1) Automated Infrastructure Setup

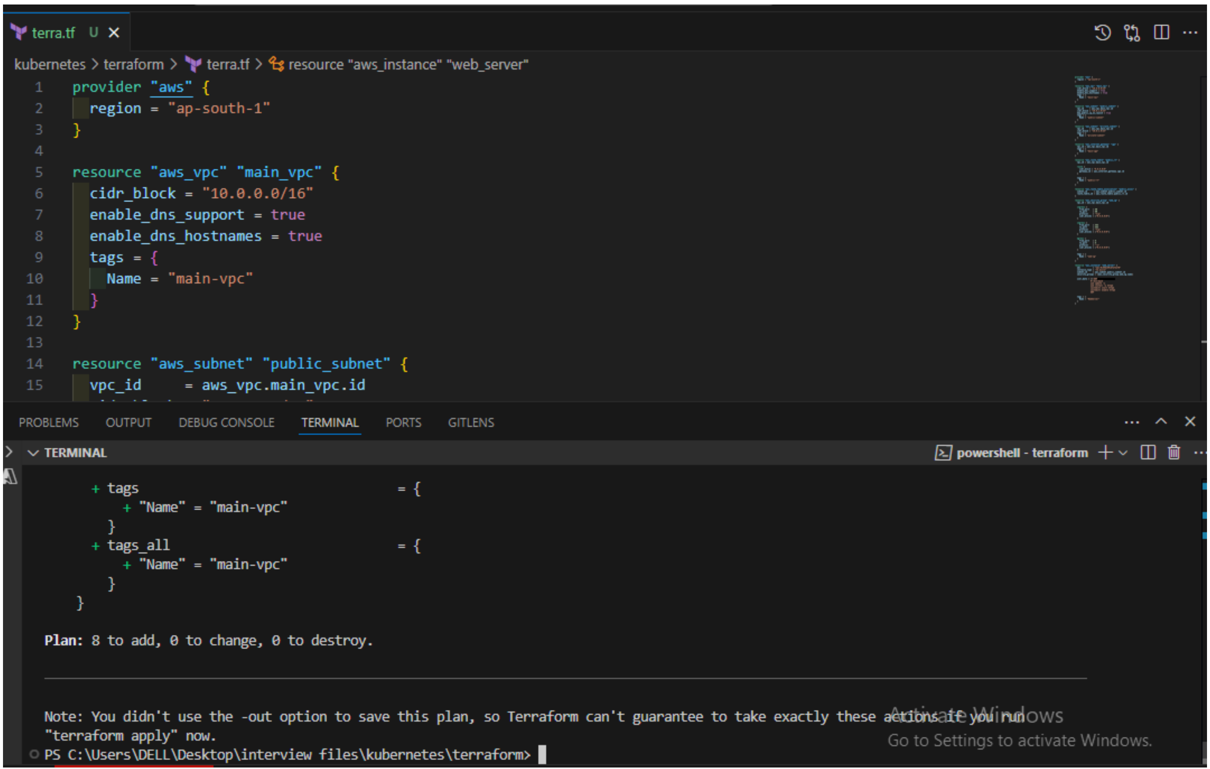
- Use Terraform to provision a GCP environment with the following components:

o One VPC with two subnets (public and private).

o A Compute Engine instance in the public subnet with a web server installed (e.g., Nginx
or Apache).

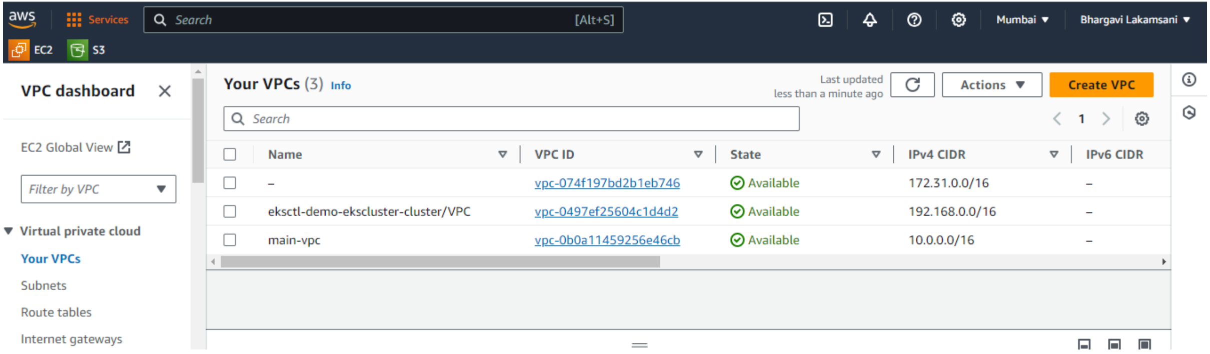
o Firewall rules that allow HTTP/HTTPS traffic to the instance.

Instead of GCP using AWS



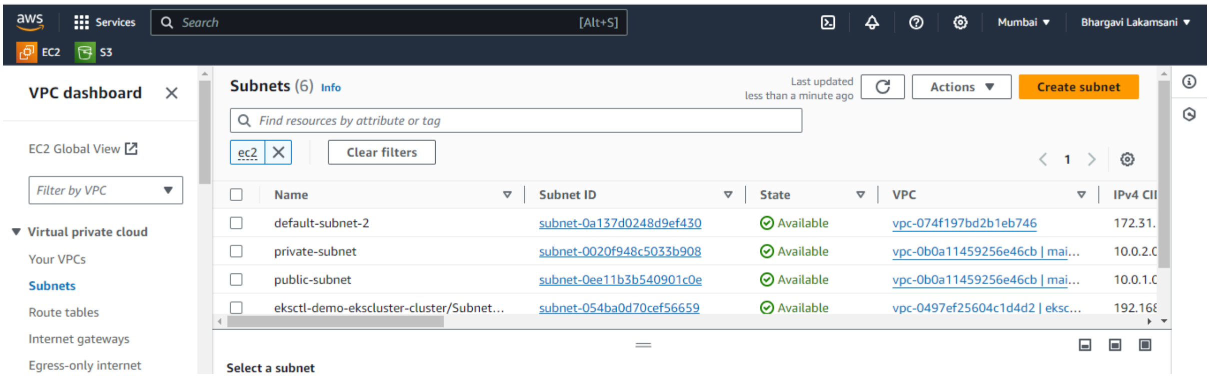
```
provider "aws" {
  region = "ap-south-1"
}

resource "aws_vpc" "main_vpc" {
  cidr_block = "10.0.0.0/16"
  enable_dns_support = true
  enable_dns_hostnames = true
  tags = {
    Name = "main-vpc"
  }
}

resource "aws_subnet" "public_subnet" {
  vpc_id      = aws_vpc.main_vpc.id
```

```
      + tags                                 = {
          + "Name" = "main-vpc"
        }
      + tags_all                             = {
          + "Name" = "main-vpc"
        }
    }

Plan: 8 to add, 0 to change, 0 to destroy.

──────────────────────────────────────────────────────────────────────────────

Note: You didn't use the -out option to save this plan, so Terraform can't guarantee to take exactly these actions if you run
"terraform apply" now.
PS C:\Users\DELL\Desktop\interview files\kubernetes\terraform>
```



Your VPCs (3)

□	Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR
□	–	vpc-074f197bd2b1eb746	✓ Available	172.31.0.0/16	–
□	eksctl-demo-ekscluster-cluster/VPC	vpc-0497ef25604c1d4d2	✓ Available	192.168.0.0/16	–
□	main-vpc	vpc-0b0a11459256e46cb	✓ Available	10.0.0.0/16	–



Subnets (6) Info

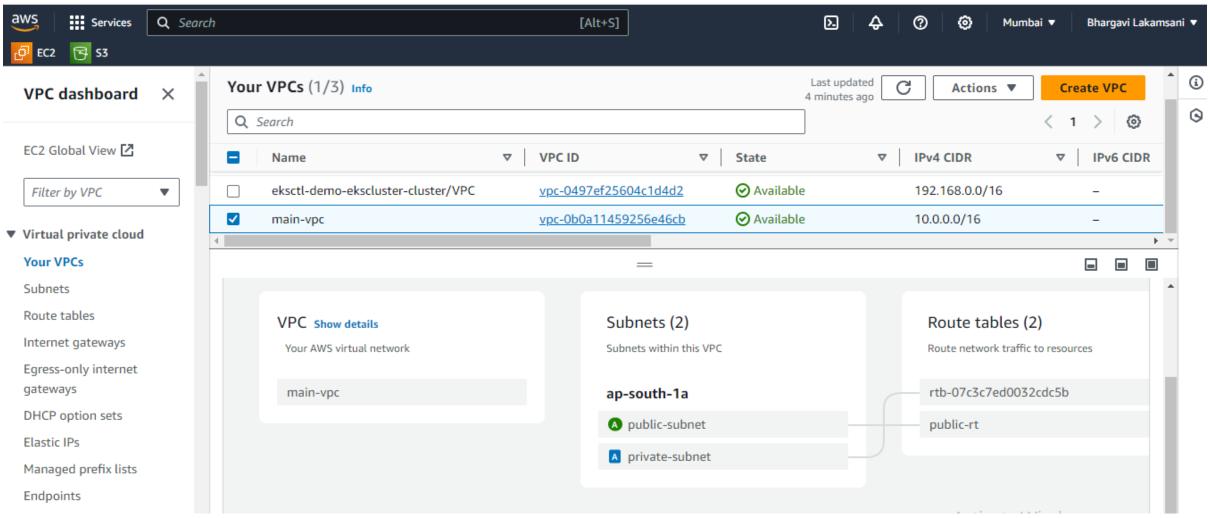
Last updated less than a minute ago

Find resources by attribute or tag

ec2

Name	Subnet ID	State	VPC	IPv4 CI
default-subnet-2	subnet-0a137d0248d9ef430	Available	vpc-074f197bd2b1eb746	172.31.
private-subnet	subnet-0020f948c5033b908	Available	vpc-0b0a11459256e46cb | mai…	10.0.2.0
public-subnet	subnet-0ee11b3b540901c0e	Available	vpc-0b0a11459256e46cb | mai…	10.0.1.0
eksctl-demo-ekscluster-cluster/Subnet…	subnet-054ba0d70cef56659	Available	vpc-0497ef25604c1d4d2 | eksc…	192.168

