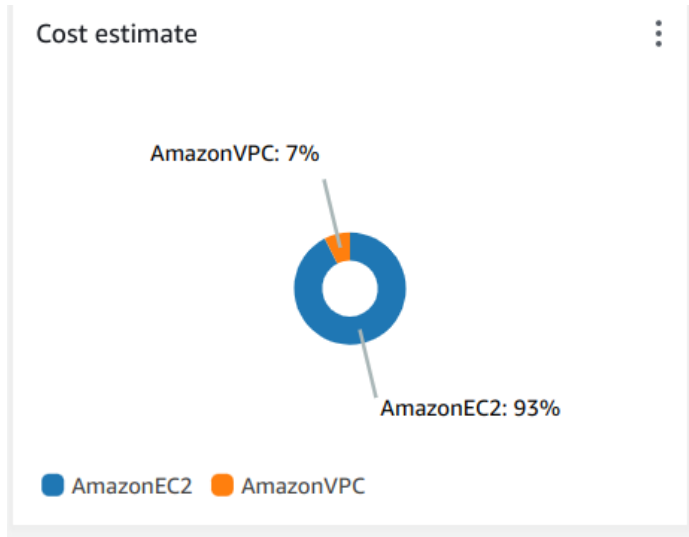
☐ **Logs**
Add widget based on query results from CloudWatch Logs Insights.

Cancel Next

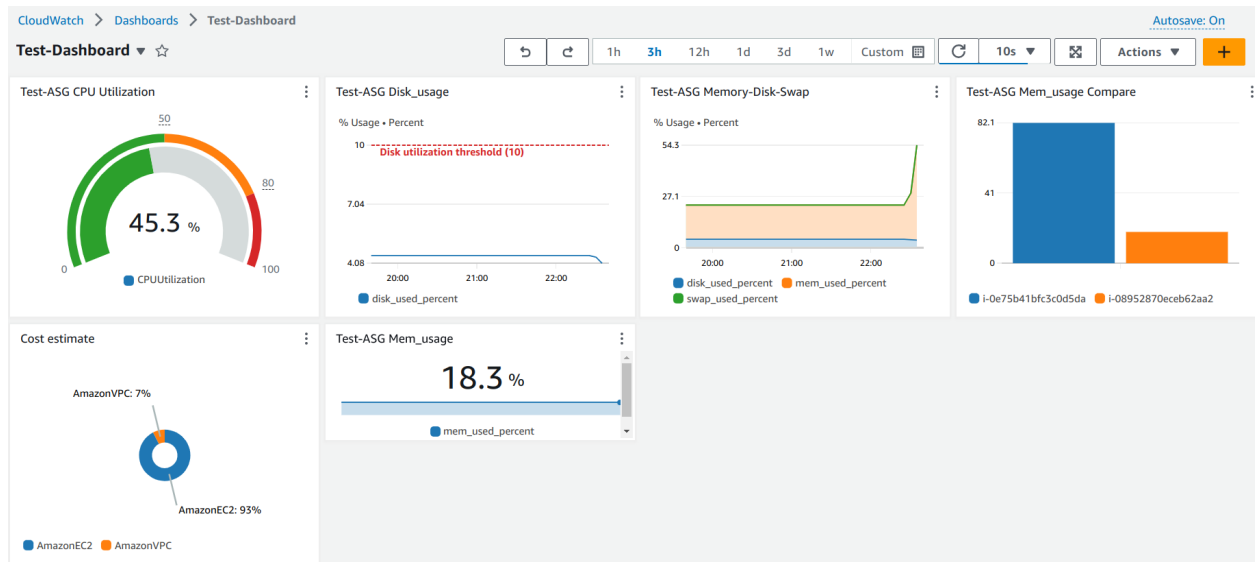
Add metric graph

N. Virginia ▼ All > Billing > By Service

ServiceName 13/13	Currency	Metric name
<input type="checkbox"/> AmazonCloudWatch	USD	EstimatedCharges
<input checked="" type="checkbox"/> AmazonEC2	USD	EstimatedCharges
<input type="checkbox"/> AmazonRDS	USD	EstimatedCharges
<input type="checkbox"/> AmazonRoute53	USD	EstimatedCharges
<input type="checkbox"/> AmazonS3	USD	EstimatedCharges
<input type="checkbox"/> AmazonSNS	USD	EstimatedCharges
<input checked="" type="checkbox"/> AmazonVPC	USD	EstimatedCharges



Step 9 - The complete dashboard.



