EC2 CPU UTILIZATION MONITORING WITH CLOUDWATCH AND ALERTING USING SNS

Project Overview

In this project I implemented a real-time monitoring solution to track EC2 CPU utilization using AWS CloudWatch. When CPU usage exceeds a defined threshold, an automated alert is triggered and delivered via Amazon SNS email notifications.

Project Architecture

EC2 → CloudWatch Metric → CloudWatch Alarm → SNS Topic → Email

AWS Services Used

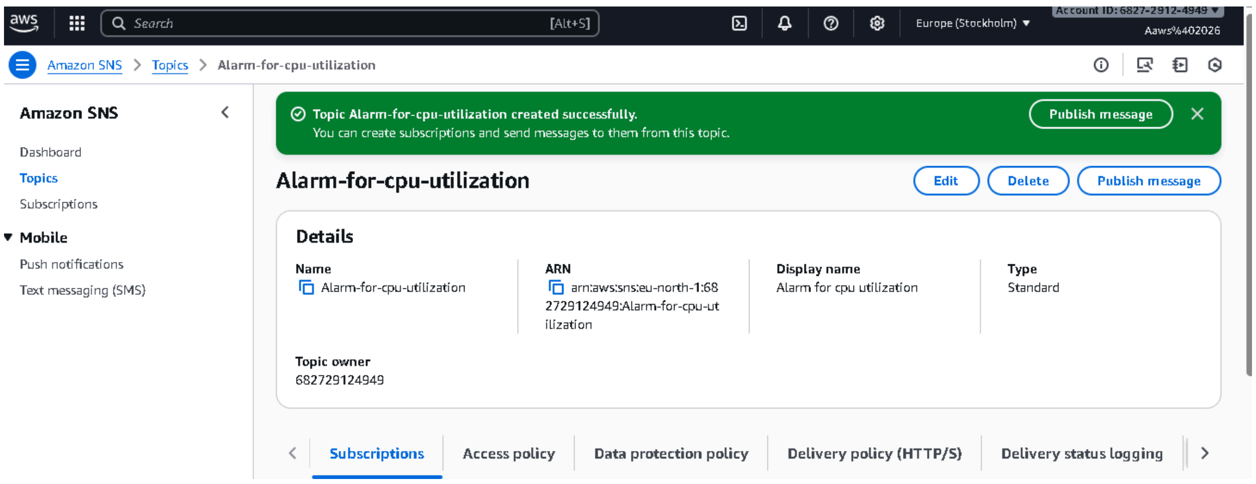
- Amazon EC2 – Compute resource being monitored
- Amazon CloudWatch – Metric collection and alarm configuration
- Amazon SNS – Notification service for sending alerts
- IAM – Access control for monitoring and notifications

Steps followed :

1: I created an SNS Topic (Alert Channel)
SNS is used to fan-out notifications (email, SMS, Lambda, HTTP).

SNS → Topics → Create topic
Type: Standard
Name: HighCPUAlertTopic --> Create topic
➕ Add Subscription
Open the topic --> Create subscription:
Protocol: Email
Endpoint: your email ID

!!!Confirm subscription from email!!! (Without confirmation → alarm won't send emails)



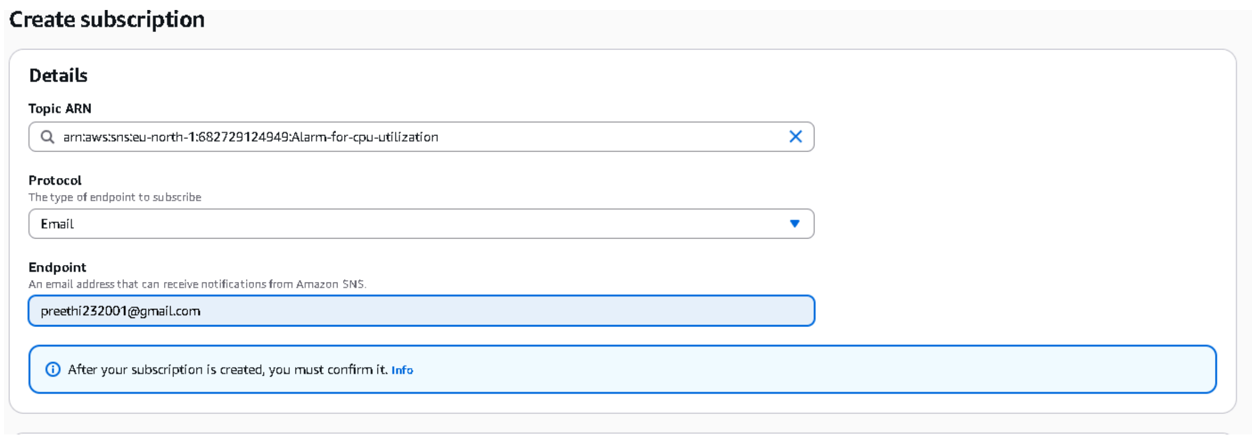
Topic Alarm-for-cpu-utilization created successfully.
You can create subscriptions and send messages to them from this topic.

Alarm-for-cpu-utilization

Details

Name	ARN	Display name	Type
Alarm-for-cpu-utilization	arn:aws:sns:eu-north-1:682729124949:Alarm-for-cpu-utilization	Alarm for cpu utilization	Standard

Topic owner
682729124949



Create subscription

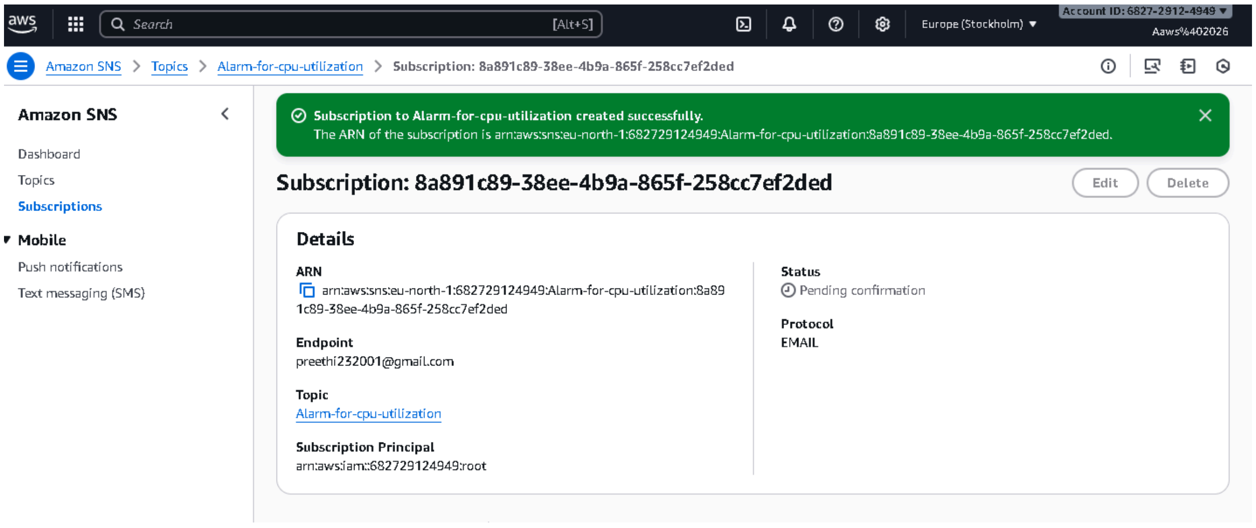
Details

Topic ARN
arn:aws:sns:eu-north-1:682729124949:Alarm-for-cpu-utilization

Protocol
The type of endpoint to subscribe
Email

Endpoint
An email address that can receive notifications from Amazon SNS.
preethi232001@gmail.com

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


Amazon SNS > Topics > Alarm-for-cpu-utilization > Subscription: 8a891c89-38ee-4b9a-865f-258cc7ef2ded

Subscription to Alarm-for-cpu-utilization created successfully.
The ARN of the subscription is arn:aws:sns:eu-north-1:682729124949:Alarm-for-cpu-utilization:8a891c89-38ee-4b9a-865f-258cc7ef2ded.

Subscription: 8a891c89-38ee-4b9a-865f-258cc7ef2ded

Details

ARN
arn:aws:sns:eu-north-1:682729124949:Alarm-for-cpu-utilization:8a891c89-38ee-4b9a-865f-258cc7ef2ded

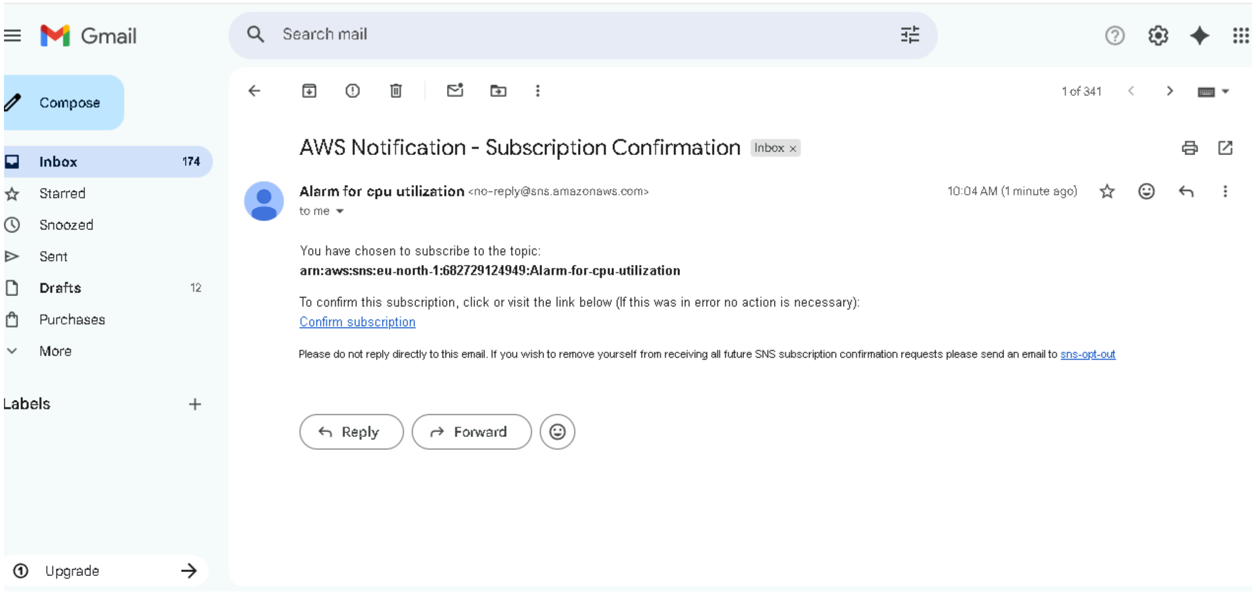
Endpoint
preethi232001@gmail.com

Topic
Alarm-for-cpu-utilization

Subscription Principal
arn:aws:iam::682729124949:root

Status
Pending confirmation

Protocol
EMAIL


AWS Notification - Subscription Confirmation

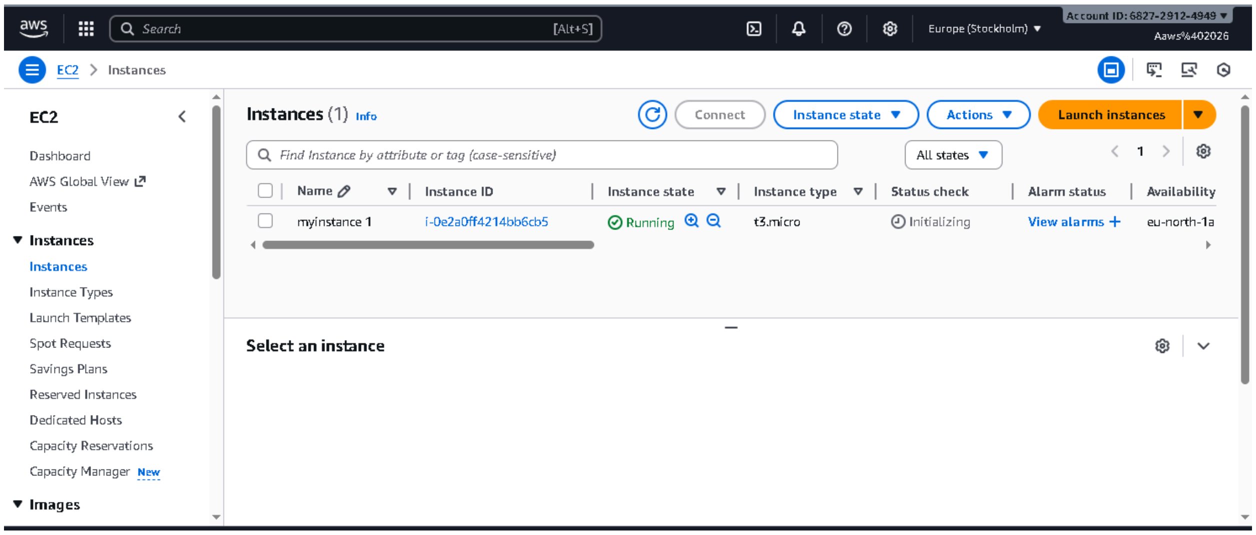
Alarm for cpu utilization <no-reply@sns.amazonaws.com>
to me
10:04 AM (1 minute ago)

You have chosen to subscribe to the topic:
arn:aws:sns:eu-north-1:682729124949:Alarm-for-cpu-utilization

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

Please do not reply directly to this email. If you wish to remove yourself from receiving all future SNS subscription confirmation requests please send an email to sns-opt-out

2: I created an EC2 instance to monitor and verified its Metrics in CloudWatch



Instances (1) Info

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability
myinstance 1	i-0e2a0ff4214bb6cb5	Running	t3.micro	Initializing	View alarms +	eu-north-1a

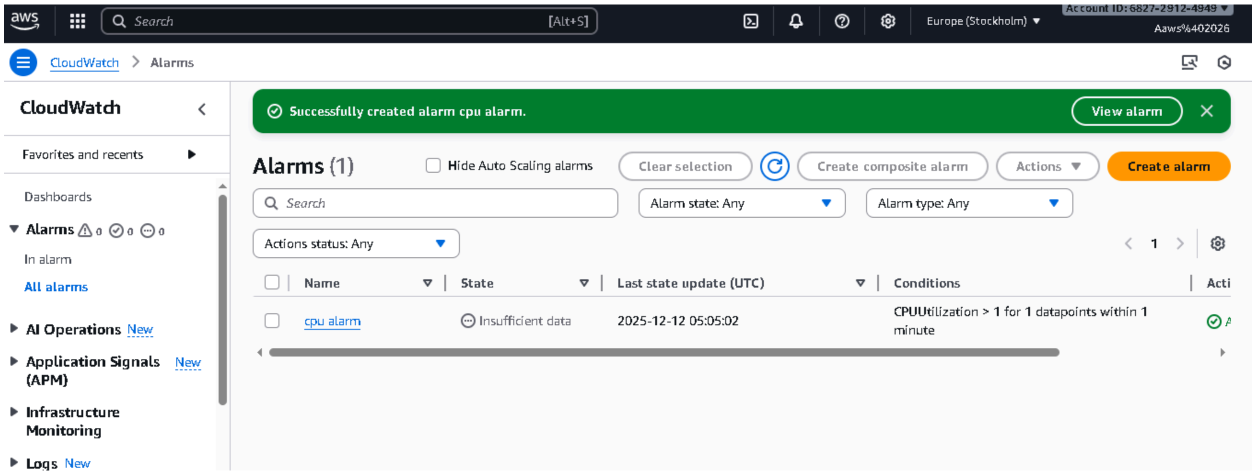
Select an instance

CloudWatch → Metrics
Select:
EC2 → Per-Instance Metrics
Choose your InstanceId
Confirm CPUUtilization metric is visible

EC2 sends CPU metrics by default (no agent needed)

3: Created a CloudWatch Alarm

CloudWatch → Alarms → Create alarm
Select metric:
EC2 → Per-Instance Metrics → CPUUtilization
⚙️ Configure Condition
Statistic: Average
Period: 1 minute
Threshold type: Static
Condition:
CPUUtilization > 10%



Successfully created alarm cpu alarm.

Alarms (1)

Hide Auto Scaling alarms

Alarm state: Any | Alarm type: Any | Actions status: Any

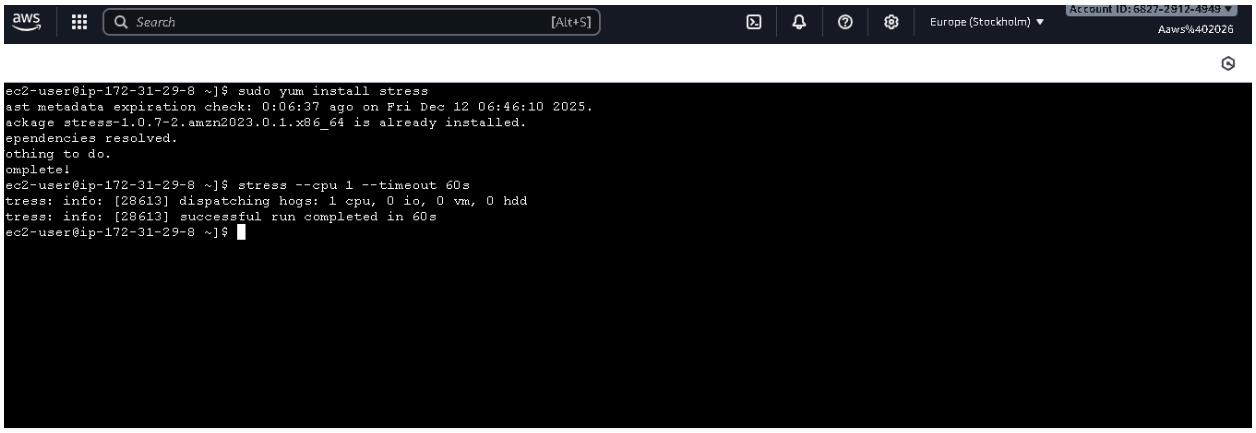
Name	State	Last state update (UTC)	Conditions	Acti
cpu alarm	Insufficient data	2025-12-12 05:05:02	CPUUtilization > 1 for 1 datapoints within 1 minute	

4: Attached the SNS Topic to Alarm

In Notification section:

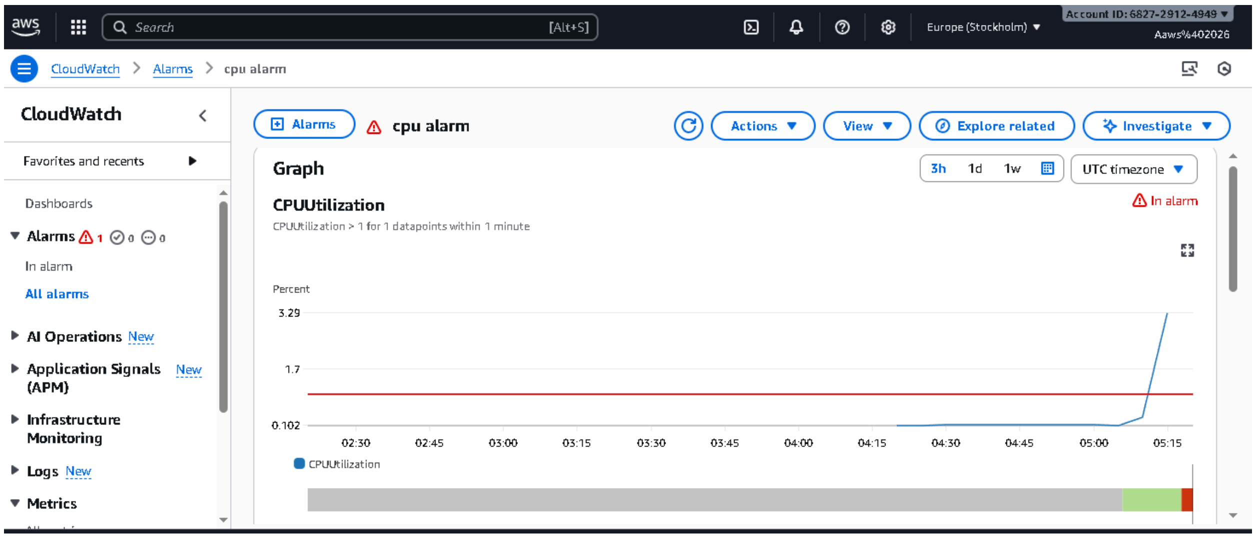
Alarm state: In alarm
Send notification to: Existing SNS topic
Select HighCPUAlertTopic

5.Manually triggered the cpu usage using linux commands through stress package

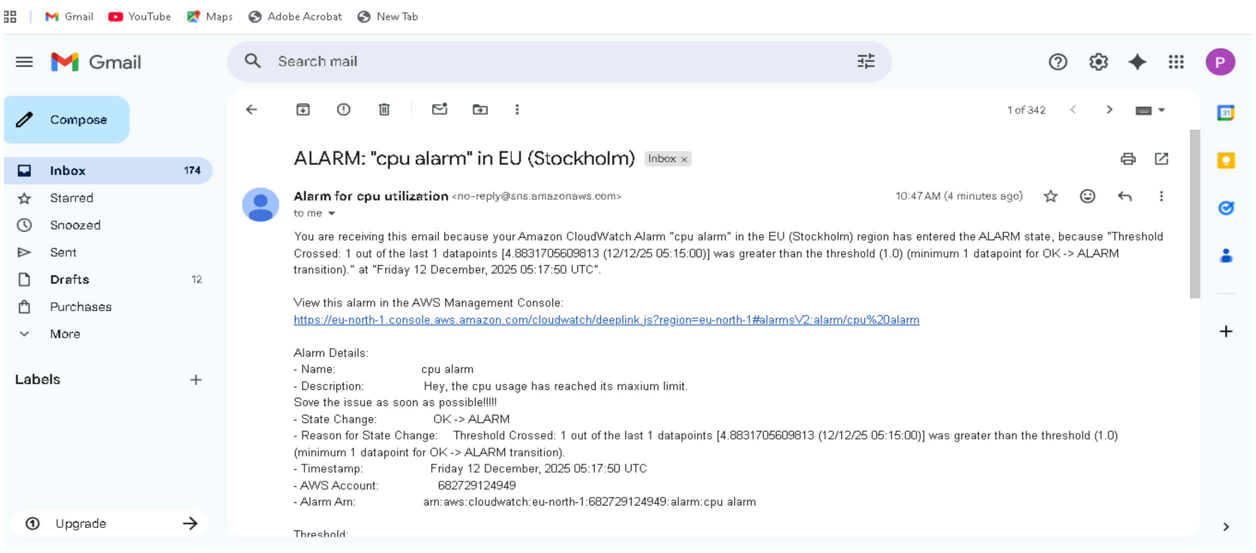


```
ec2-user@ip-172-31-29-8 ~]$ sudo yum install stress
ast metadata expiration check: 0:06:37 ago on Fri Dec 12 06:46:10 2025.
ackage stress-1.0.7-2.amzn2023.0.1.x86_64 is already installed.
ependencies resolved.
othing to do.
omplete!
ec2-user@ip-172-31-29-8 ~]$ stress --cpu 1 --timeout 60s
tress: info: [28613] dispatching hogs: 1 cpu, 0 io, 0 vm, 0 hdd
tress: info: [28613] successful run completed in 60s
ec2-user@ip-172-31-29-8 ~]$
```

6.The graph in the Cloudwatch after triggering the usage manually



📧 Email received via SNS and check the MONITORING TAB in cloudwatch to see the graph change



ALARM: "cpu alarm" in EU (Stockholm) Inbox

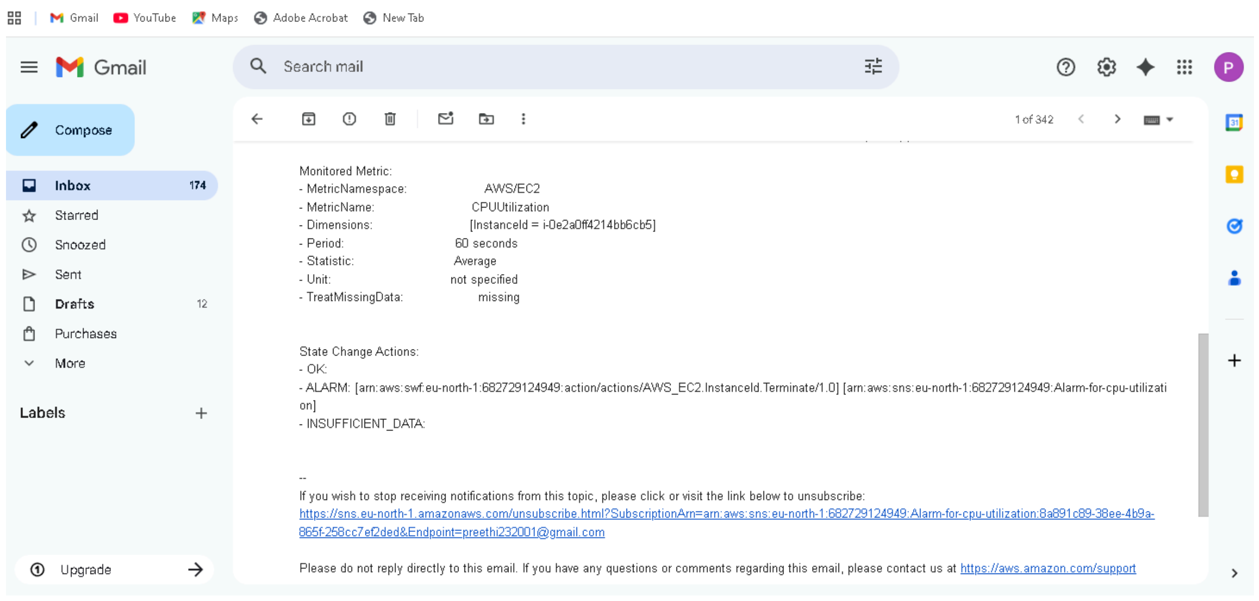
Alarm for cpu utilization <no-reply@sns.amazonaws.com> 10:47 AM (4 minutes ago)
to me

You are receiving this email because your Amazon CloudWatch Alarm "cpu alarm" in the EU (Stockholm) region has entered the ALARM state, because "Threshold Crossed: 1 out of the last 1 datapoints [4.8831705609813 (12/12/25 05:15:00)] was greater than the threshold (1.0) (minimum 1 datapoint for OK -> ALARM transition)." at "Friday 12 December, 2025 05:17:50 UTC".

View this alarm in the AWS Management Console:
https://eu-north-1.console.aws.amazon.com/cloudwatch/deeplink.js?region=eu-north-1#alarmsV2:alarm/cpu%20alarm

Alarm Details:
- Name: cpu alarm
- Description: Hey, the cpu usage has reached its maxium limit.
Sove the issue as soon as possible!!!!!
- State Change: OK -> ALARM
- Reason for State Change: Threshold Crossed: 1 out of the last 1 datapoints [4.8831705609813 (12/12/25 05:15:00)] was greater than the threshold (1.0) (minimum 1 datapoint for OK -> ALARM transition).
- Timestamp: Friday 12 December, 2025 05:17:50 UTC
- AWS Account: 682729124949
- Alarm Arn: arn:aws:cloudwatch:eu-north-1:682729124949:alarm:cpu alarm

Threshold:



```
Monitored Metric:
- MetricNamespace:                AWS/EC2
- MetricName:                     CPUUtilization
- Dimensions:                     [InstanceId = i-0e2a0ff4214bb6cb5]
- Period:                         60 seconds
- Statistic:                      Average
- Unit:                           not specified
- TreatMissingData:               missing


State Change Actions:
- OK:
- ALARM: [arn:aws:swf:eu-north-1:682729124949:action/actions/AWS_EC2.InstanceId.Terminate/1.0] [arn:aws:sns:eu-north-1:682729124949:Alarm-for-cpu-utilizati
on]
- INSUFFICIENT_DATA: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If you wish to stop receiving notifications from this topic, please click or visit the link below to unsubscribe:
https://sns.eu-north-1.amazonaws.com/unsubscribe.html?SubscriptionArn=arn:aws:sns:eu-north-1:682729124949:Alarm-for-cpu-utilization:8a891c89-38ee-4b9a-
865f-258cc7ef2ded&Endpoint=preethi232001@gmail.com

Please do not reply directly to this email. If you have any questions or comments regarding this email, please contact us at https://aws.amazon.com/support
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Testing & Validation

Simulated high CPU usage on the EC2 instance using stress commands and verified alarm state change and email notification delivery through SNS.

Outcome

Successfully achieved automated monitoring and alerting, ensuring timely notification during high CPU utilization without manual intervention.

Key Learnings

- CloudWatch metrics and alarm evaluation
- SNS topic and subscription workflow
- Real-time monitoring and alert automation
- Importance of proactive resource monitoring

Conclusion

In this project I demonstrated a practical cloud monitoring solution using AWS native services to improve reliability, responsiveness, and operational efficiency.