Select a subnet



Your VPCs (1/3) Info

Last updated 4 minutes ago

Search

Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR
eksctl-demo-ekscluster-cluster/VPC	vpc-0497ef25604c1d4d2	Available	192.168.0.0/16	–
main-vpc	vpc-0b0a11459256e46cb	Available	10.0.0.0/16	–

VPC Show details

Your AWS virtual network

main-vpc

Subnets (2)

Subnets within this VPC

ap-south-1a

public-subnet

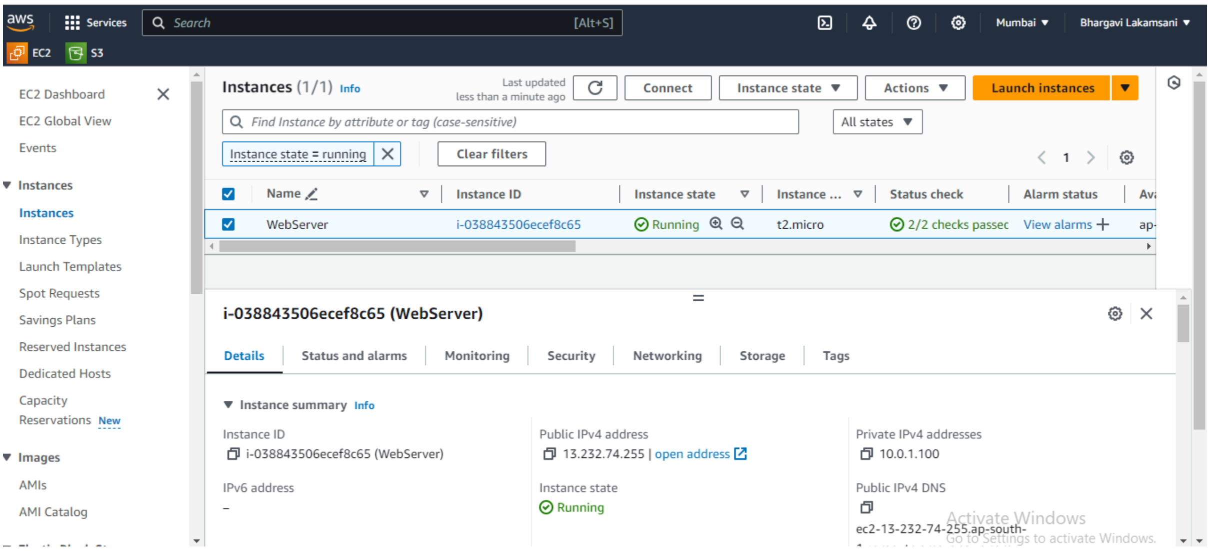
private-subnet

Route tables (2)

Route network traffic to resources

rtb-07c3c7ed0032cdc5b

public-rt



Instances (1/1) Info

Last updated less than a minute ago

Find Instance by attribute or tag (case-sensitive)

Instance state = running

Name	Instance ID	Instance state	Instance ...	Status check	Alarm status	Av
WebServer	i-038843506ecef8c65	Running	t2.micro	2/2 checks passec	View alarms +	ap-

i-038843506ecef8c65 (WebServer)

Details | Status and alarms | Monitoring | Security | Networking | Storage | Tags

Instance summary Info

Instance ID
i-038843506ecef8c65 (WebServer)

Public IPv4 address
13.232.74.255 | open address

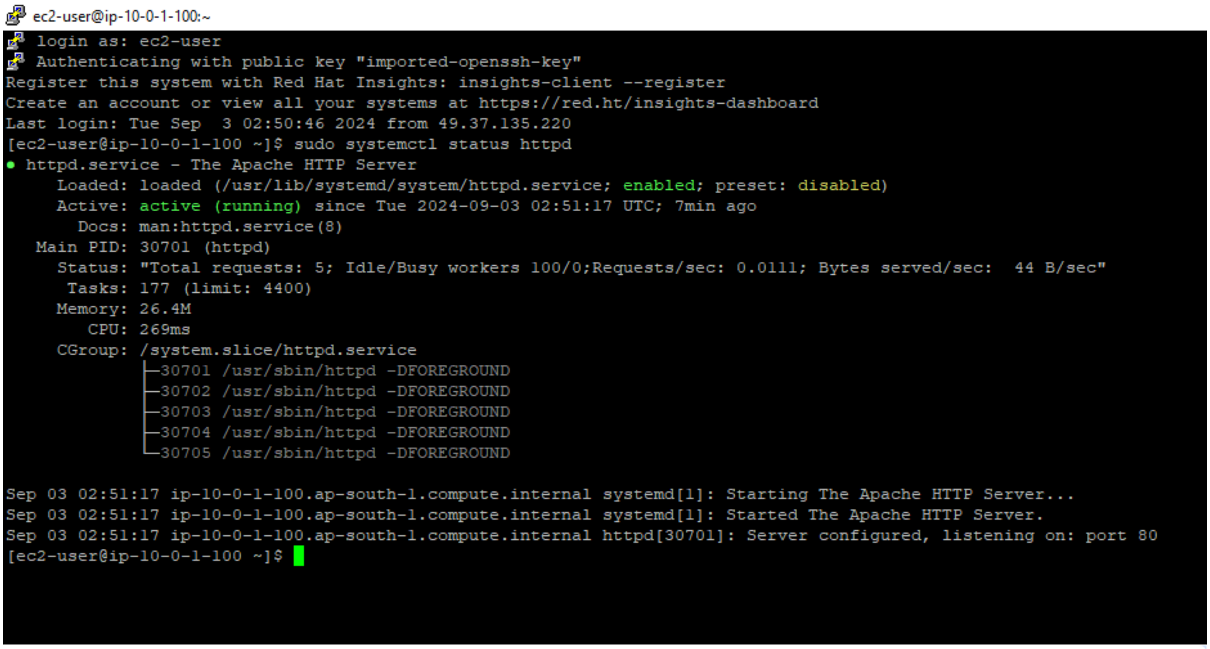
Private IPv4 addresses
10.0.1.100

IPv6 address
–

Instance state
Running

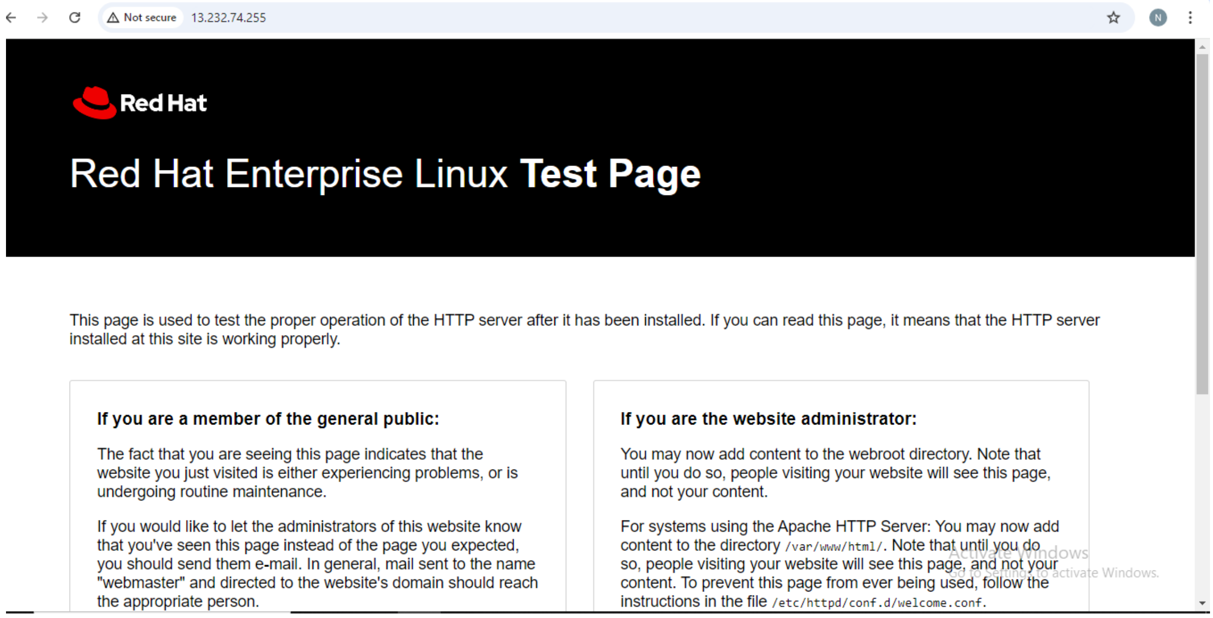
Public IPv4 DNS
ec2-13-232-74-255.ap-south-

Activate Windows
Go to Settings to activate Windows.



ec2-user@ip-10-0-1-100:~

```
login as: ec2-user
Authenticating with public key "imported-openssh-key"
Register this system with Red Hat Insights: insights-client --register
Create an account or view all your systems at https://red.ht/insights-dashboard
Last login: Tue Sep  3 02:50:46 2024 from 49.37.135.220
[ec2-user@ip-10-0-1-100 ~]$ sudo systemctl status httpd
● httpd.service - The Apache HTTP Server
     Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
     Active: active (running) since Tue 2024-09-03 02:51:17 UTC; 7min ago
       Docs: man:httpd.service(8)
   Main PID: 30701 (httpd)
     Status: "Total requests: 5; Idle/Busy workers 100/0;Requests/sec: 0.0111; Bytes served/sec:  44 B/sec"
      Tasks: 177 (limit: 4400)
     Memory: 26.4M
        CPU: 269ms
     CGroup: /system.slice/httpd.service
             ├─30701 /usr/sbin/httpd -DFOREGROUND
             ├─30702 /usr/sbin/httpd -DFOREGROUND
             ├─30703 /usr/sbin/httpd -DFOREGROUND
             ├─30704 /usr/sbin/httpd -DFOREGROUND
             └─30705 /usr/sbin/httpd -DFOREGROUND

Sep 03 02:51:17 ip-10-0-1-100.ap-south-1.compute.internal systemd[1]: Starting The Apache HTTP Server...
Sep 03 02:51:17 ip-10-0-1-100.ap-south-1.compute.internal systemd[1]: Started The Apache HTTP Server.
Sep 03 02:51:17 ip-10-0-1-100.ap-south-1.compute.internal httpd[30701]: Server configured, listening on: port 80
[ec2-user@ip-10-0-1-100 ~]$ 
```



Red Hat Enterprise Linux **Test Page**

This page is used to test the proper operation of the HTTP server after it has been installed. If you can read this page, it means that the HTTP server installed at this site is working properly.

If you are a member of the general public:

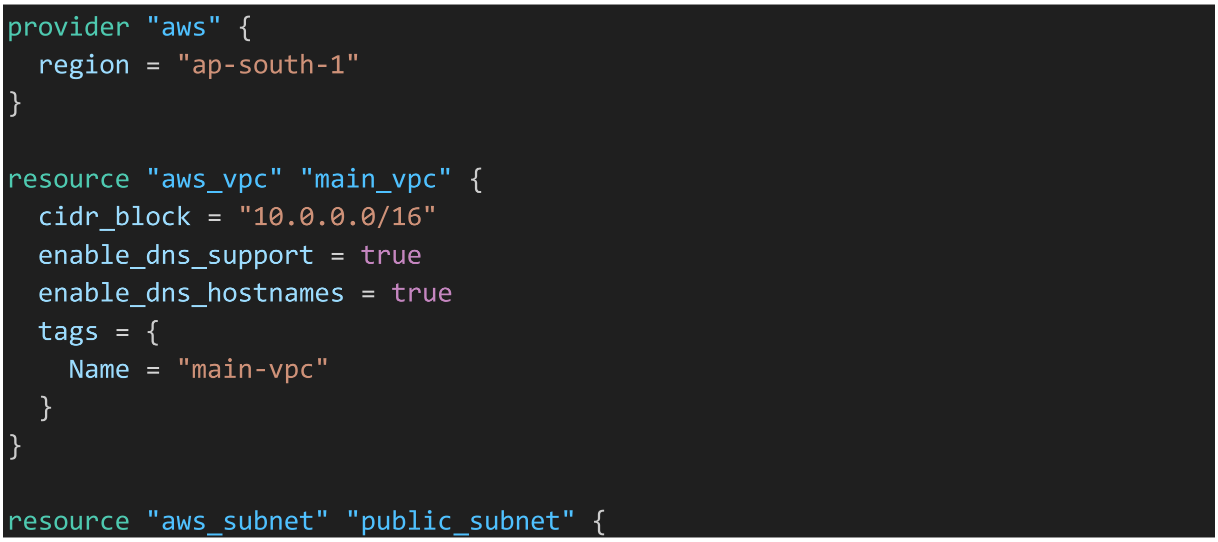
The fact that you are seeing this page indicates that the website you just visited is either experiencing problems, or is undergoing routine maintenance.

If you would like to let the administrators of this website know that you've seen this page instead of the page you expected, you should send them e-mail. In general, mail sent to the name "webmaster" and directed to the website's domain should reach the appropriate person.

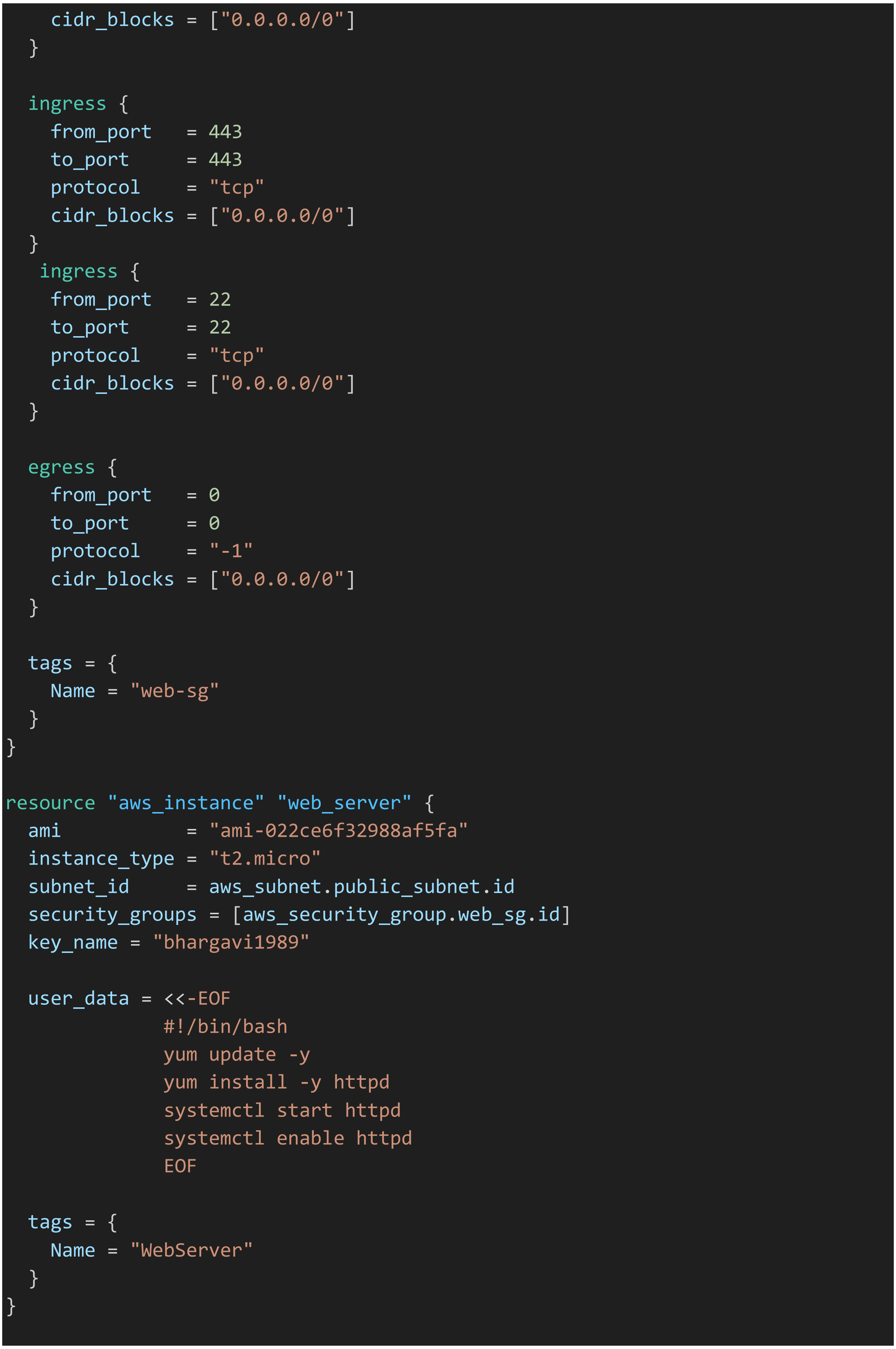
If you are the website administrator:

You may now add content to the webroot directory. Note that until you do so, people visiting your website will see this page, and not your content.

For systems using the Apache HTTP Server: You may now add content to the directory `/var/www/html/`. Note that until you do so, people visiting your website will see this page, and not your content. To prevent this page from ever being used, follow the instructions in the file `/etc/httpd/conf.d/welcome.conf`.



```
provider "aws" {
  region = "ap-south-1"
}

resource "aws_vpc" "main_vpc" {
  cidr_block = "10.0.0.0/16"
  enable_dns_support = true
  enable_dns_hostnames = true
  tags = {
    Name = "main-vpc"
  }
}

resource "aws_subnet" "public_subnet" {
  vpc_id     = aws_vpc.main_vpc.id
  cidr_block = "10.0.1.0/24"
  map_public_ip_on_launch = true
  tags = {
    Name = "public-subnet"
  }
}

resource "aws_subnet" "private_subnet" {
  vpc_id     = aws_vpc.main_vpc.id
  cidr_block = "10.0.2.0/24"
  tags = {
    Name = "private-subnet"
  }
}

resource "aws_internet_gateway" "igw" {
  vpc_id = aws_vpc.main_vpc.id
  tags = {
    Name = "main-igw"
  }
}

resource "aws_route_table" "public_rt" {
  vpc_id = aws_vpc.main_vpc.id

  route {
    cidr_block = "0.0.0.0/0"
    gateway_id = aws_internet_gateway.igw.id
  }

  tags = {
    Name = "public-rt"
  }
}

resource "aws_route_table_association" "public_assoc" {
  subnet_id      = aws_subnet.public_subnet.id
  route_table_id = aws_route_table.public_rt.id
}

resource "aws_security_group" "web_sg" {
  vpc_id = aws_vpc.main_vpc.id

  ingress {
    from_port   = 80
    to_port     = 80
    protocol    = "tcp"
```



```
    cidr_blocks = ["0.0.0.0/0"]
  }

  ingress {
    from_port   = 443
    to_port     = 443
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }
   ingress {
    from_port   = 22
    to_port     = 22
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }

  egress {
    from_port   = 0
    to_port     = 0
    protocol    = "-1"
    cidr_blocks = ["0.0.0.0/0"]
  }

  tags = {
    Name = "web-sg"
  }
}

resource "aws_instance" "web_server" {
  ami           = "ami-022ce6f32988af5fa"
  instance_type = "t2.micro"
  subnet_id     = aws_subnet.public_subnet.id
  security_groups = [aws_security_group.web_sg.id]
  key_name = "bhargavi1989"

  user_data = <<-EOF
              #!/bin/bash
              yum update -y
              yum install -y httpd
              systemctl start httpd
              systemctl enable httpd
              EOF

  tags = {
    Name = "WebServer"
  }
}
```

2) CI/CD Pipeline

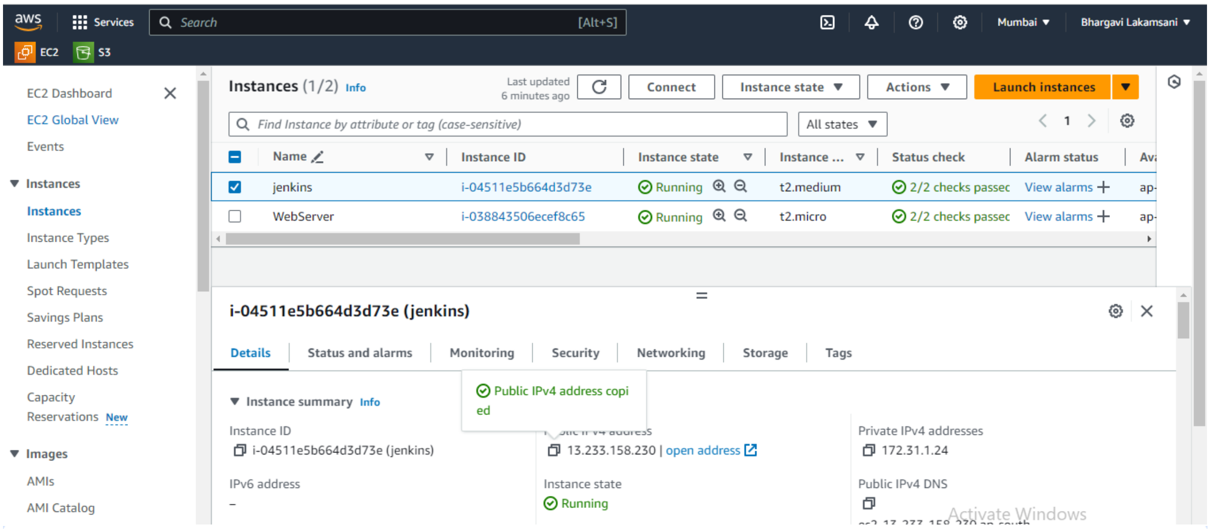
- Set up a basic CI/CD pipeline using Google Cloud Build or Jenkins to deploy a simple web application.

o Configure the pipeline to:

- Pull code from a Git repository.
- Build and test the application.
- Deploy the application to the Compute Engine instance.

o Include automated tests and ensure they pass before deployment.

Instead of GCP using AWS



Instances (1/2) Info

Last updated 6 minutes ago

Find Instance by attribute or tag (case-sensitive) | All states

	Name	Instance ID	Instance state	Instance ...	Status check	Alarm status	Ava
☑	jenkins	i-04511e5b664d3d73e	Running	t2.medium	2/2 checks passec	View alarms +	ap-
□	WebServer	i-038843506ecef8c65	Running	t2.micro	2/2 checks passec	View alarms +	ap-

i-04511e5b664d3d73e (jenkins)

Instance summary Info

Public IPv4 address copied

Instance ID
i-04511e5b664d3d73e (jenkins)

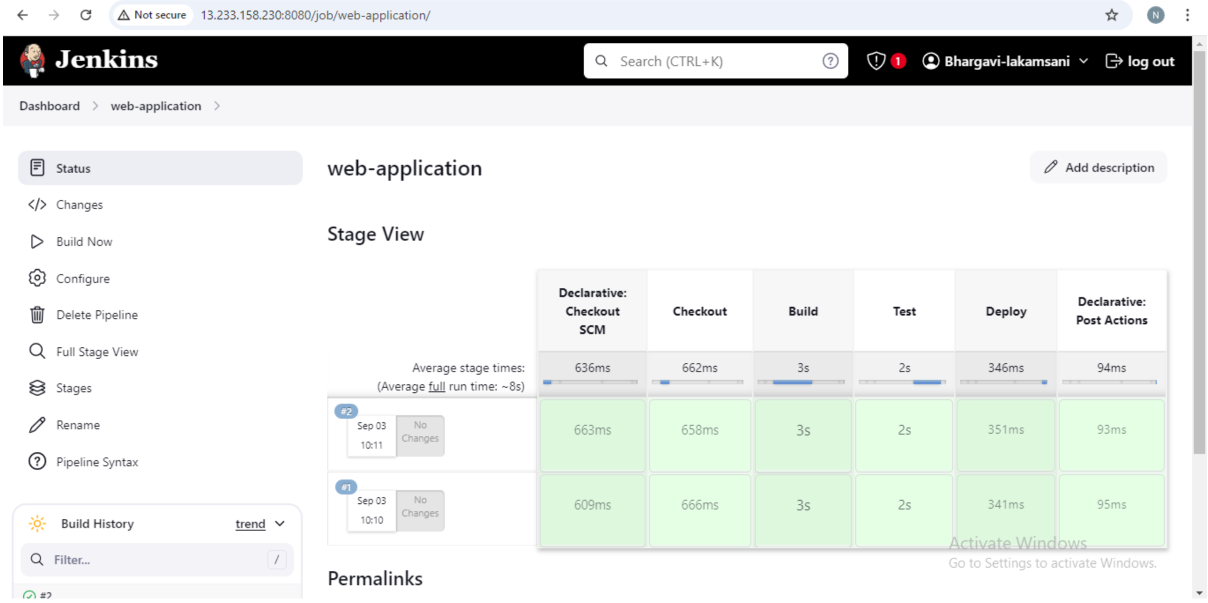
Public IPv4 address
13.233.158.230 | open address

Private IPv4 addresses
172.31.1.24

IPv6 address
–

Instance state
Running

Public IPv4 DNS



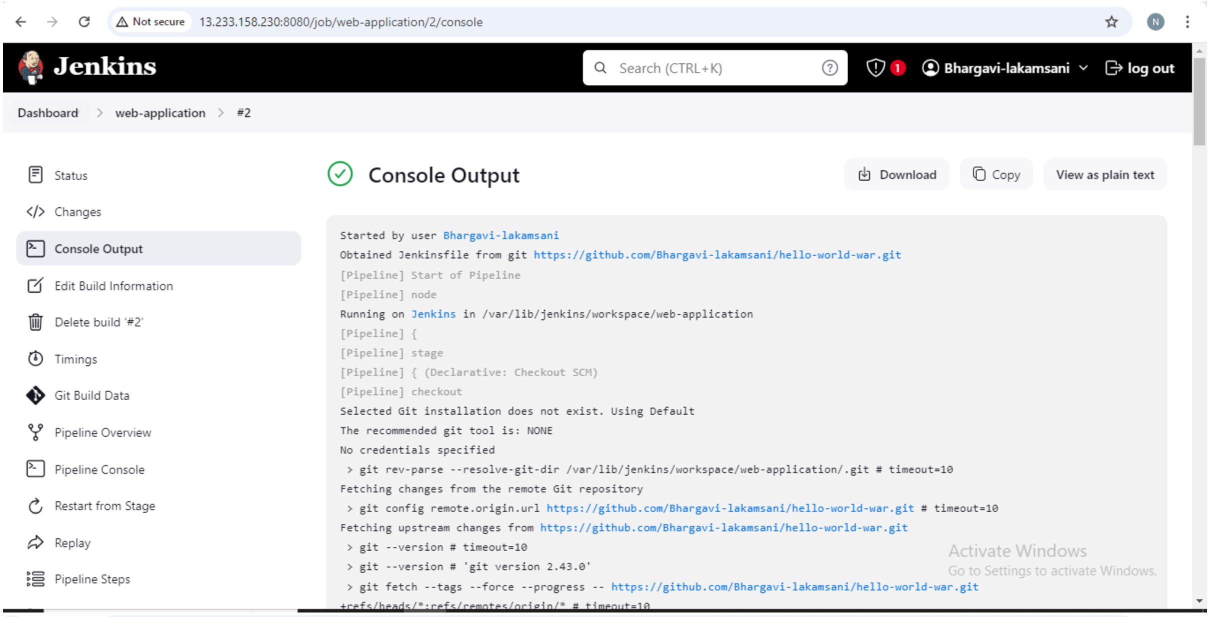
13.233.158.230:8080/job/web-application/

web-application

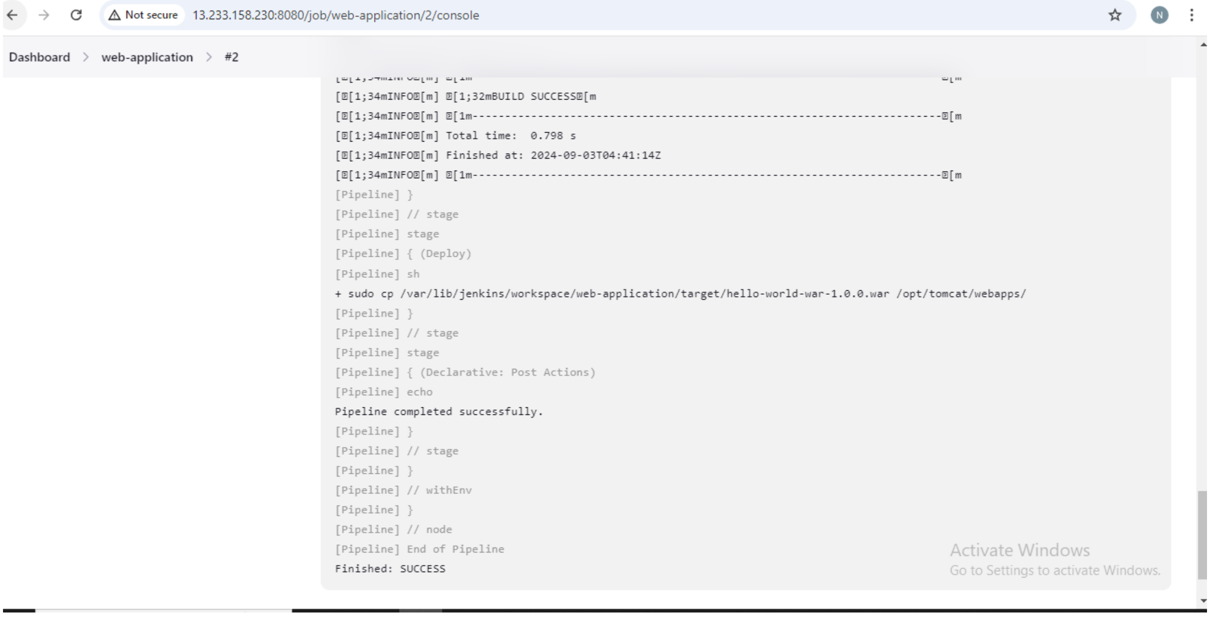
Stage View

	Declarative: Checkout SCM	Checkout	Build	Test	Deploy	Declarative: Post Actions
Average stage times: (Average full run time: ~8s)	636ms	662ms	3s	2s	346ms	94ms
#2 Sep 03 10:11 No Changes	663ms	658ms	3s	2s	351ms	93ms
#1 Sep 03 10:10 No Changes	609ms	666ms	3s	2s	341ms	95ms

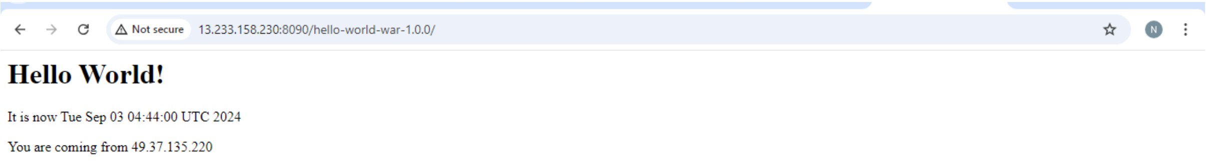
Permalinks



```
Started by user Bhargavi-lakamsani
Obtained Jenkinsfile from git https://github.com/Bhargavi-lakamsani/hello-world-war.git
[Pipeline] Start of Pipeline
[Pipeline] node
Running on Jenkins in /var/lib/jenkins/workspace/web-application
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Declarative: Checkout SCM)
[Pipeline] checkout
Selected Git installation does not exist. Using Default
The recommended git tool is: NONE
No credentials specified
 > git rev-parse --resolve-git-dir /var/lib/jenkins/workspace/web-application/.git # timeout=10
Fetching changes from the remote Git repository
 > git config remote.origin.url https://github.com/Bhargavi-lakamsani/hello-world-war.git # timeout=10
Fetching upstream changes from https://github.com/Bhargavi-lakamsani/hello-world-war.git
 > git --version # timeout=10
 > git --version # 'git version 2.43.0'
 > git fetch --tags --force --progress -- https://github.com/Bhargavi-lakamsani/hello-world-war.git
+refs/heads/*:refs/remotes/origin/* # timeout=10
```


Not secure 13.233.158.230:8080/job/web-application/2/console
Dashboard > web-application > #2
Activate Windows
Go to Settings to activate Windows.

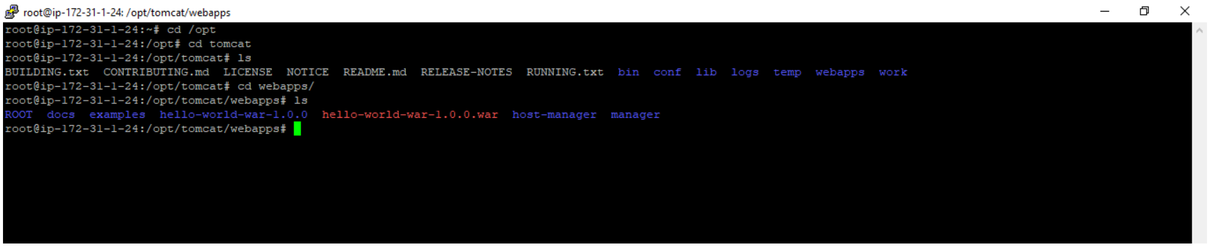
```
[[1;34mINFO[m] [1;32mBUILD SUCCESS[m
[[1;34mINFO[m] [1m------------------------------------------------------------------------[m
[[1;34mINFO[m] Total time:  0.798 s
[[1;34mINFO[m] Finished at: 2024-09-03T04:41:14Z
[[1;34mINFO[m] [1m------------------------------------------------------------------------[m
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Deploy)
[Pipeline] sh
+ sudo cp /var/lib/jenkins/workspace/web-application/target/hello-world-war-1.0.0.war /opt/tomcat/webapps/
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Declarative: Post Actions)
[Pipeline] echo
Pipeline completed successfully.
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```



Hello World!

It is now Tue Sep 03 04:44:00 UTC 2024

You are coming from 49.37.135.220



```
root@ip-172-31-1-24:~# cd /opt
root@ip-172-31-1-24:/opt# cd tomcat
root@ip-172-31-1-24:/opt/tomcat# ls
BUILDING.txt  CONTRIBUTING.md  LICENSE  NOTICE  README.md  RELEASE-NOTES  RUNNING.txt  bin  conf  lib  logs  temp  webapps  work
root@ip-172-31-1-24:/opt/tomcat# cd webapps/
root@ip-172-31-1-24:/opt/tomcat/webapps# ls
ROOT  docs  examples  hello-world-war-1.0.0  hello-world-war-1.0.0.war  host-manager  manager
root@ip-172-31-1-24:/opt/tomcat/webapps#
```

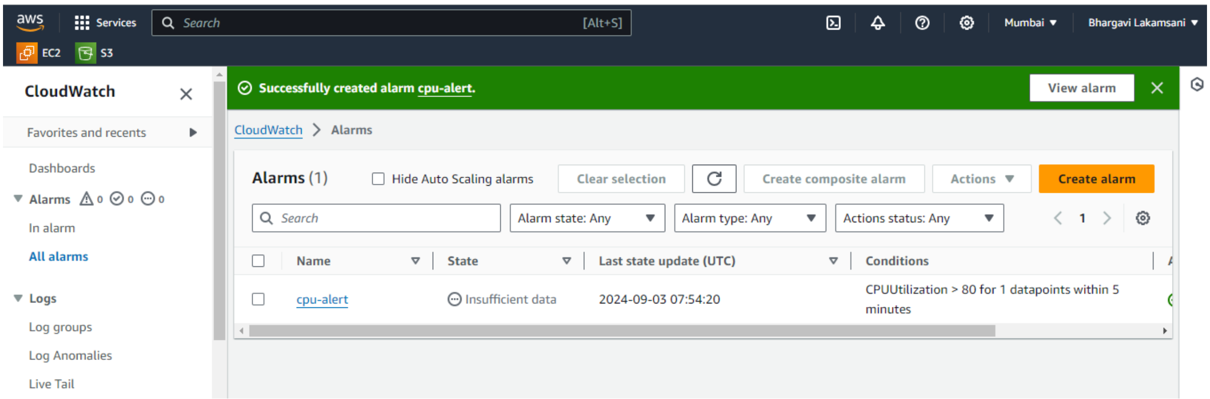
```
pipeline {
    agent any

    stages {
        stage('Checkout') {
            steps {

                git branch: 'master', credentialsId: 'github', url: 'https://github.com/Bhargavi-lakamsani/hello-world-war.git'
            }
        }

        stage('Build') {
            steps {

                sh 'mvn clean package'
            }
        }

        stage('Test') {
            steps {

                sh 'mvn test'
            }
        }

        stage('Deploy') {
            steps {

                sh 'sudo cp /var/lib/jenkins/workspace/web-application/target/*.war /opt/tomcat/webapps/'
            }
        }
    }

    post {
        success {
            echo 'Pipeline completed successfully.'

        }
        failure {
            echo 'Pipeline failed.'

        }
    }
```

3) Monitoring and Logging

□ Integrate Google Cloud Monitoring to monitor the instance&#39;s CPU, memory, and disk usage.

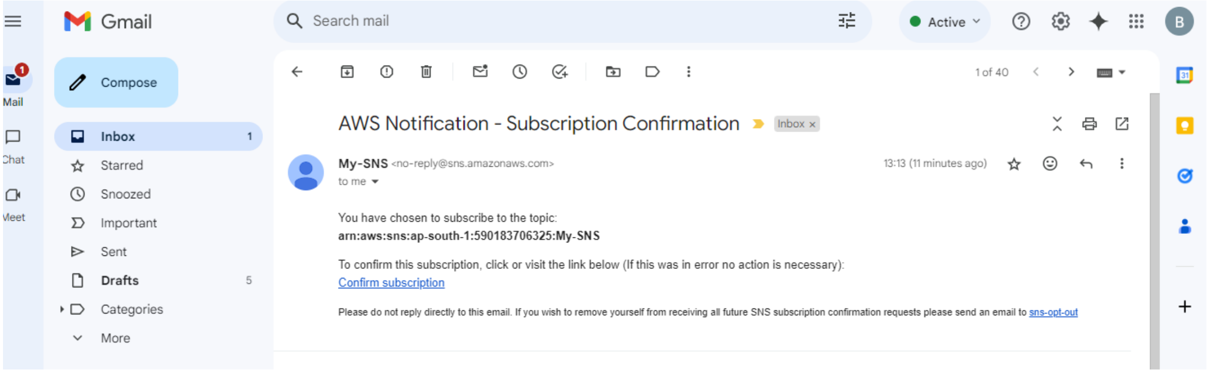
□ Set up a basic alert to notify you via email if CPU usage exceeds 80%.

Instead of GCP using AWS



Successfully created alarm cpu-alert.

□	Name	State	Last state update (UTC)	Conditions
□	cpu-alert	Insufficient data	2024-09-03 07:54:20	CPUUtilization > 80 for 1 datapoints within 5 minutes



AWS Notification - Subscription Confirmation

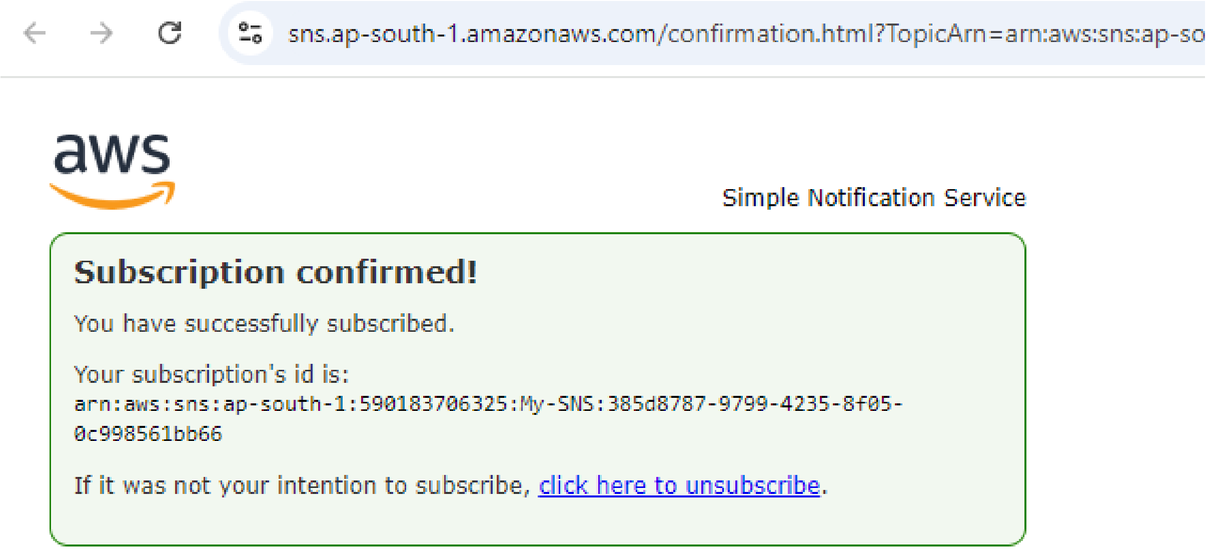
My-SNS <no-reply@sns.amazonaws.com>
to me

13:13 (11 minutes ago)

You have chosen to subscribe to the topic:
arn:aws:sns:ap-south-1:590183706325:My-SNS

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



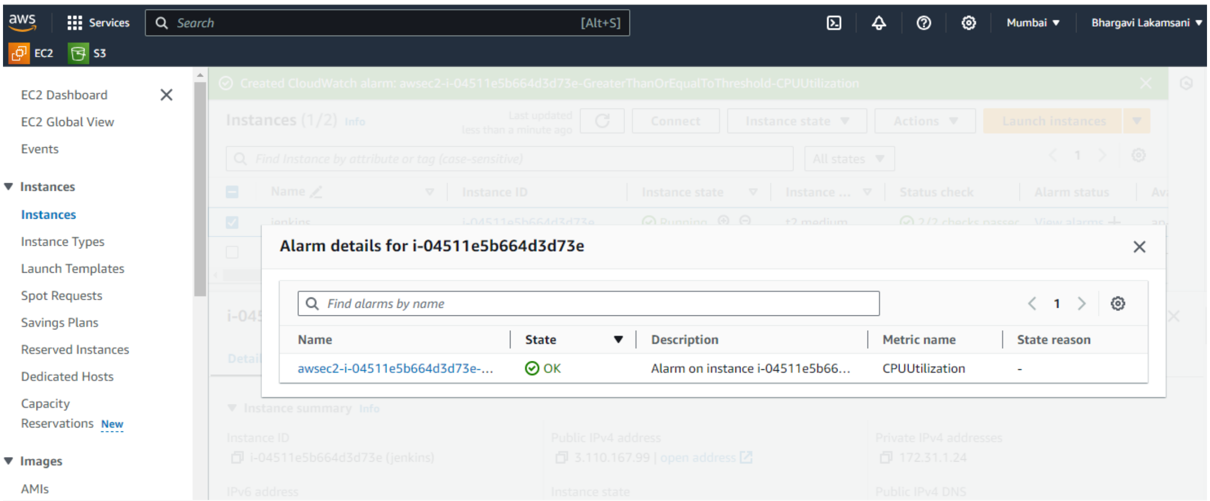
sns.ap-south-1.amazonaws.com/confirmation.html?TopicArn=arn:aws:sns:ap-so

Subscription confirmed!

You have successfully subscribed.

Your subscription's id is:
arn:aws:sns:ap-south-1:590183706325:My-SNS:385d8787-9799-4235-8f05-0c998561bb66

If it was not your intention to subscribe, click here to unsubscribe.

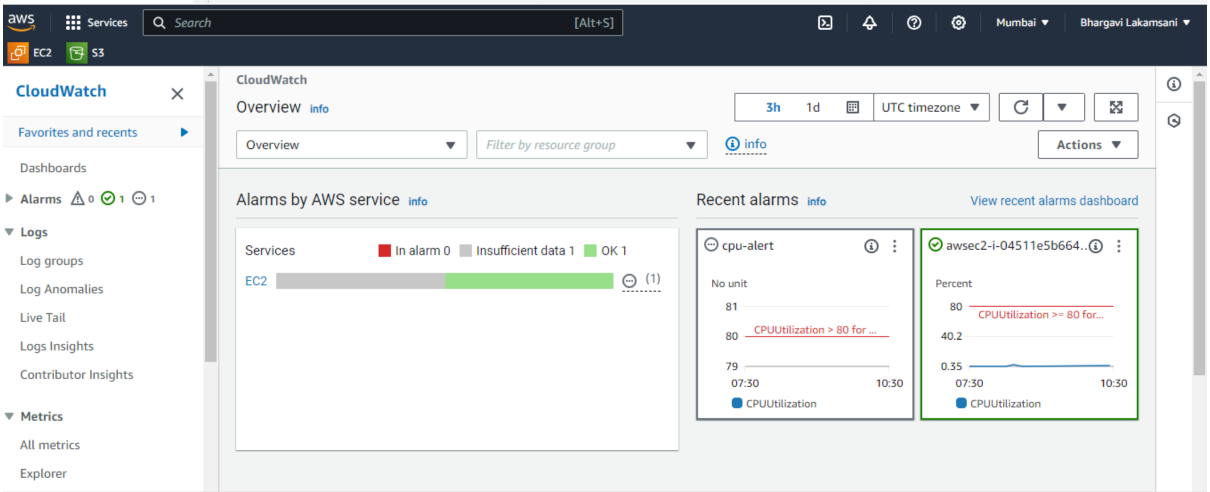


Created CloudWatch alarm: awsec2-i-04511e5b664d3d73e-GreaterThanOrEqualToThreshold-CPUUtilization

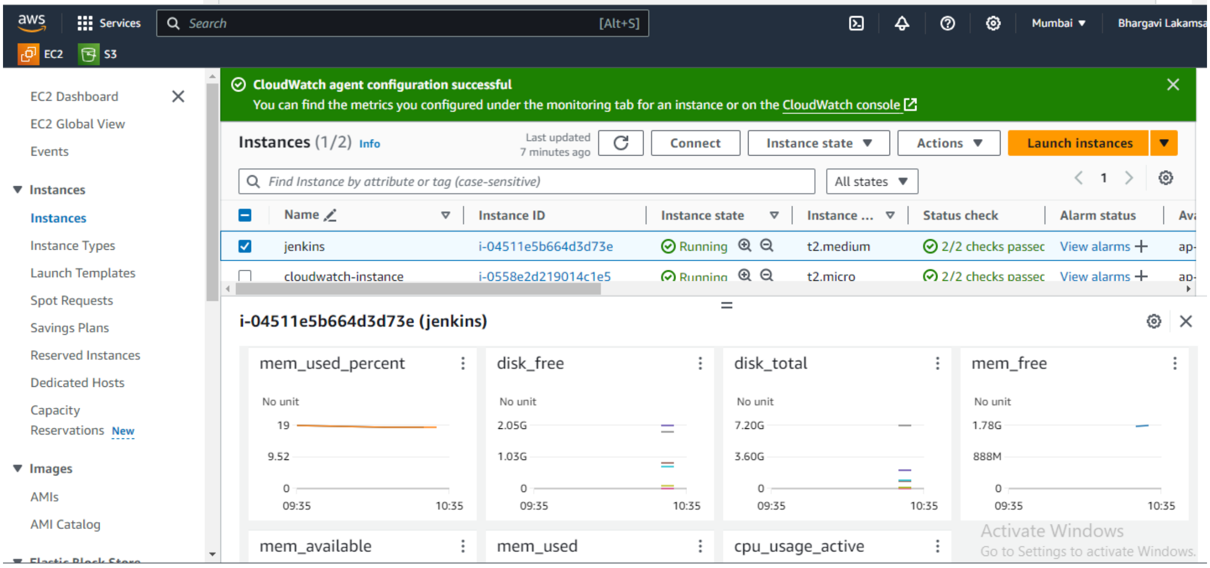
Alarm details for i-04511e5b664d3d73e

Find alarms by name

Name	State	Description	Metric name	State reason
awsec2-i-04511e5b664d3d73e-...	✓ OK	Alarm on instance i-04511e5b66...	CPUUtilization	-



Services	🟥 In alarm 0	Insufficient data 1	🟩 OK 1
EC2		(1)	



CloudWatch agent configuration successful

You can find the metrics you configured under the monitoring tab for an instance or on the CloudWatch console

Instances (1/2) Info

Last updated 7 minutes ago

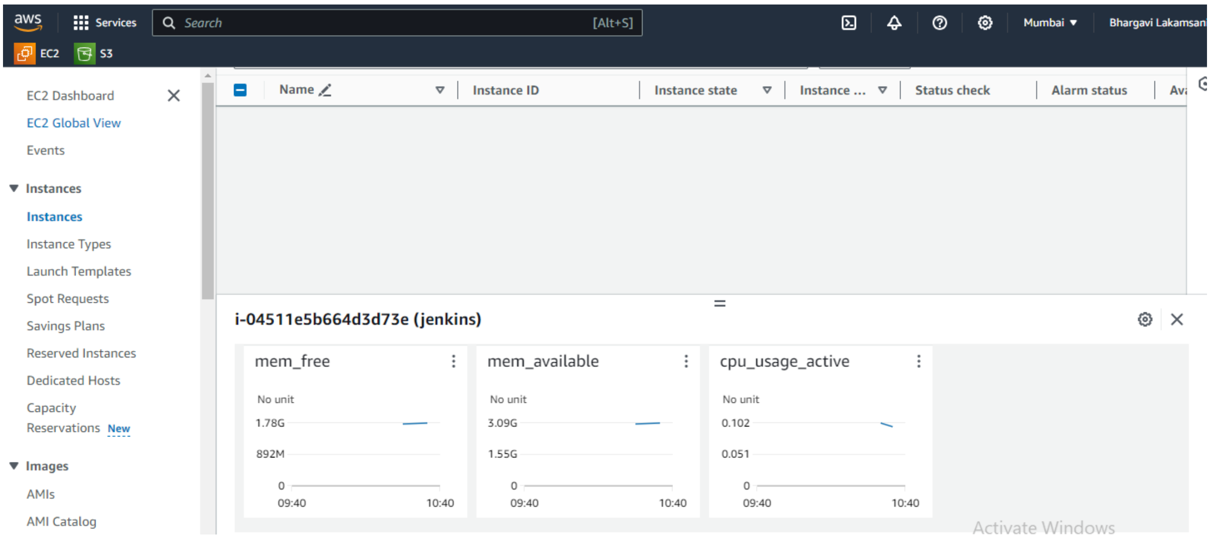
Connect | Instance state | Actions | Launch instances

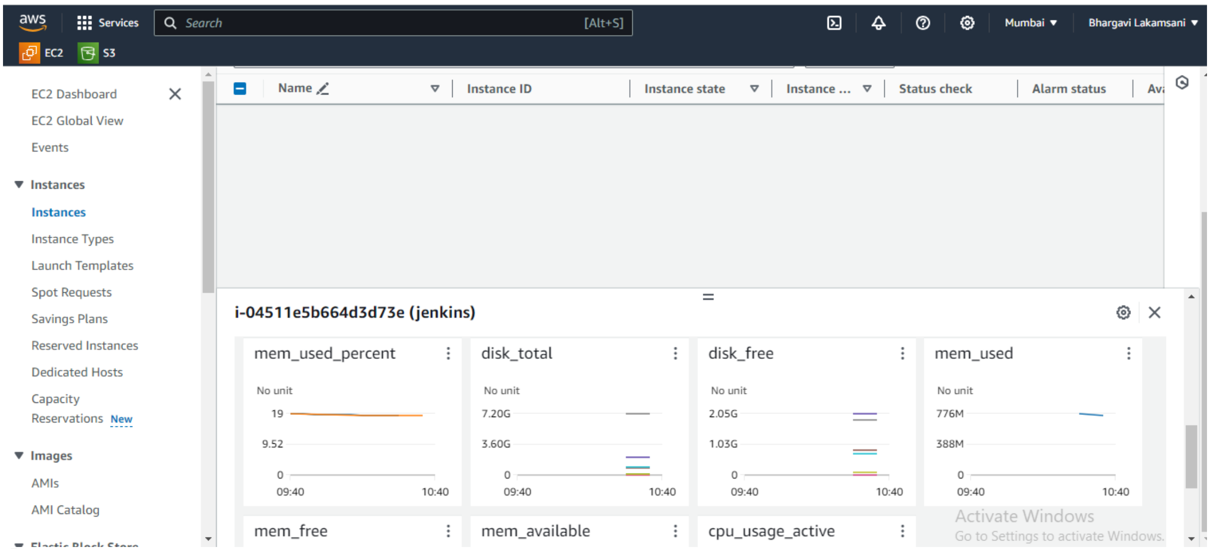
Find Instance by attribute or tag (case-sensitive)

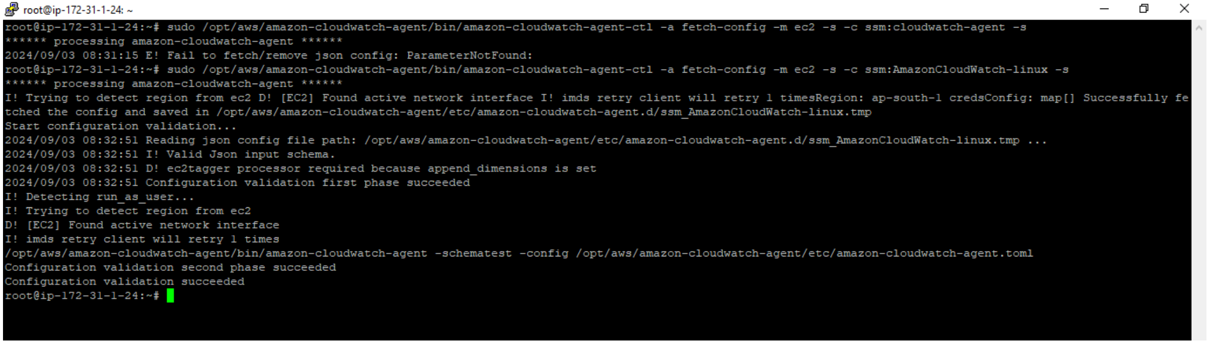
All states

	Name	Instance ID	Instance state	Instance ...	Status check	Alarm status	Ava
☑	jenkins	i-04511e5b664d3d73e	Running	t2.medium	2/2 checks passec	View alarms +	ap-
□	cloudwatch-instance	i-0558e2d219014c1e5	Running	t2.micro	2/2 checks passec	View alarms +	ap-

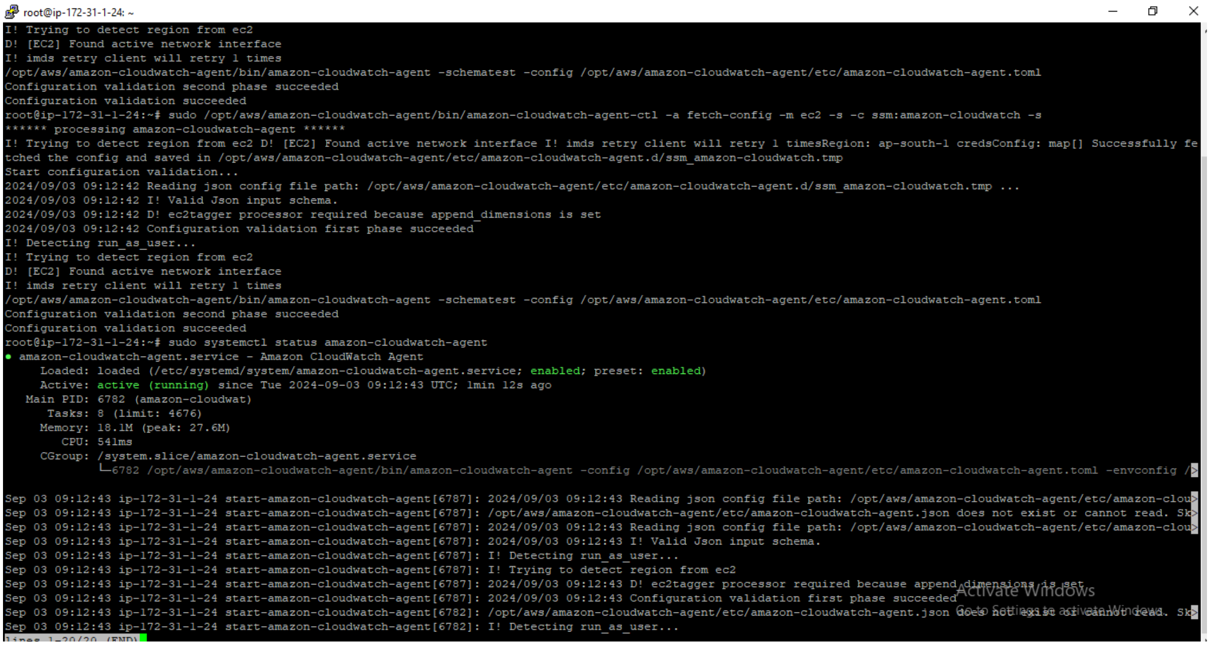
i-04511e5b664d3d73e (jenkins)







```
root@ip-172-31-1-24:~# sudo /opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent-ctl -a fetch-config -m ec2 -s -c ssm:cloudwatch-agent -s
****** processing amazon-cloudwatch-agent ******
2024/09/03 08:31:15 E! Fail to fetch/remove json config: ParameterNotFound:
root@ip-172-31-1-24:~# sudo /opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent-ctl -a fetch-config -m ec2 -s -c ssm:AmazonCloudWatch-linux -s
****** processing amazon-cloudwatch-agent ******
I! Trying to detect region from ec2 D! [EC2] Found active network interface I! imds retry client will retry 1 timesRegion: ap-south-1 credsConfig: map[] Successfully fe
tched the config and saved in /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.d/ssm_AmazonCloudWatch-linux.tmp
Start configuration validation...
2024/09/03 08:32:51 Reading json config file path: /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.d/ssm_AmazonCloudWatch-linux.tmp ...
2024/09/03 08:32:51 I! Valid Json input schema.
2024/09/03 08:32:51 D! ec2tagger processor required because append_dimensions is set
2024/09/03 08:32:51 Configuration validation first phase succeeded
I! Detecting run_as_user...
I! Trying to detect region from ec2
D! [EC2] Found active network interface
I! imds retry client will retry 1 times
/opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent -schematest -config /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.toml
Configuration validation second phase succeeded
Configuration validation succeeded
root@ip-172-31-1-24:~# 
```



```
I! Trying to detect region from ec2
D! [EC2] Found active network interface
I! imds retry client will retry 1 times
/opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent -schematest -config /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.toml
Configuration validation second phase succeeded
Configuration validation succeeded
root@ip-172-31-1-24:~# sudo /opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent-ctl -a fetch-config -m ec2 -s -c ssm:amazon-cloudwatch -s
****** processing amazon-cloudwatch-agent ******
I! Trying to detect region from ec2 D! [EC2] Found active network interface I! imds retry client will retry 1 timesRegion: ap-south-1 credsConfig: map[] Successfully fe
tched the config and saved in /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.d/ssm_amazon-cloudwatch.tmp
Start configuration validation...
2024/09/03 09:12:42 Reading json config file path: /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.d/ssm_amazon-cloudwatch.tmp ...
2024/09/03 09:12:42 I! Valid Json input schema.
2024/09/03 09:12:42 D! ec2tagger processor required because append_dimensions is set
2024/09/03 09:12:42 Configuration validation first phase succeeded
I! Detecting run_as_user...
I! Trying to detect region from ec2
D! [EC2] Found active network interface
I! imds retry client will retry 1 times
/opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent -schematest -config /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.toml
Configuration validation second phase succeeded
Configuration validation succeeded
root@ip-172-31-1-24:~# sudo systemctl status amazon-cloudwatch-agent
● amazon-cloudwatch-agent.service - Amazon CloudWatch Agent
     Loaded: loaded (/etc/systemd/system/amazon-cloudwatch-agent.service; enabled; preset: enabled)
     Active: active (running) since Tue 2024-09-03 09:12:43 UTC; 1min 12s ago
   Main PID: 6782 (amazon-cloudwat)
      Tasks: 8 (limit: 4676)
     Memory: 18.1M (peak: 27.6M)
        CPU: 541ms
     CGroup: /system.slice/amazon-cloudwatch-agent.service
             └─6782 /opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent -config /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.toml -envconfig />

Sep 03 09:12:43 ip-172-31-1-24 start-amazon-cloudwatch-agent[6787]: 2024/09/03 09:12:43 Reading json config file path: /opt/aws/amazon-cloudwatch-agent/etc/amazon-clou>
Sep 03 09:12:43 ip-172-31-1-24 start-amazon-cloudwatch-agent[6787]: /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.json does not exist or cannot read. Sk>
Sep 03 09:12:43 ip-172-31-1-24 start-amazon-cloudwatch-agent[6787]: 2024/09/03 09:12:43 Reading json config file path: /opt/aws/amazon-cloudwatch-agent/etc/amazon-clou>
Sep 03 09:12:43 ip-172-31-1-24 start-amazon-cloudwatch-agent[6787]: 2024/09/03 09:12:43 I! Valid Json input schema.
Sep 03 09:12:43 ip-172-31-1-24 start-amazon-cloudwatch-agent[6787]: I! Detecting run_as_user...
Sep 03 09:12:43 ip-172-31-1-24 start-amazon-cloudwatch-agent[6787]: I! Trying to detect region from ec2
Sep 03 09:12:43 ip-172-31-1-24 start-amazon-cloudwatch-agent[6787]: 2024/09/03 09:12:43 D! ec2tagger processor required because append_dimensions is set
Sep 03 09:12:43 ip-172-31-1-24 start-amazon-cloudwatch-agent[6787]: 2024/09/03 09:12:43 Configuration validation first phase succeeded
Sep 03 09:12:43 ip-172-31-1-24 start-amazon-cloudwatch-agent[6782]: /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.json does not exist or cannot read. Sk>
Sep 03 09:12:43 ip-172-31-1-24 start-amazon-cloudwatch-agent[6782]: I! Detecting run_as_user...
lines 1-20/20 (END)
```