Assignment 2 - Create metric filter in cloudwatch for security group and user authorization.

Step 1 - Navigate to the CloudWatch console and create a log group.

Create log group

Log group details

Log group name

Retention setting

Never expire ▼

KMS key ARN - optional

Step 2 - Create a metric filter in the log group.

“{ (\$.eventName = ConsoleLogin) && (\$.errorMessage = "Failed authentication") }” - The filter pattern will filter out the specified events of console login requests with an error message of failed authentication.

Create filter pattern

You can use metric filters to monitor events in a log group as they are sent to CloudWatch Logs. You can monitor and count specific terms or extract values from log events and associate the results with a metric. [Learn more about pattern syntax.](#)

Filter pattern

Specify the terms or pattern to match in your log events to create metrics.

✕

Create filter name

Log events that match the pattern you define are recorded to the metric that you specify. You can graph the metric and set alarms to notify you.

Filter name

Filter pattern

{ (\$.eventName = ConsoleLogin) && (\$.errorMessage = "Failed authentication") }

The metric will have the name “LoginRequest_FailureCount” and will be stored in the “ConsoleLogins” namespace.

Metric details

Metric namespace

Namespaces let you group similar metrics. [Learn more](#)

☒ Create new

Namespaces can be up to 255 characters long; all characters are valid except for colon(:) at the start of the name.

Metric name

Metric name identifies this metric, and must be unique within the namespace. [Learn more](#)

Metric name can be up to 255 characters long; all characters are valid except for colon(:), asterisk(*), dollar(\$), and space().

Metric value

Metric value is the value published to the metric name when a Filter Pattern match occurs.

Valid metric values are: floating point number (1, 99.9, etc.), numeric field identifiers (\$1, \$2, etc.), or named field identifiers (e.g.

Step 3 - Select the metric filter and create an alarm.

Metric filters (1)

Edit
Delete
Create alarm

Console_SignIn_Fails

Filter pattern

{ (\$.eventName = ConsoleLogin) && (\$.errorMessage = "Failed authentication") }

Metric

[ConsoleLogins](#) / [LoginRequest_FailureCount](#)

Metric value

1

Default value

-

Unit

-

Dimensions

-

Alarms

None.

The alarm will be triggered whenever the condition meets. Here the condition is whenever the metric value is greater than or equal to one, the action to send an alert through the SNS topic will be triggered.

Conditions

Threshold type

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

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

Whenever LoginRequest_FailureCount 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

Notification

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.

Remove

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**

Send a notification to...

Only email lists for this account are available.

Email (endpoints)
skayarkar89@gmail.com - [View in SNS Console](#)

Add notification

Name and description

Alarm name

Alarm description - optional [View formatting guidelines](#)

Edit | Preview

Login request to the AWS management console has failed. Please check the login credentials.

Up to 1024 characters (91/1024)

Markdown formatting is only applied when viewing your alarm in the console. The description will remain in plain text in the alarm notifications.

Cancel Previous Next

Confirm the subscription request of SNS topic.

Confirm subscription

Enter the subscription confirmation url.

Cancel Confirm subscription

Step 4 - Create a second metric filter for security group configuration changes.

“{(\$.eventName = AuthorizeSecurityGroupIngress) || (\$.eventName = AuthorizeSecurityGroupEgress) || (\$.eventName = RevokeSecurityGroupIngress) || (\$.eventName = RevokeSecurityGroupEgress) || (\$.eventName = CreateSecurityGroup) || (\$.eventName = DeleteSecurityGroup) }” - This filter pattern will filter out the logs of any security group configuration changes based on the event names specified in the pattern.

Define pattern

Create filter pattern

You can use metric filters to monitor events in a log group as they are sent to CloudWatch Logs. You can monitor and count specific terms or extract values from log events and associate the results with a metric. [Learn more about pattern syntax.](#)

Filter pattern

Specify the terms or pattern to match in your log events to create metrics.

The filter name is “SecurityGroup_ConfigurationChanges”, with the metric “SG-ConfigurationChangeCount” stored in the “SG_Configuration” metric namespace.

Create filter name

Log events that match the pattern you define are recorded to the metric that you specify. You can graph the metric and set alarms to notify you.

Filter name

Filter pattern

```
{ ($.eventName = AuthorizeSecurityGroupIngress) || ($.eventName = AuthorizeSec
```

Metric details

Metric namespace
Namespaces let you group similar metrics. [Learn more](#)

 ☒ Create new
Namespaces can be up to 255 characters long; all characters are valid except for colon(:) at the start of the name.

Metric name
Metric name identifies this metric, and must be unique within the namespace. [Learn more](#)

Metric name can be up to 255 characters long; all characters are valid except for colon(:), asterisk(*), dollar(\$), and space().

Metric value
Metric value is the value published to the metric name when a Filter Pattern match occurs.

Valid metric values are: floating point number (1, 99.9, etc.), numeric field identifiers (\$1, \$2, etc.), or named field identifiers (e.g. \$requestSize for delimited filter pattern or \$.status for JSON-based filter pattern - dollar (\$) or dollar dot (.\$) followed by

Step 5 - Create an alarm for the above metric filter.

The alarm will be triggered whenever the metric value is equal to or greater than 1.

Conditions

Threshold type

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

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

Whenever SG-ConfigurationChangeCount 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

Add the action to notify through the SNS topic and confirm the subscription request in SNS console.

Notification

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.

Remove

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.

SecurityGroupEvent_SNS

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.

skayarkar89@gmail.com

Name and description

Alarm name

SecurityGroup_ConfigurationEvent

Alarm description - optional [View formatting guidelines](#)

EditPreview

A security group configuration has been changes.

Up to 1024 characters (48/1024)

ⓘ

Markdown formatting is only applied when viewing your alarm in the console. The description will remain in plain text in the alarm notifications.

CancelPreviousNext

Both the metric filters are created.

Console_SignIn_Fails <input type="checkbox"/>	SecurityGroup_ConfigurationChanges <input type="checkbox"/>
Filter pattern { (\$.eventName = ConsoleLogin) && (\$.errorMessage = "Failed authentication") }	Filter pattern { (\$.eventName = AuthorizeSecurityGroupIngress) (\$.eventName = AuthorizeSecurityGroupEgress) (\$.eventName = RevokeSecurityGroupIngress) (\$.eventName = RevokeSecurityGroupEgress) (\$.eventName = CreateSecurityGroup) (\$.eventName = DeleteSecurityGroup) }
Metric ConsoleLogins / LoginRequest_FailureCount	Metric SG_Configuration / SG-ConfigurationChangeCount
Metric value 1	Metric value 1
Default value -	Default value -
Unit -	Unit -
Dimensions -	Dimensions -
Alarms Console Login Fail	Alarms SecurityGroup_ConfigurationEvent

Step 6 - Create a CloudTrail trail. To log API calls in the cloudwatch log group that was created in the previous step.

Quick trail create

Trail details

Start logging management events by creating a trail with simplified settings. Logs are sent to an S3 bucket we create on your behalf. To choose a different bucket or additional events, go to the full [Create trail](#) workflow.

A trail created in the console is a multi-region trail. [Learn more](#)

Trail name

Enter a display name for your trail.

3-128 characters. Only letters, numbers, periods, underscores, and dashes are allowed.

Trail log bucket and folder

aws-cloudtrail-logs-237042273450-300568af

Logs will be stored in aws-cloudtrail-logs-237042273450-300568af/AWSLogs/237042273450

ⓘ Though there is no cost to log these events, you incur charges for the S3 bucket that we create to store your logs.

Cancel

Create trail

Step 7 - Edit the trail and enable CloudWatch logs.

The role attached will allow CloudTrail to push logs to CloudWatch log group “Test-logGroup”.

CloudWatch Logs - optional
Configure CloudWatch Logs to monitor your trail logs and notify you when specific activity occurs. Standard CloudWatch and CloudWatch Logs charges apply. [Learn more](#)

CloudWatch Logs [Info](#)

☒ Enabled

☐ New

☒ Existing

Log group name

1-512 characters. Only letters, numbers, dashes, underscores, forward slashes, and periods are allowed.

AWS CloudTrail assumes this role to send CloudTrail events to your CloudWatch Logs log group.

☐ New

☒ Existing

Role name

[Policy document](#)

Cancel

Save changes

CloudWatch Logs [Edit](#)

Log group

UserRequestFails

IAM Role

arn:aws:iam::237042273450:role/service-role/CloudTrail_logsTo_cloudWatch

Step 8 - Check if the alarms and metric filters are working correctly.

- **Configure one of the security groups.**

Adding an inbound rule to allow all traffic from anywhere.

Inbound rules [Info](#)

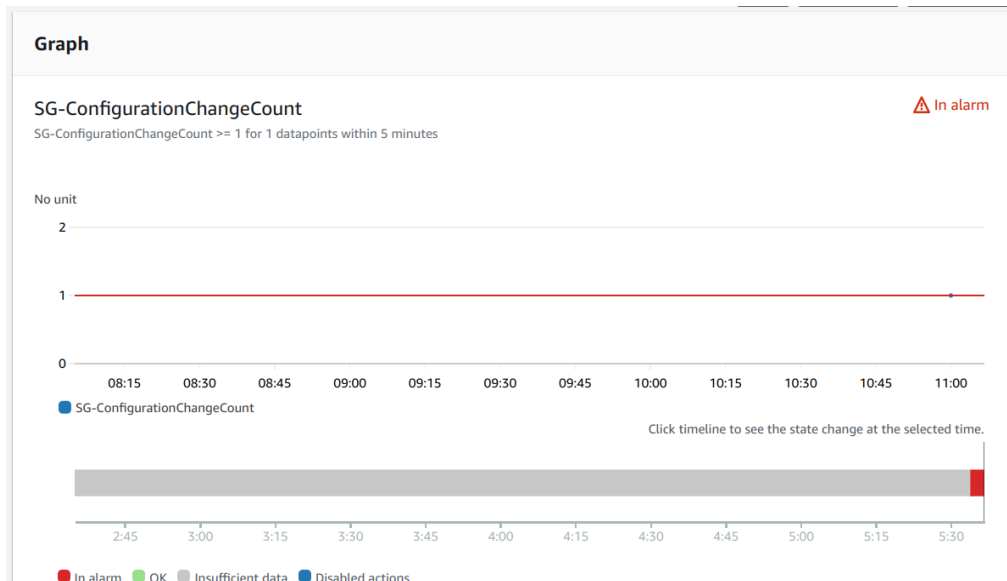
Security group rule ID	Type Info	Protocol Info	Port range Info	Source Info	Description - optional Info	
sgr-0a6d00365c749d2aa	All traffic	All	All	Custom	<input type="text" value="sg-0704dc427f2870dfa"/>	<input type="button" value="Delete"/>
sgr-0a93fcdcb60e017f9	SSH	TCP	22	Custom	<input type="text" value="0.0.0.0"/>	<input type="button" value="Delete"/>
-	All traffic	All	All	Anywh...	<input type="text" value="0.0.0.0"/>	<input type="button" value="Delete"/>

Cancel

Preview changes

Save rules

The alarm state turns to an “in-alarm” state.



Email alert sent through SNS topic.

ALARM: "SecurityGroup_ConfigurationEvent" in US East (N. Virginia) Inbox x

AWS Notifications <no-reply@sns.amazonaws.com> 11:03 AM (3 minutes ago) ☆ ↶

to me ▾

You are receiving this email because your Amazon CloudWatch Alarm "SecurityGroup_ConfigurationEvent" in the US East (N. Virginia) region has entered the ALARM state, because "Threshold Crossed: 1 out of the last 1 datapoints [1.0 (27/07/23 05:28:00)] was greater than or equal to the threshold (1.0) (minimum 1 datapoint for OK -> ALARM transition)." at "Thur 27 July, 2023 05:33:51 UTC".

View this alarm in the AWS Management Console:
https://us-east-1.console.aws.amazon.com/cloudwatch/deeplink.js?region=us-east-1#alarmsV2:alarm/SecurityGroup_ConfigurationEvent

Alarm Details:

- Name: SecurityGroup_ConfigurationEvent
- Description: A security group configuration has been changes.
- State Change: INSUFFICIENT_DATA -> ALARM
- Reason for State Change: Threshold Crossed: 1 out of the last 1 datapoints [1.0 (27/07/23 05:28:00)] was greater than or equal to the threshold (1.0) (minimum 1 datapoint for OK -> ALARM transition).
- Timestamp: Thursday 27 July, 2023 05:33:51 UTC
- AWS Account: 237042273450
- Alarm Arn: arn:aws:cloudwatch:us-east-1:237042273450:alarm:SecurityGroup_ConfigurationEvent

Threshold:

- The alarm is in the ALARM state when the metric is GreaterThanOrEqualToThreshold 1.0 for at least 1 of the last 1 period(s) of 300 seconds.

Monitored Metric:

- MetricNamespace: SG_Configuration
- MetricName: SG-ConfigurationChangeCount

- **Make a console login fail attempt.**

Your authentication information is incorrect. Please try again.

Sign in as IAM user

Account ID (12 digits) or account alias

237042273450

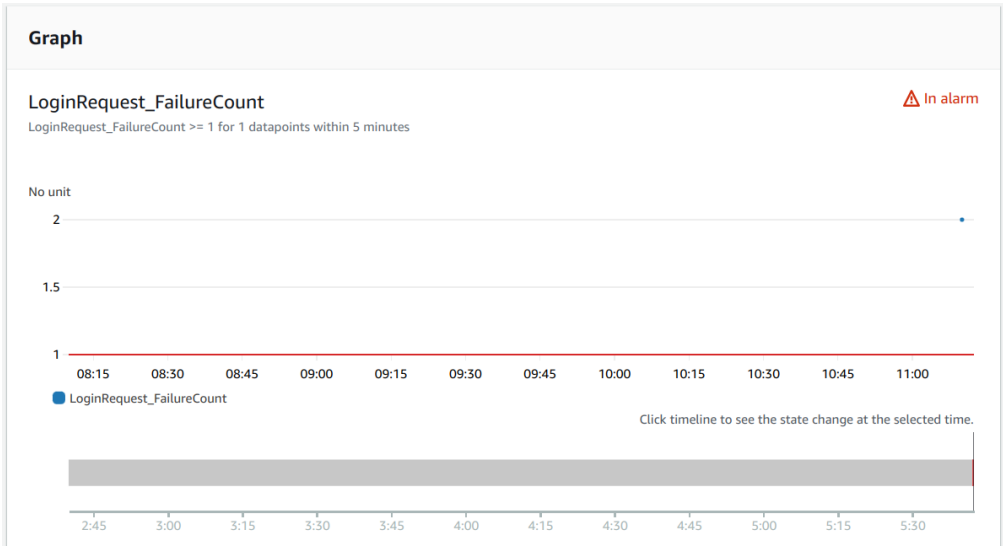
IAM user name

IAM_user-ShreyasK


Password

☒ Remember this account

Sign in



ALARM: "Console Login Fail" in US East (N. Virginia) Inbox x

**AWS Notifications** <no-reply@sns.amazonaws.com> 11:12 AM (C)

to me ▾

You are receiving this email because your Amazon CloudWatch Alarm "Console Login Fail" in the US East (N. Virginia) region has entered the ALARM state out of the last 1 datapoints [2.0 (27/07/23 05:37:00)] was greater than or equal to the threshold (1.0) (minimum 1 datapoint for OK -> ALARM transition)." at UTC".

View this alarm in the AWS Management Console:
<https://us-east-1.console.aws.amazon.com/cloudwatch/deeplink.js?region=us-east-1#alarmsV2:alarm/Console%20Login%20Fail>

Alarm Details:

- Name: Console Login Fail
- Description: Login request to the AWS management console has failed. Please check the login credentials.
- State Change: INSUFFICIENT_DATA -> ALARM
- Reason for State Change: Threshold Crossed: 1 out of the last 1 datapoints [2.0 (27/07/23 05:37:00)] was greater than or equal to the threshold (1.0) (minimum 1 datapoint for OK -> ALARM transition).
- Timestamp: Thursday 27 July, 2023 05:42:06 UTC
- AWS Account: 237042273450
- Alarm Arn: arn:aws:cloudwatch:us-east-1:237042273450:alarm:Console Login Fail

Threshold:

- The alarm is in the ALARM state when the metric is GreaterThanOrEqualToThreshold 1.0 for at least 1 of the last 1 period(s) of 300 seconds.

Monitored Metric: