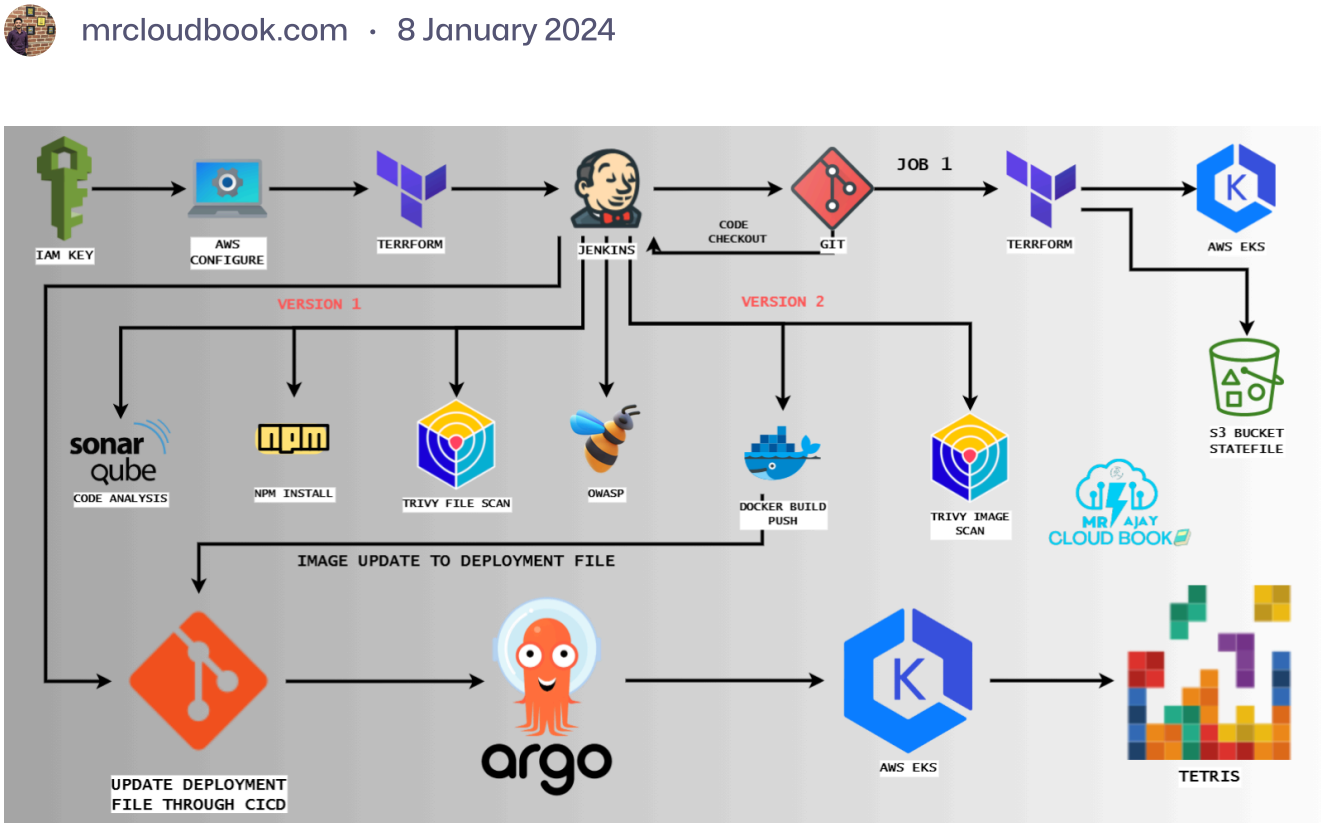
DevOps

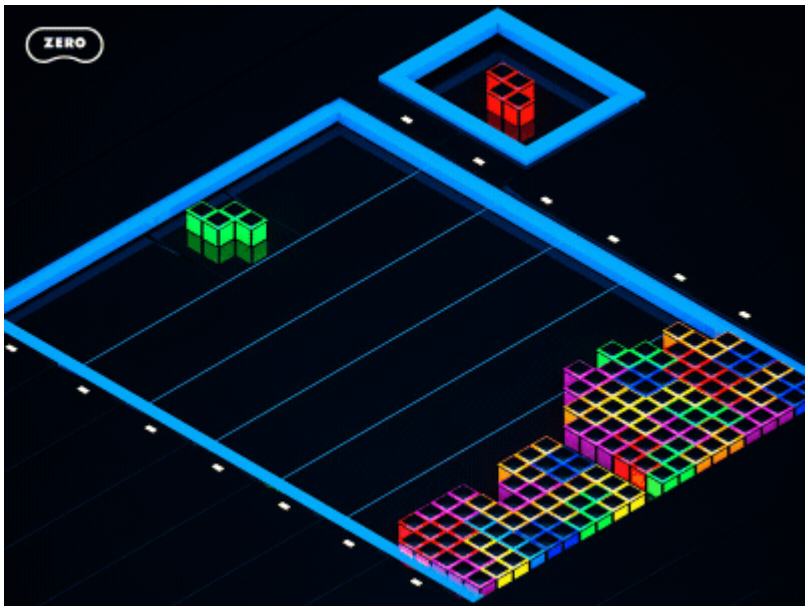
# Automating Tetris Deployments: DevSecOps with ArgoCD, Terraform, and Jenkins for Two Game Versions




mrcloudbook.com · 8 January 2024

Welcome to the world of DevSecOps automation, where cutting-edge technologies merge to streamline the deployment of one of the most beloved classic games, Tetris. In this blog, we'll embark on a fascinating journey that unveils the power of ArgoCD, Terraform, and Jenkins in orchestrating a seamless and secure deployment pipeline for not one, but two distinct versions of the Tetris game.

Imagine a scenario where your Tetris application effortlessly transitions through various stages of development, from infrastructure provisioning to continuous integration and delivery, all while maintaining the highest standards of security. Join us as we delve into the details of how these sophisticated tools work together to create an automated, efficient, and foolproof DevOps workflow, capable of handling multiple game versions, designed to impress even the most discerning tech enthusiasts.




**GitHub REPOSITORIES**

TETRIS-VERSION1

https://github.com/Aj7Ay/Tetris-V1.git

TETRIS-VERSION2

https://github.com/Aj7Ay/Tetris-V2.git

TETRIS_MANIFEST

https://github.com/Aj7Ay/Tetris-manifest.git

**Prerequisites:**

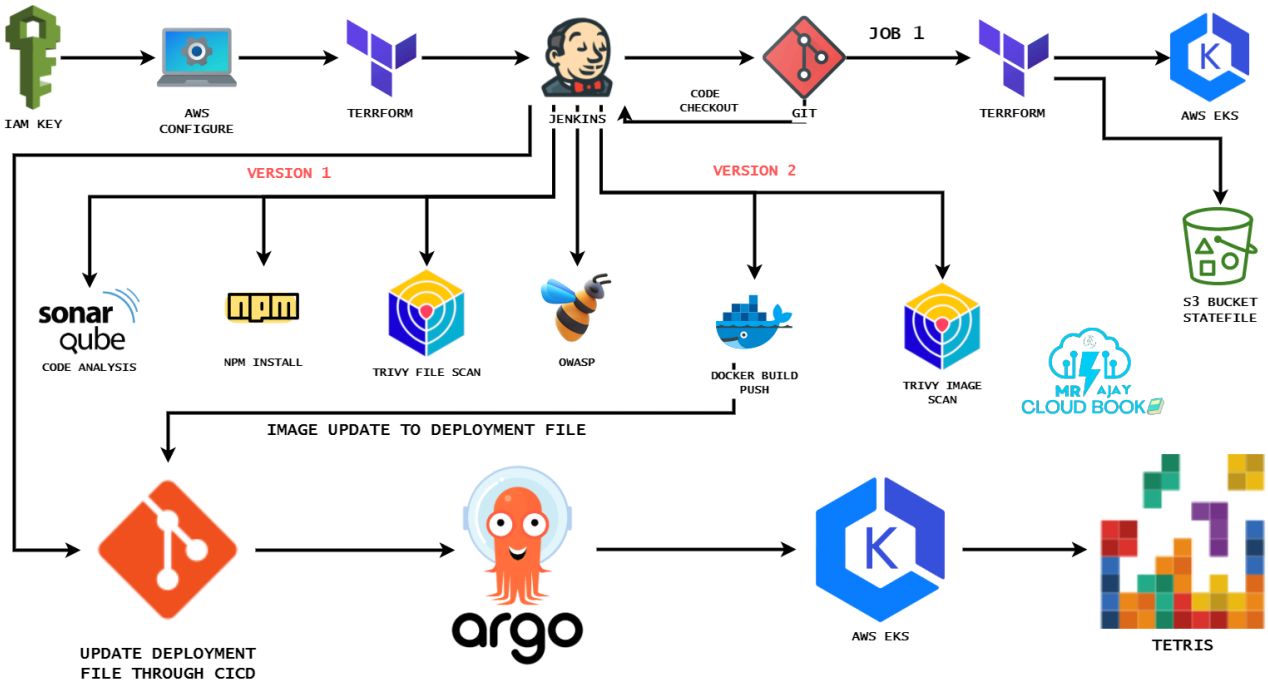
1. **AWS Account:** To get started, you'll need an active AWS account. Ensure that you have access and permission to create and manage AWS resources.

2. **AWS CLI:** Install the AWS Command Line Interface (CLI) on your local machine and configure it with your AWS credentials. This is essential for managing your AWS resources.

3. **IAM User and Key Pair:** Create an IAM (Identity and Access Management) user with the necessary permissions to provision resources on AWS. Additionally, generate an IAM Access Key and Secret Access Key for programmatic access. Ensure that you securely manage these credentials.

4. **S3 Bucket:** Set up an S3 bucket to store your Terraform state files. This bucket is crucial for maintaining the state of your infrastructure and enabling collaboration.

5. **Terraform:** Install Terraform on your local machine. Terraform is used for provisioning infrastructure as code and managing AWS resources. Make sure to configure Terraform to work with your AWS credentials and your S3 bucket for state storage.



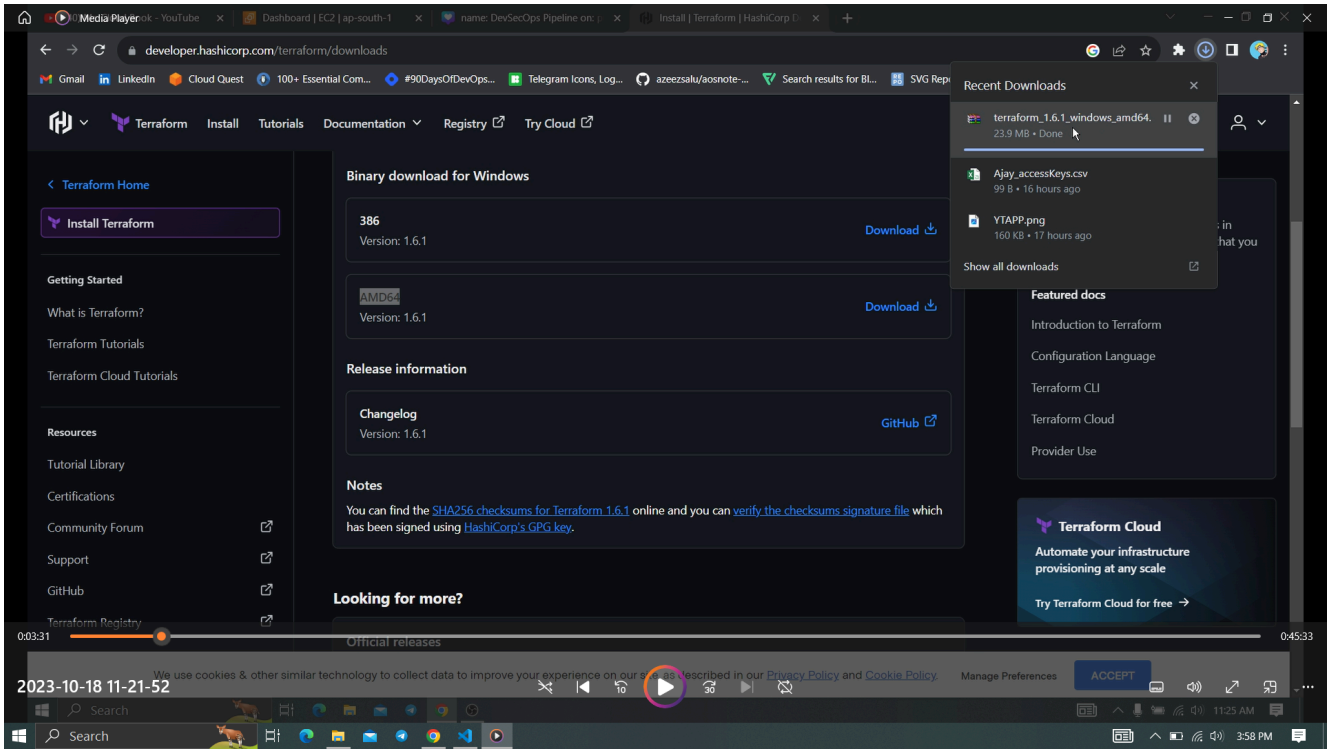
Contents [ hide ]

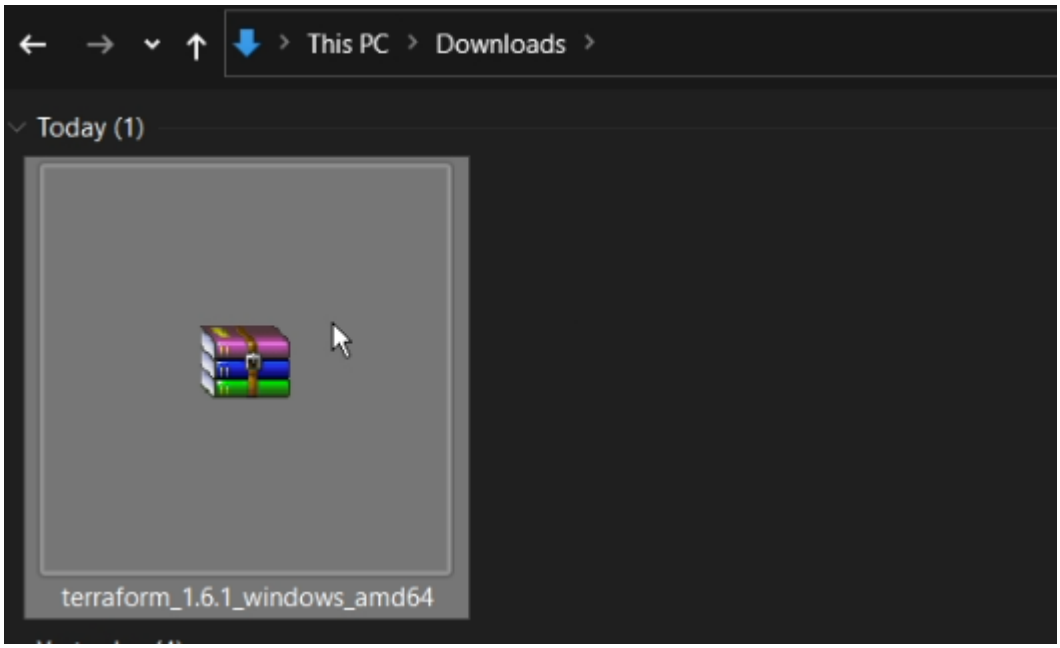


# Step1: How to install and setup Terraform on Windows

### Download Terraform:

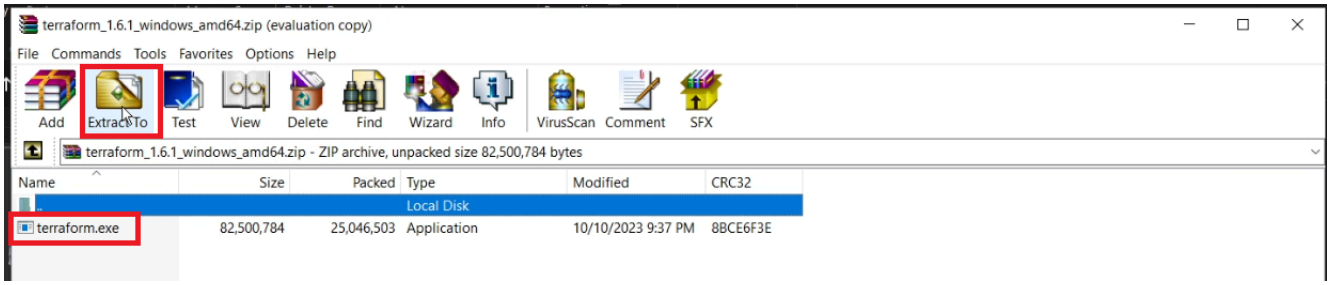
Visit the official Terraform website: **terraform.io/downloads.html**



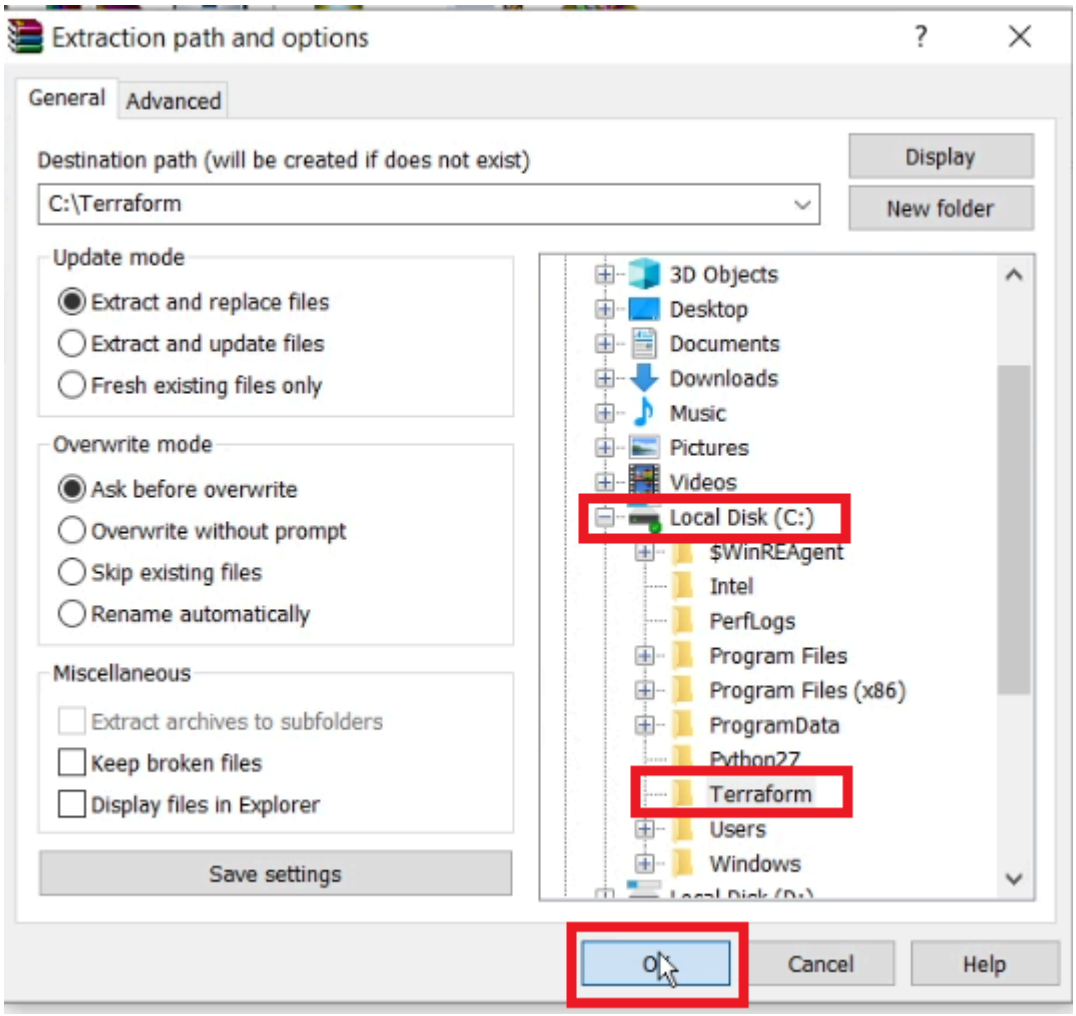


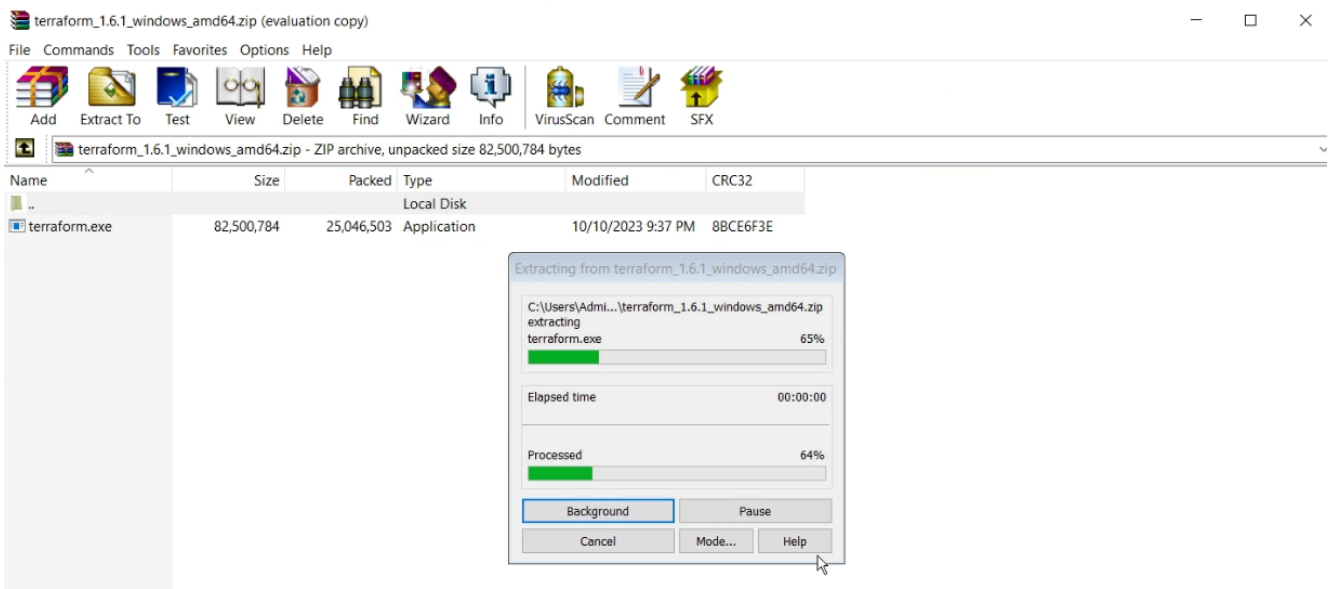

**Extract the ZIP Archive**:

Once the download is complete, extract the contents of the ZIP archive to a directory on your computer. You can use a tool like 7-Zip or the built-in Windows extraction tool. Ensure that you extract it to a directory that's part of your system's PATH.

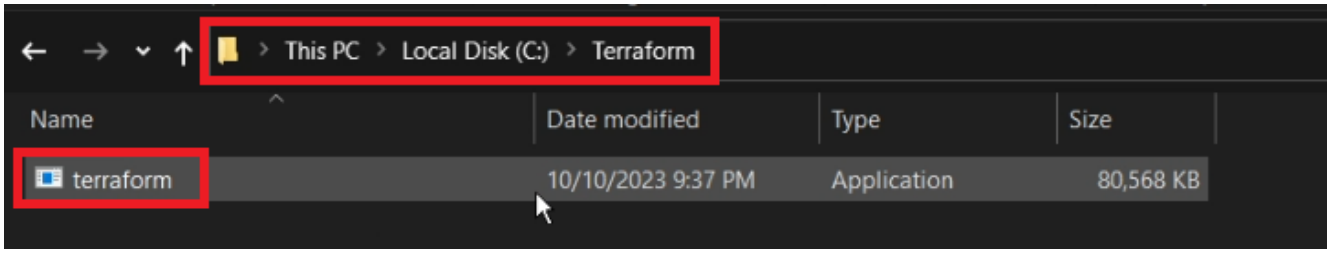



Remember that I created a Terraform Directory in C drive

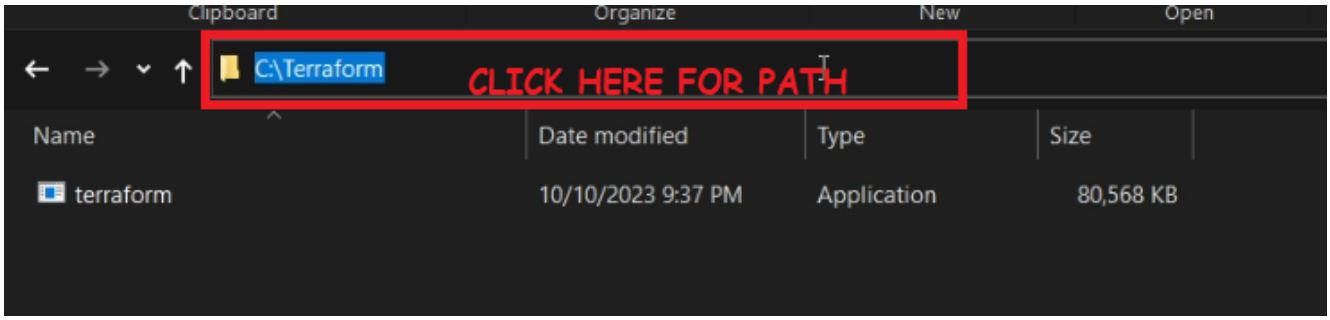



## Extracted to C drive



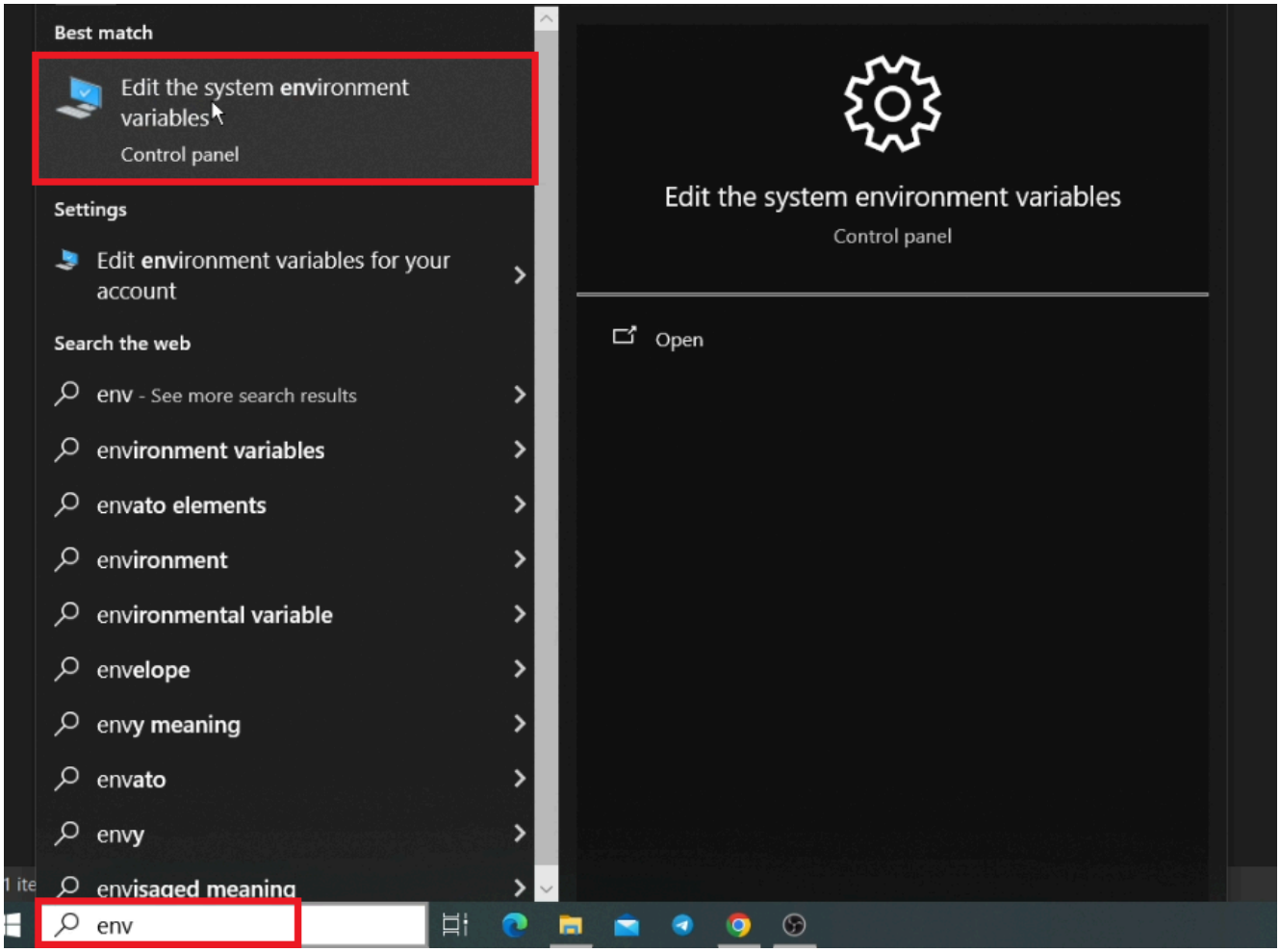
Copy the path



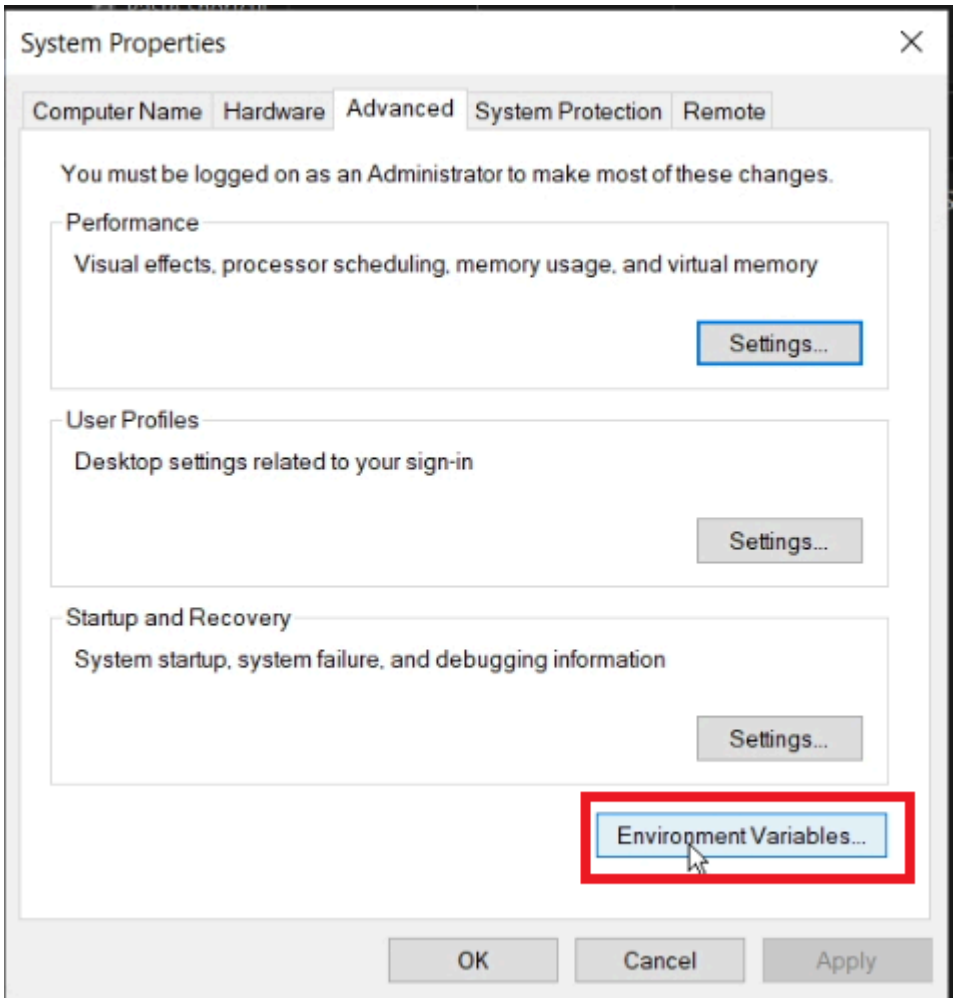

**Add Terraform to Your System's PATH**:

To make Terraform easily accessible from the command prompt, add the directory where Terraform is extracted to your system's PATH environment variable. Follow these steps:

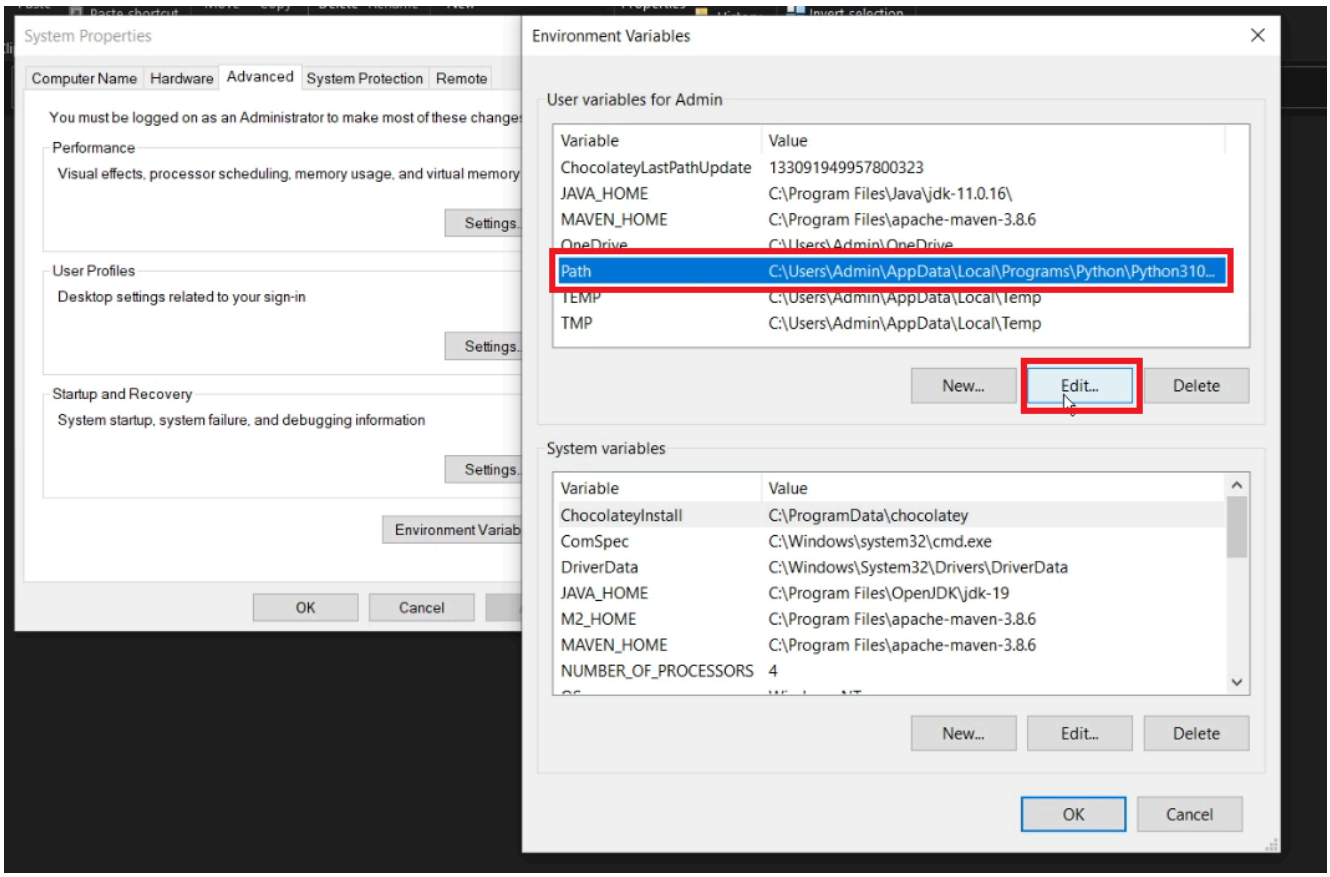
Search for "Environment Variables" in your Windows search bar and click "Edit the system environment variables."



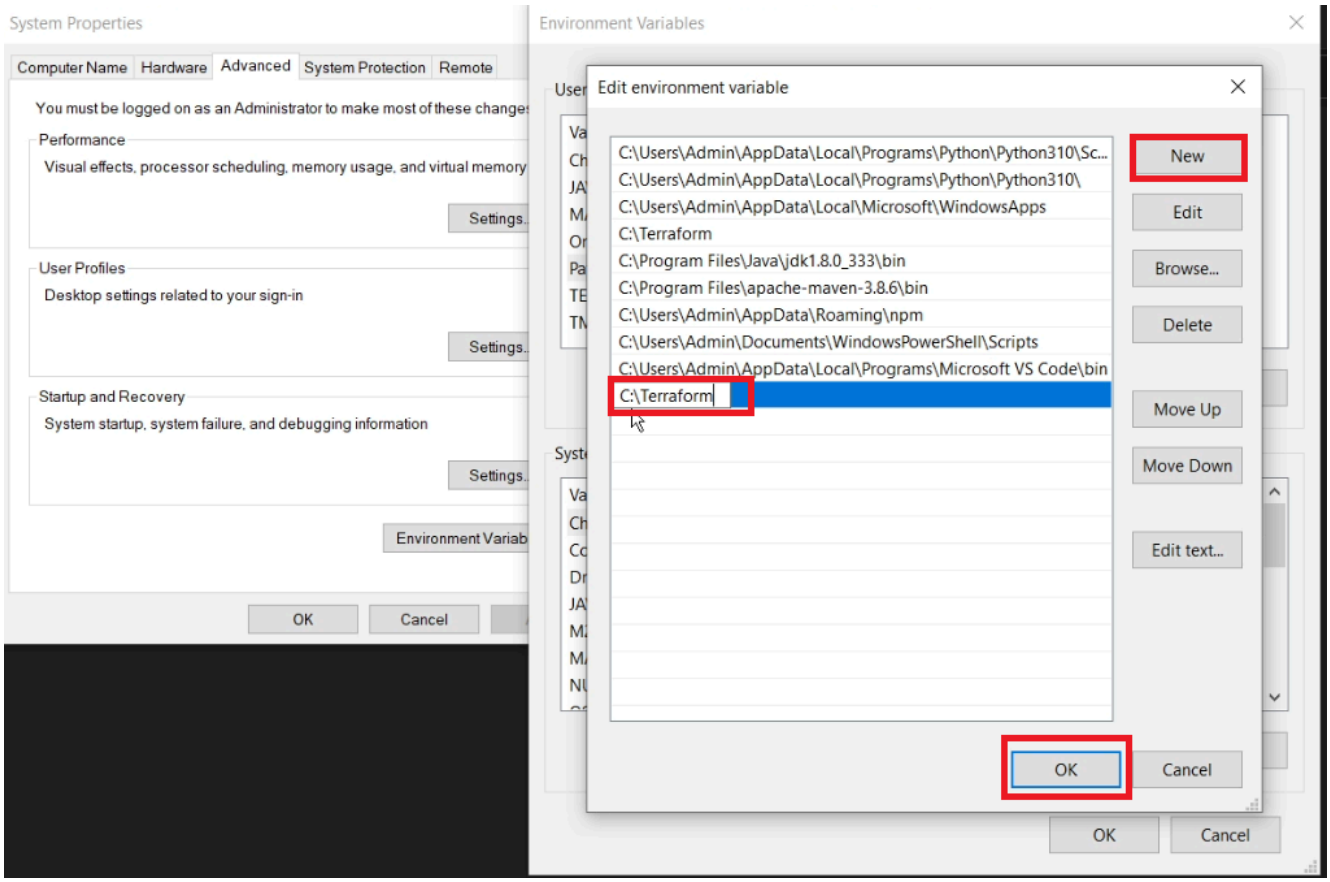

In the "System Properties" window, click the "Environment Variables" button.



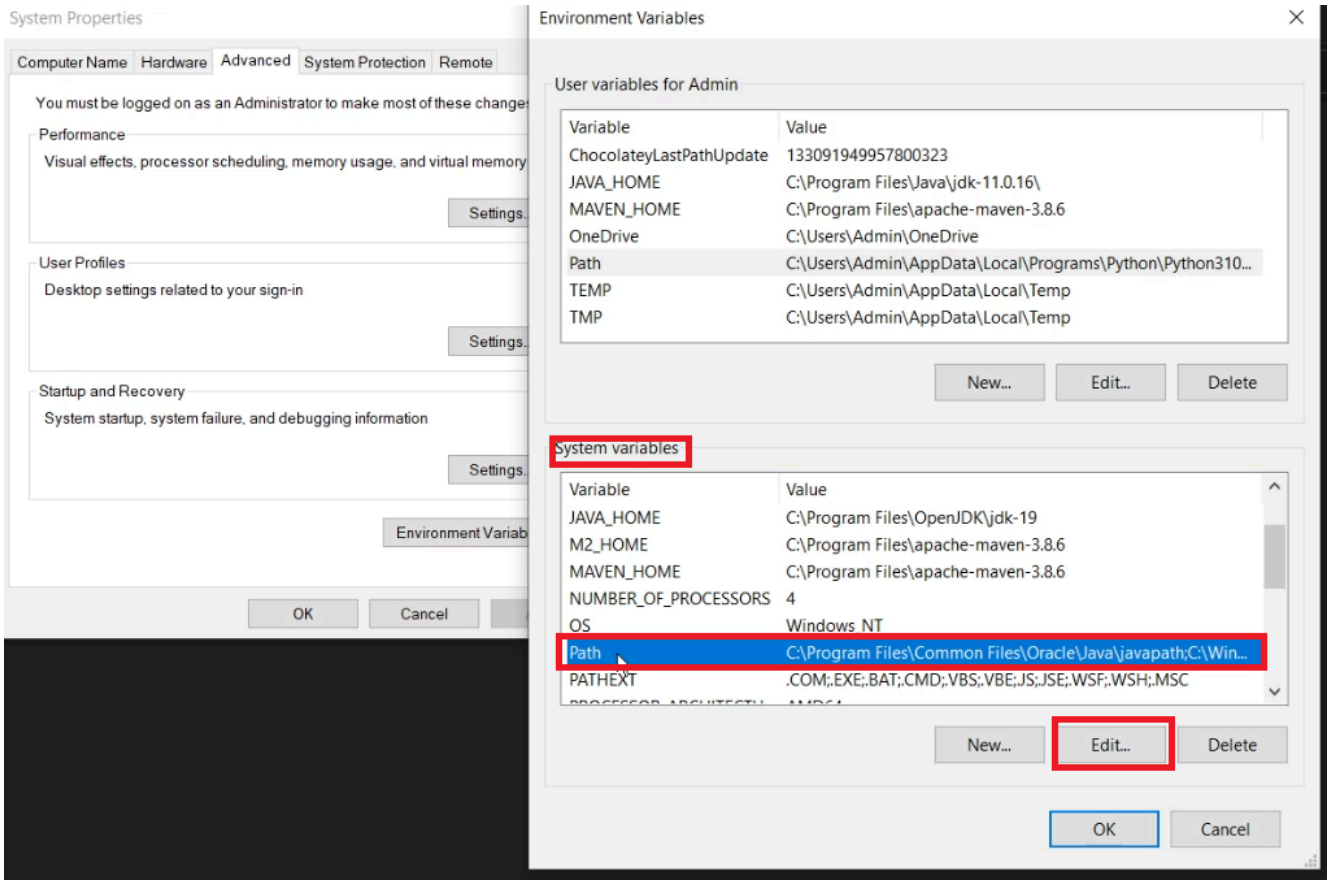

Under “User variables for Admin,” find the “Path” variable and click “Edit.”



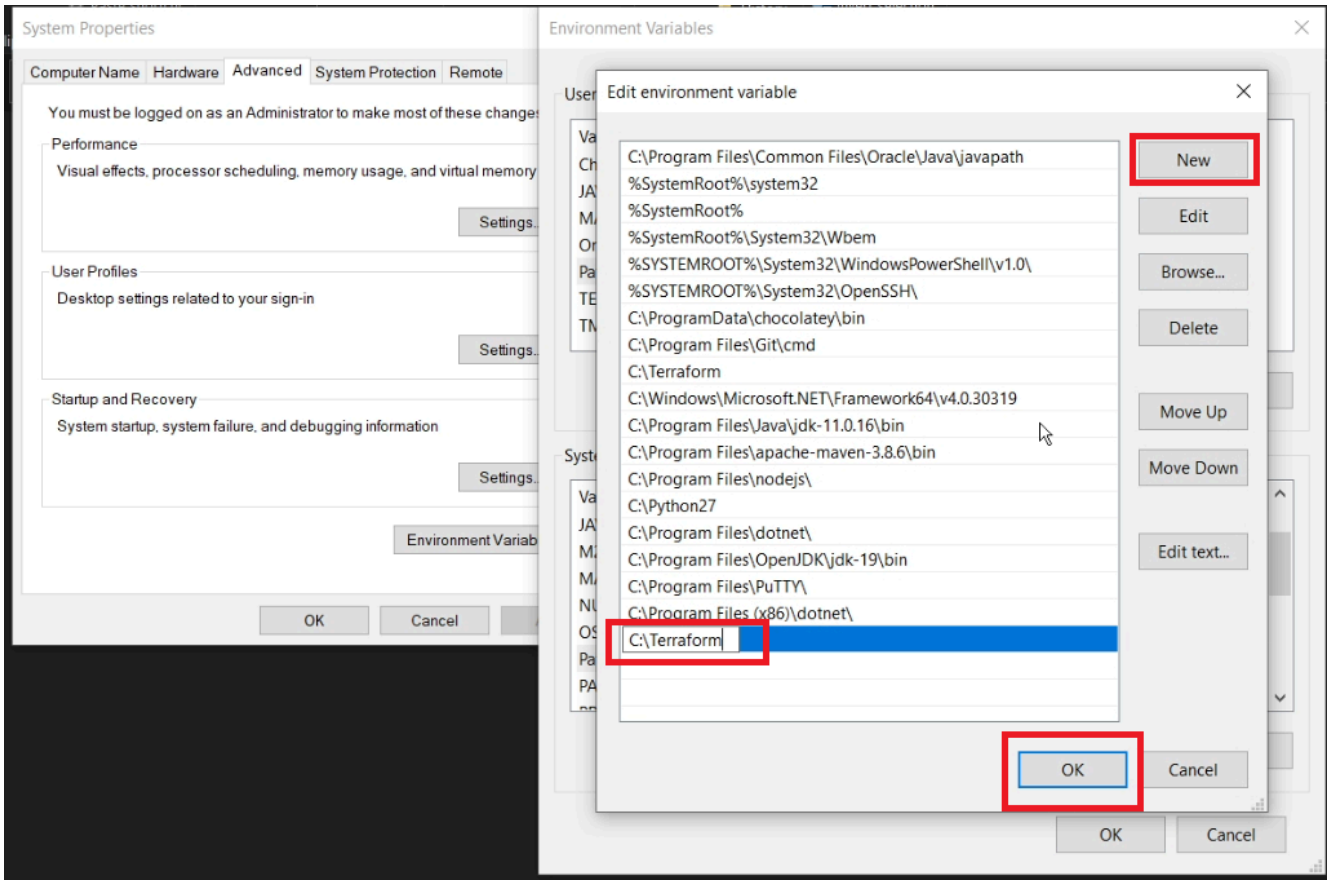
Click on New paste the copied path and click on OK




Under “System variables,” find the “Path” variable and click “Edit.”



Click “New” and add the path to the directory where you extracted Terraform (e.g., C:\path\to\terraform).



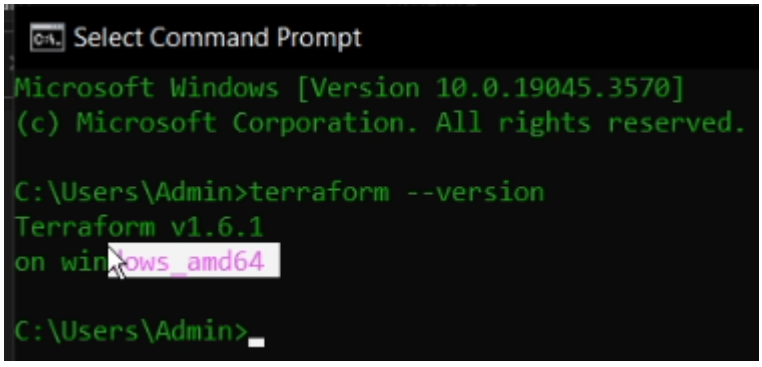

Click “OK” to close the Environment Variables windows.

Click “OK” again to close the System Properties window.

**Verify the Installation:**

Open a new Command Prompt or PowerShell window.

Type terraform –version and press Enter. This command should display the Terraform version, confirming that Terraform is installed and in your PATH.

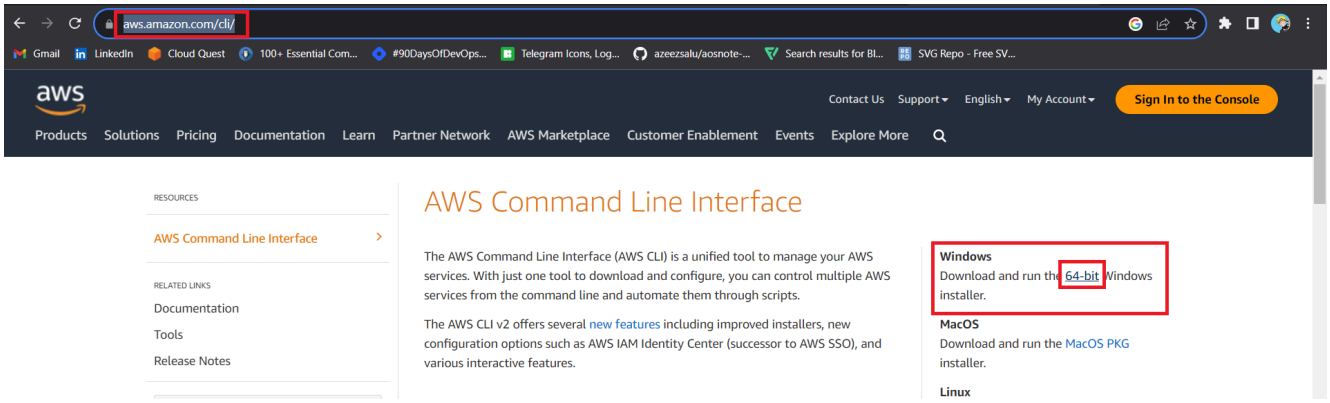


Your Terraform installation is now complete, and you can start using Terraform to manage your infrastructure as code.

## Step2: Download the AWS CLI Installer:

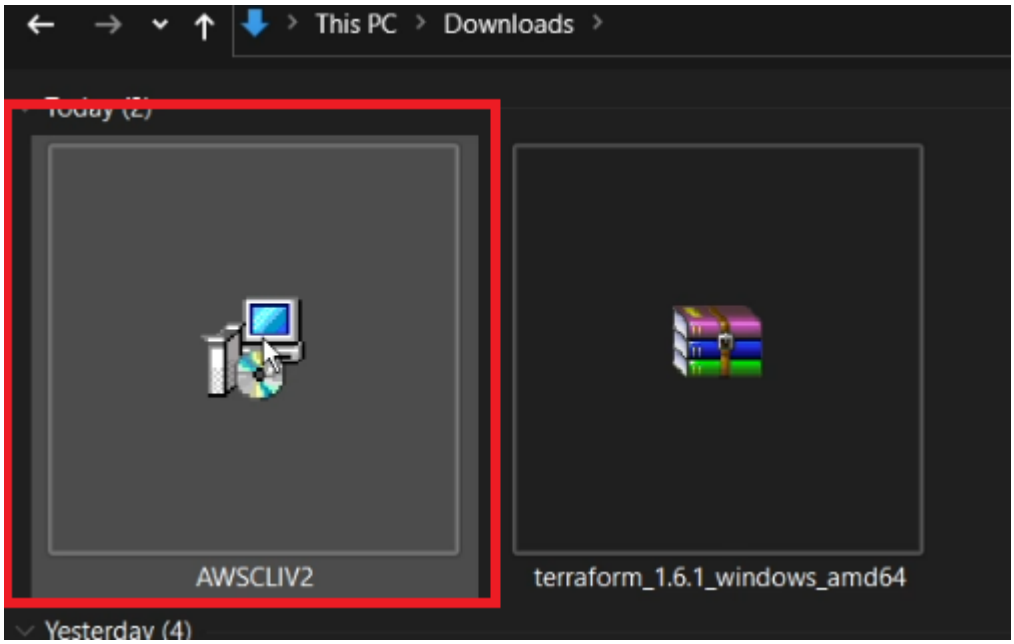
Visit the AWS CLI Downloads page: **aws.amazon.com/cli**

Under “Install the AWS CLI,” click on the “64-bit” link to download the AWS CLI installer for Windows.

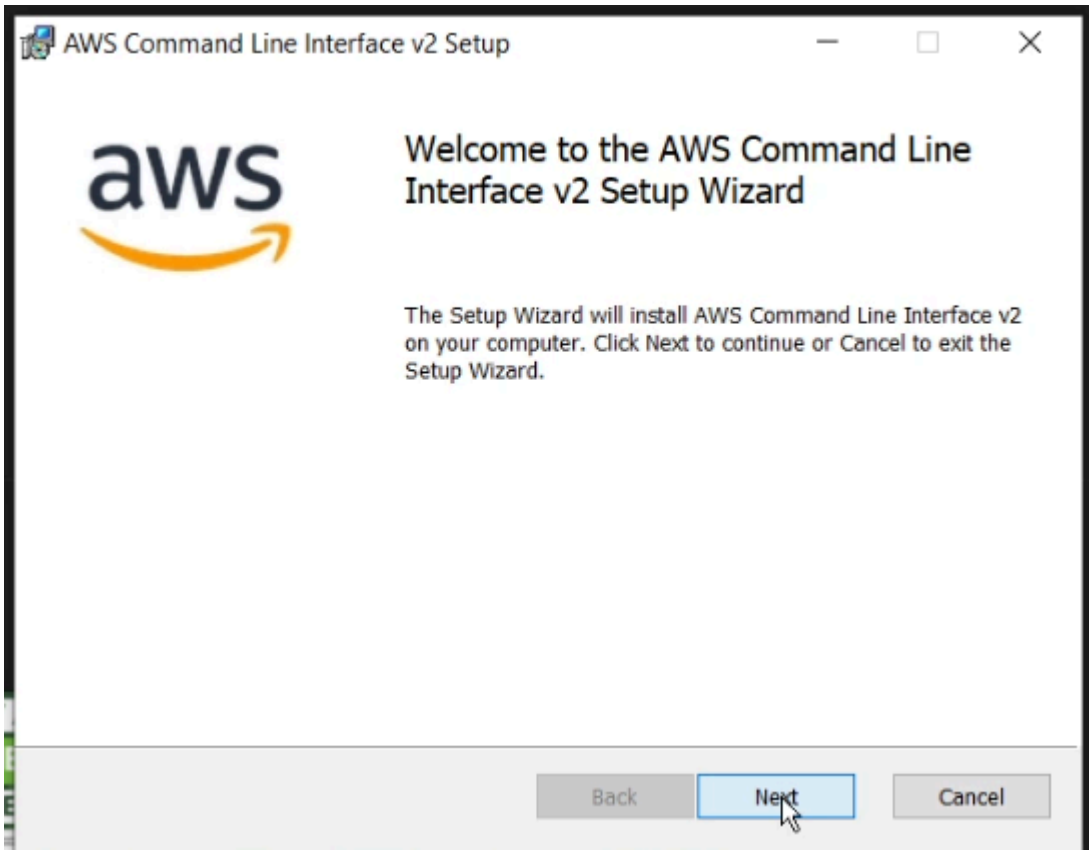



### Run the Installer:

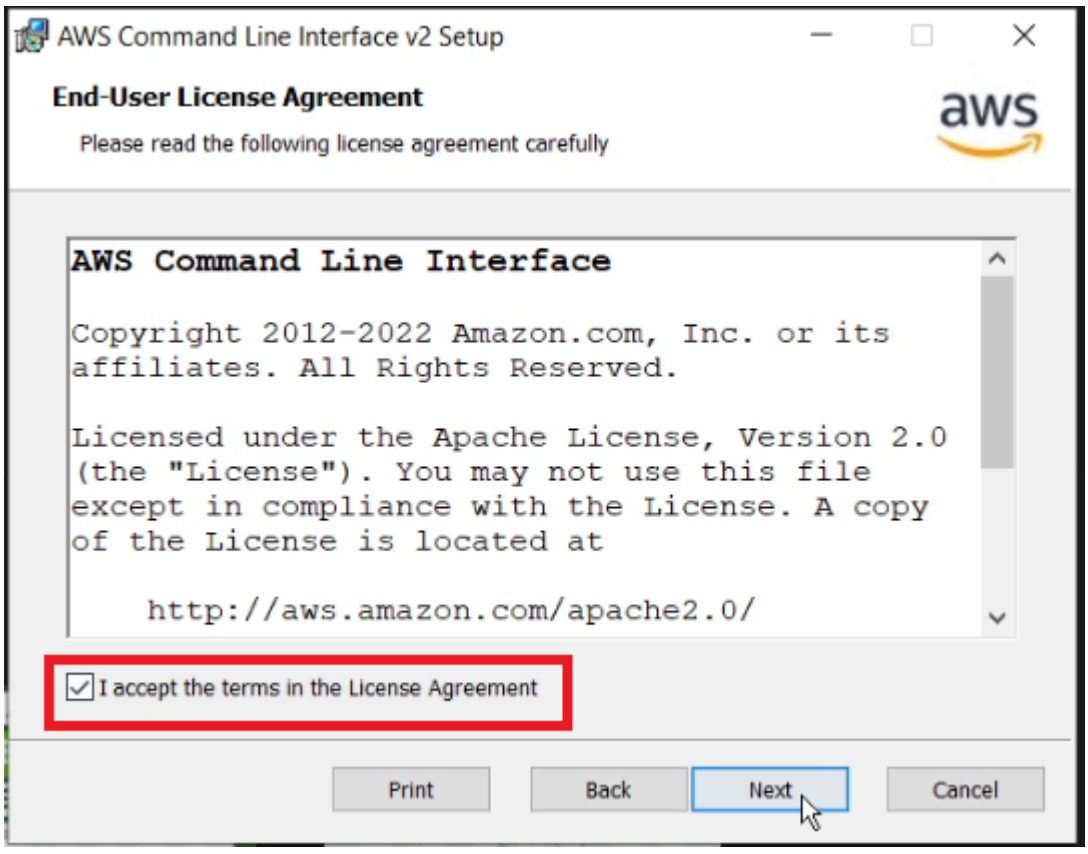
Locate the downloaded installer executable (e.g., AWSCLIV2.exe) and double-click it to run the installer.




Click on Next




Agree to the terms and click on Next

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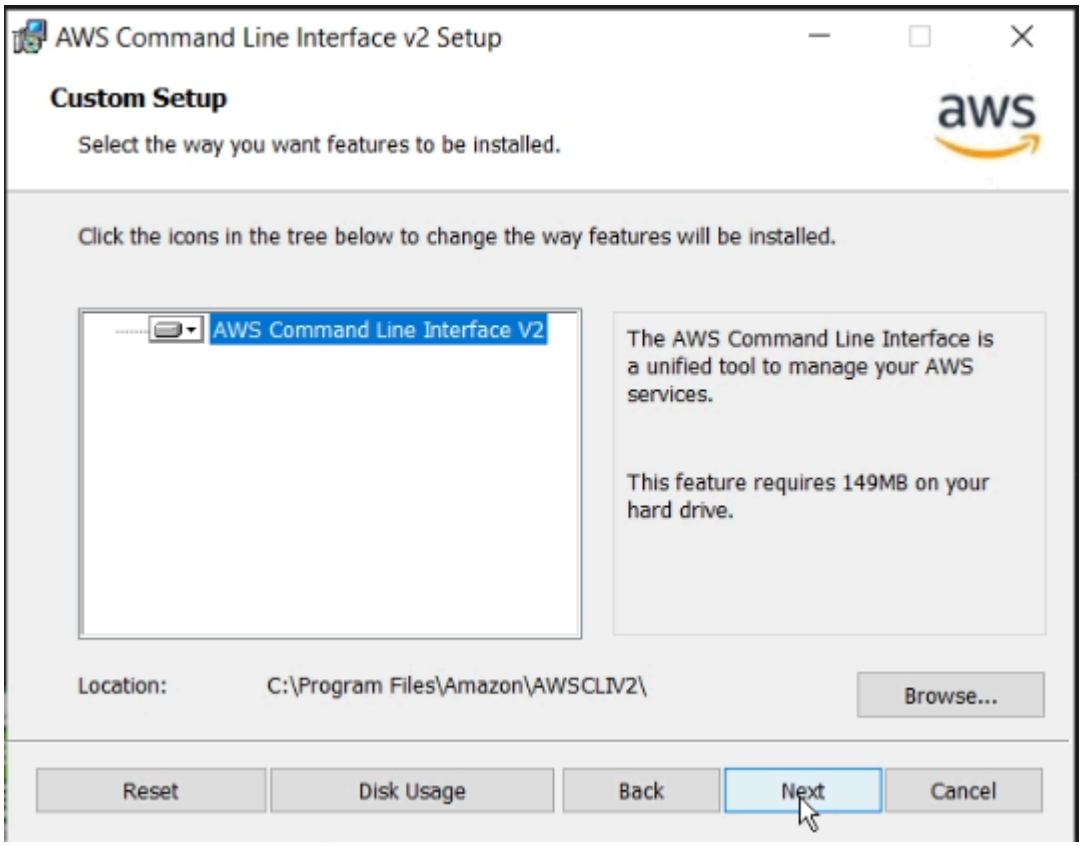
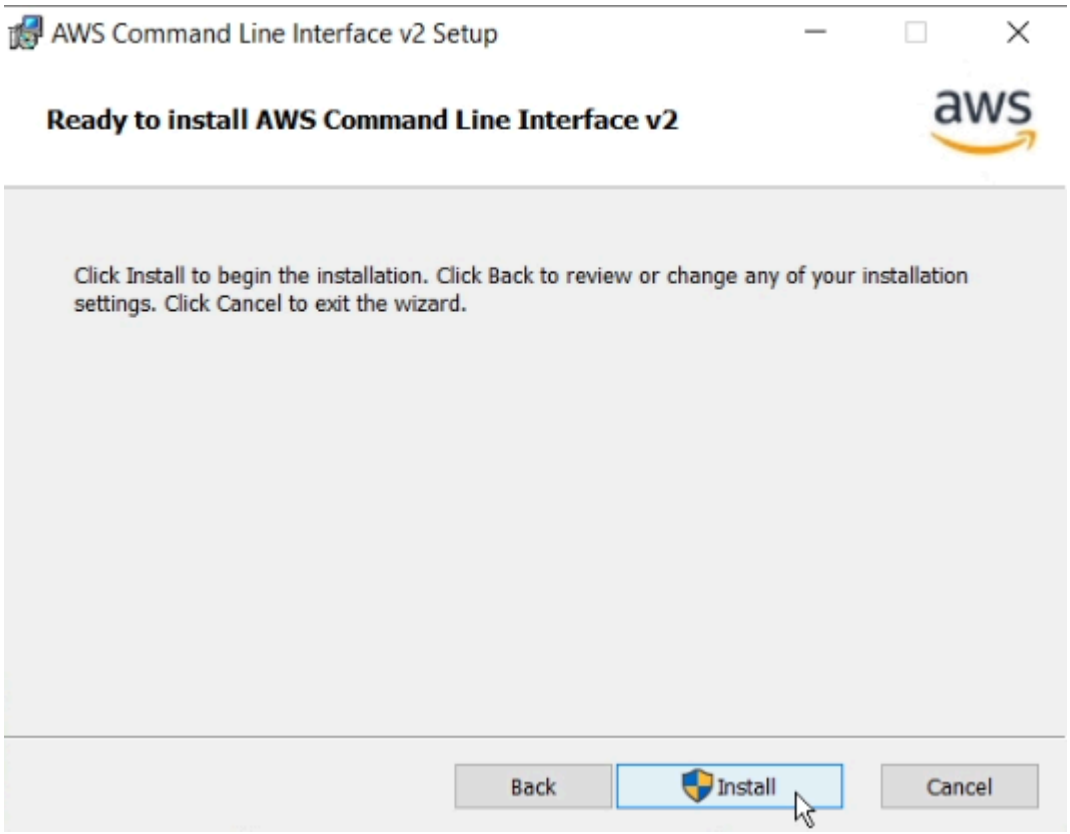
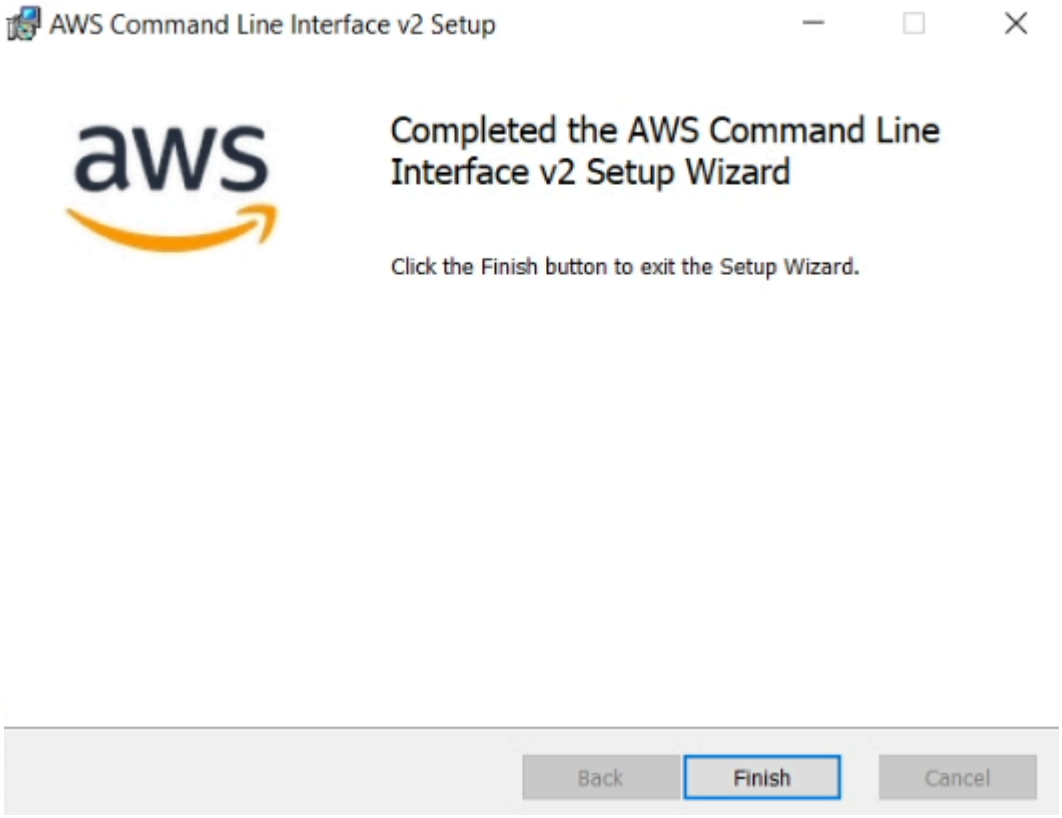



Click on install



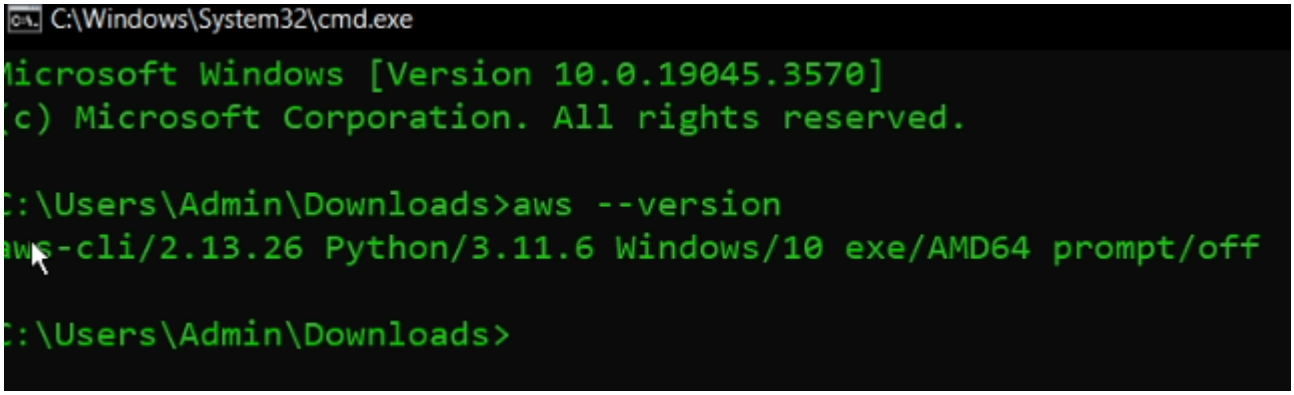

Click Finish Aws cli is installed




**Verify the Installation:**

Open a Command Prompt or PowerShell window.

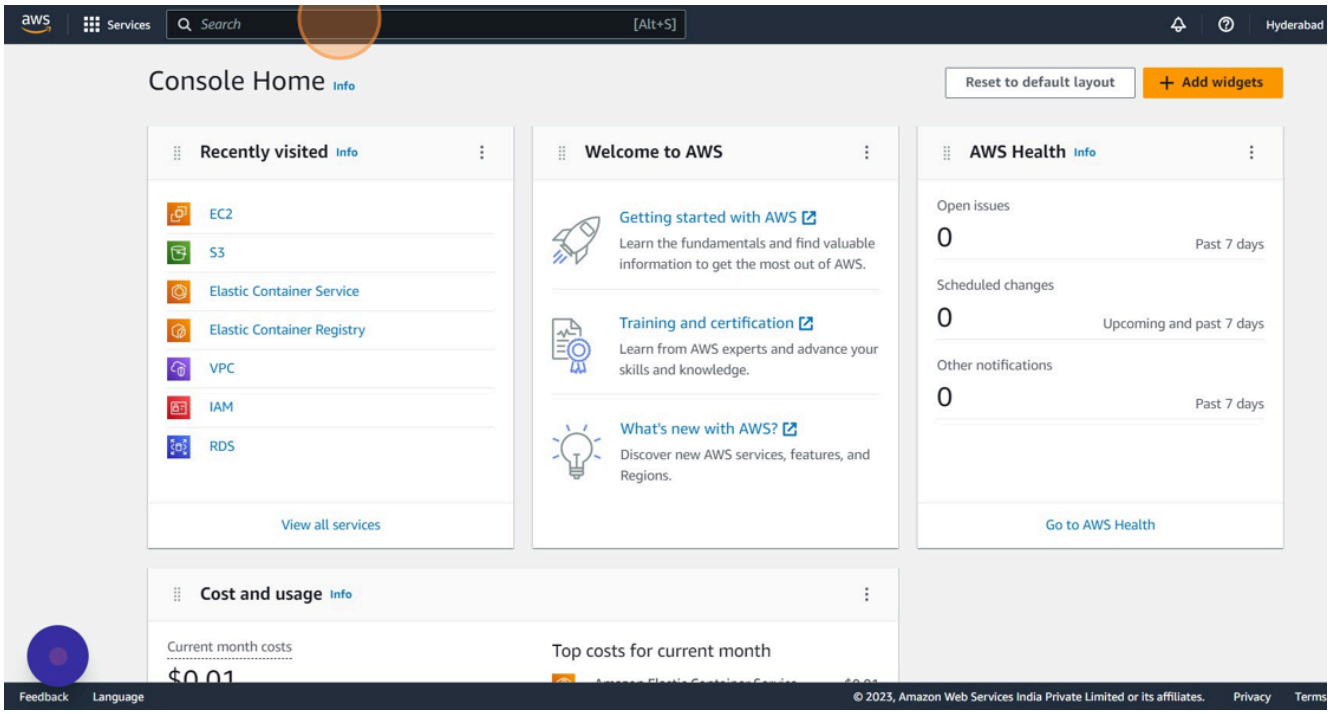
Type **aws –version** and press Enter. This command should display the AWS CLI version, confirming that the installation was successful.



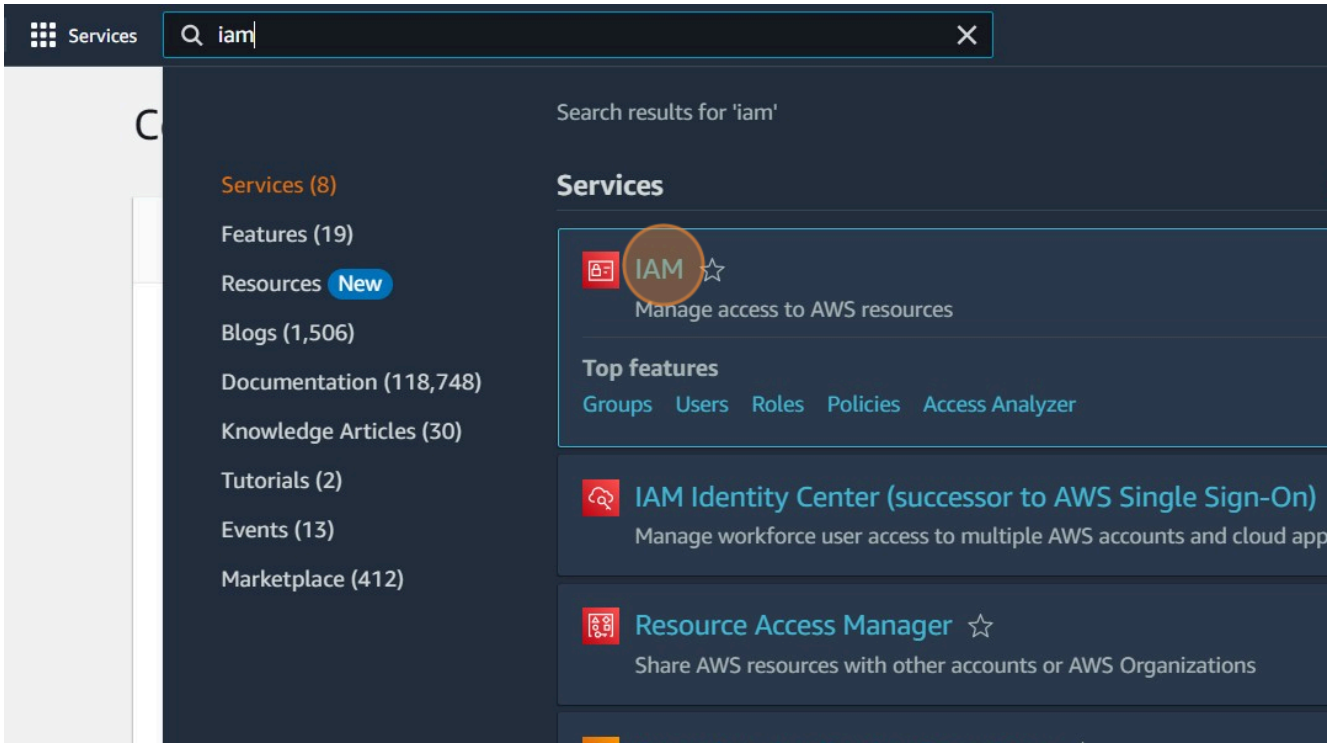

## Step3: create an IAM user

Navigate to the **AWS console**

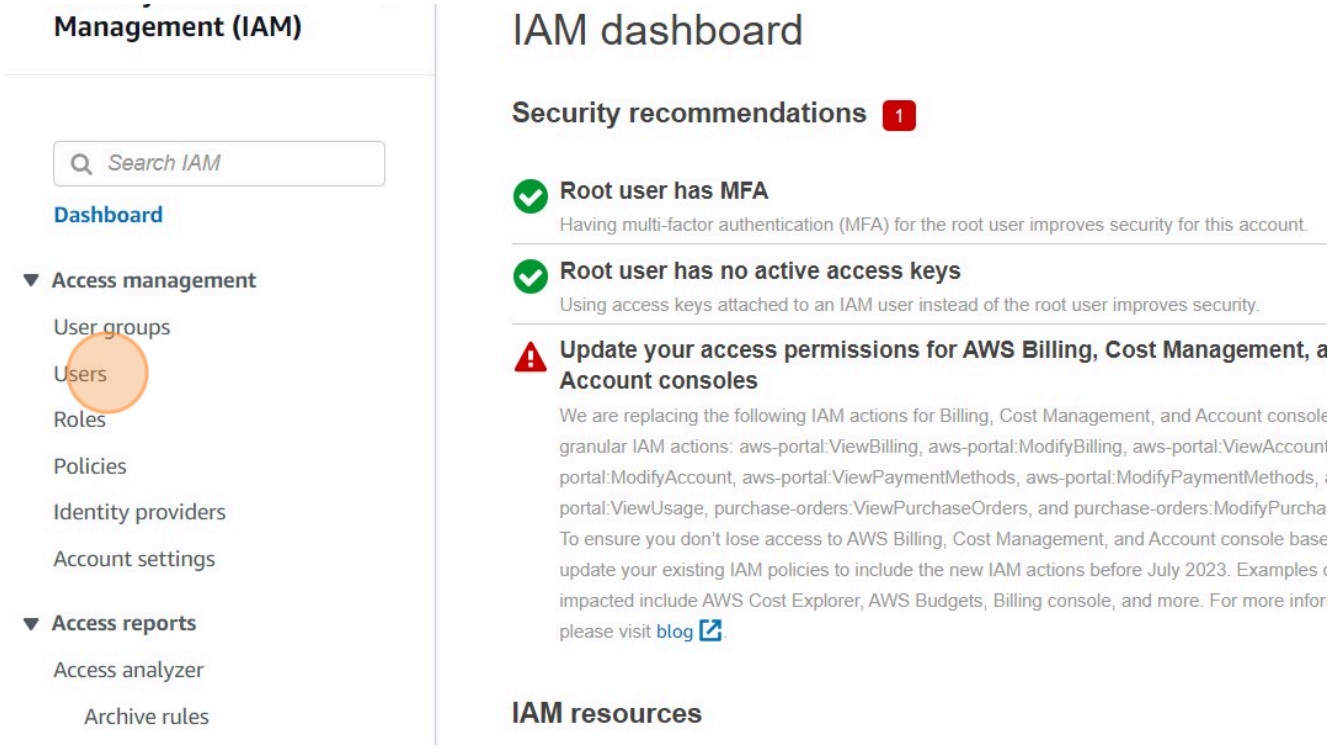
Click the “Search” field.



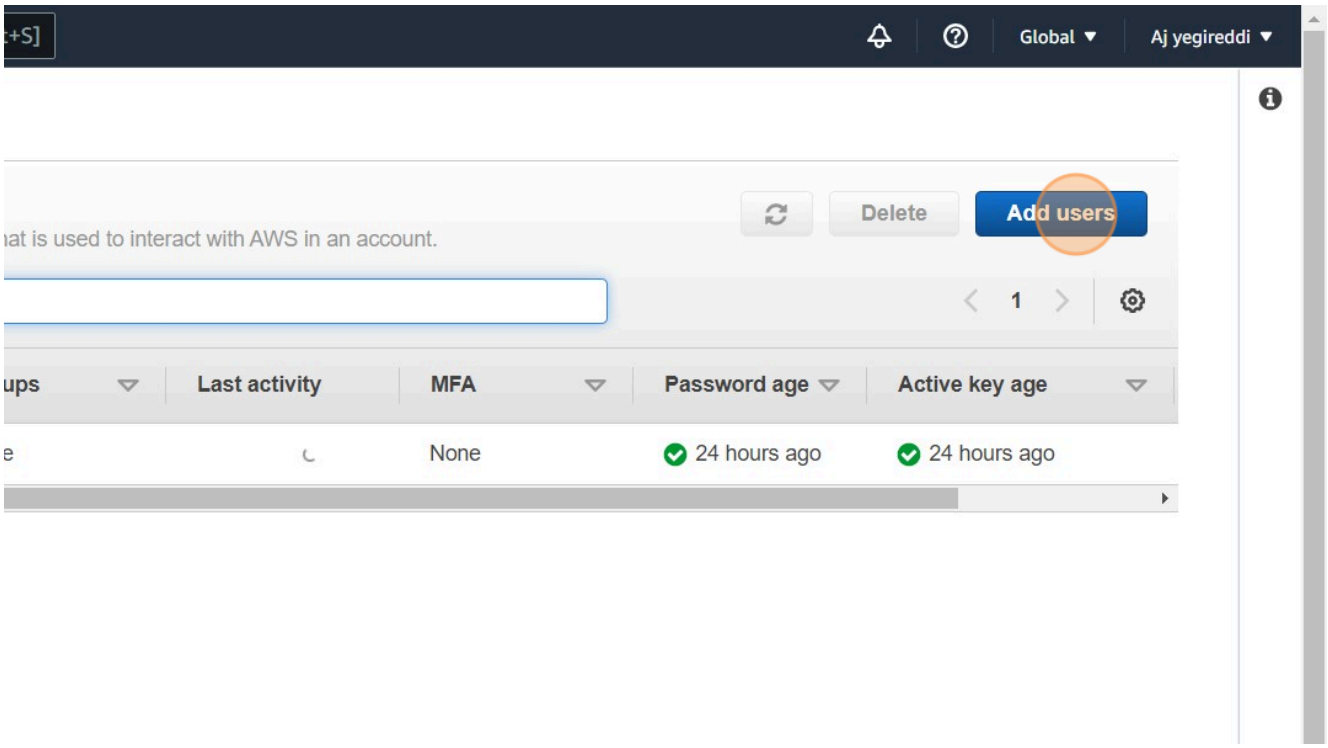

Search for IAM



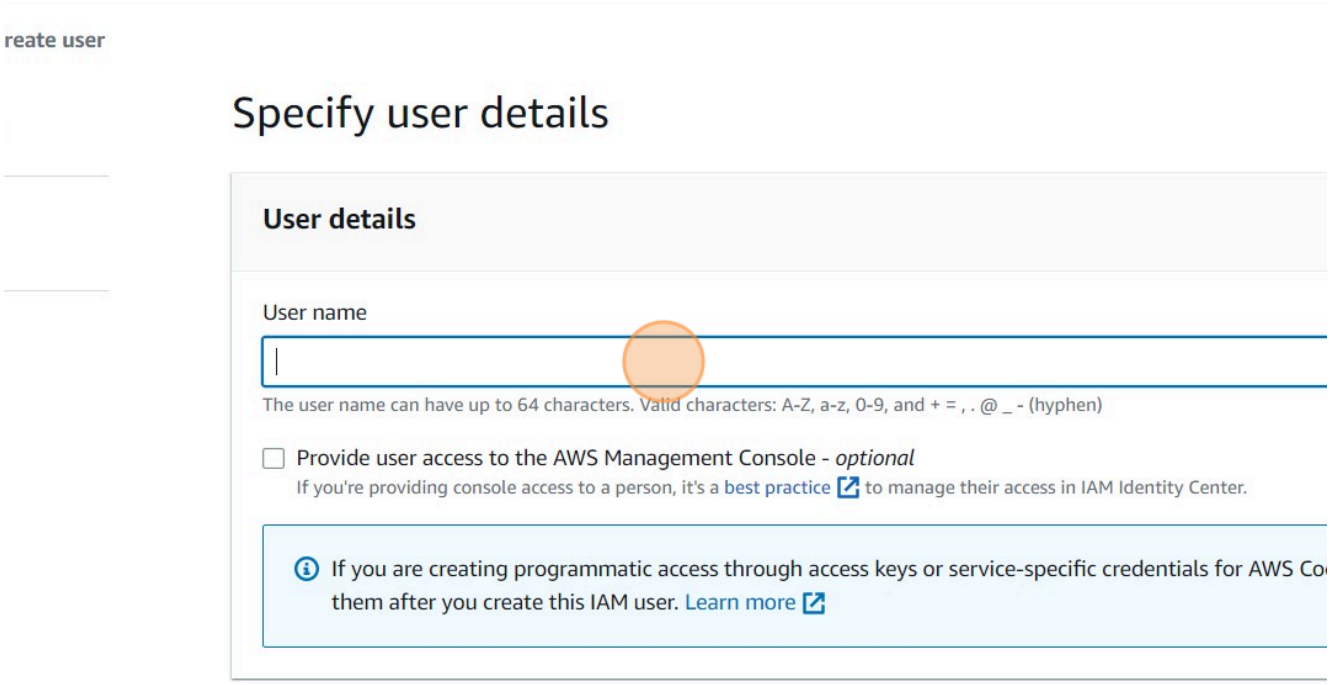

Click “Users”




Click “Add users”

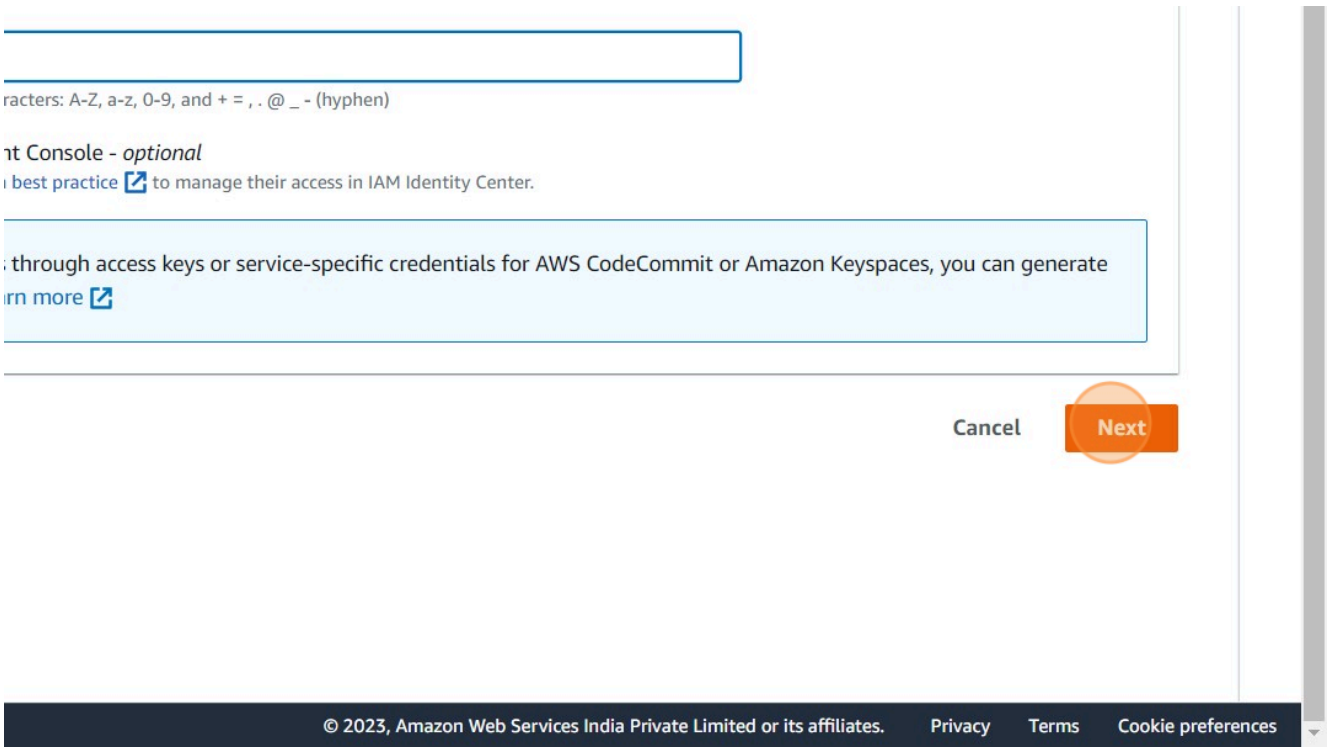



Click the “User name” field.

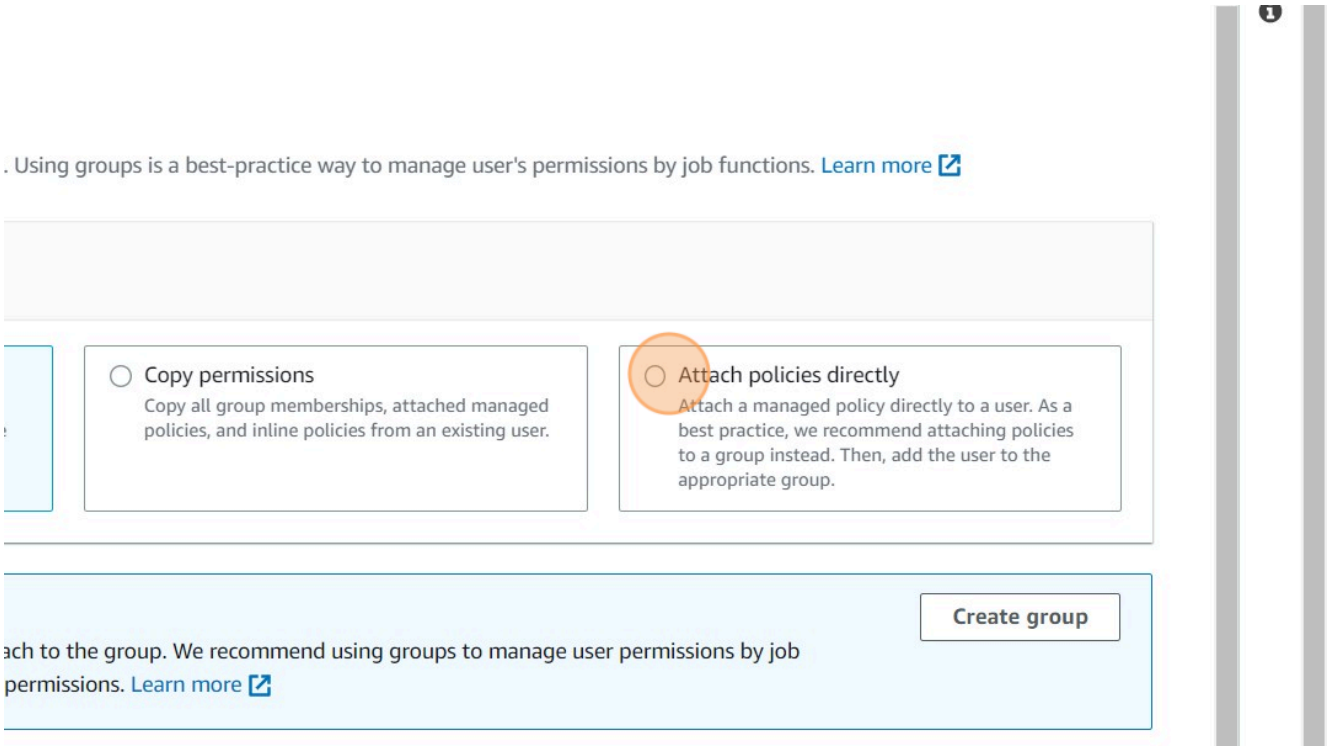



Type “Terraform” or as you wish about the name

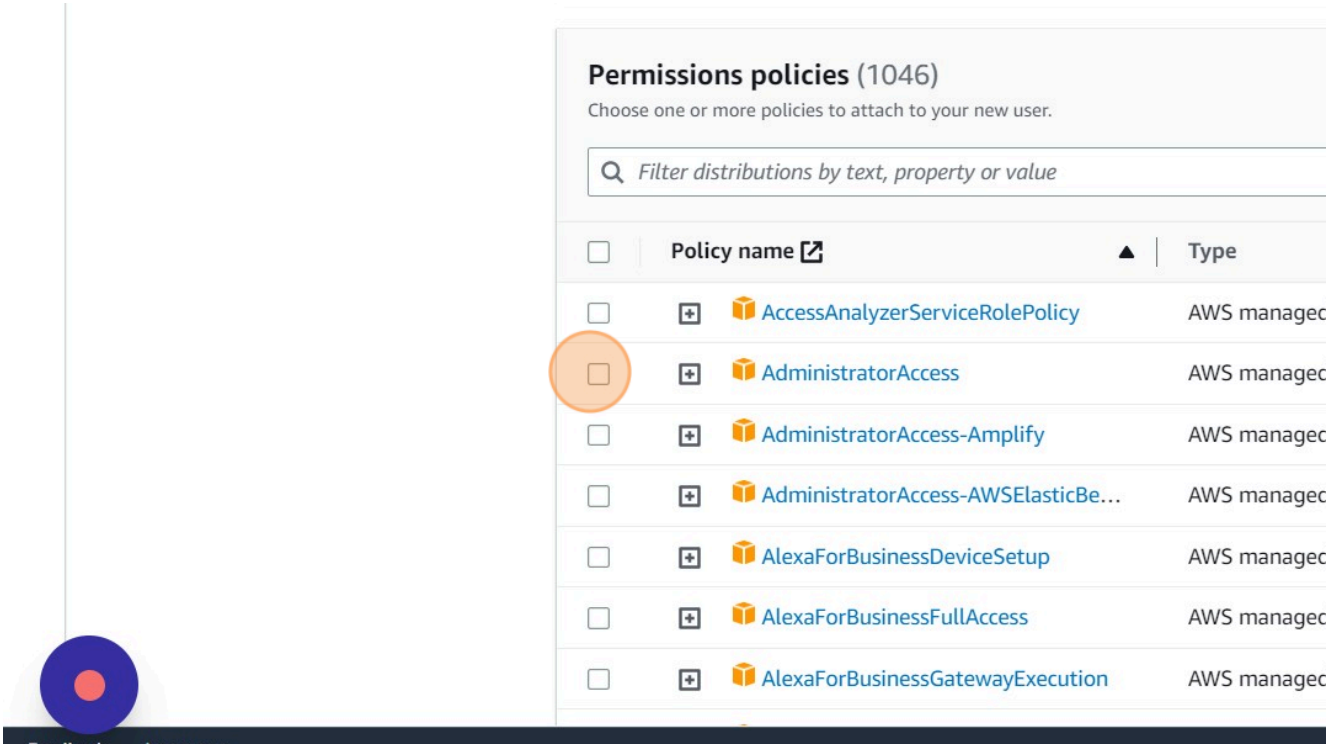
Click Next



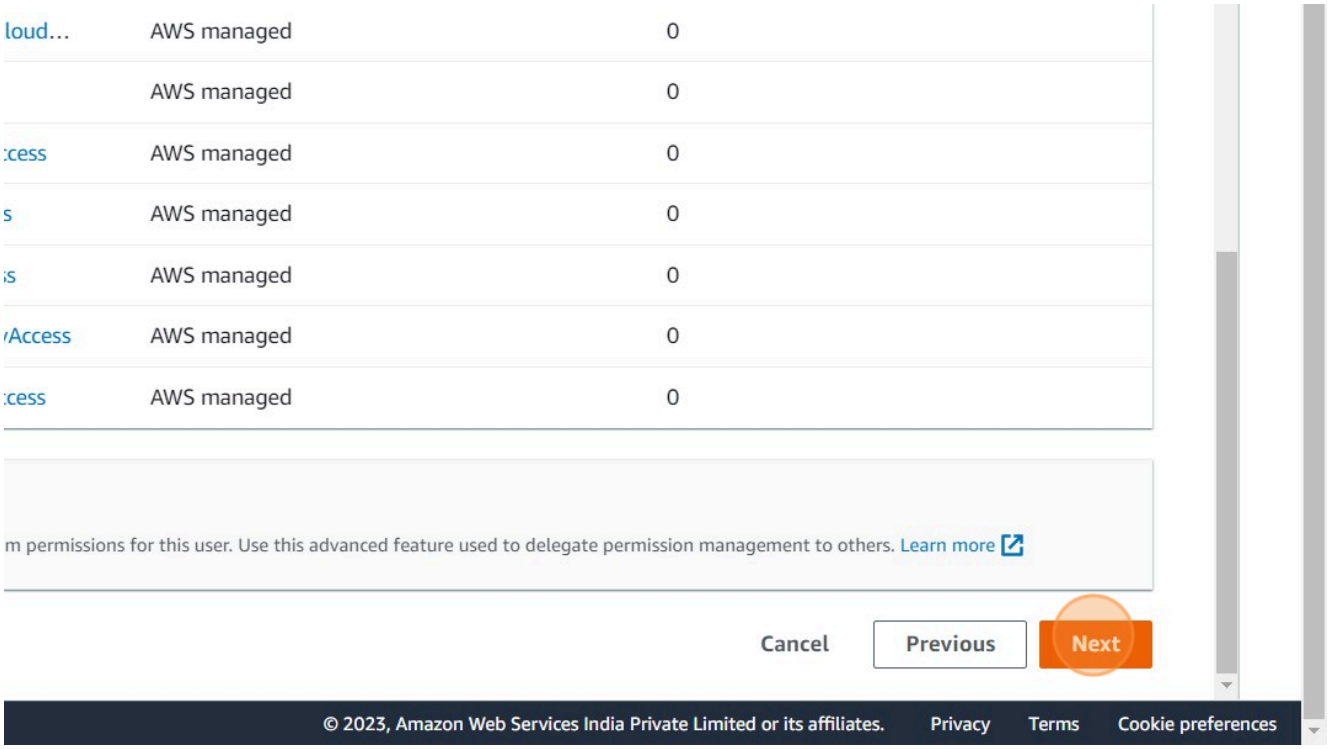

Click “Attach policies directly”



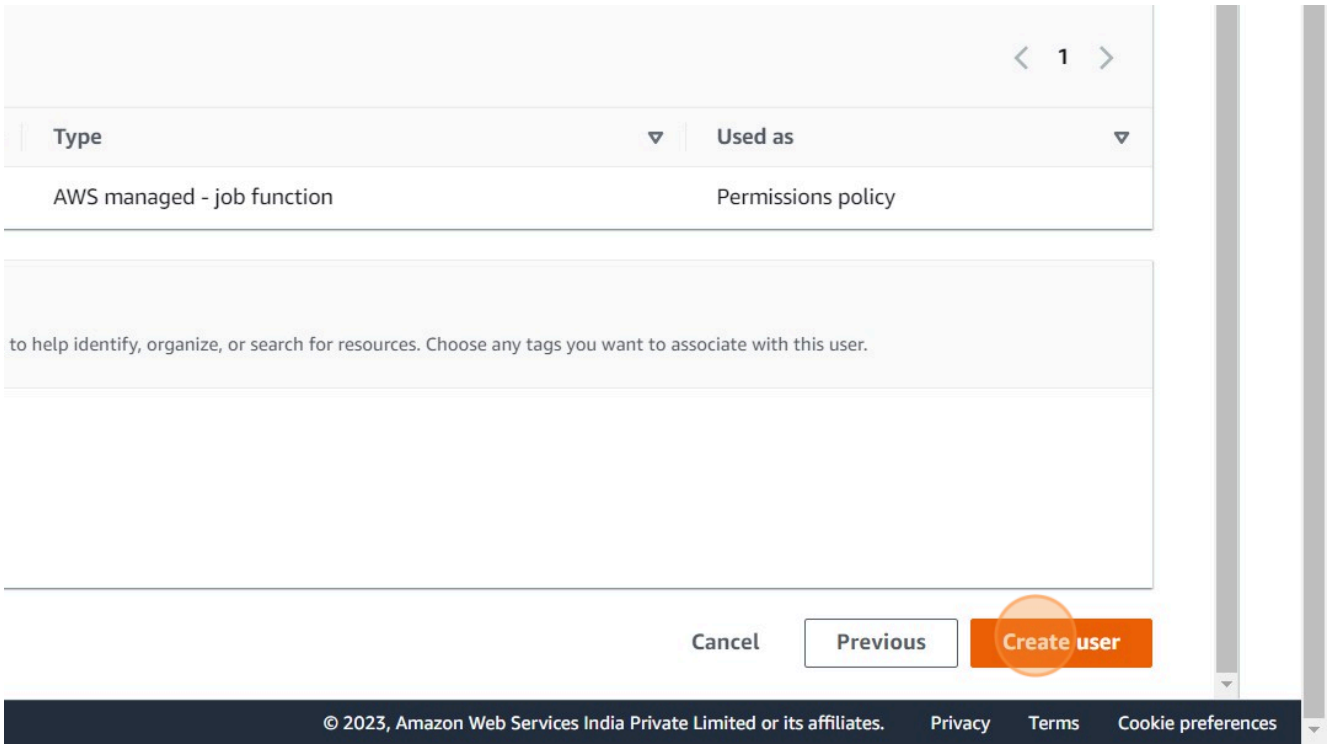

Click this checkbox with Administrator access



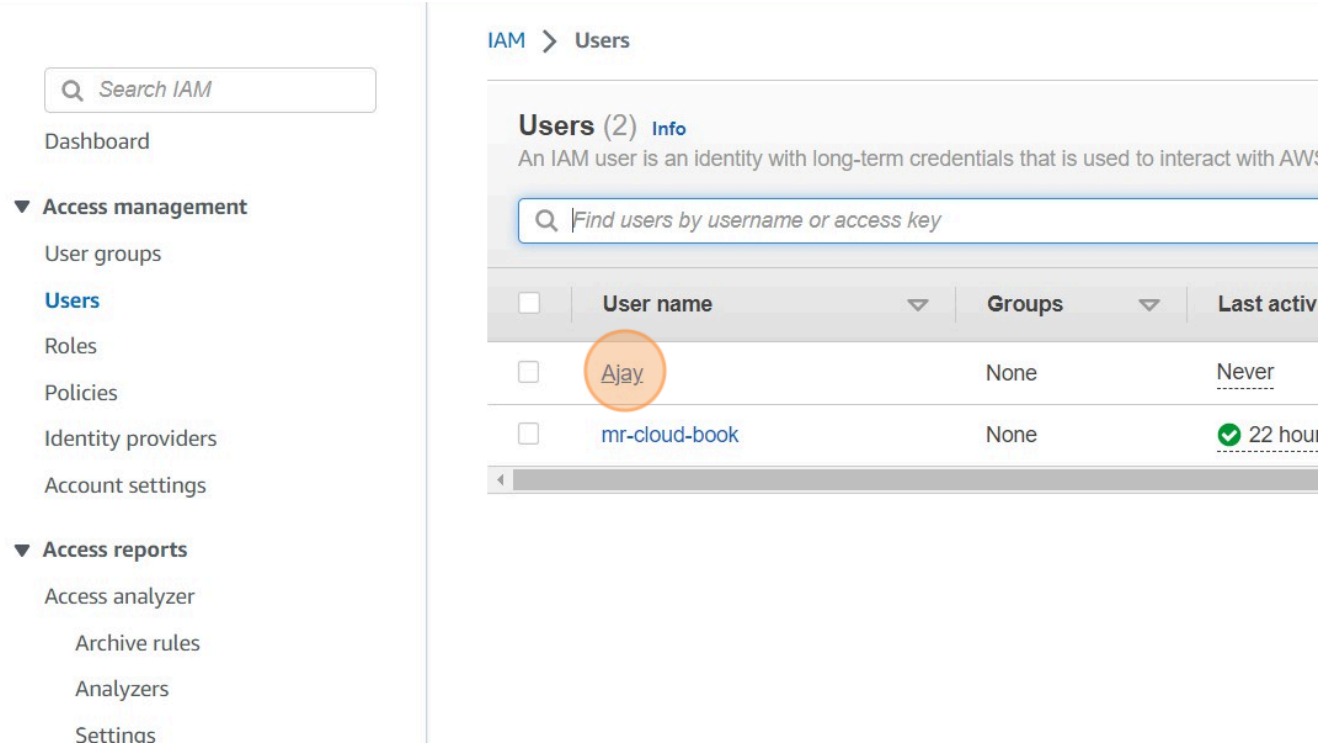

Click “Next”



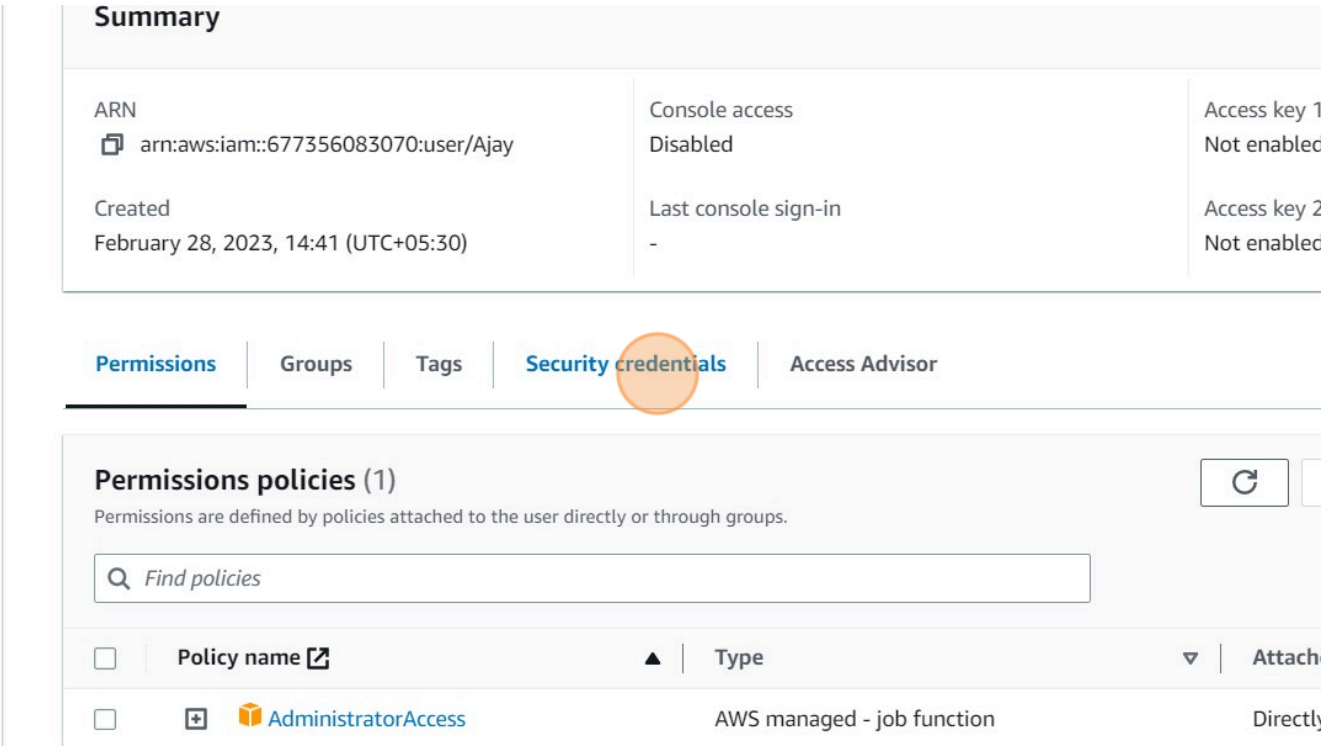

Click “Create user”



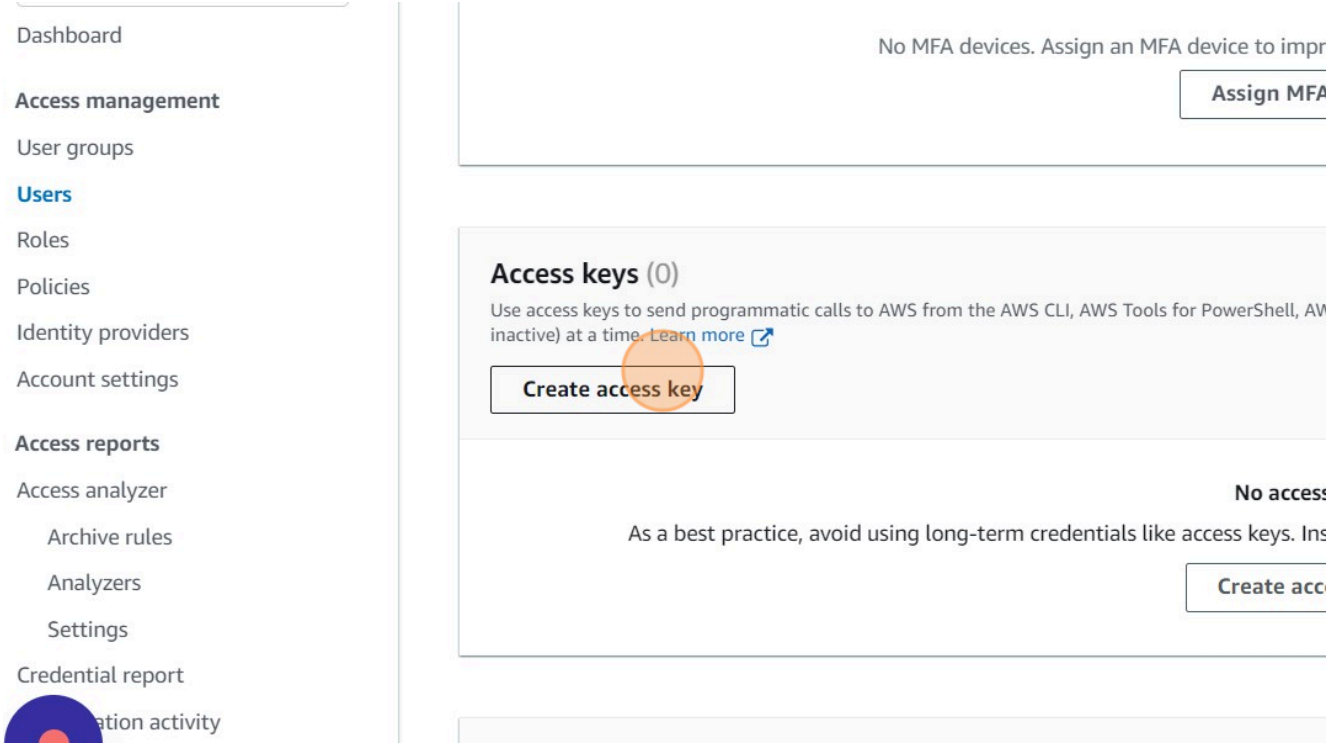

Click newly created user in my case Ajay



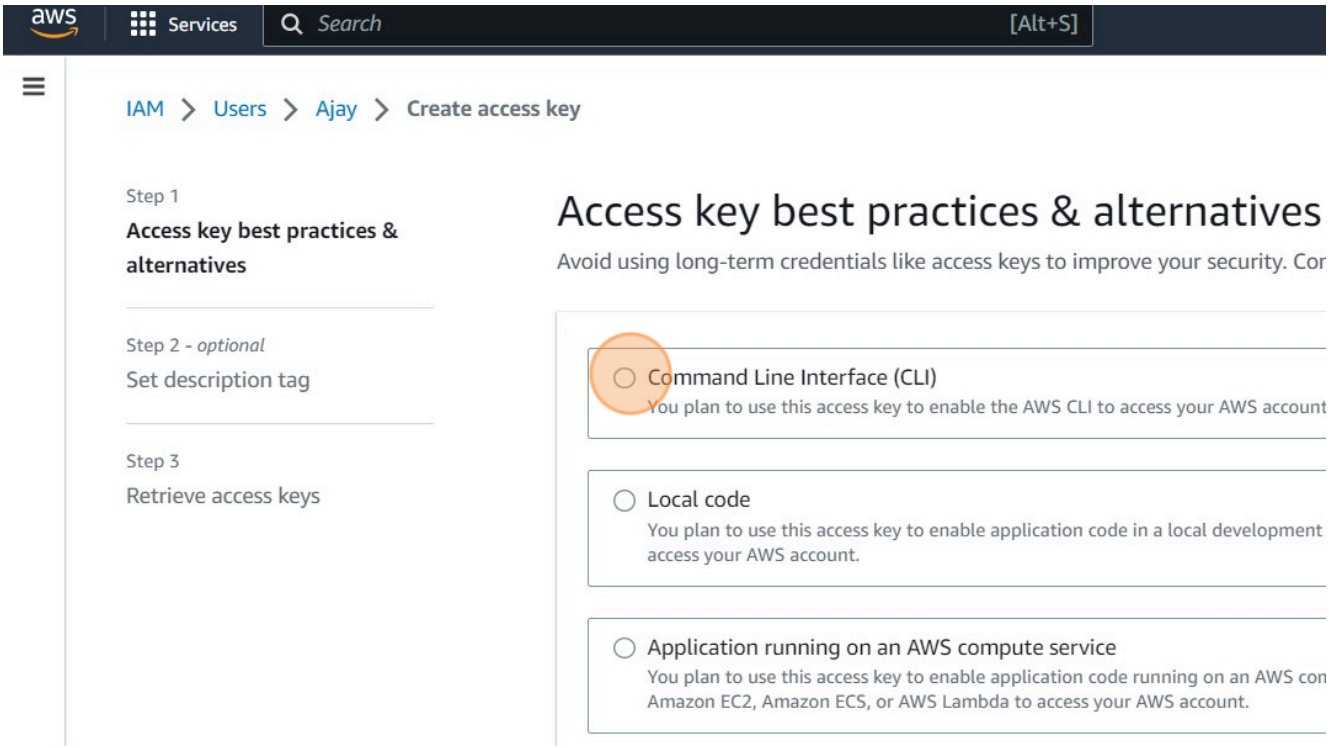

Click “Security credentials”



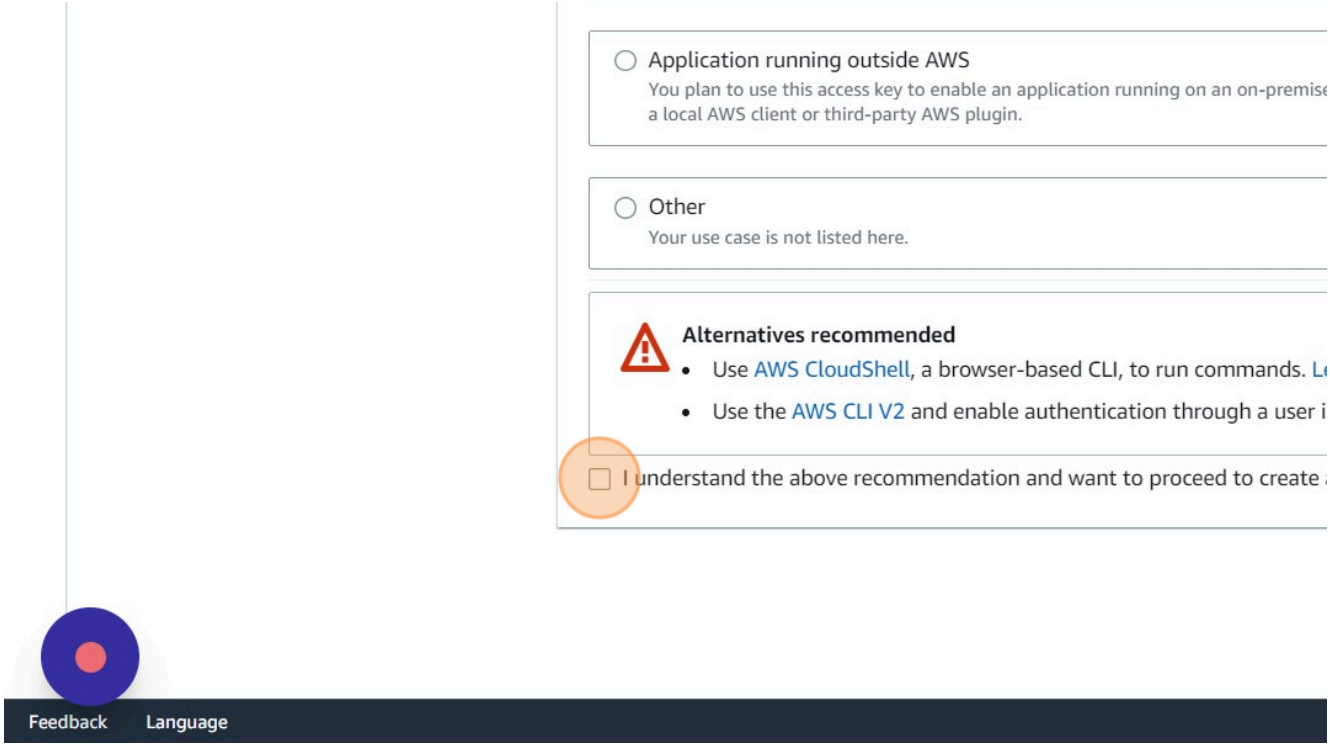

Click “Create access key”



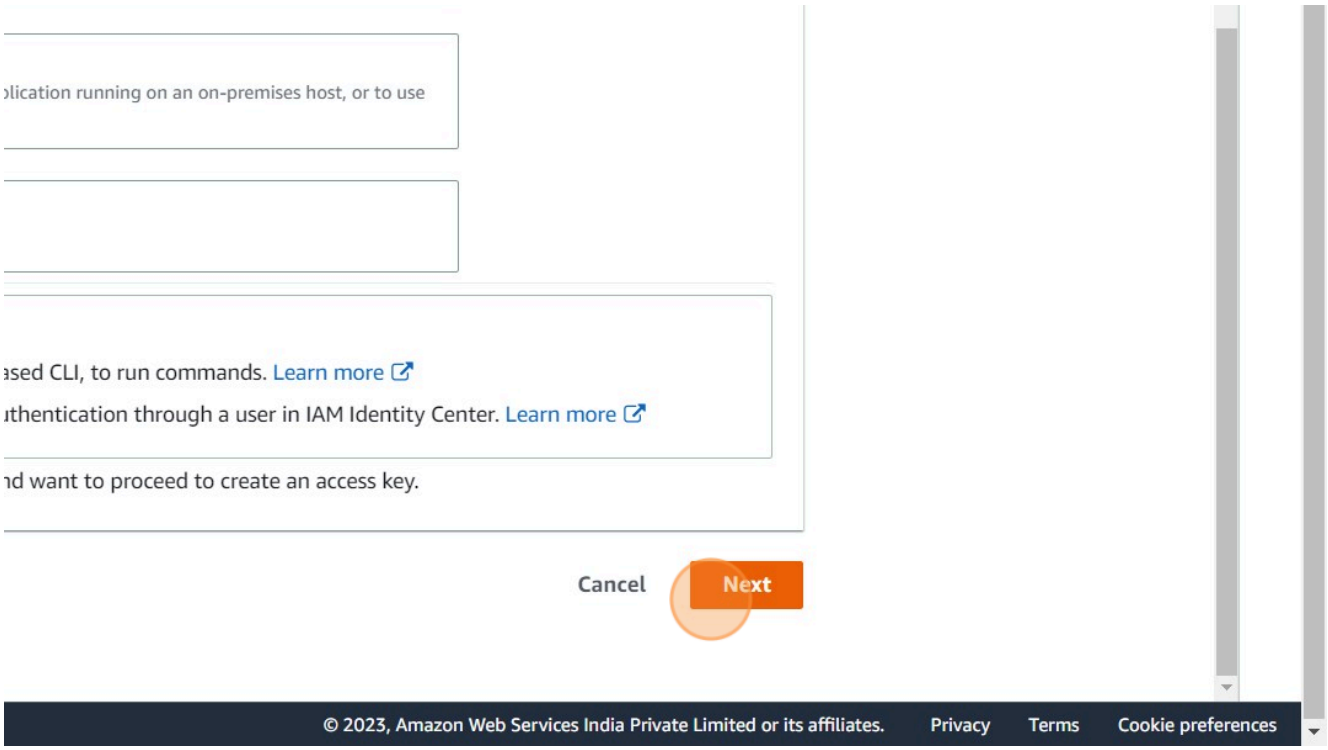

Click this radio button with the CLI



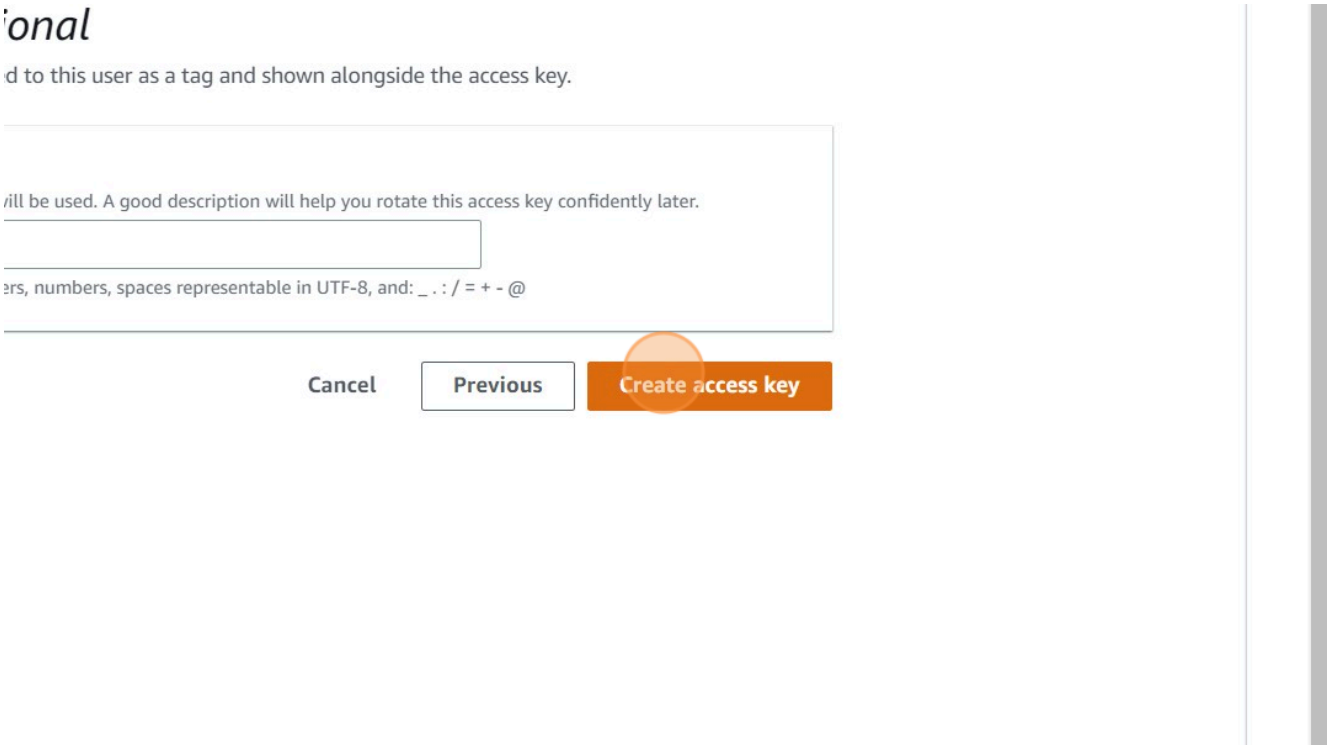

Agree to terms



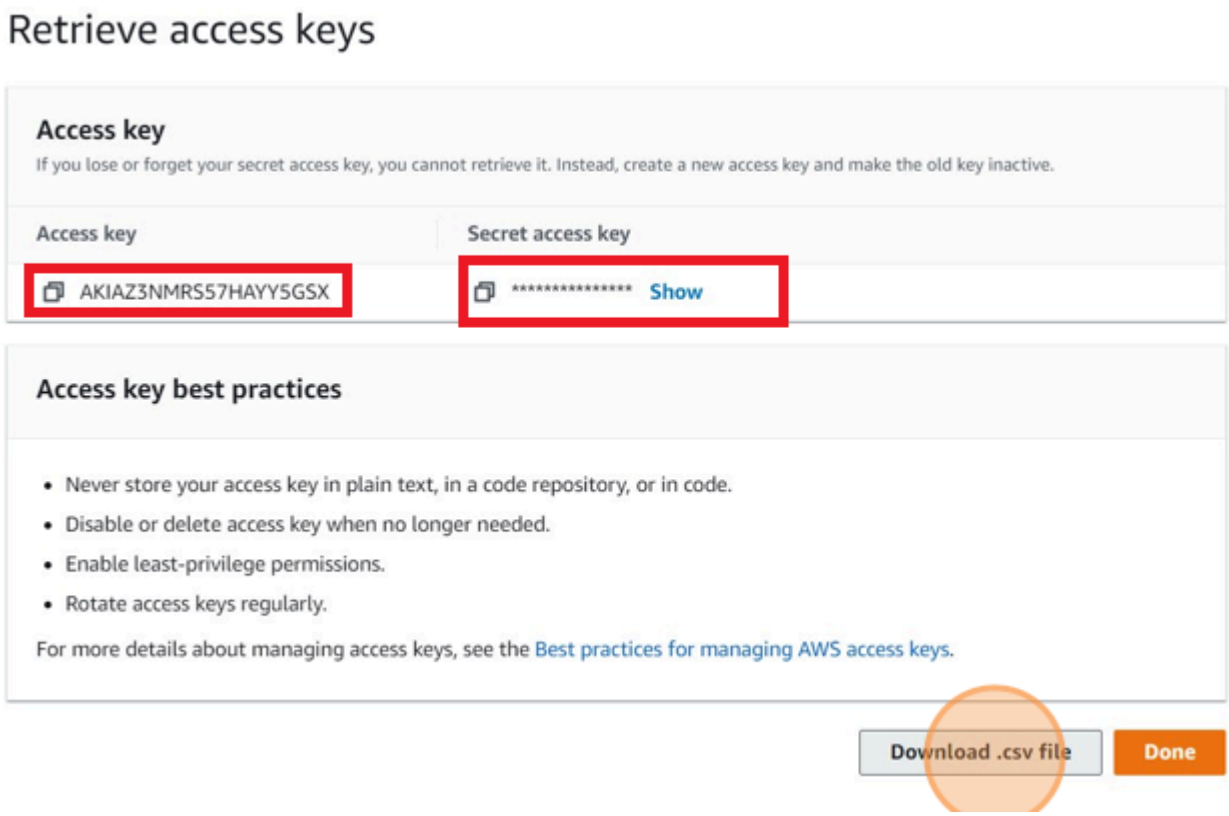

Click Next




Click “Create access key”




Download .csv file

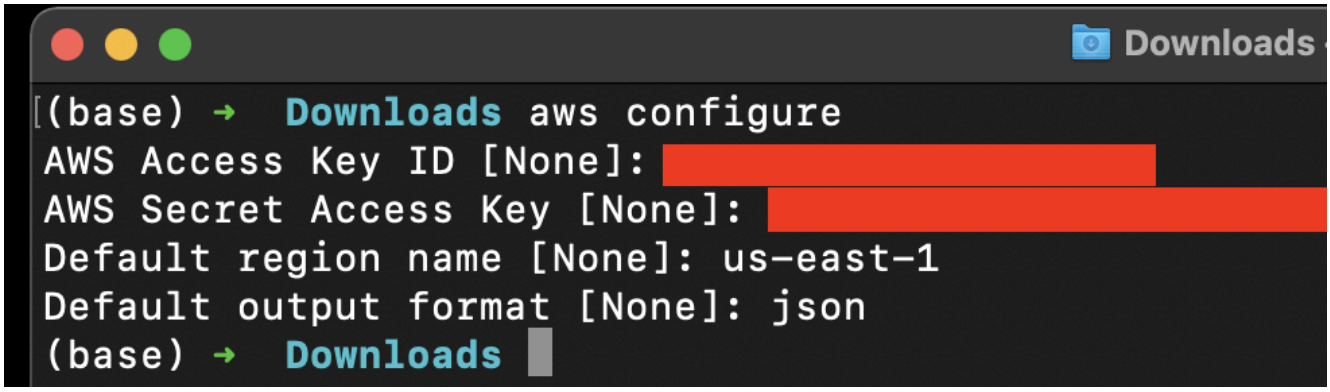



## Step4: Aws Configure

Go to vs code or Cmd your wish

```
aws configure
```

Provide your Aws Access key and Secret Access key

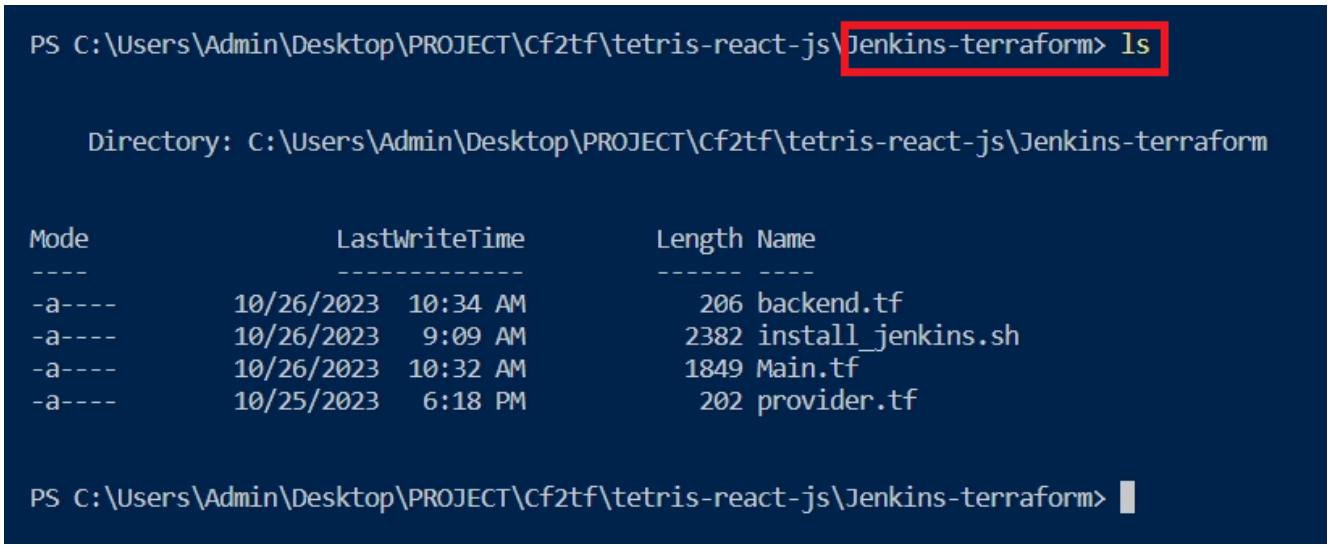



## Step5: Terraform files and Provision

CHANGE YOUR S3 BUCKET NAME IN THE BACKEND.TF

Clone the repository to your local file explorer

```
https://github.com/Aj7Ay/Tetris-V1.git
cd Tetris-V1
cd Jenkins-terraform
ls #to see files
```




Now you can see the terraform files to provision the AWS Ec2 with Jenkins installed,sonarqube container and Trivy, Aws cli,Kubectl and terraform

Shell script

```
#!/bin/bash
sudo apt update -y
wget -O - https://packages.adoptium.net/artifactory/api/gpg/key/public
echo "deb [signed-by=/etc/apt/keyrings/adoptium.asc] https://packages.ad
sudo apt update -y
sudo apt install temurin-17-jdk -y
/usr/bin/java --version
curl -fsSL https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key | su
echo deb [signed-by=/usr/share/keyrings/jenkins-keyring.asc] https://pkg
sudo apt-get update -y
sudo apt-get install jenkins -y
sudo systemctl start jenkins
sudo systemctl status jenkins

#install docker
sudo apt-get update
sudo apt-get install docker.io -y
sudo usermod -aG docker ubuntu
newgrp docker
sudo chmod 777 /var/run/docker.sock
docker run -d --name sonar -p 9000:9000 sonarqube:lts-community

# install trivy
sudo apt-get install wget apt-transport-https gnupg lsb-release -y
```

```
wget -qO - https://aquasecurity.github.io/trivy-repo/deb/public.key | gp
echo "deb [signed-by=/usr/share/keyrings/trivy.gpg] https://aquasecurity
sudo apt-get update
sudo apt-get install trivy -y

#install terraform
sudo apt install wget -y
wget -O- https://apt.releases.hashicorp.com/gpg | sudo gpg --dearmor -o
echo "deb [signed-by=/usr/share/keyrings/hashicorp-archive-keyring.gpg]
sudo apt update && sudo apt install terraform
#install Kubectl on Jenkins
sudo apt update
sudo apt install curl -y
curl -LO https://dl.k8s.io/release/$(curl -L -s https://dl.k8s.io/releas
sudo install -o root -g root -m 0755 kubectl /usr/local/bin/kubectl
kubectl version --client

#install Aws cli
curl "https://awscli.amazonaws.com/awscli-exe-linux-x86_64.zip" -o "awsc
sudo apt-get install unzip -y
unzip awscliv2.zip
sudo ./aws/install
```

Now inside the Jenkins-terraform directory

Open the terminal and provide the below commands

```
terraform init
```

```
PS C:\Users\Admin\Desktop\PROJECT\Cf2tf\tetris-react-js\Jenkins-terraform> terraform init

Initializing the backend...

Successfully configured the backend "s3"! Terraform will automatically
use this backend unless the backend configuration changes.

Initializing provider plugins...
- Finding hashicorp/aws versions matching "~> 5.0"...
- Installing hashicorp/aws v5.22.0...
```

Now validate the code to see any issues in Terraform files

```
terraform validate
```

```
PS C:\Users\Admin\Desktop\PROJECT\Cf2tf\tetris-react-js\Jenkins-terraform> terraform validate
Success! The configuration is valid.

PS C:\Users\Admin\Desktop\PROJECT\Cf2tf\tetris-react-js\Jenkins-terraform>
```

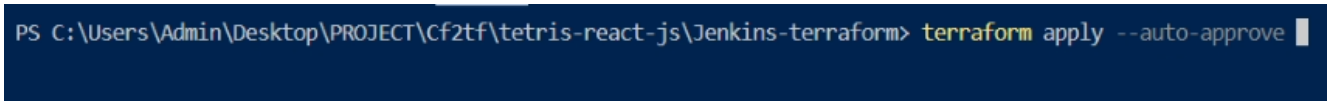
Now see the plan for resources

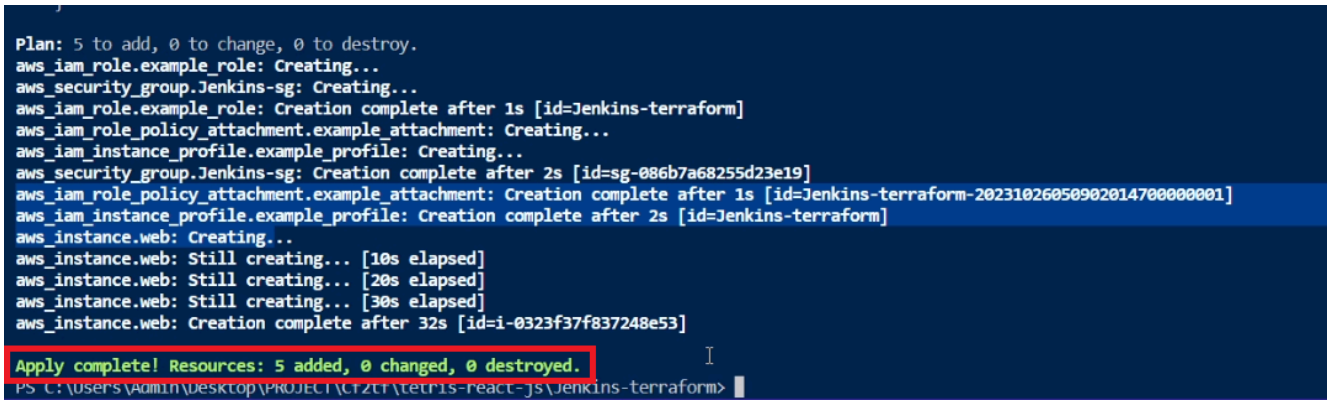
```
terraform plan
```

```
PS C:\Users\Admin\Desktop\PROJECT\Cf2tf\tetris-react-js\Jenkins-terraform> terraform plan
```

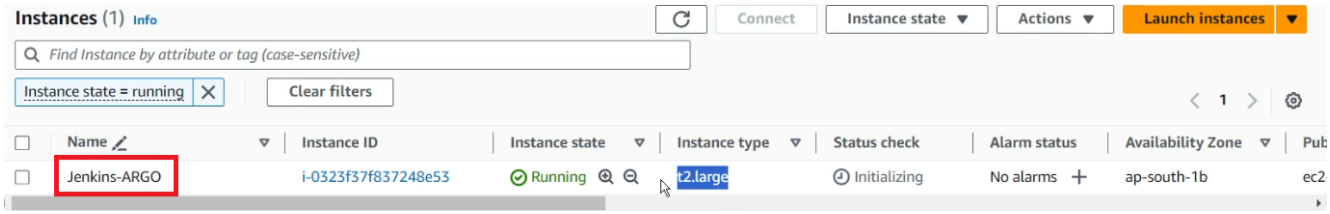
After the plan Apply to provision resources

```
terraform apply --auto-approve
```



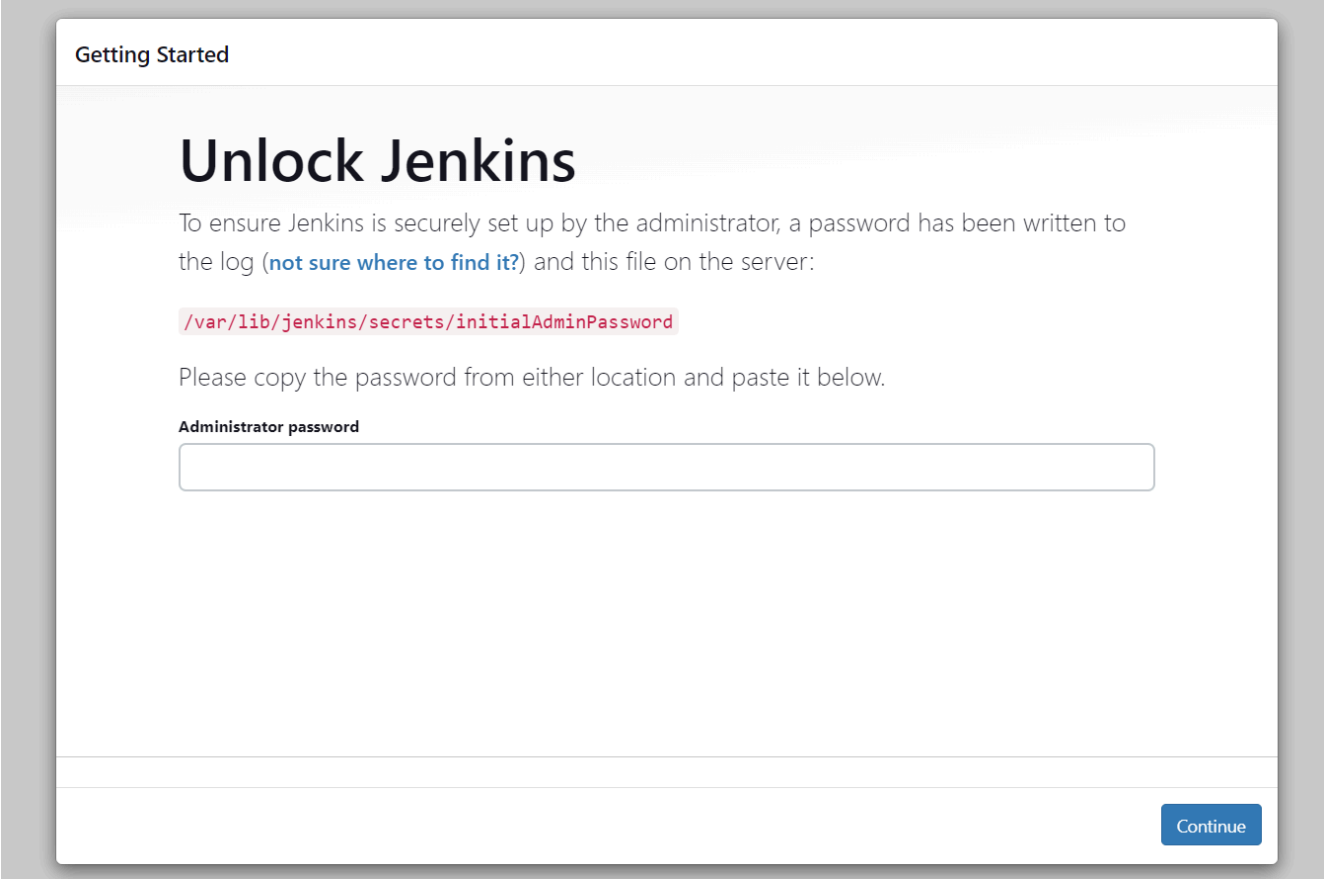




Apply completed you can see Ec2 is created in the Aws console



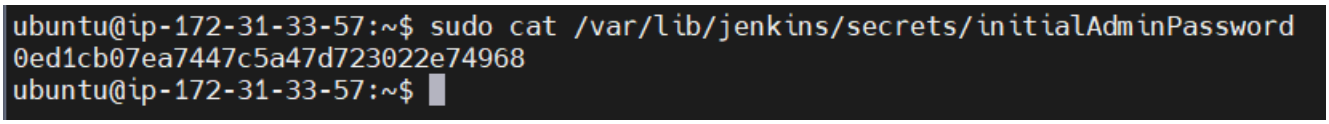

Now copy the public IP address of ec2 and paste it into the browser

```
<Ec2-ip:8080> #you will Jenkins login page
```

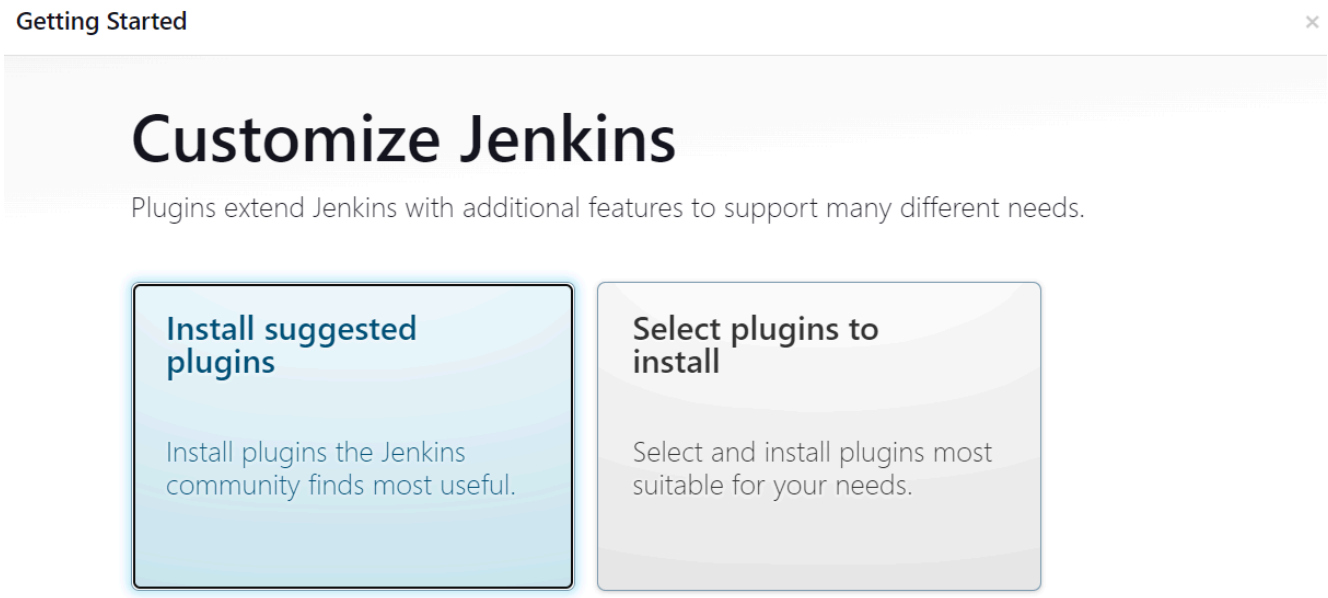



Connect your Instance to Putty or Mobaxtreme and provide the below command for the Administrator password

```
sudo cat /var/lib/jenkins/secrets/initialAdminPassword
```

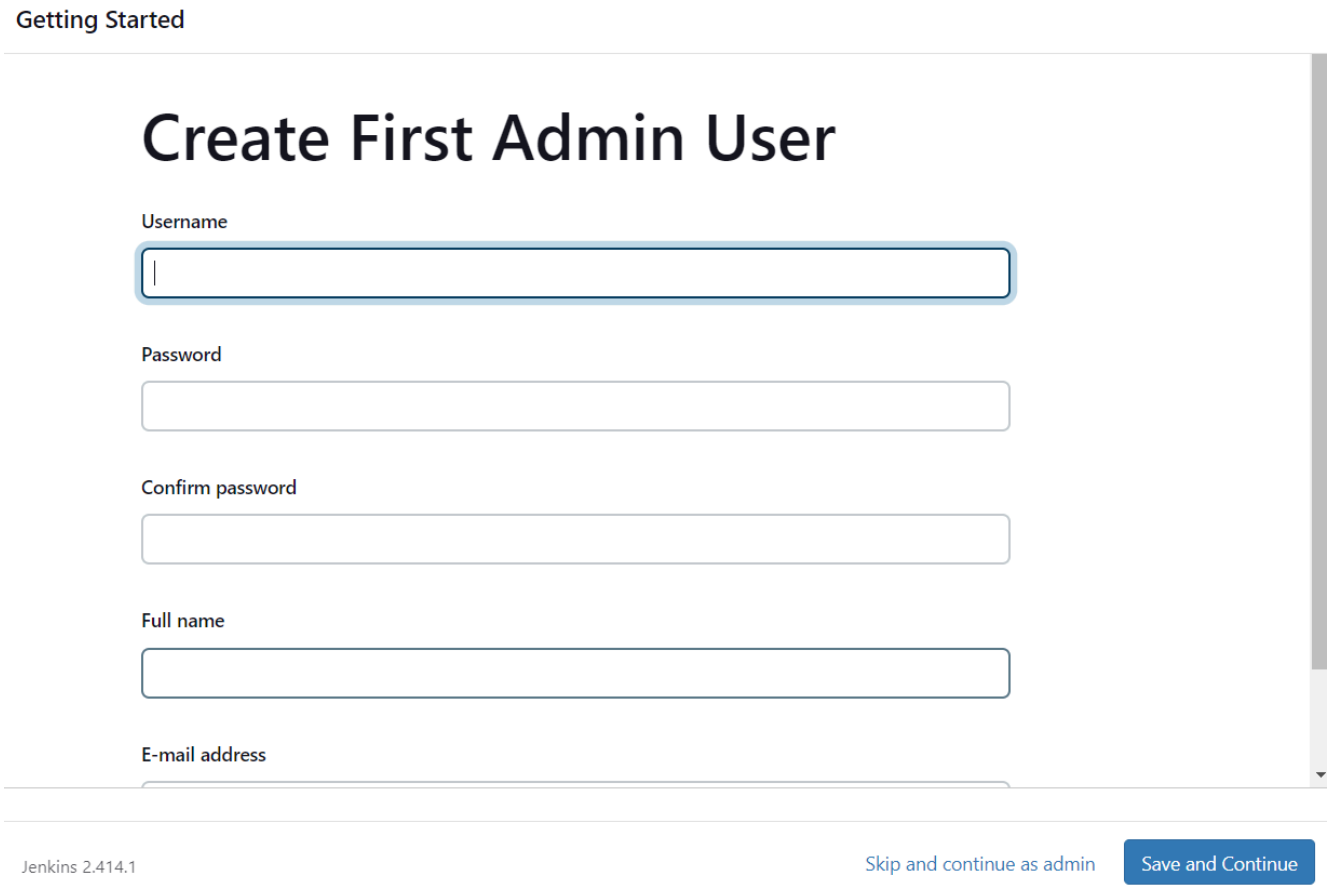



Now, install the suggested plugins.



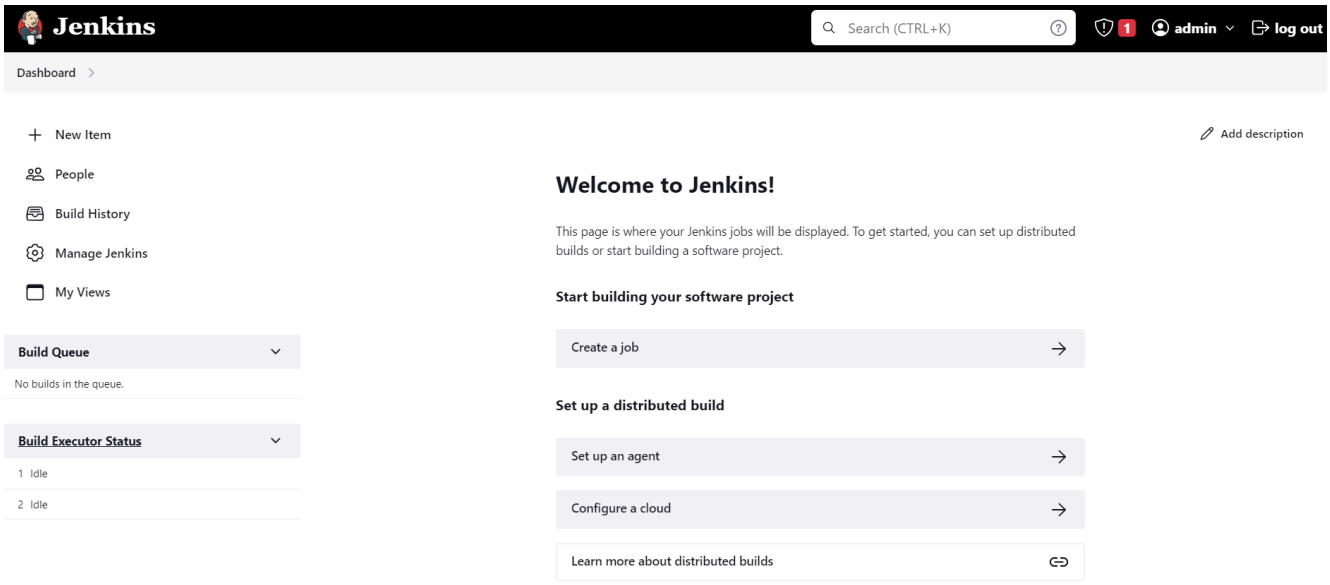

Jenkins will now get installed and install all the libraries.

Create an admin user



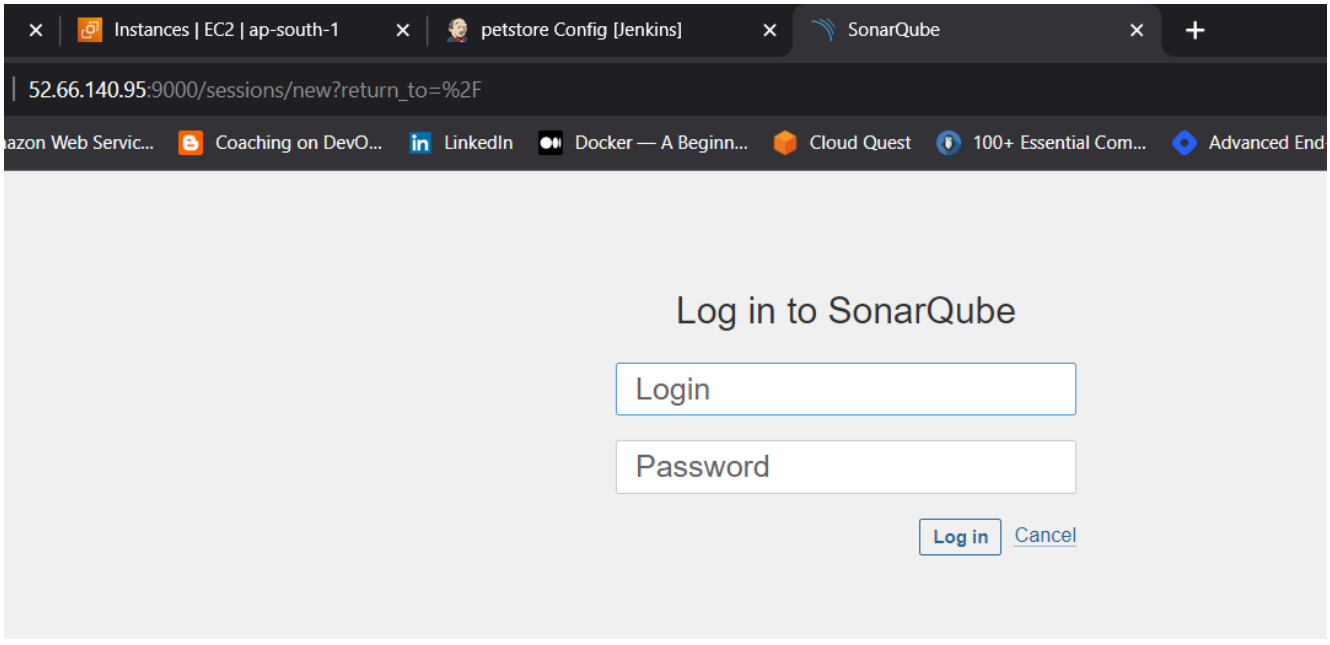

Click on save and continue.

Jenkins Dashboard



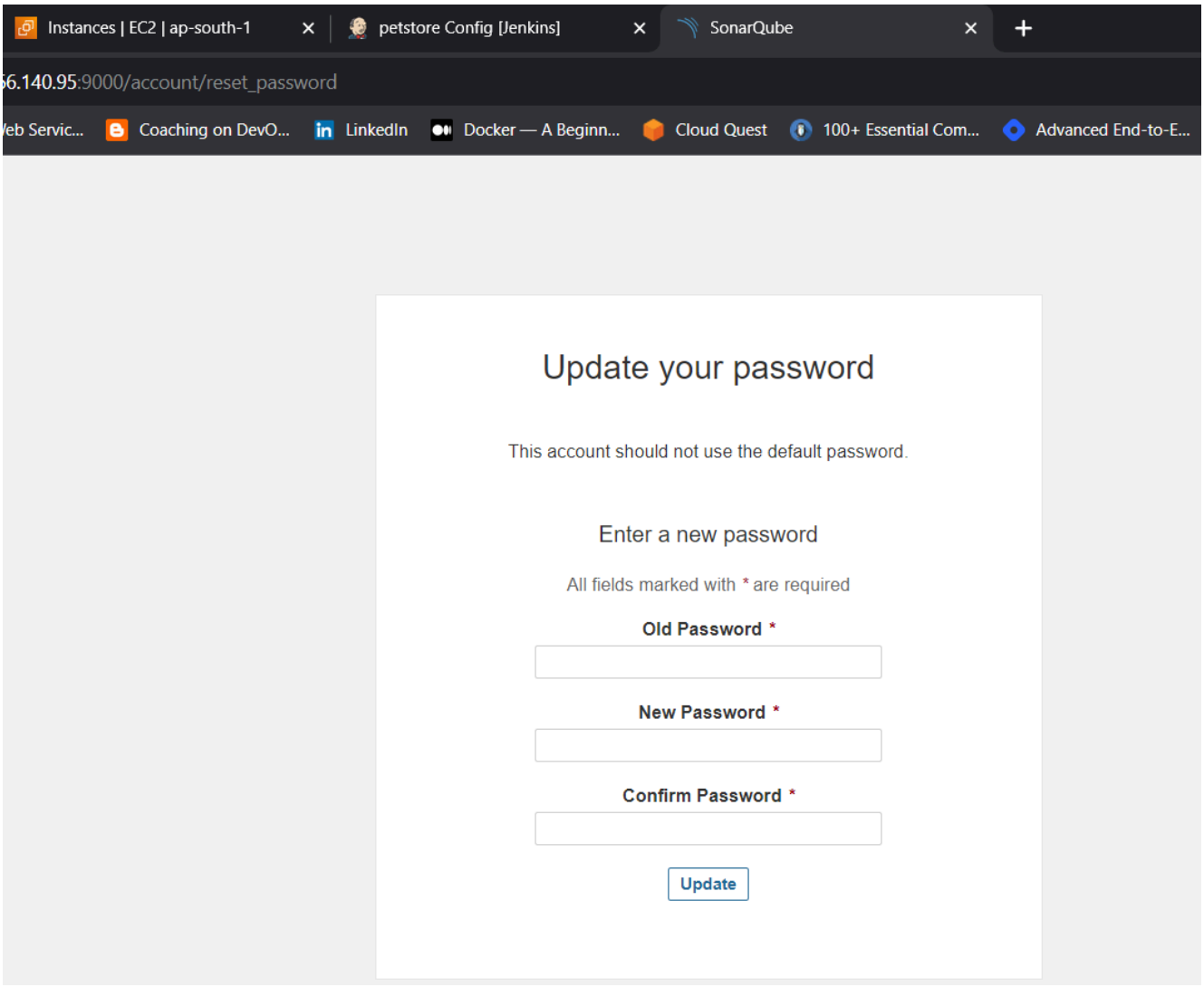

Now Copy the public IP again and paste it into a new tab in the browser with 9000

```
<ec2-ip:9000>  #runs sonar container
```

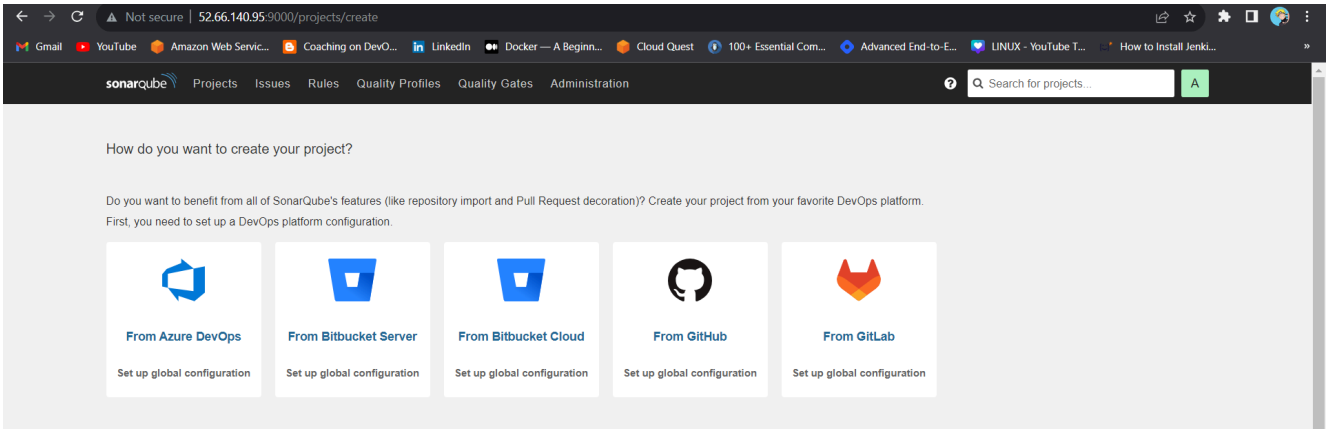



Enter username and password, click on login and change password

```
username admin
password admin
```

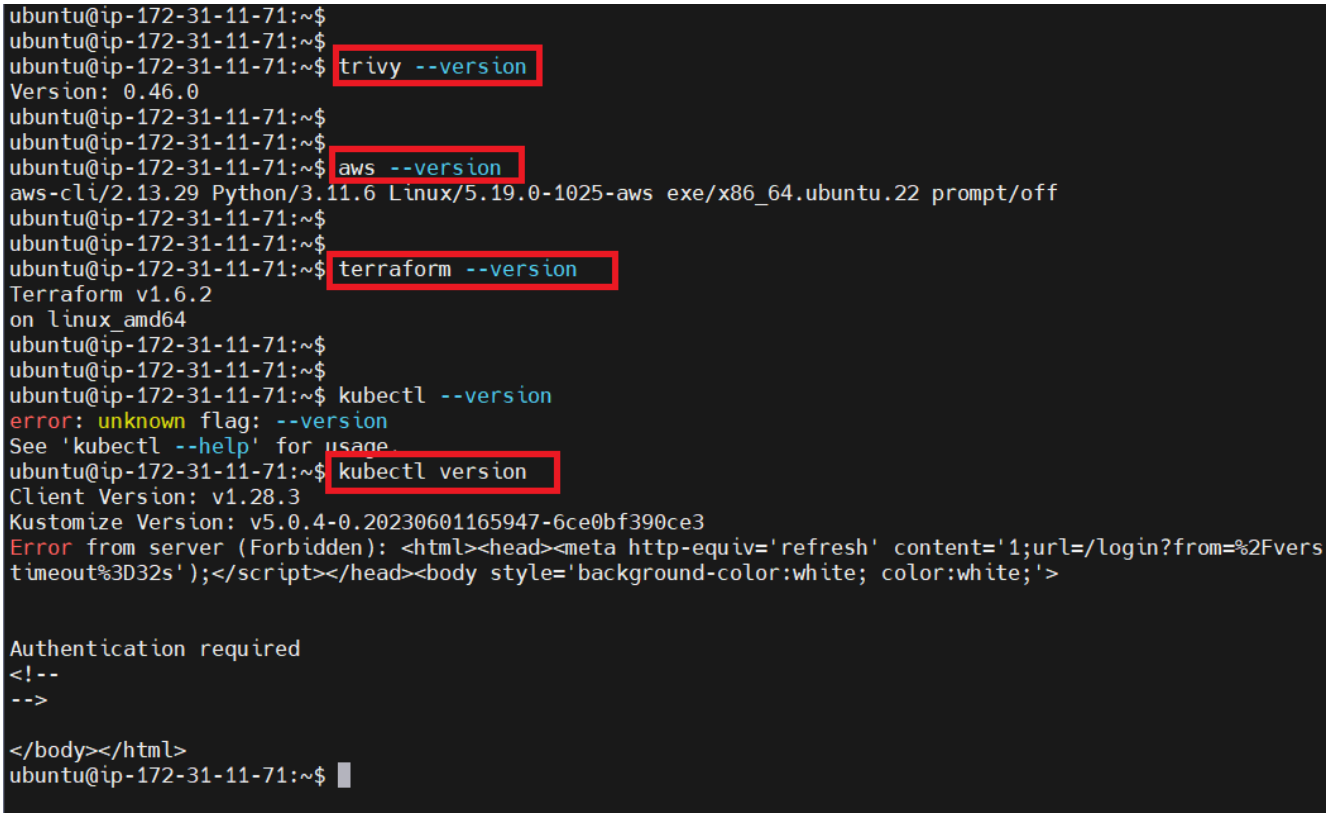



Update New password, This is Sonar Dashboard.



Now go to Putty and see whether it's installed Trivy, Terraform, Aws cli, Kubectl or not.

```
trivy --version
aws --version
terraform --version
kubectl version
```




That is done now go to Jenkins and add a terraform plugin to provision the AWS EKS using the Pipeline Job.

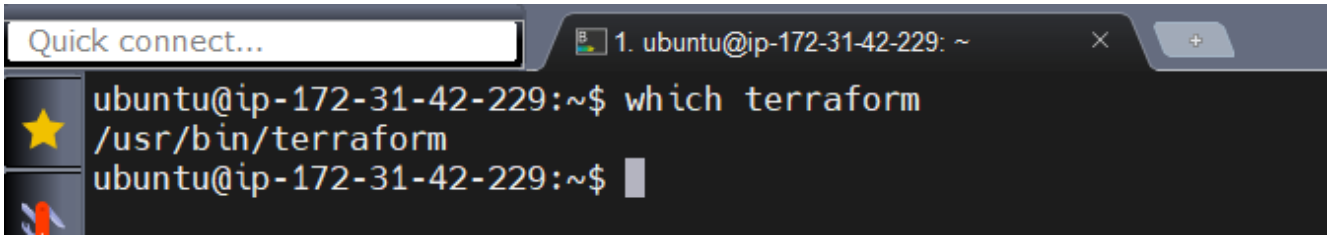
Go to Jenkins dashboard –> Manage Jenkins –> Plugins

Available Plugins, Search for Terraform and install it.


Go to Putty and use the below command

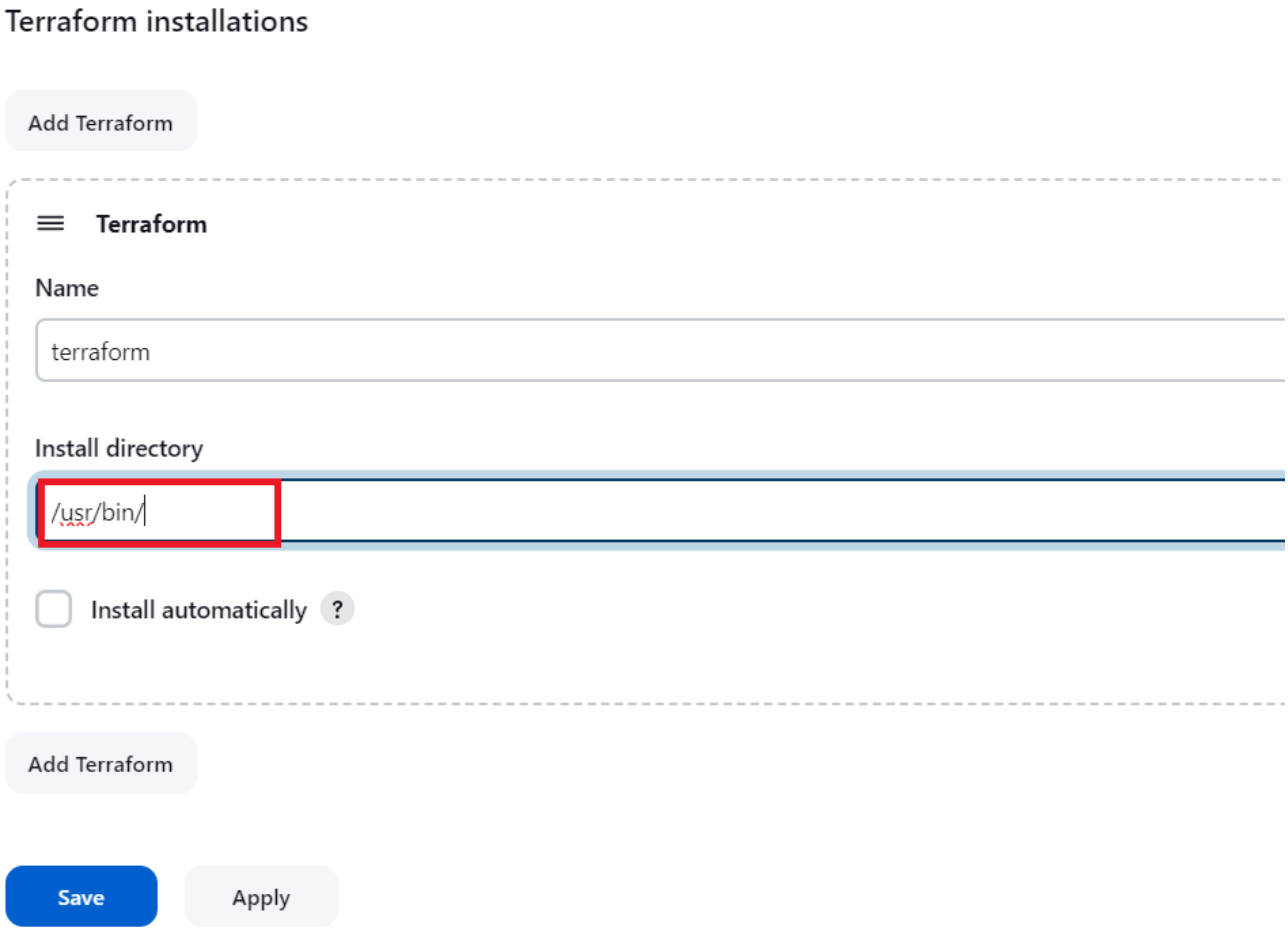
let's find the path to our Terraform (we will use it in the tools section of Terraform)

```
which terraform
```




Now come back to Manage Jenkins –> Tools

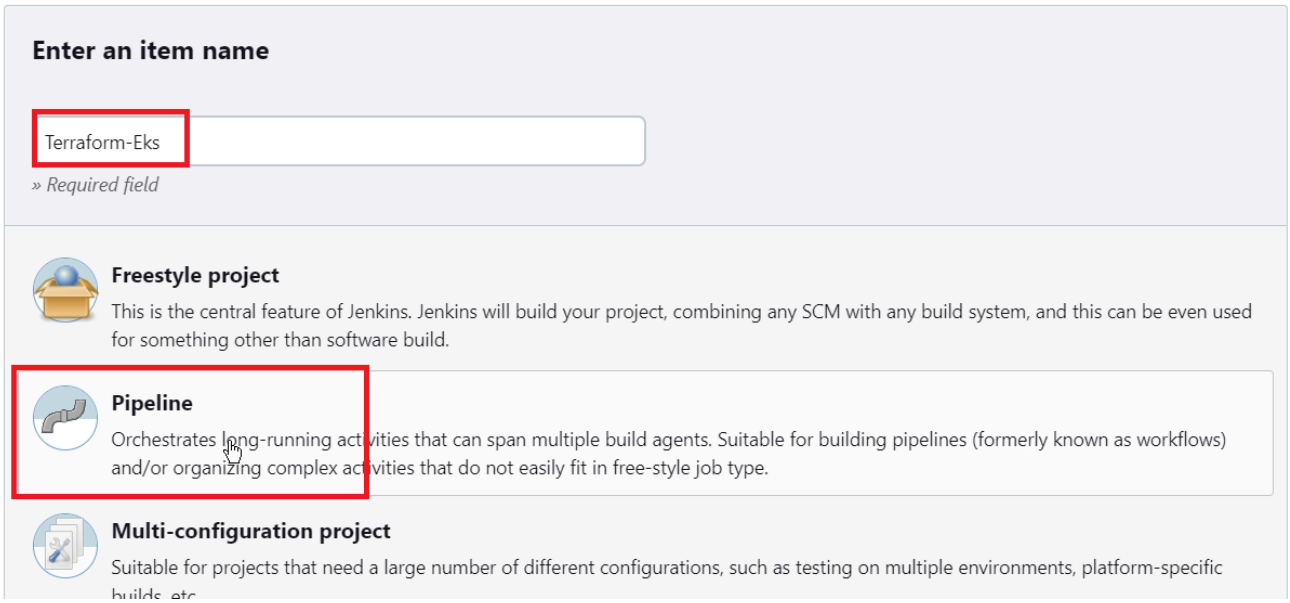
Add the terraform in Tools




Apply and save.

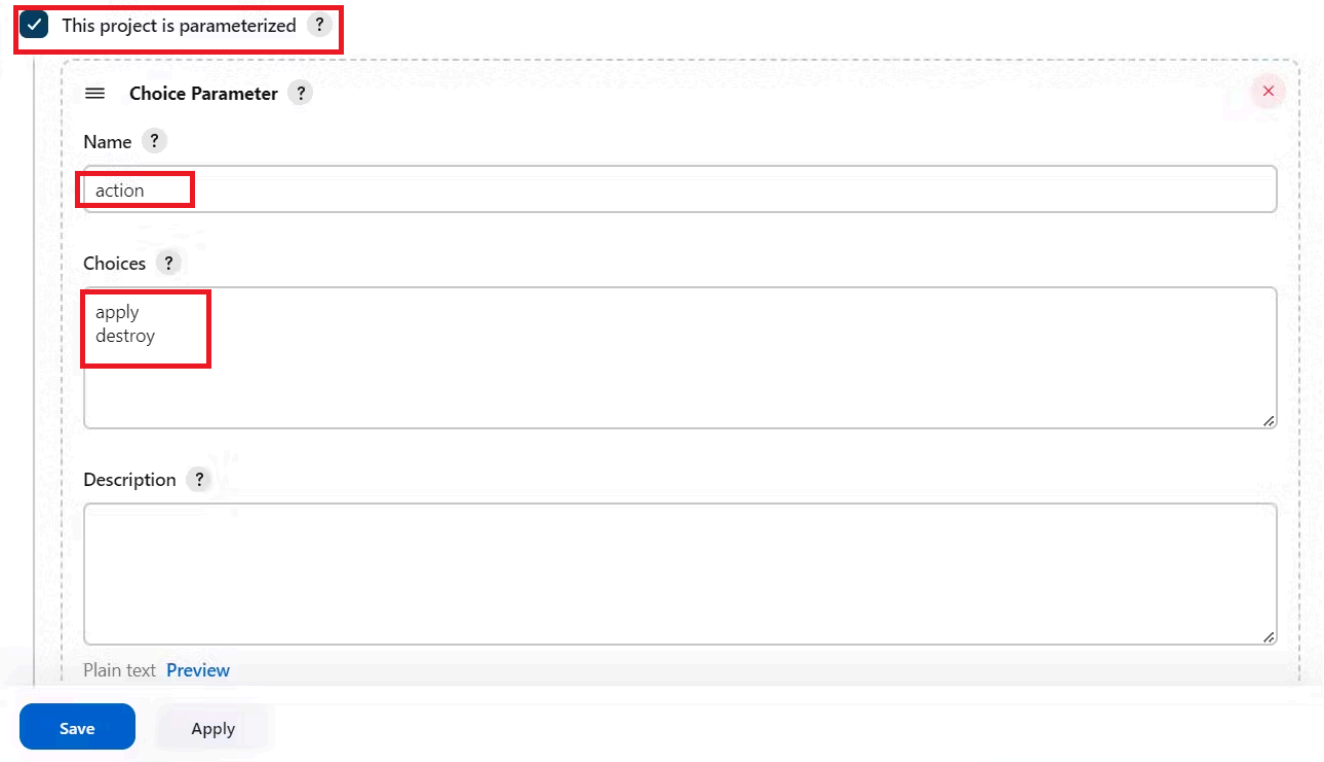
CHANGE YOUR S3 BUCKET NAME IN THE BACKEND.TF

Now create a new job for the Eks provision




I want to do this with build parameters to apply and destroy while building only.

you have to add this inside job like the below image

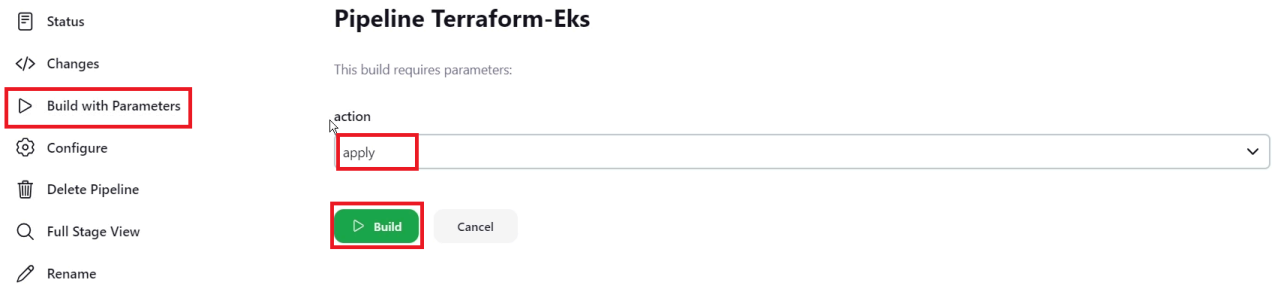



Let's add a pipeline

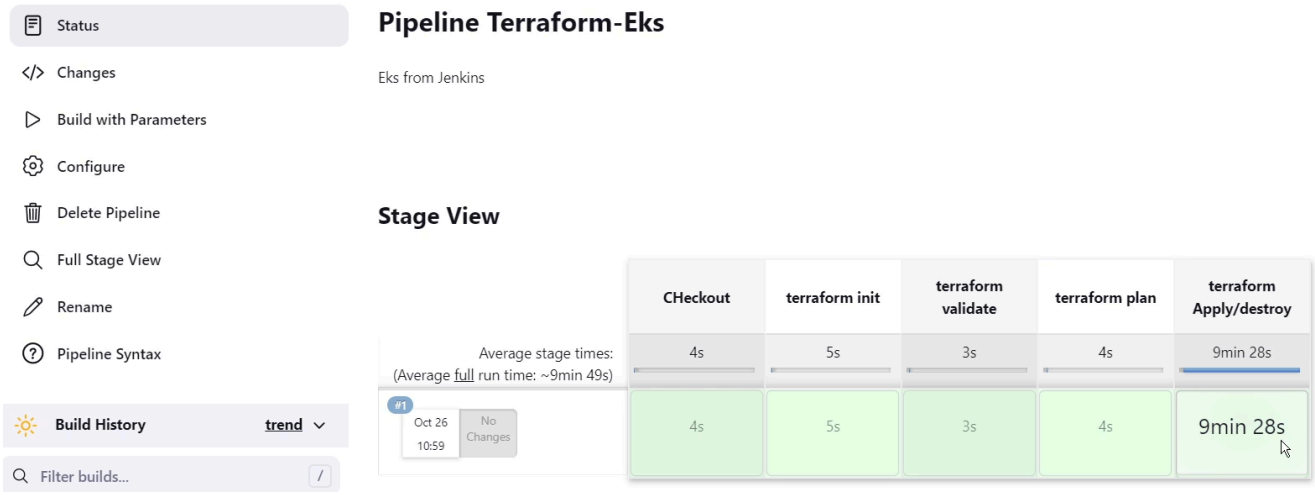
```
pipeline{
    agent any
    stages {
        stage('Checkout from Git'){
            steps{
                git branch: 'main', url: 'https://github.com/Aj7Ay/Tetr
            }
        }
        stage('Terraform version'){
             steps{
                 sh 'terraform --version'
             }
        }
        stage('Terraform init'){
             steps{
                 dir('Eks-terraform') {
                      sh 'terraform init'
                   }
             }
        }
```

```
        stage('Terraform validate'){
             steps{
                 dir('Eks-terraform') {
                      sh 'terraform validate'
                   }
             }
        }
        stage('Terraform plan'){
             steps{
                 dir('Eks-terraform') {
                      sh 'terraform plan'
                   }
             }
        }
        stage('Terraform apply/destroy'){
             steps{
                 dir('Eks-terraform') {
                      sh 'terraform ${action} --auto-approve'
                   }
             }
        }
    }
}
```

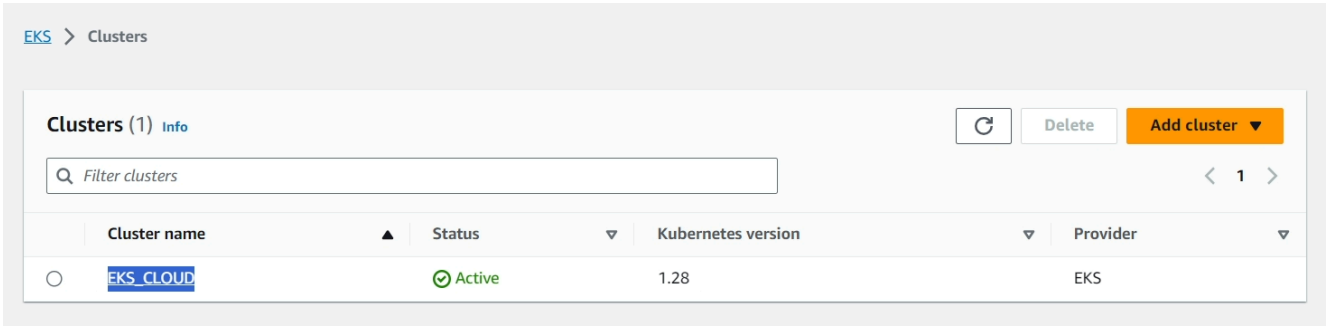
Let's apply and save and Build with parameters and select action as apply



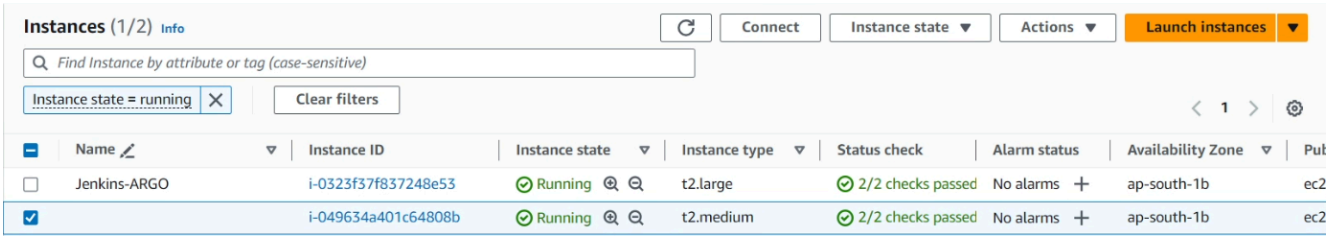

Stage view it will take max 10mins to provision




Check in Your Aws console whether it created EKS or not.




Ec2 instance is created for the Node group




Now let's build Tetris version 1

We need some plugins to complete this process

Go to Jenkins dashboard

Manage Jenkins –> Plugins –> Available Plugins

Search for the Below Plugins

```
Eclipse Temurin installer
```

Sonarqube Scanner

NodeJs

Owasp Dependency-Check

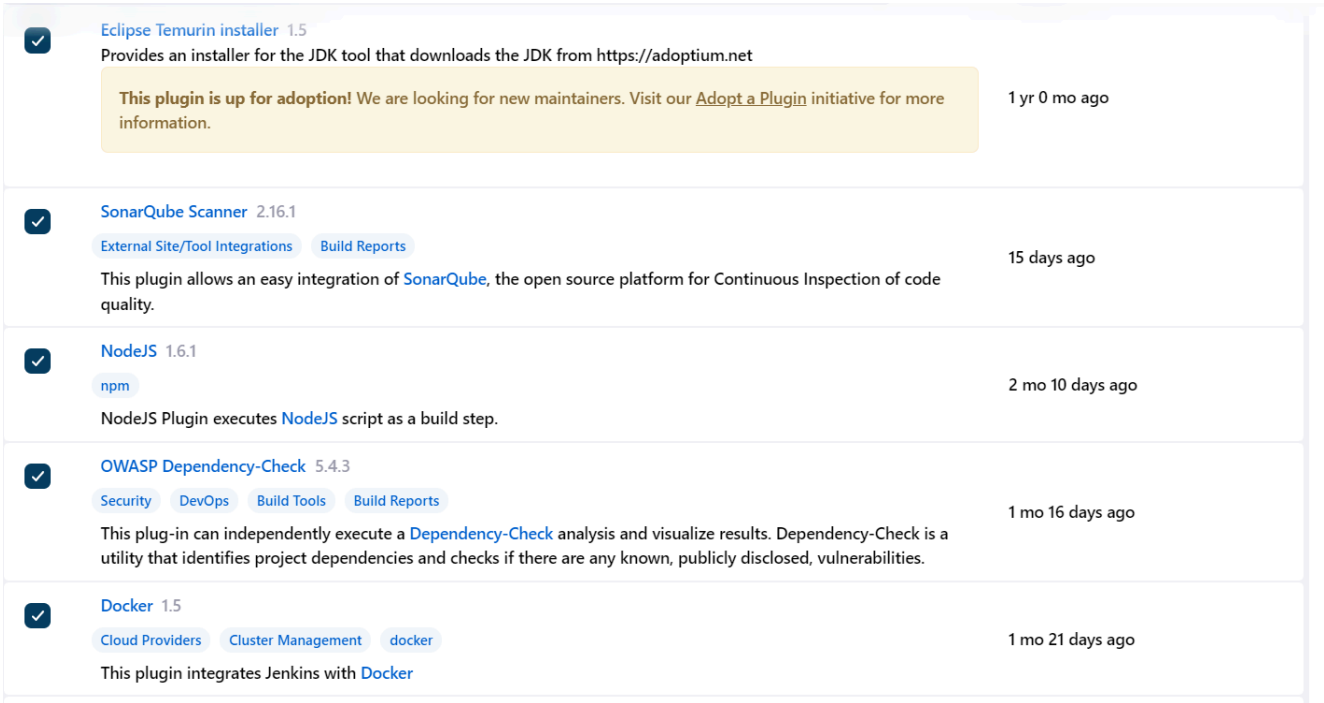
Docker

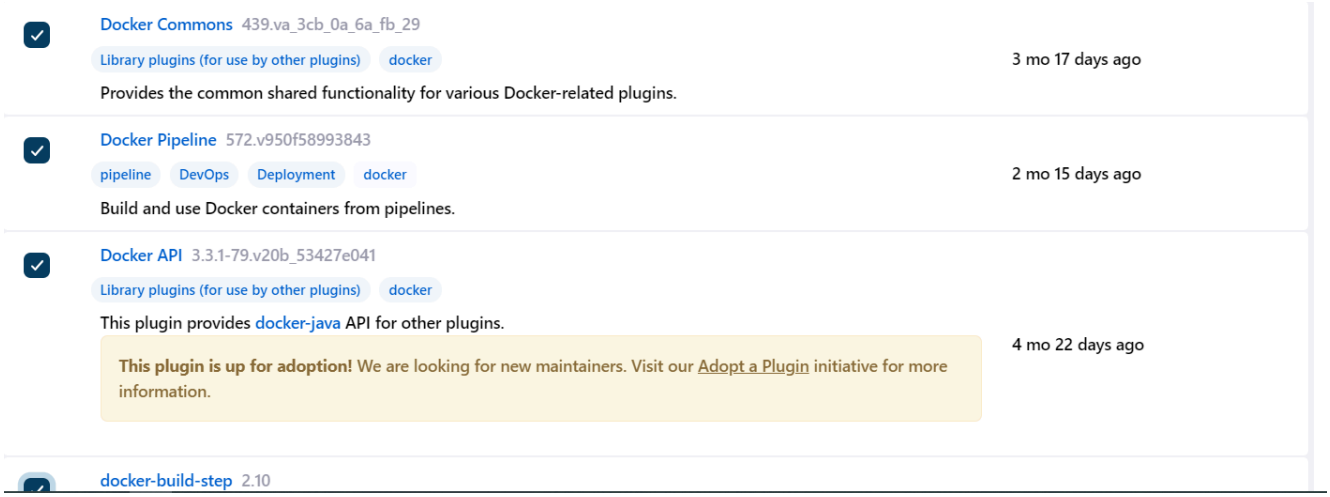
Docker Commons

Docker Pipeline

Docker API

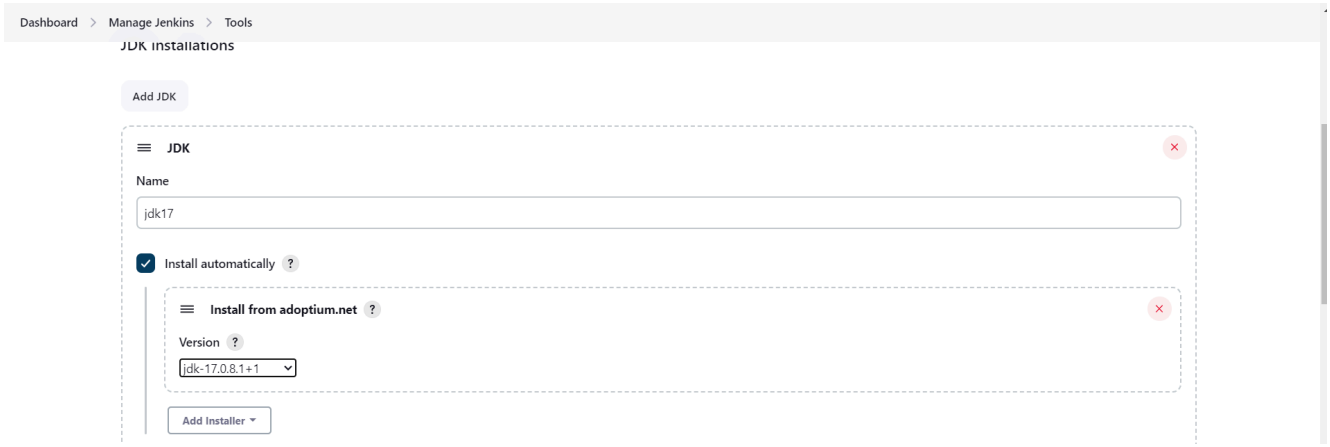
Docker-build-step





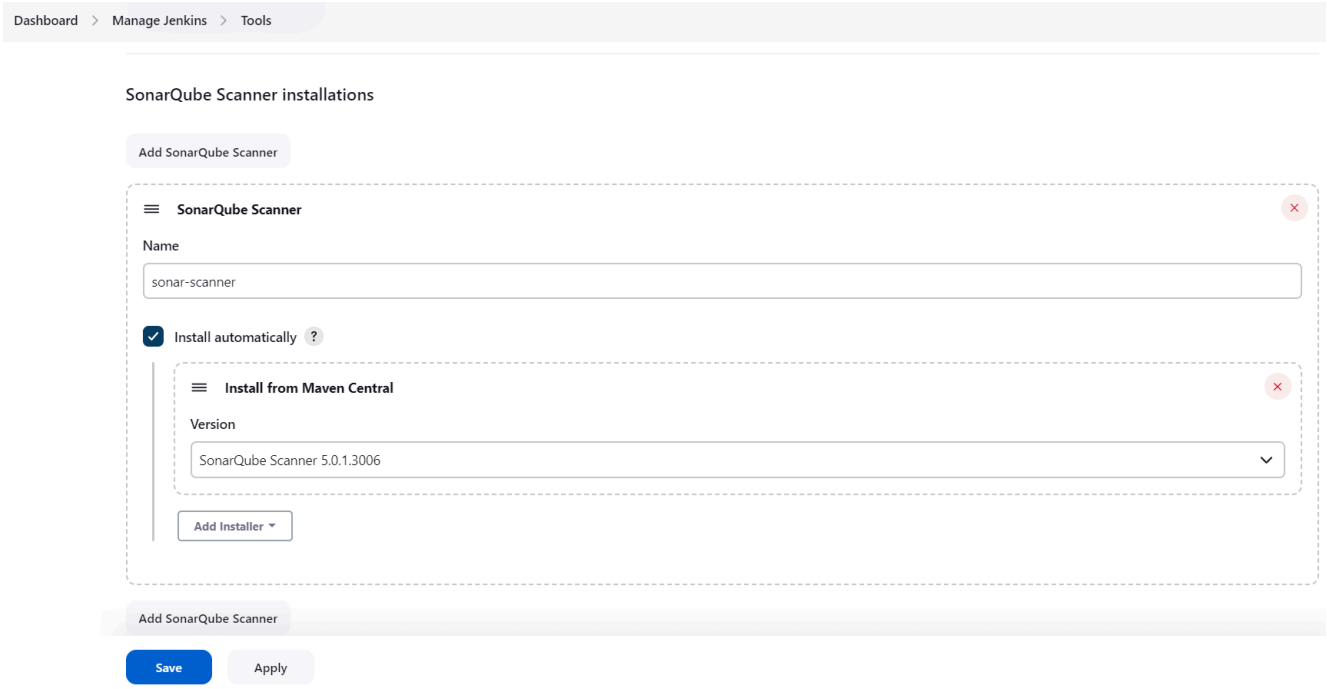

# Configure in Global Tool Configuration

Goto Manage Jenkins → Tools → Install JDK(17) and NodeJs(16)→ Click on Apply and Save

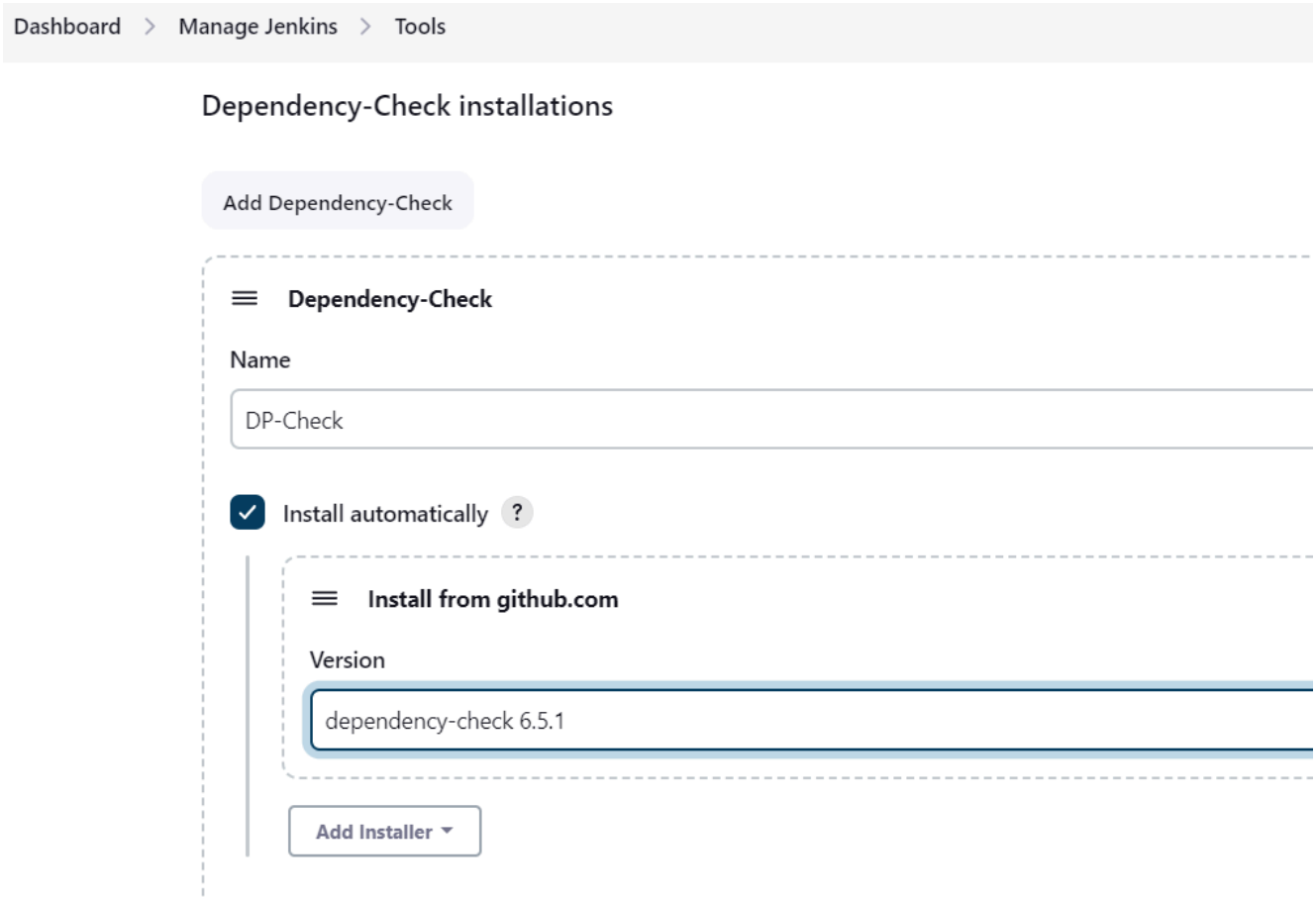




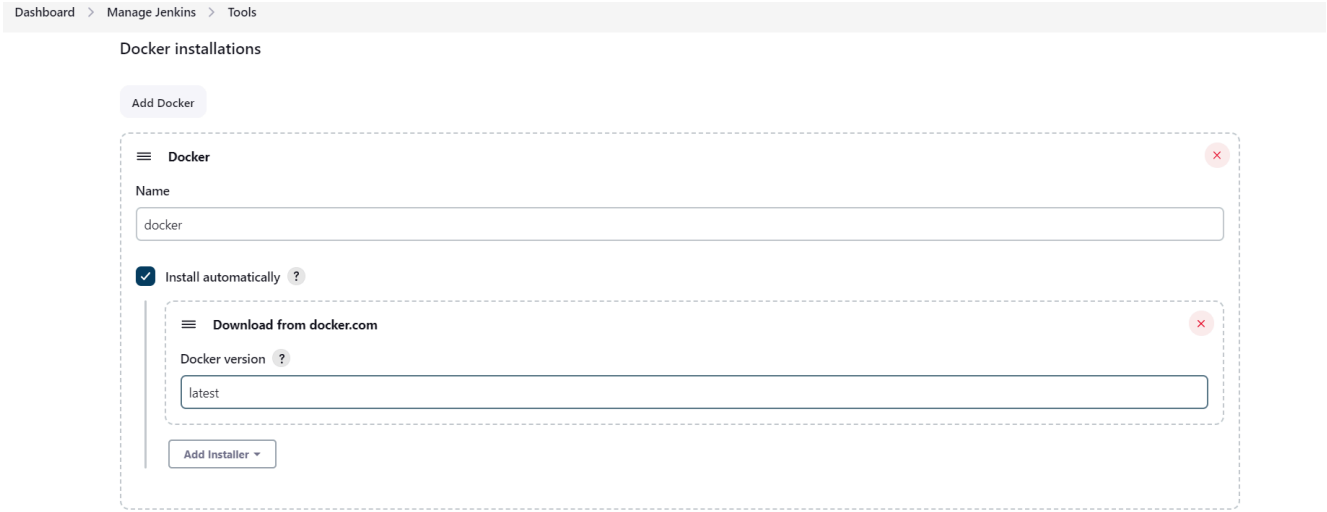
For Sonarqube use the latest version




For Owasp use the 6.5.1 version



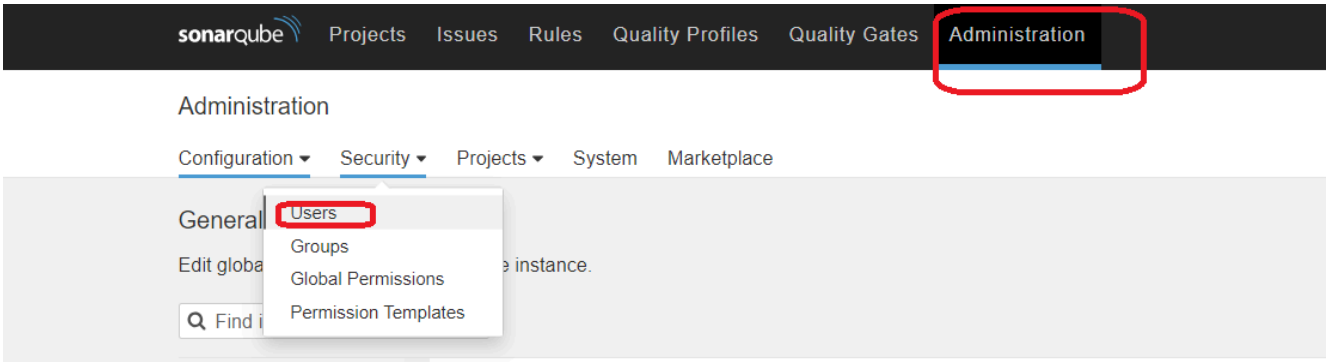

Use the latest version of Docker



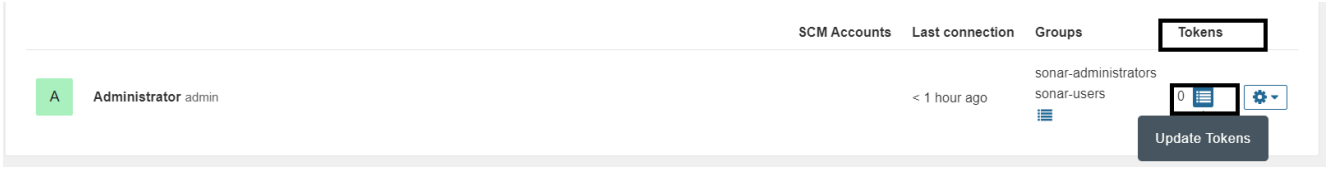

Click apply and save.

## Configure Sonar Server in Manage Jenkins

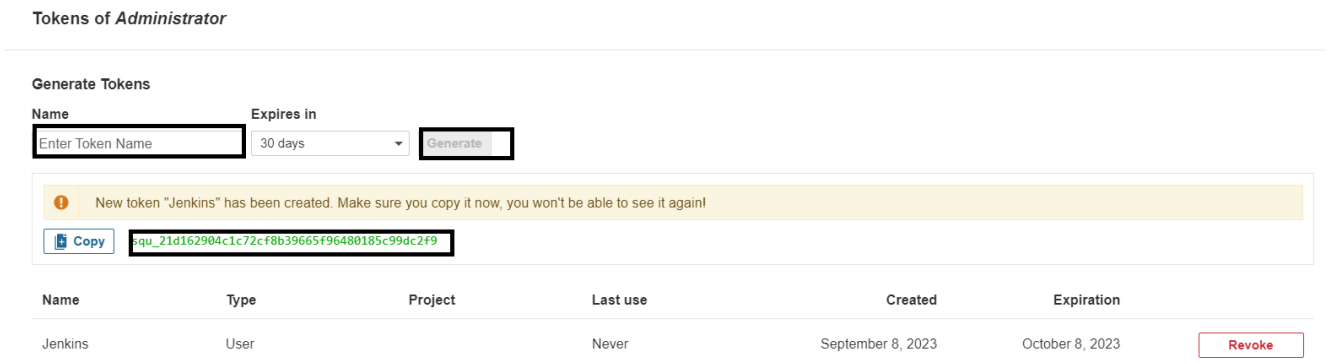
Grab the Public IP Address of your EC2 Instance, Sonarqube works on Port 9000, so <Public IP>:9000. Goto your Sonarqube Server. Click on Administration → Security → Users → Click on Tokens and Update Token → Give it a name → and click on Generate Token




click on update Token

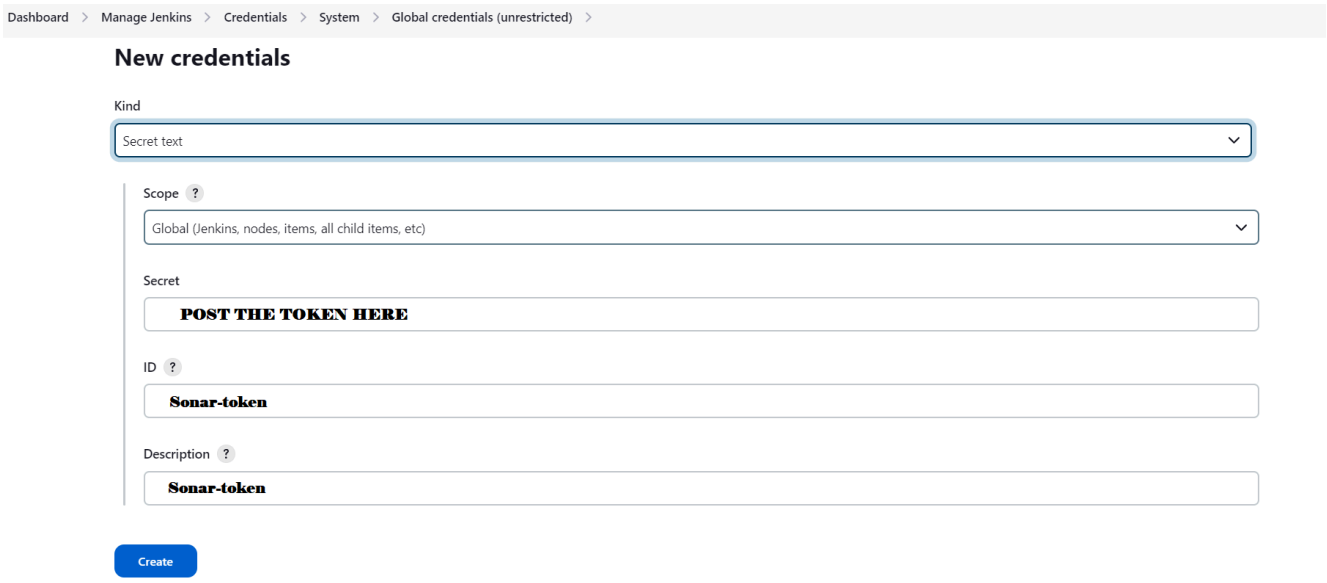



Create a token with a name and generate



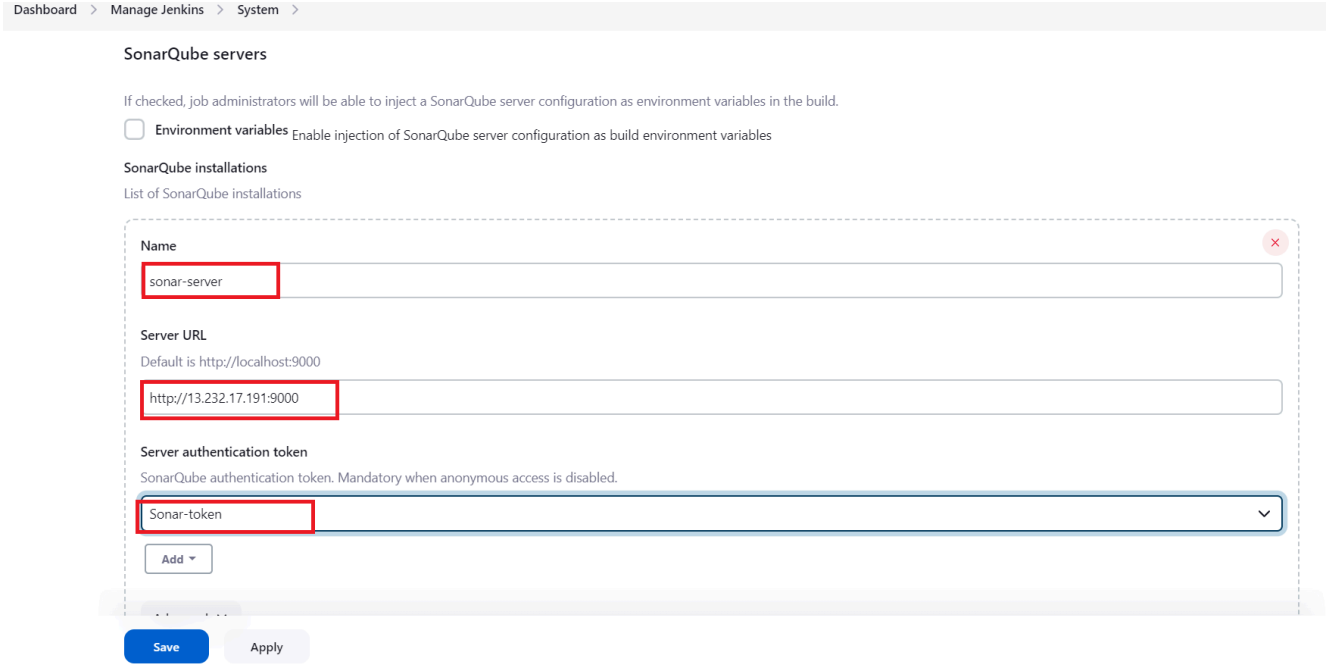

copy Token

Goto Jenkins Dashboard → Manage Jenkins → Credentials → Add Secret Text. It should look like this




You will this page once you click on create

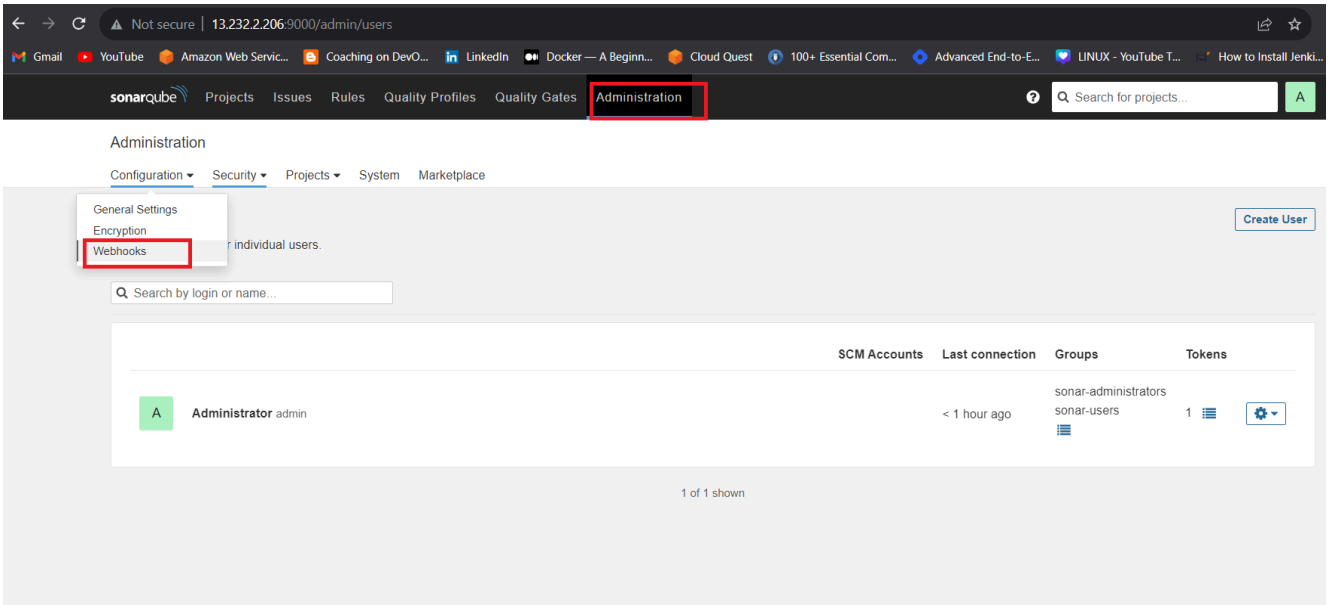

Now, go to Dashboard → Manage Jenkins → System and Add like the below image.



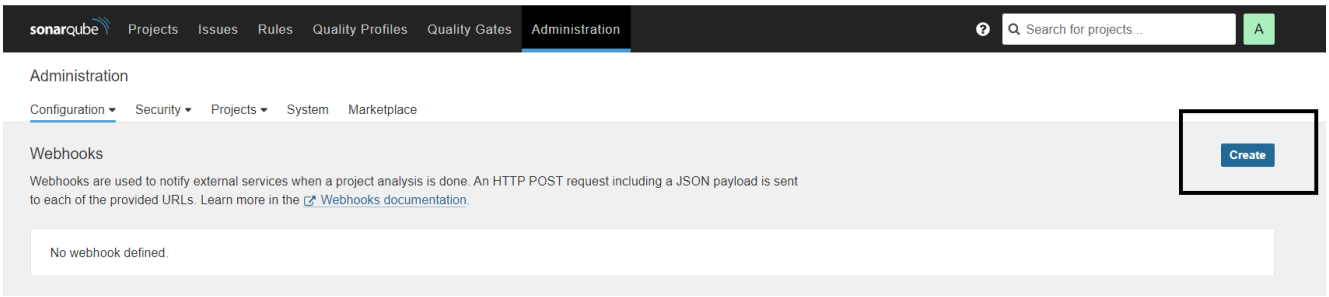

Click on Apply and Save

In the Sonarqube Dashboard add a quality gate also

Administration–> Configuration–>Webhooks

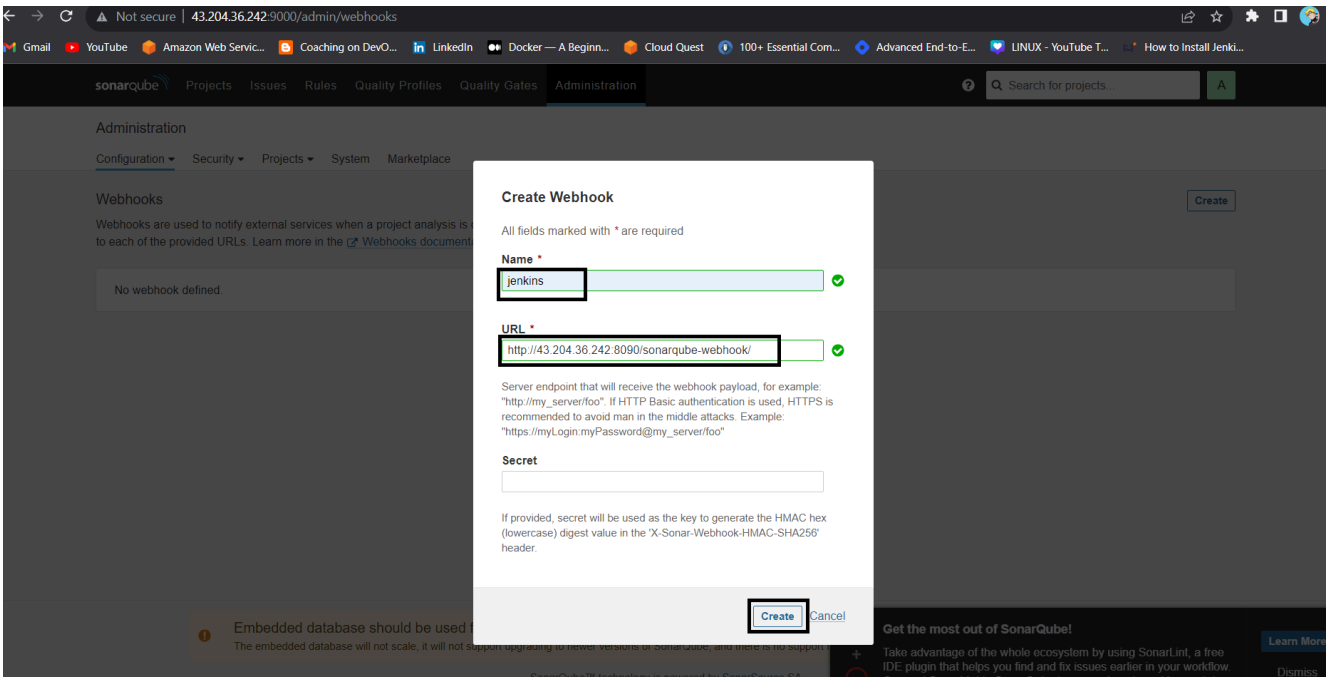



Click on Create




## Add details

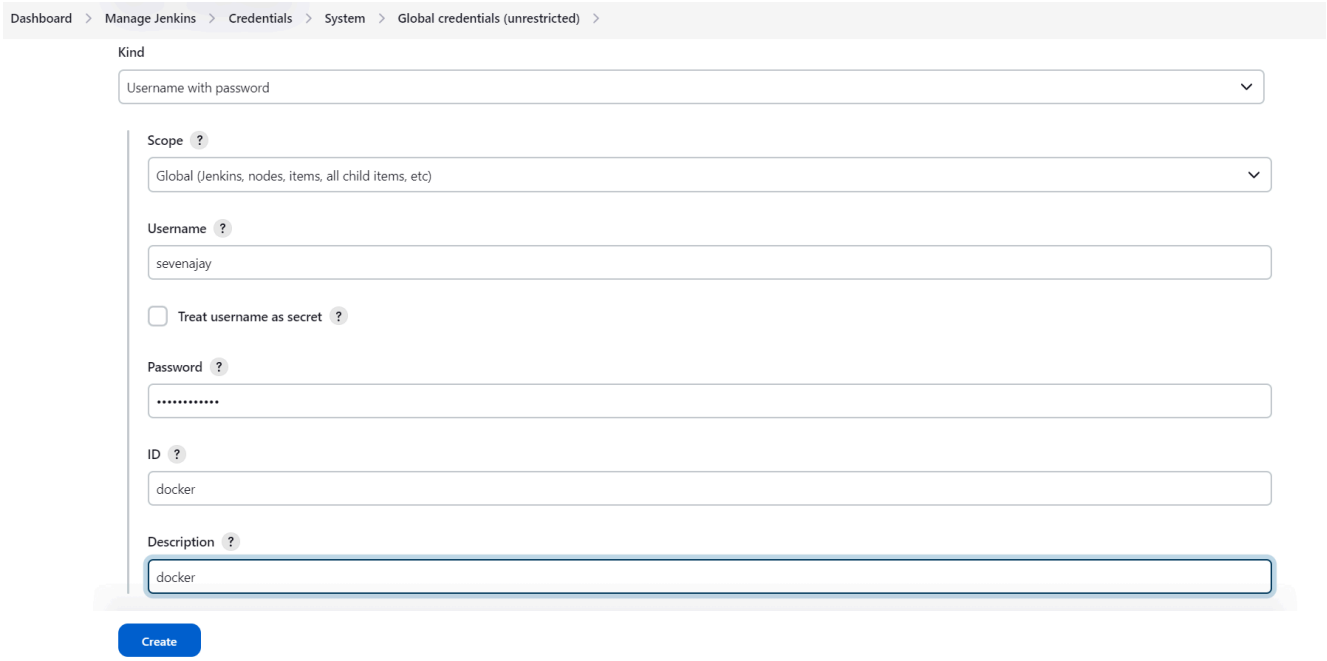
```
#in url section of quality gate
<http://jenkins-public-ip:8080>/sonarqube-webhook/
```




Now add Docker credentials to the Jenkins to log in and push the image

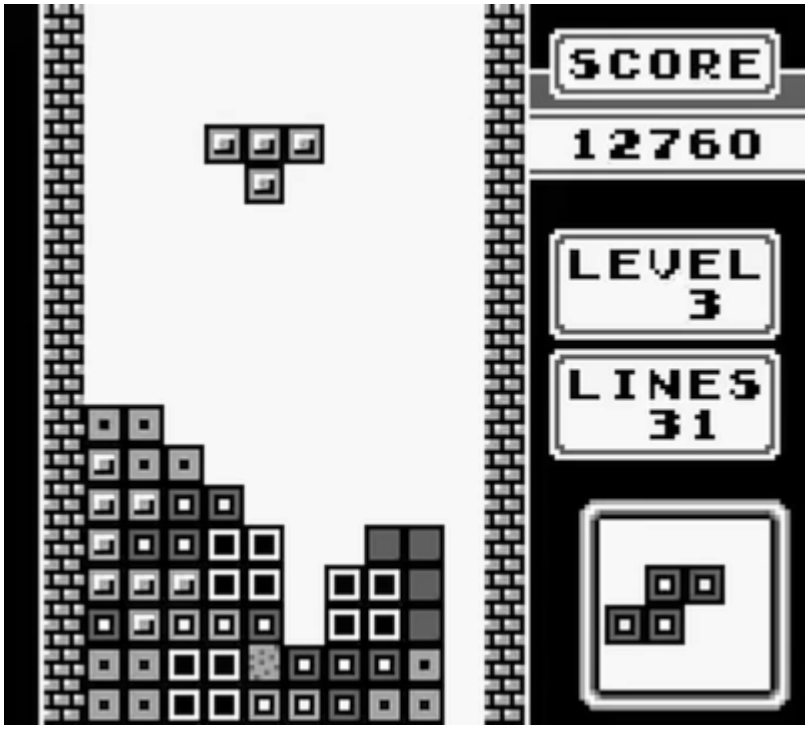
Manage Jenkins –> Credentials –> global –> add credential

Add DockerHub Username and Password under Global Credentials

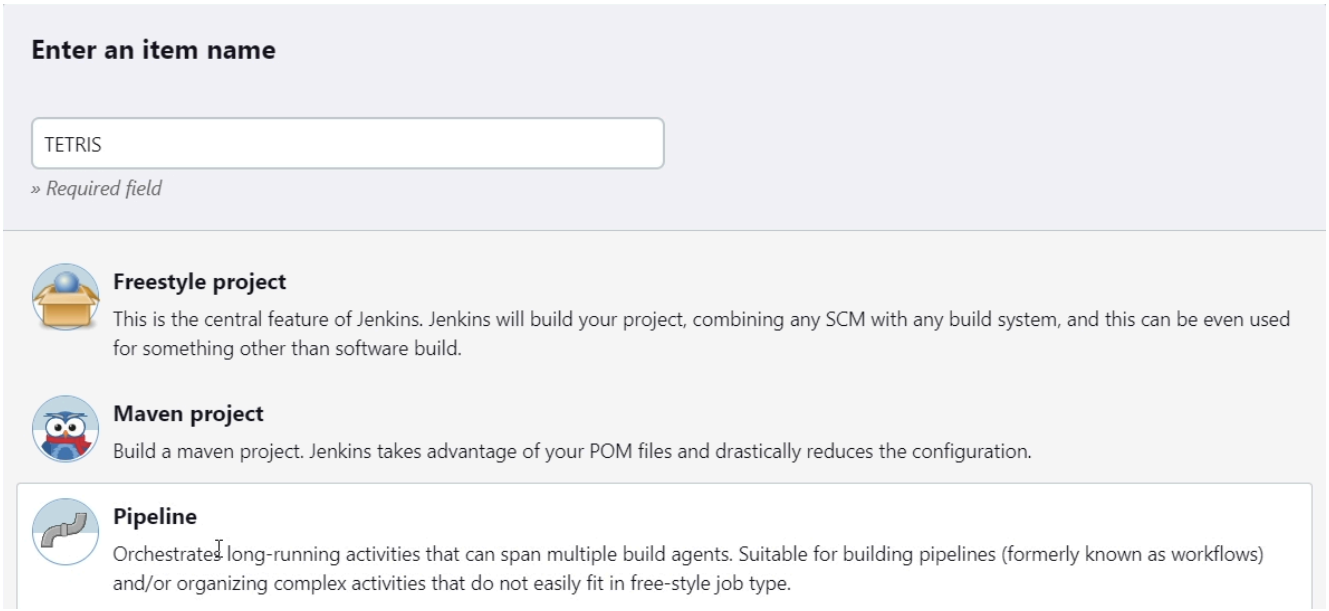



Create.

## Version 1.0




Now let’s create a new job for our pipeline




Add this to Pipeline

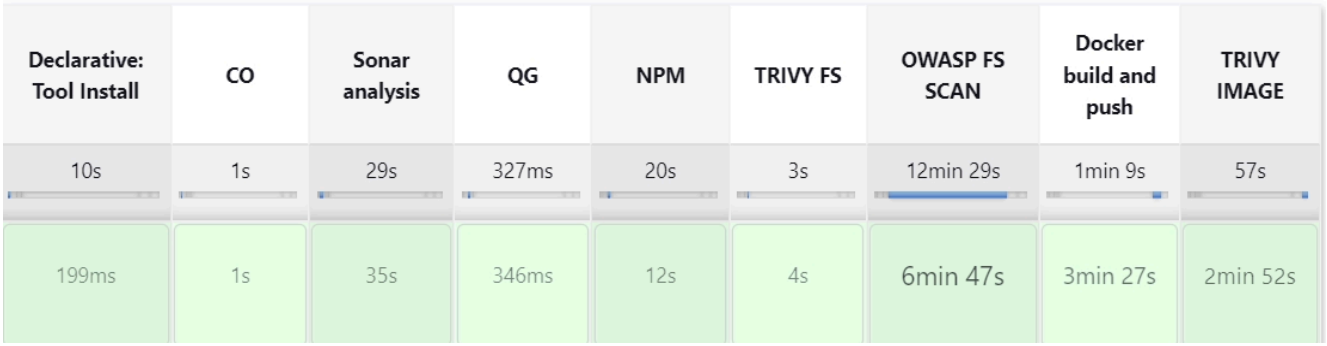
```
pipeline{
    agent any
    tools{
        jdk 'jdk17'
        nodejs 'node16'
    }
    environment {
        SCANNER_HOME=tool 'sonar-scanner'
    }
    stages {
        stage('clean workspace'){
            steps{
                cleanWs()
            }
        }
        stage('Checkout from Git'){
            steps{
                git branch: 'main', url: 'https://github.com/Aj7Ay/Tetr
            }
        }
        stage("Sonarqube Analysis "){
            steps{
                withSonarQubeEnv('sonar-server') {
                    sh ''' $SCANNER_HOME/bin/sonar-scanner -Dsonar.proje
                    -Dsonar.projectKey=TetrisVersion1.0 '''
                }
```

```
            }
        }
        stage("quality gate"){
           steps {
                script {
                    waitForQualityGate abortPipeline: false, credentials
                }
            }
        }
        stage('Install Dependencies') {
            steps {
                sh "npm install"
            }
        }
        stage('OWASP FS SCAN') {
            steps {
                dependencyCheck additionalArguments: '--scan ./ --disab
                dependencyCheckPublisher pattern: '**/dependency-check-r
            }
        }
        stage('TRIVY FS SCAN') {
            steps {
                sh "trivy fs . > trivyfs.txt"
            }
        }
        stage("Docker Build & Push"){
            steps{
                script{
                   withDockerRegistry(credentialsId: 'docker', toolName
                       sh "docker build -t tetrisv1 ."
                       sh "docker tag tetrisv1 sevenajay/tetrisv1:latest
                       sh "docker push sevenajay/tetrisv1:latest "
                    }
                }
            }
        }
        stage("TRIVY"){
            steps{
                sh "trivy image sevenajay/tetrisv1:latest > trivyimage.t
            }
        }
    }
}
```

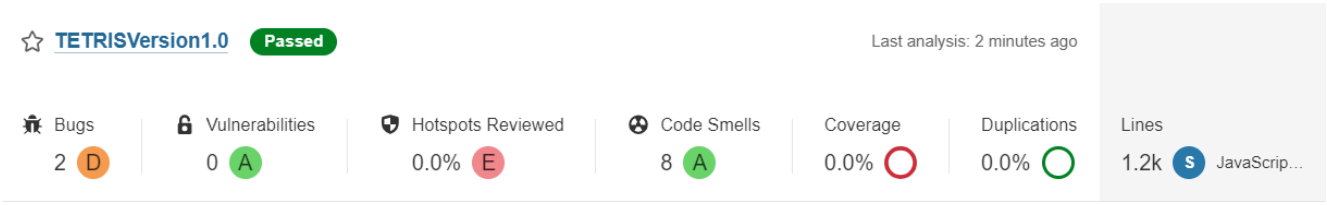
Click on Apply and save.

Build now

Stage view




To see the report, you can go to Sonarqube Server and go to Projects.




You can see the report has been generated and the status shows as passed. You can see that there are 1.2k lines it scanned. To see a detailed report, you can go to issues.

OWASP, You will see that in status, a graph will also be generated and Vulnerabilities.

## Dependency-Check Results

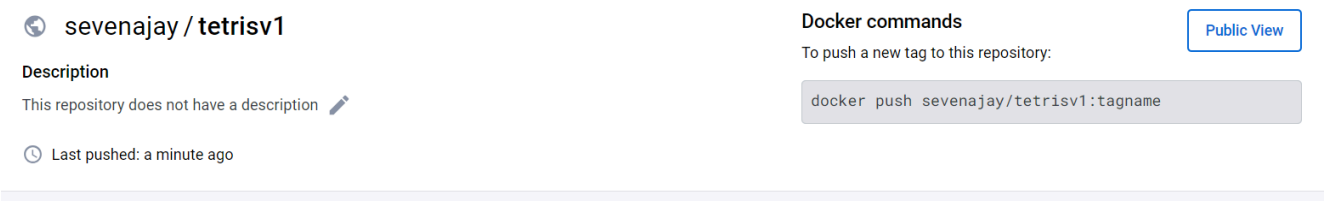
SEVERITY DISTRIBUTION

15 | 47 | 25

Search

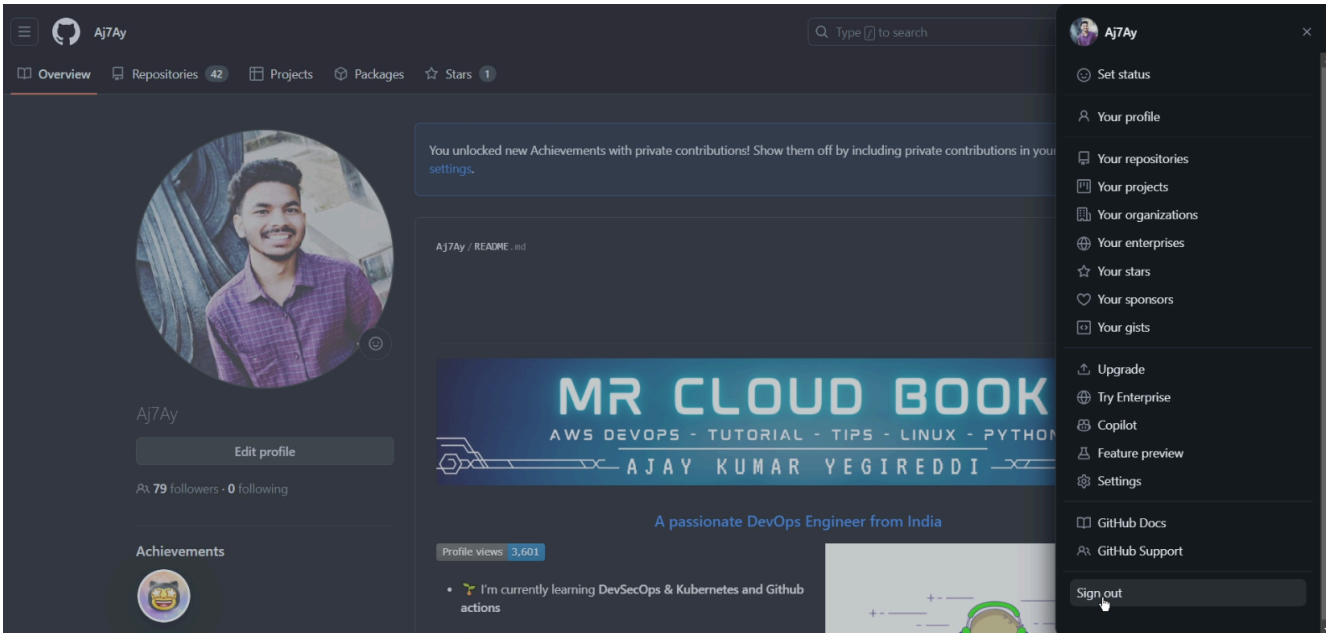
| File Name | Vulnerability | Severity | Weakness |
|---|---|---|---|
| @babel/preset-env:7.12.1 | NVD CVE-2023-45133 | High | CWE-697 |
| ansi-html:0.0.7 | NVD CVE-2021-23424 | High | NVD-CWE-noinfo |
| ansi-regex:4.1.0 | NVD CVE-2021-3807 | High | CWE-1333 |
| ansi-regex:5.0.0 | NVD CVE-2021-3807 | High | CWE-1333 |
| async:2.6.3 | NVD CVE-2021-43138 | High | CWE-1321 |
| browserslist:4.14.2 | NVD CVE-2021-23364 | Medium | CWE-1333 |
| browserslist:4.16.3 | NVD CVE-2021-23364 | Medium | CWE-1333 |
| css-what:3.4.2 | OSSINDEX CVE-2022-21222 | High | CWE-1333 |
| decode-uri-component:0.2.0 | NVD CVE-2022-38778 | Medium | CWE-20 |
| decode-uri-component:0.2.0 | NVD CVE-2022-38900 | High | CWE-20 |

When you log in to Dockerhub, you will see a new image is created

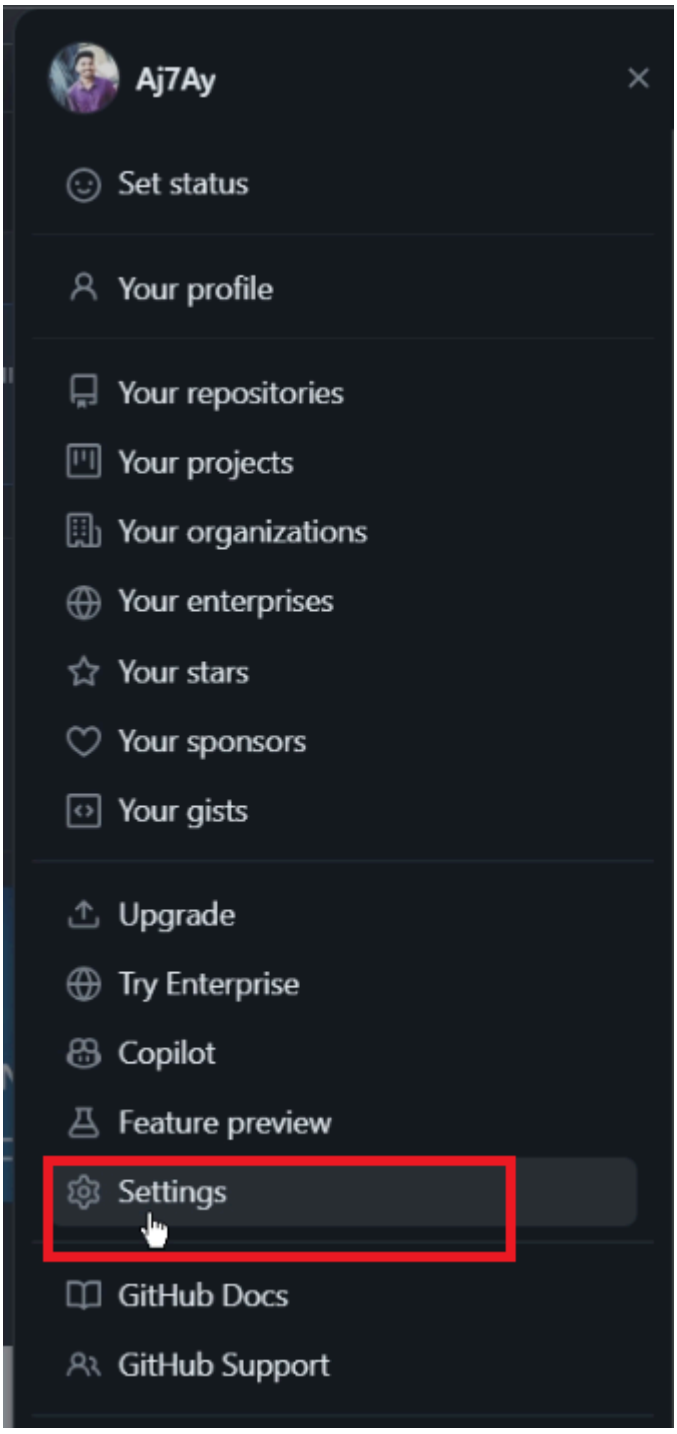



Let's create a GitHub Token. Go to GitHub

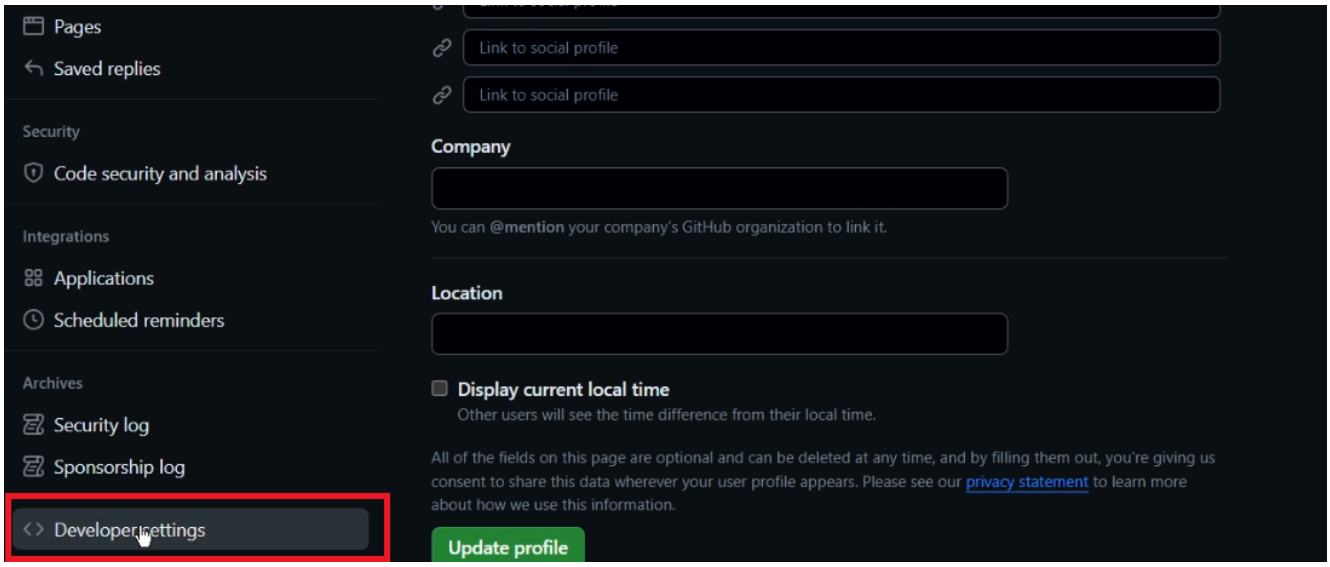
Click on Your Profile on the top right



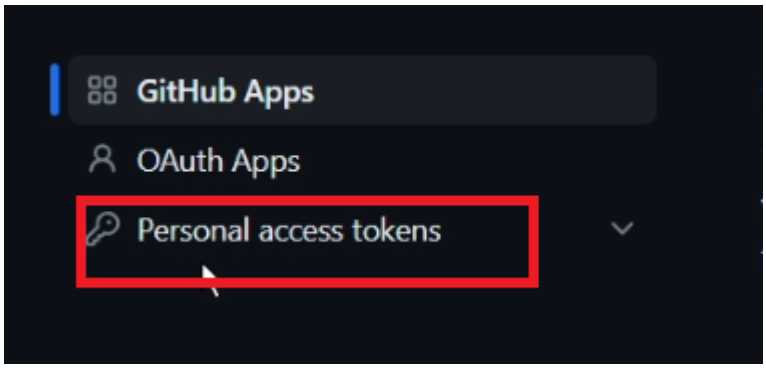

Now click on Settings



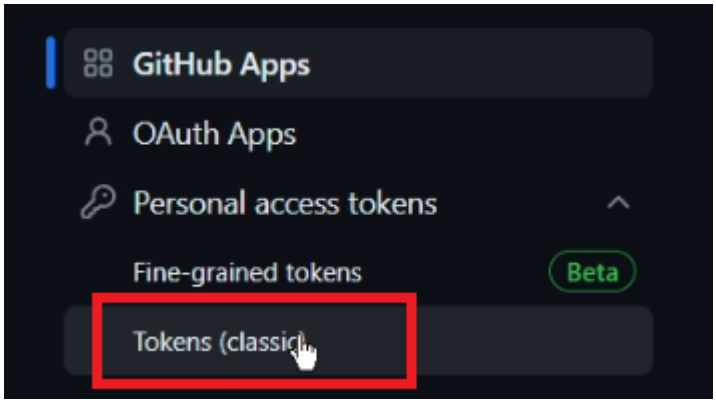

Now go down and search for Developer settings and click on it



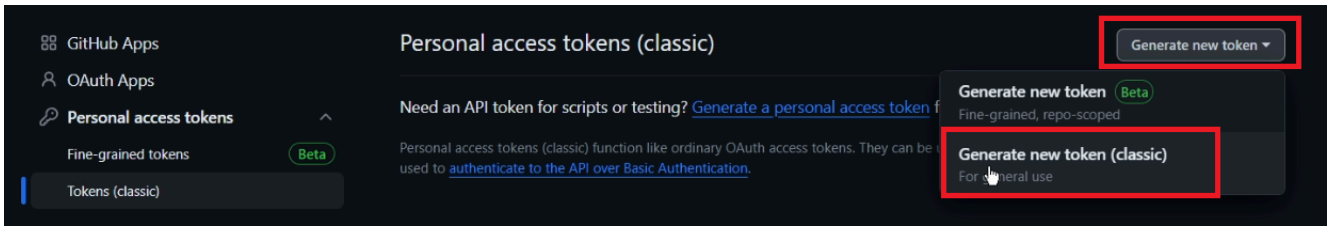

Now click on Personal Access tokens



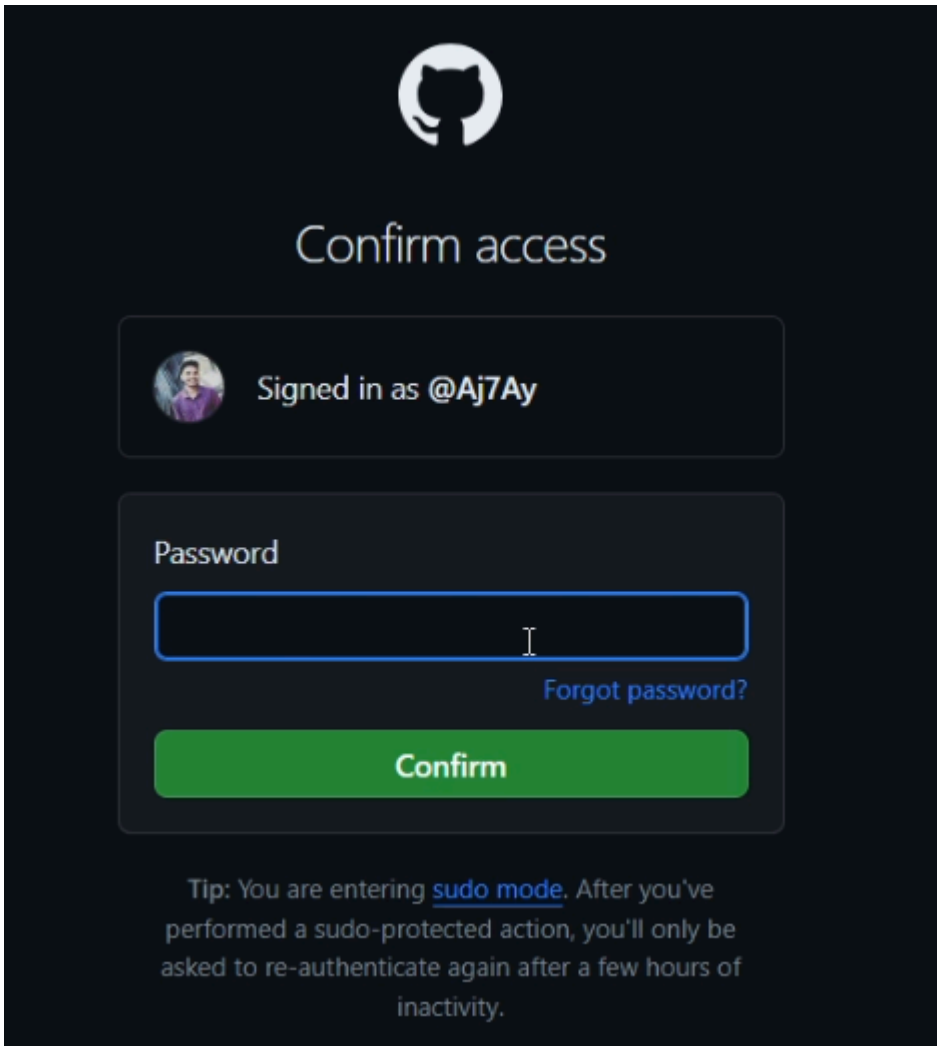

Click on Tokens (Classic)



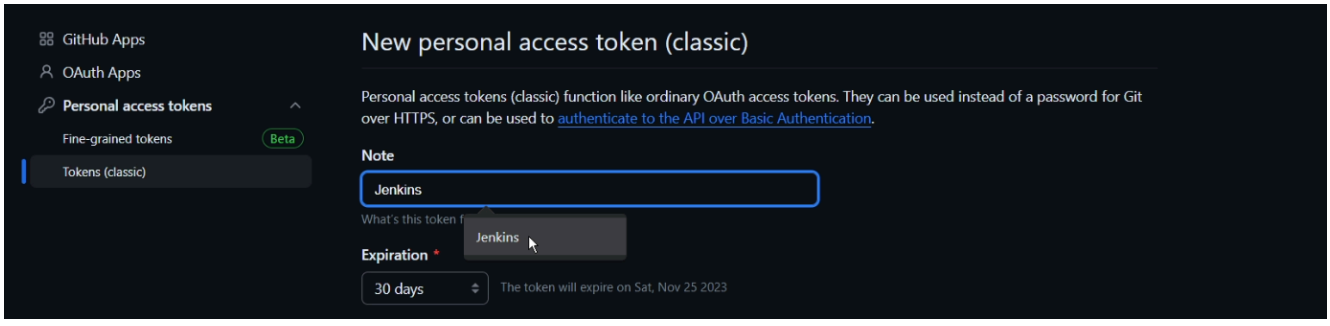

Click on Generate New token –> Generate new token (classic)



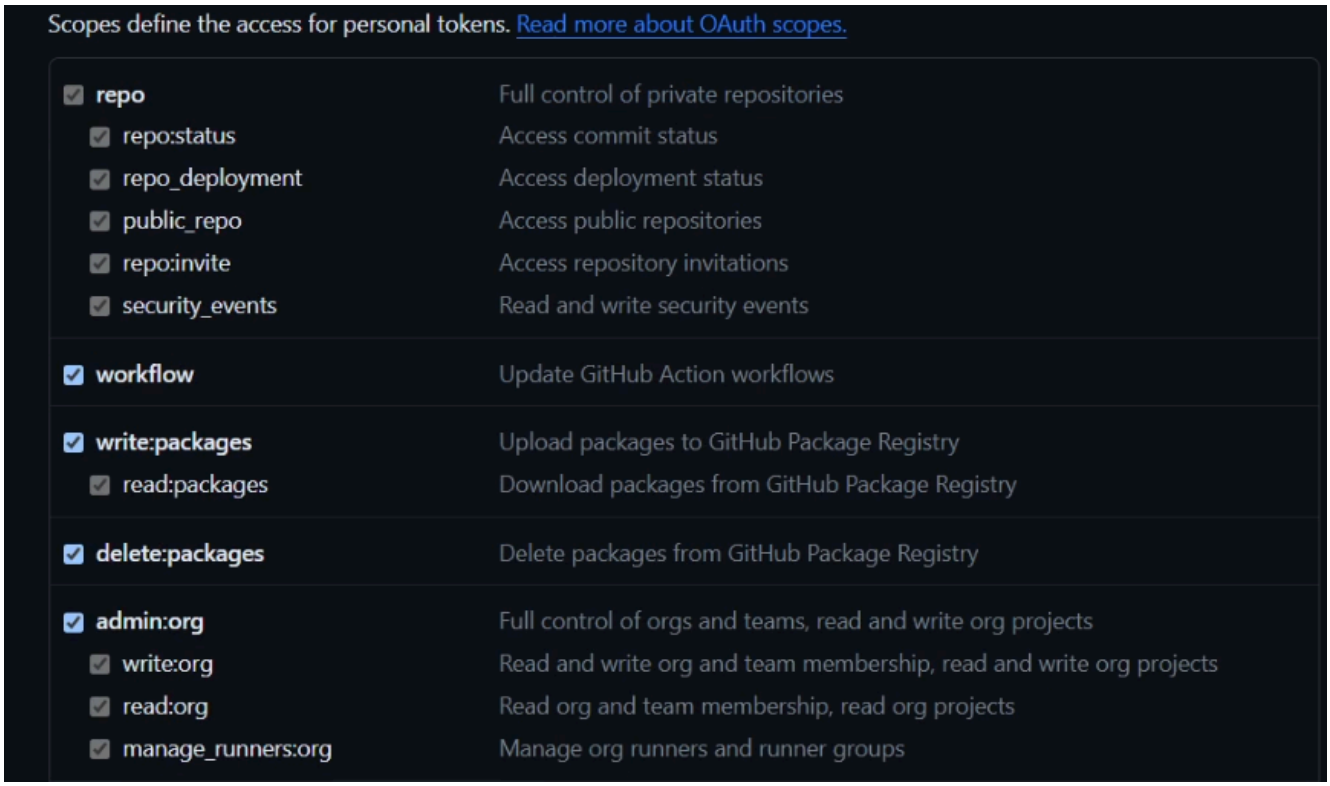
Now it asks for access provide your GitHub password



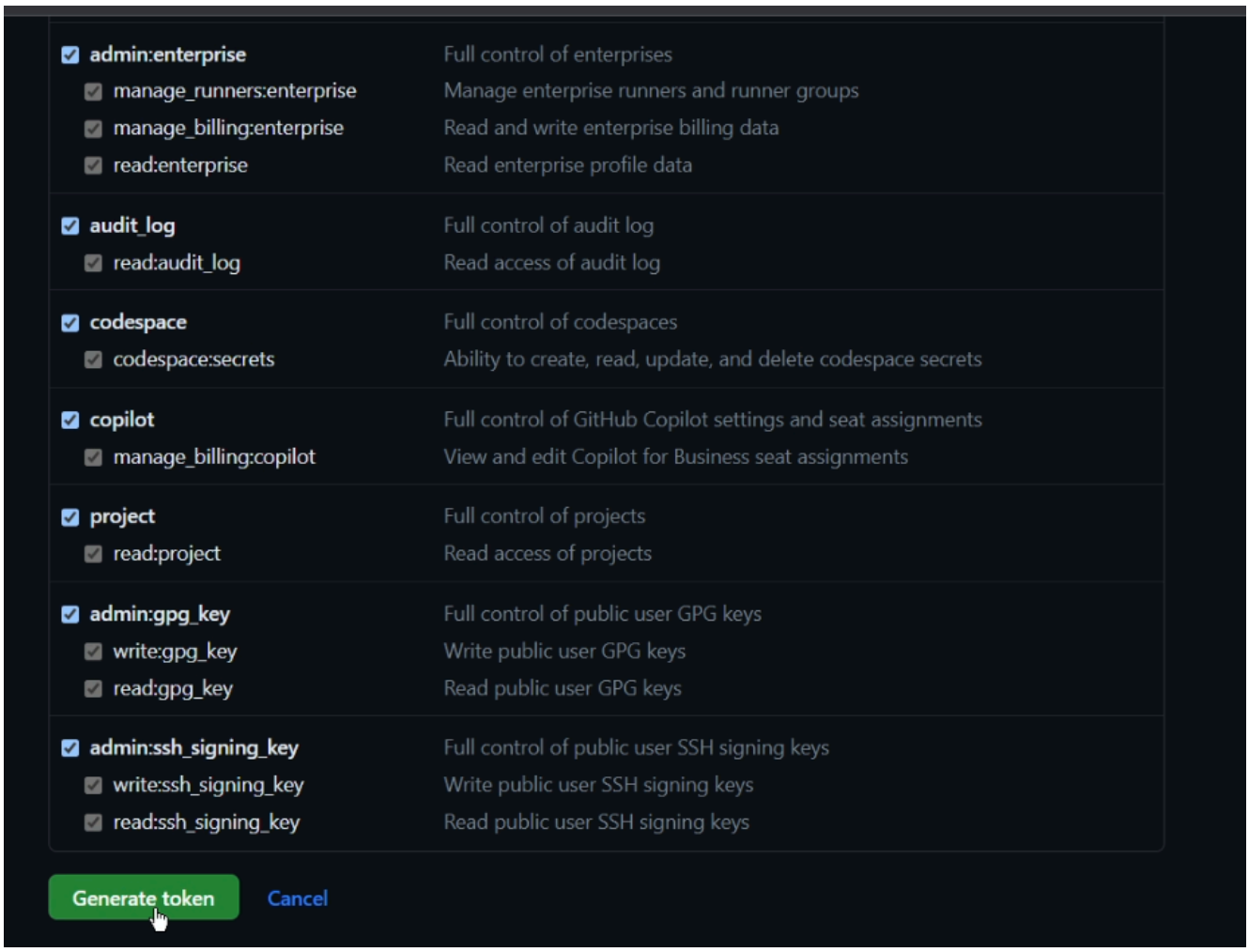

Now provide a name for the token



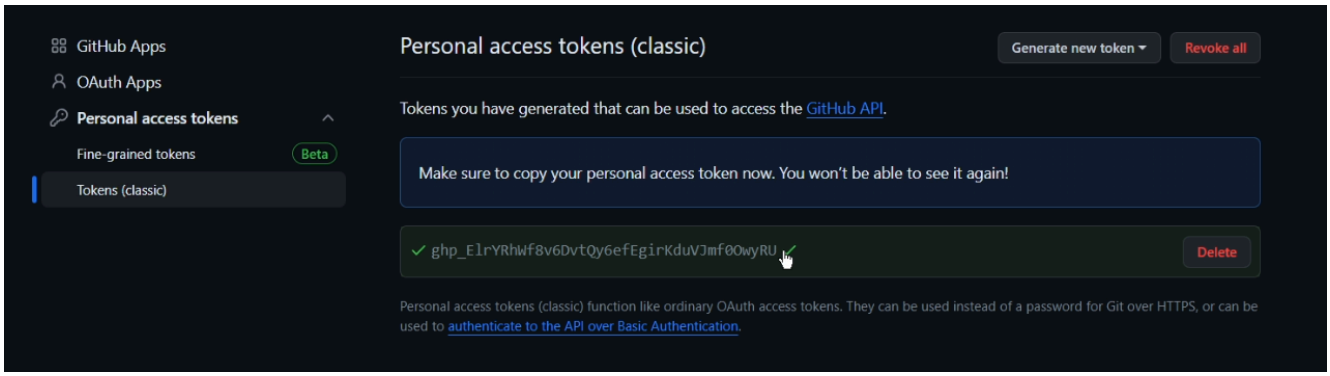

Click on all check box




Now click on Generate token



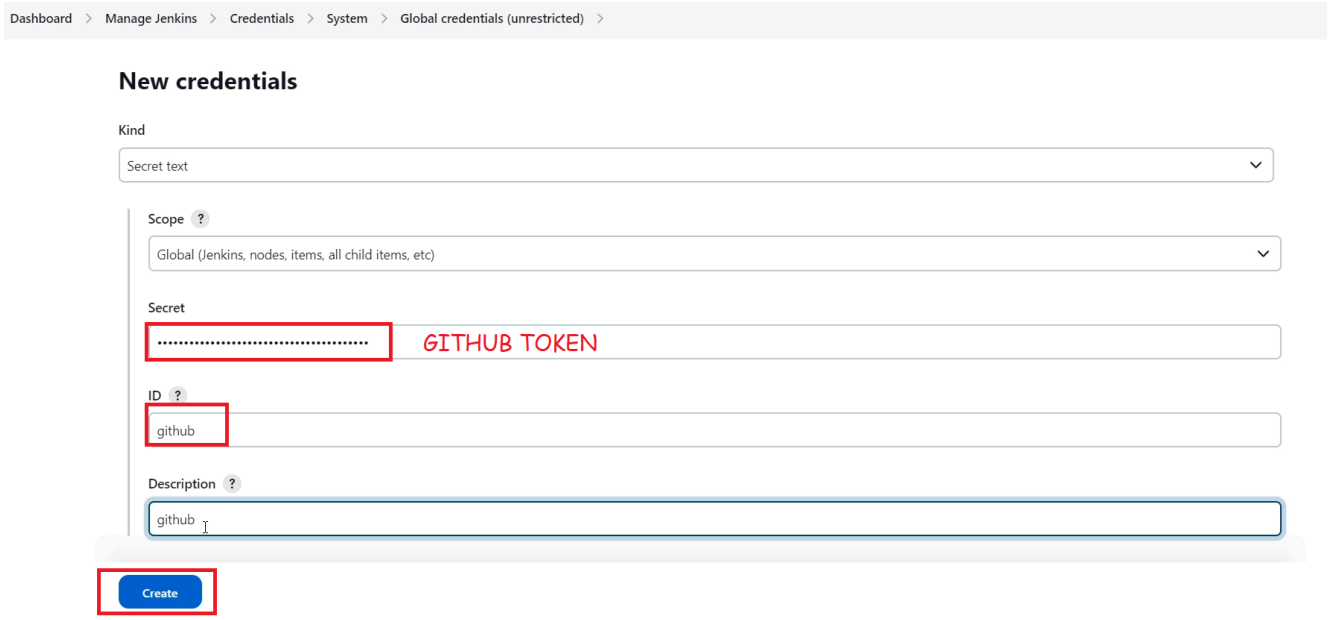

Now copy the token




Now go to the Jenkins dashboard

Manage Jenkins –> credentials –> Global

Add credential




Let's add the Image Updater stage to the Pipeline

```
#add inside environment
 environment {
    GIT_REPO_NAME = "Tetris-manifest"
    GIT_USER_NAME = "Aj7Ay"      # change your  Github Username here
  }
# add these stages after trivy image scan
        stage('Checkout Code') {
            steps {
                git branch: 'main', url: 'https://github.com/Aj7Ay/Tetr
```

```
            }
        }
        stage('Update Deployment File') {
            steps {
                script {
                    withCredentials([string(credentialsId: 'github', var
                       NEW_IMAGE_NAME = "sevenajay/tetrisv1:latest"   #u
                       sh "sed -i 's|image: .*|image: $NEW_IMAGE_NAME|'
                       sh 'git add deployment.yml'
                       sh "git commit -m 'Update deployment image to $NE
                       sh "git push https://${GITHUB_TOKEN}@github.com/$
                    }
                }
            }
        }
```

## Complete Pipeline

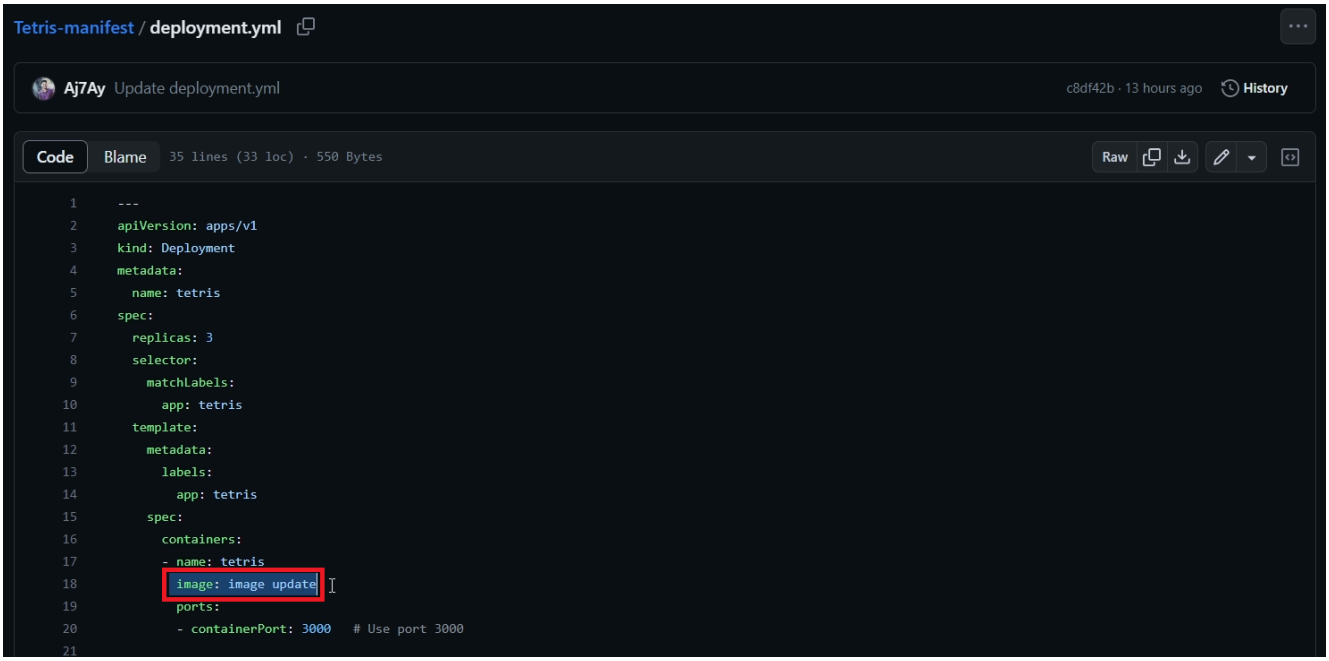
```
pipeline{
    agent any
    tools{
        jdk 'jdk17'
        nodejs 'node16'
    }
    environment {
        SCANNER_HOME=tool 'sonar-scanner'
        GIT_REPO_NAME = "Tetris-manifest"
        GIT_USER_NAME = "Aj7Ay"      # change your Github Username here
    }
    stages {
        stage('clean workspace'){
            steps{
                cleanWs()
            }
        }
        stage('Checkout from Git'){
            steps{
                git branch: 'main', url: 'https://github.com/Aj7Ay/Tetri
            }
```

```
        }
        stage("Sonarqube Analysis "){
            steps{
                withSonarQubeEnv('sonar-server') {
                    sh ''' $SCANNER_HOME/bin/sonar-scanner -Dsonar.proje
                    -Dsonar.projectKey=TetrisVersion1.0 '''
                }
            }
        }
        stage("quality gate"){
           steps {
                script {
                    waitForQualityGate abortPipeline: false, credentials
                }
            }
        }
        stage('Install Dependencies') {
            steps {
                sh "npm install"
            }
        }
        stage('OWASP FS SCAN') {
            steps {
                dependencyCheck additionalArguments: '--scan ./ --disab
                dependencyCheckPublisher pattern: '**/dependency-check-r
            }
        }
        stage('TRIVY FS SCAN') {
            steps {
                sh "trivy fs . > trivyfs.txt"
            }
        }
        stage("Docker Build & Push"){
            steps{
                script{
                   withDockerRegistry(credentialsId: 'docker', toolName
                       sh "docker build -t tetrisv1 ."
                       sh "docker tag tetrisv1 sevenajay/tetrisv1:latest
                       sh "docker push sevenajay/tetrisv1:latest "
                    }
                }
            }
        }
        stage("TRIVY"){
            steps{
```

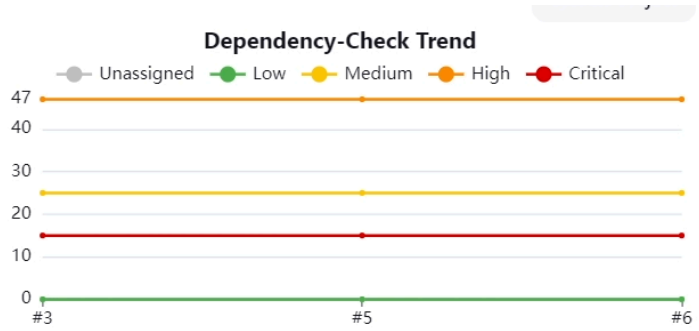
```
                sh "trivy image sevenajay/tetrisv1:latest > trivyimage.t
            }
        }
        stage('Checkout Code') {
            steps {
                git branch: 'main', url: 'https://github.com/Aj7Ay/Tetri
            }
        }
        stage('Update Deployment File') {
            steps {
                script {
                    withCredentials([string(credentialsId: 'github', var
                       NEW_IMAGE_NAME = "sevenajay/tetrisv1:latest"   #u
                       sh "sed -i 's|image: .*|image: $NEW_IMAGE_NAME|'
                       sh 'git add deployment.yml'
                       sh "git commit -m 'Update deployment image to $NE
                       sh "git push https://${GITHUB_TOKEN}@github.com/$
                    }
                }
            }
        }
    }
}
```

Click on Apply and save

Now click on Build and you can see no image inside the deployment file



Stage view




| Declarative: Tool Install | CO | Sonar analysis | QG | NPM | TRIVY FS | OWASP FS SCAN | Docker build and push | TRIVY IMAGE | COManifest | Image updater |
|---|---|---|---|---|---|---|---|---|---|---|
| 177ms | 918ms | 47s | 357ms | 10s | 23s | 2min 43s | 1min 35s | 2min 22s | 1s | 3s |
| 177ms | 918ms | 47s | 357ms (paused for 18s) | 10s | 23s | 2min 43s | 1min 35s | 2min 22s | 1s | 3s |

Now if you see the deployment file in the Tetris manifest repo

The image is automatically updated after the build

Tetris-manifest / deployment.yml

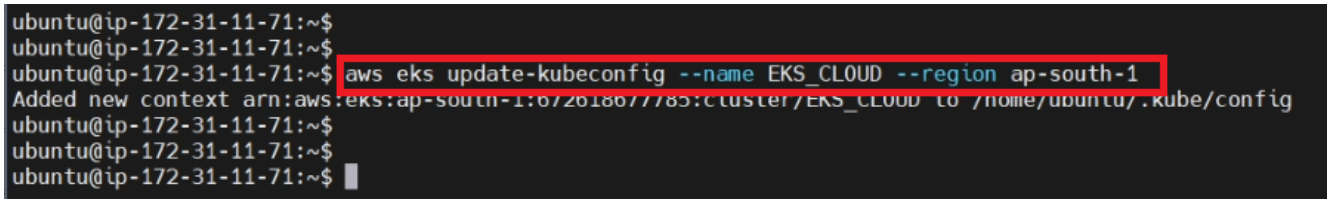
Code Blame 35 lines (33 loc) · 563 Bytes

```yaml
---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: tetris
spec:
  replicas: 3
  selector:
    matchLabels:
      app: tetris
  template:
    metadata:
      labels:
        app: tetris
    spec:
      containers:
      - name: tetris
        image: sevenajay/tetrisv1:latest
        ports:
        - containerPort: 3000   # Use port 3000
```

Let's Update the kubeconfig

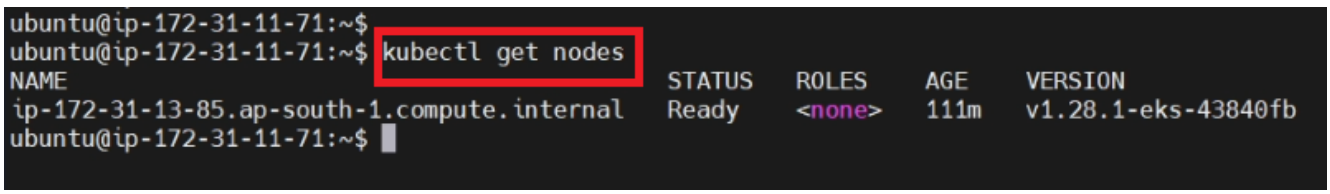
Go to Putty of your Jenkins instance SSH and enter the below command

```
aws eks update-kubeconfig --name <CLUSTER NAME> --region <CLUSTER REGIOI
aws eks update-kubeconfig --name EKS_CLOUD --region ap-south-1
```




Let's see the nodes

```
kubectl get nodes
```




## ARGO CD SETUP

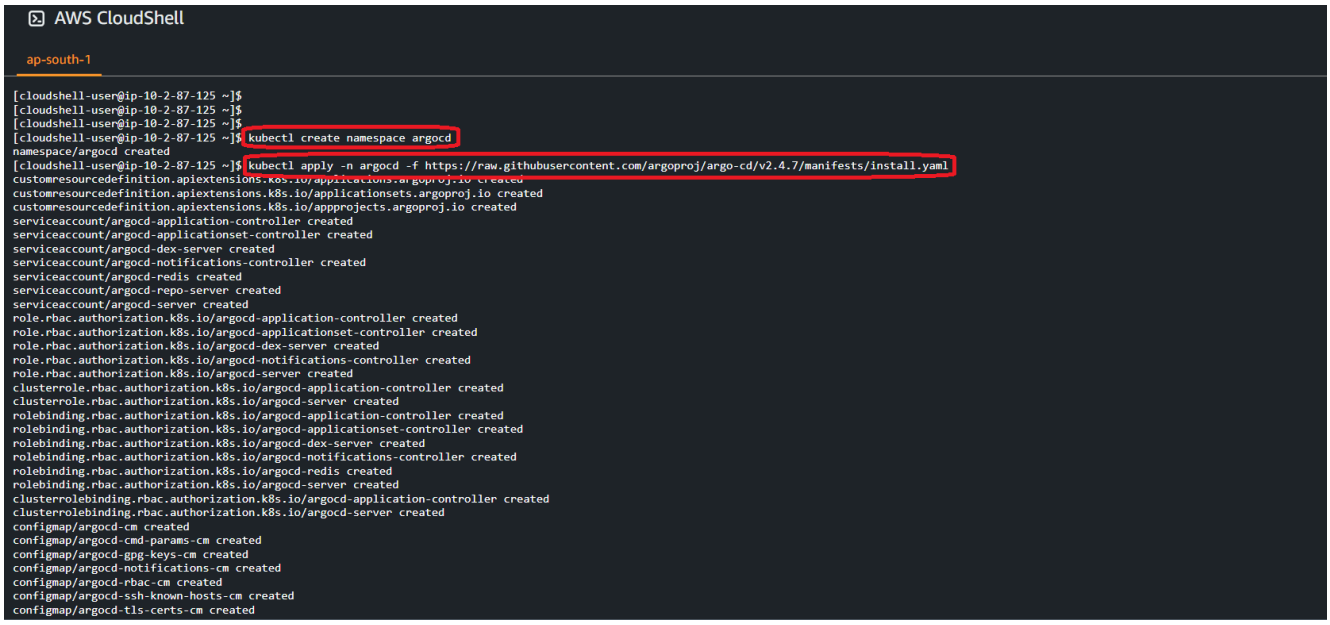
Let's install ArgoCD

**ARGOCD INSTALLATION LINK**

You will redirected to this page


All those components could be installed using a manifest provided by the Argo Project: use the below commands

```
kubectl create namespace argocd
kubectl apply -n argocd -f https://raw.githubusercontent.com/argoproj/ar
```

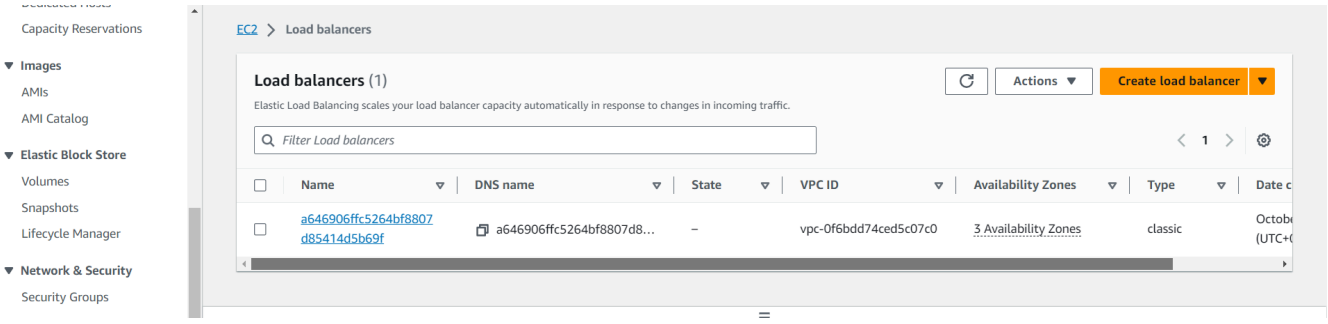



## COMMANDS ARGOCD

By default, argocd-server is not publicly exposed. For this project, we will use a Load Balancer to make it usable:

```
kubectl patch svc argocd-server -n argocd -p '{"spec": {"type": "LoadBa
```


One load balancer will created in the AWS

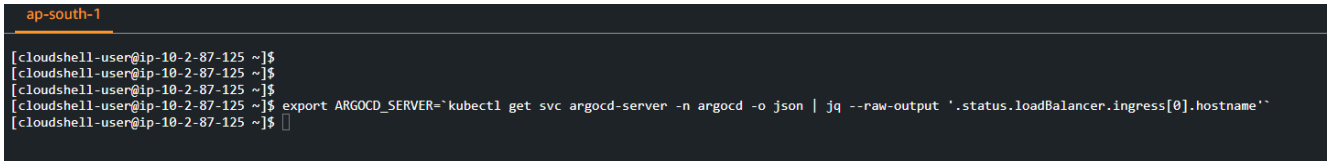



Wait about 2 minutes for the LoadBalancer creation

```
sudo apt install jq -y
```

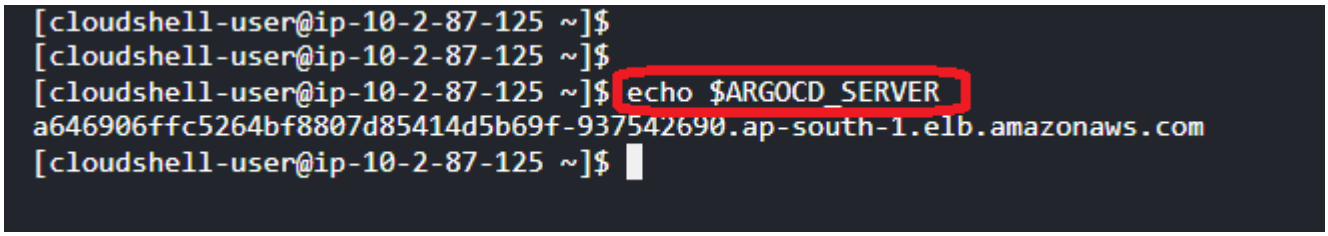
```
export ARGOCD_SERVER=`kubectl get svc argocd-server -n argocd -o json |
```

when you run this command, it will export the hostname of the ArgoCD server's load balancer and store it in the `ARGOCD_SERVER` environment variable, which you can then use in other commands or scripts to interact with the ArgoCD server. This can be useful when you need to access the ArgoCD web UI or interact with the server programmatically.




If run this command you will get the load balancer external IP

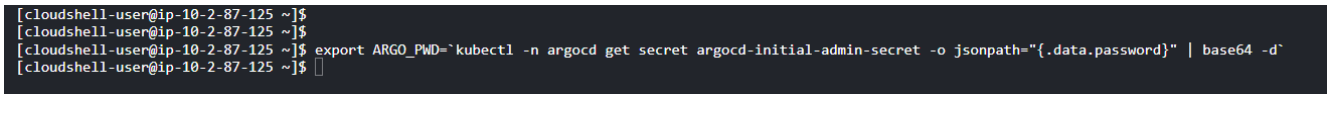
```
echo $ARGOCD_SERVER
```




## Login

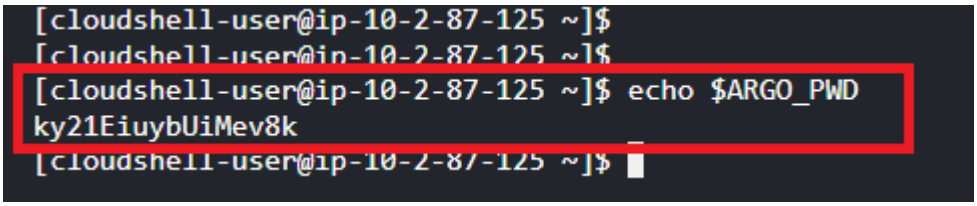
The command you provided is used to extract the password for the initial admin user of ArgoCD, decode it from base64 encoding, and store it in an environment variable named `ARGO_PWD` .

```
export ARGO_PWD=`kubectl -n argocd get secret argocd-initial-admin-secre
```



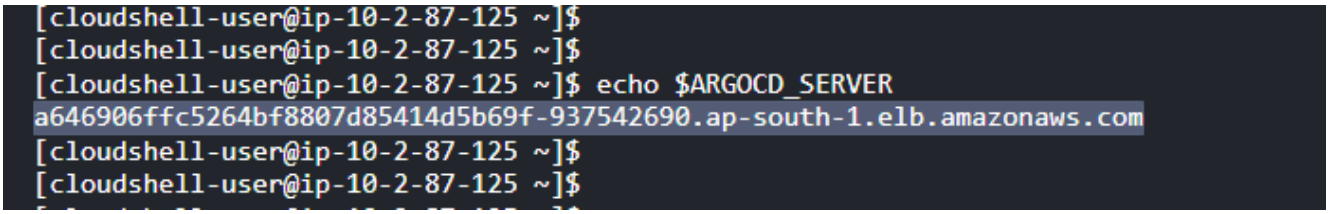
If you want to see your password provide the below command

```
echo $ARGO_PWD
```

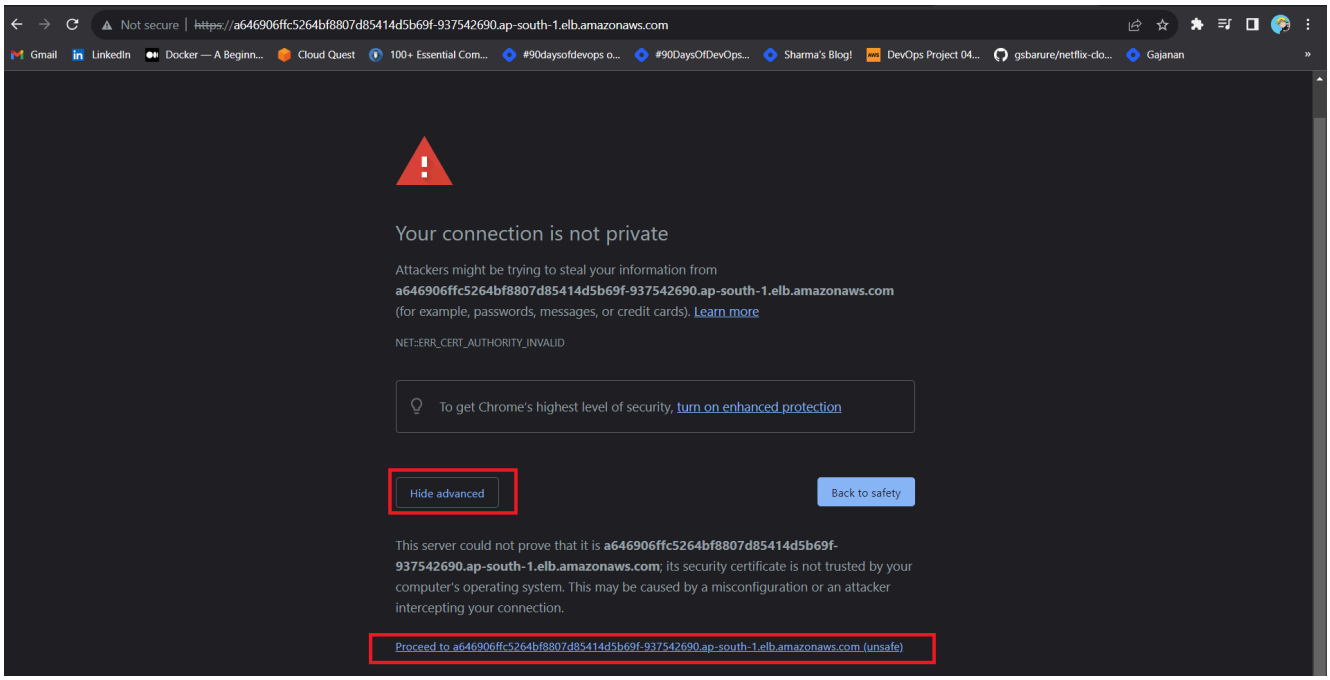



Now copy the load balancer IP and paste it into the browser

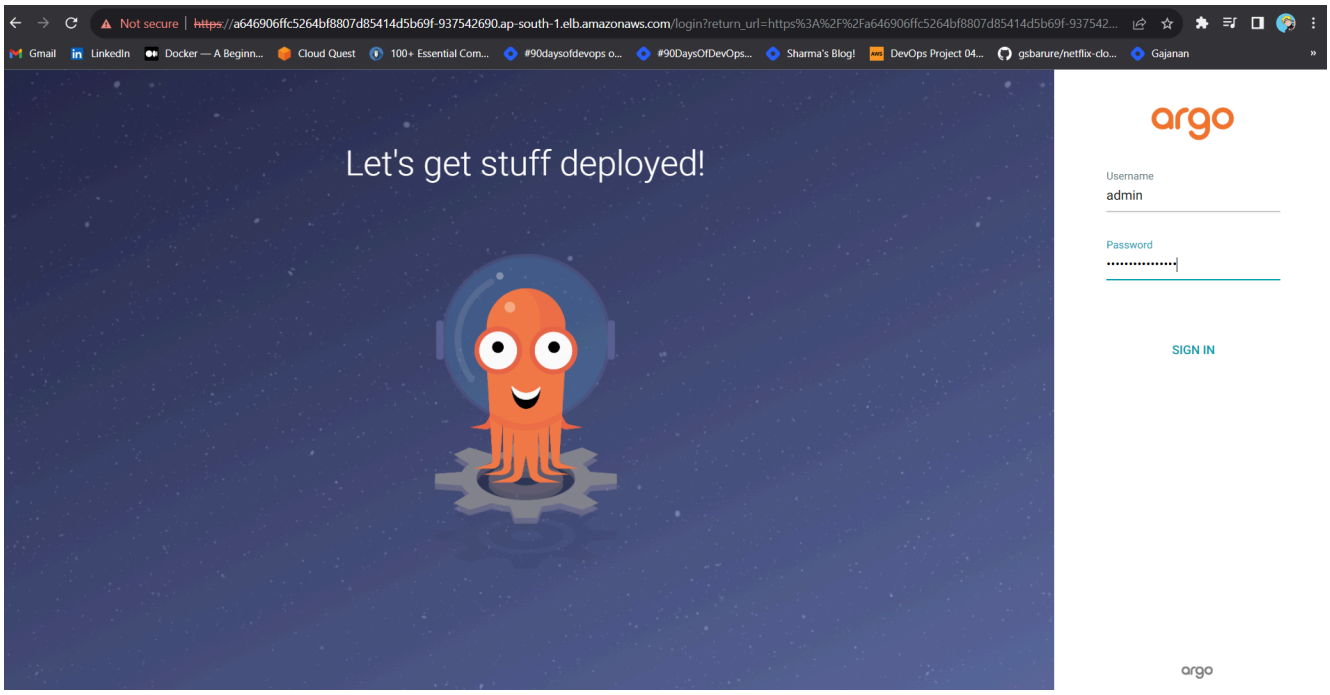
```
echo $ARGOCD_SERVER
```




Now you will see this page. if you get an error click on advanced and click on proceed.



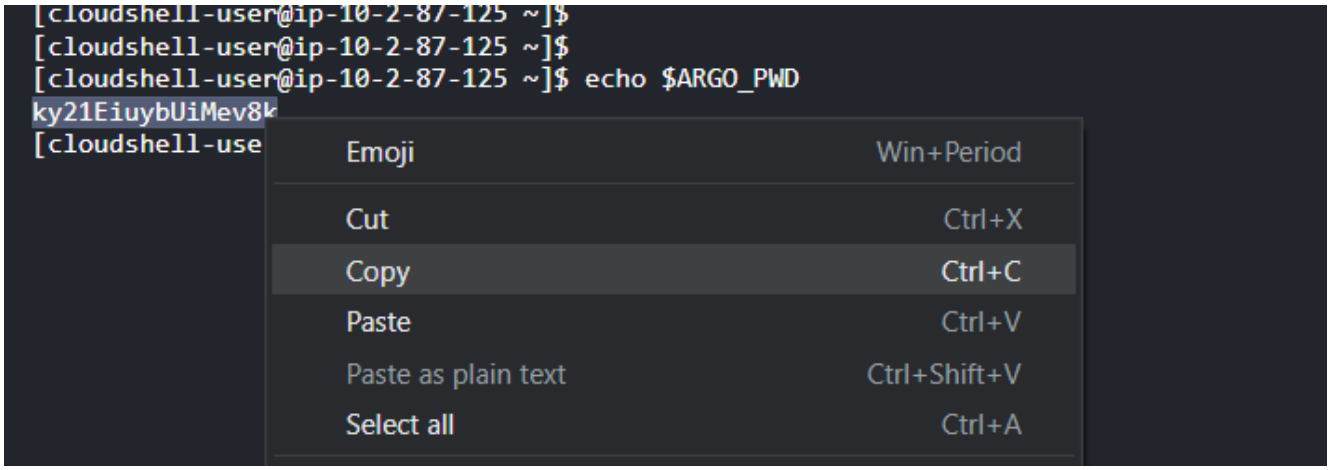

Now you will see this page and log in to ArgoCD



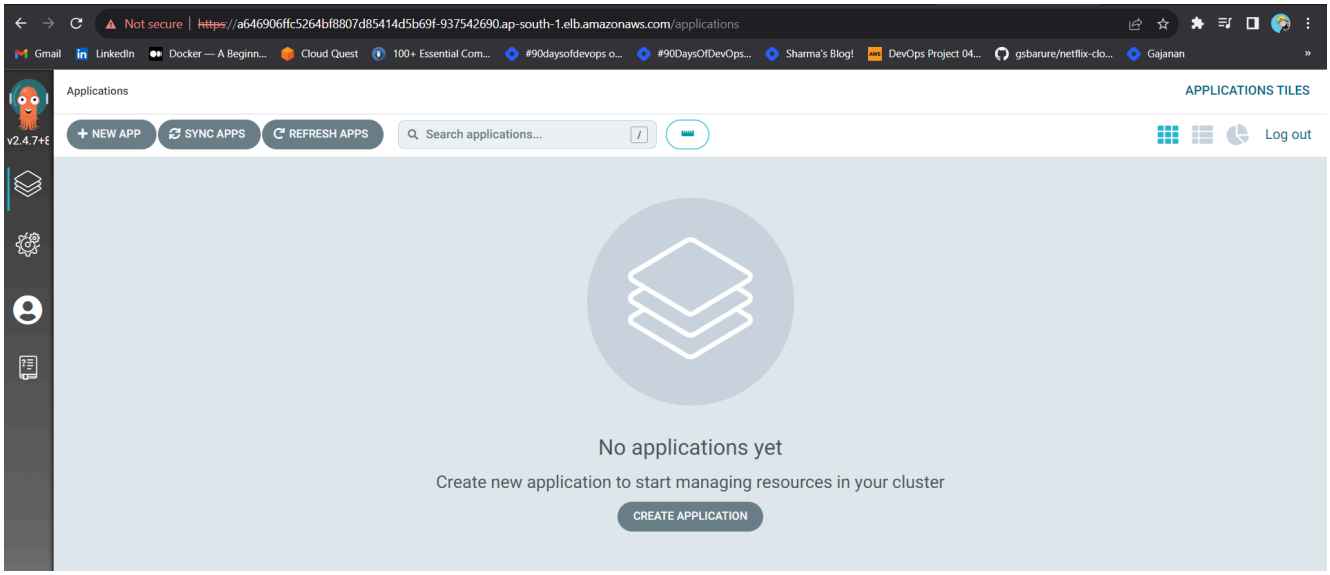

Username is admin

For the password, you have to provide the below command and copy it

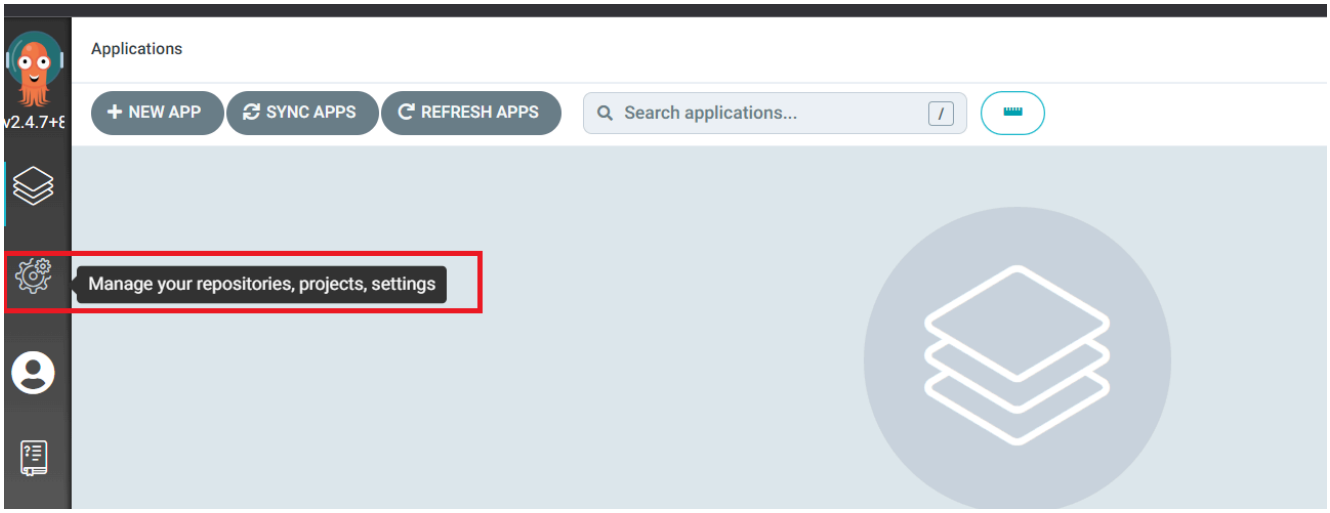
```
echo $ARGO_PWD
```



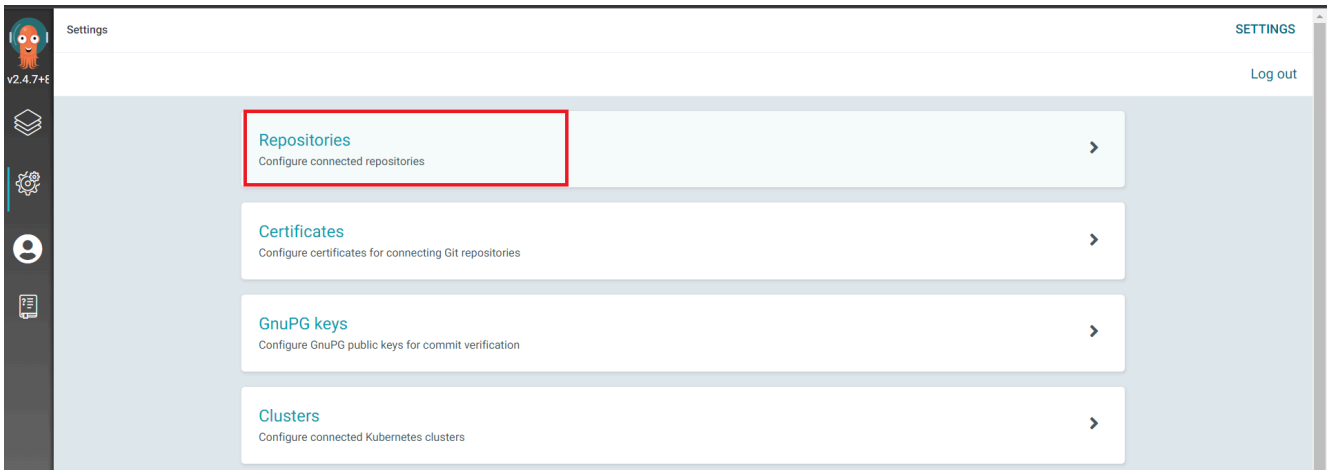

Click on Sign in and you will see this page.



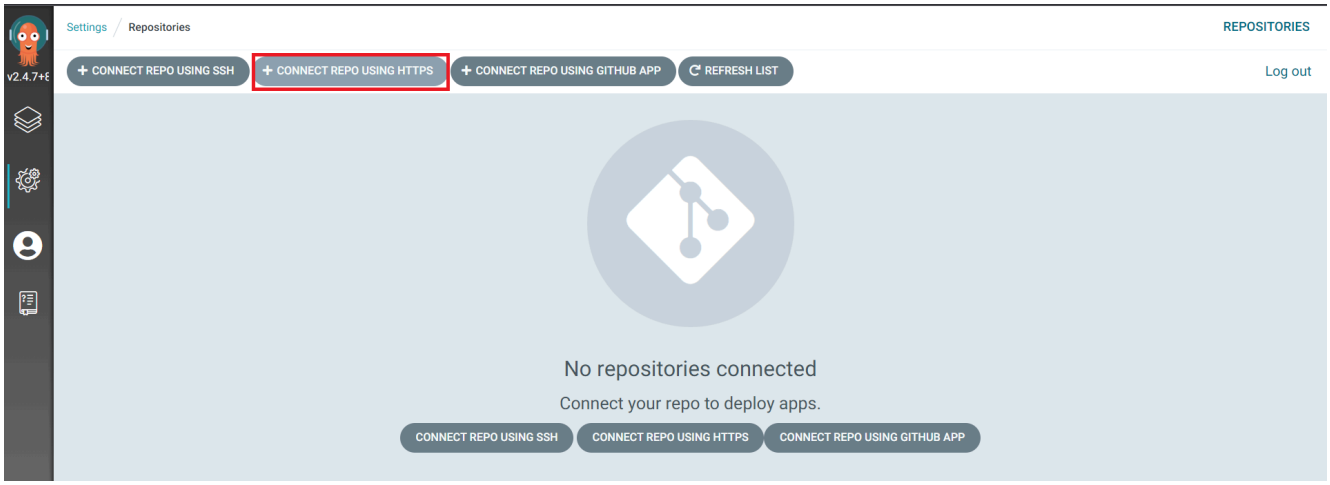

Now click on the Setting gear icon in the left side panel



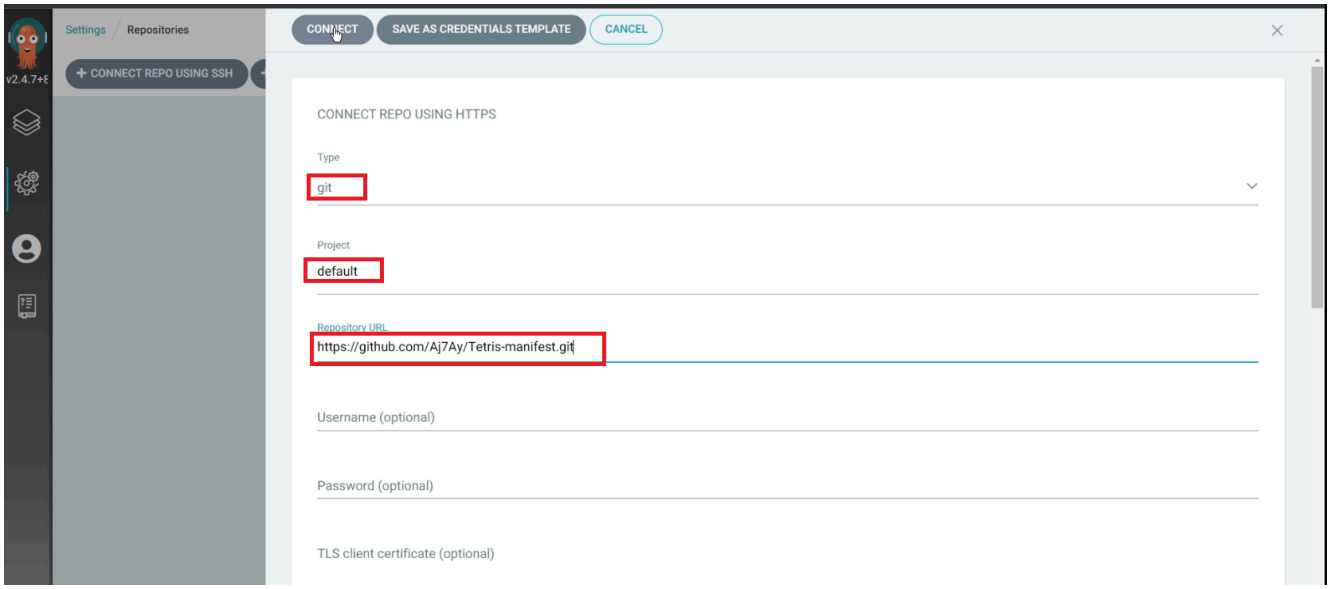

Click on Repositories



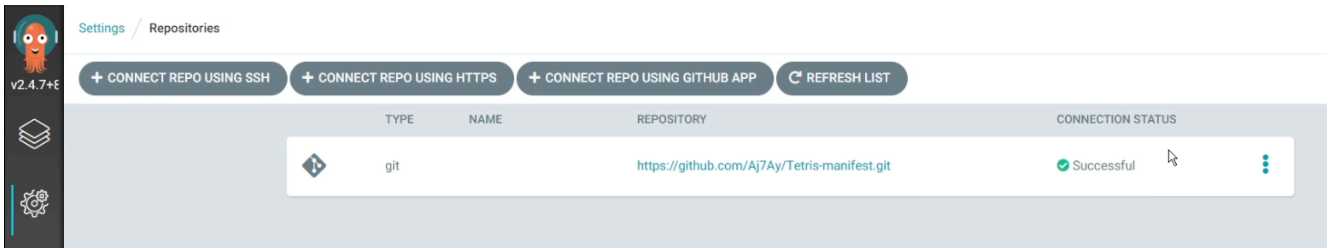

Now click on Connect Repo Using HTTPS



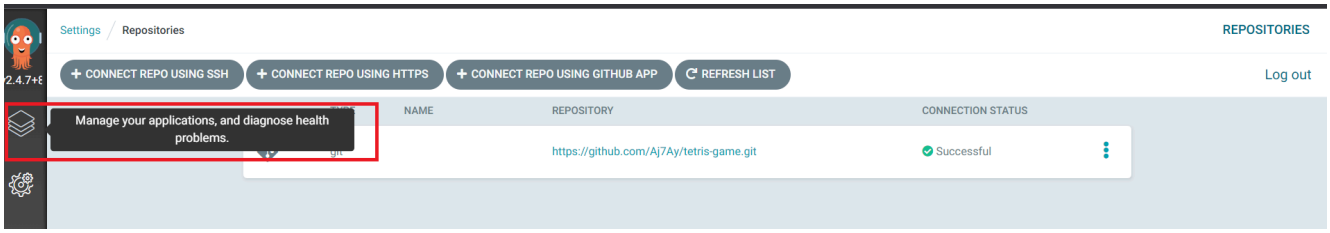

Add Github details, Type as git, Project as default and provide the GitHub URL of this manifest and click on connect



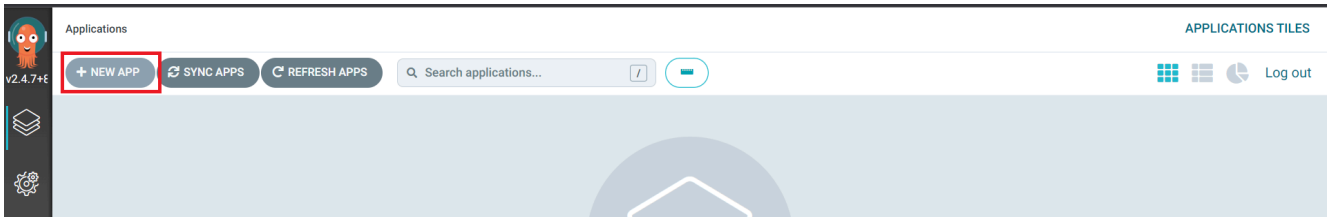

You will get Connection Status as Successful



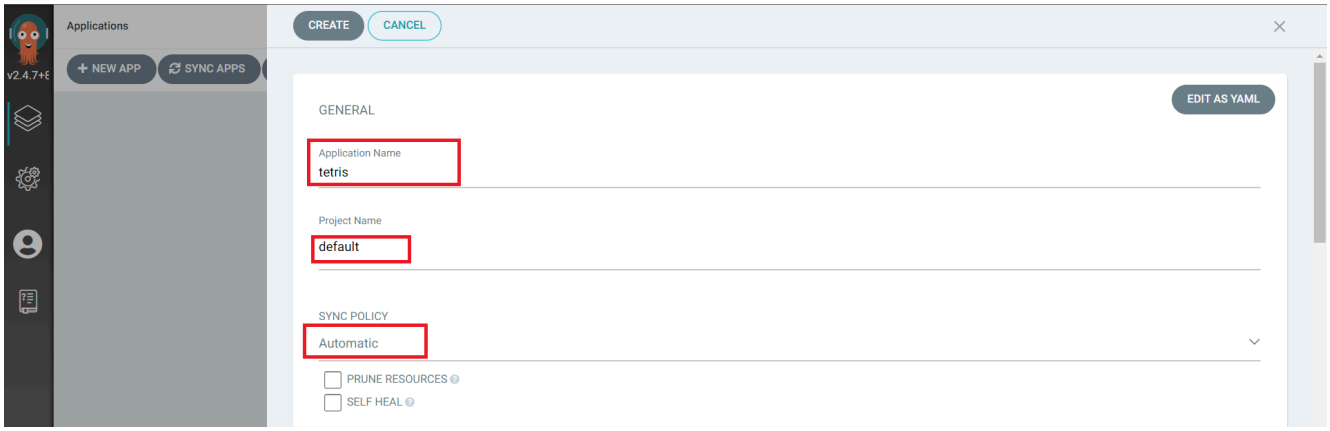

Click on Manage Your application

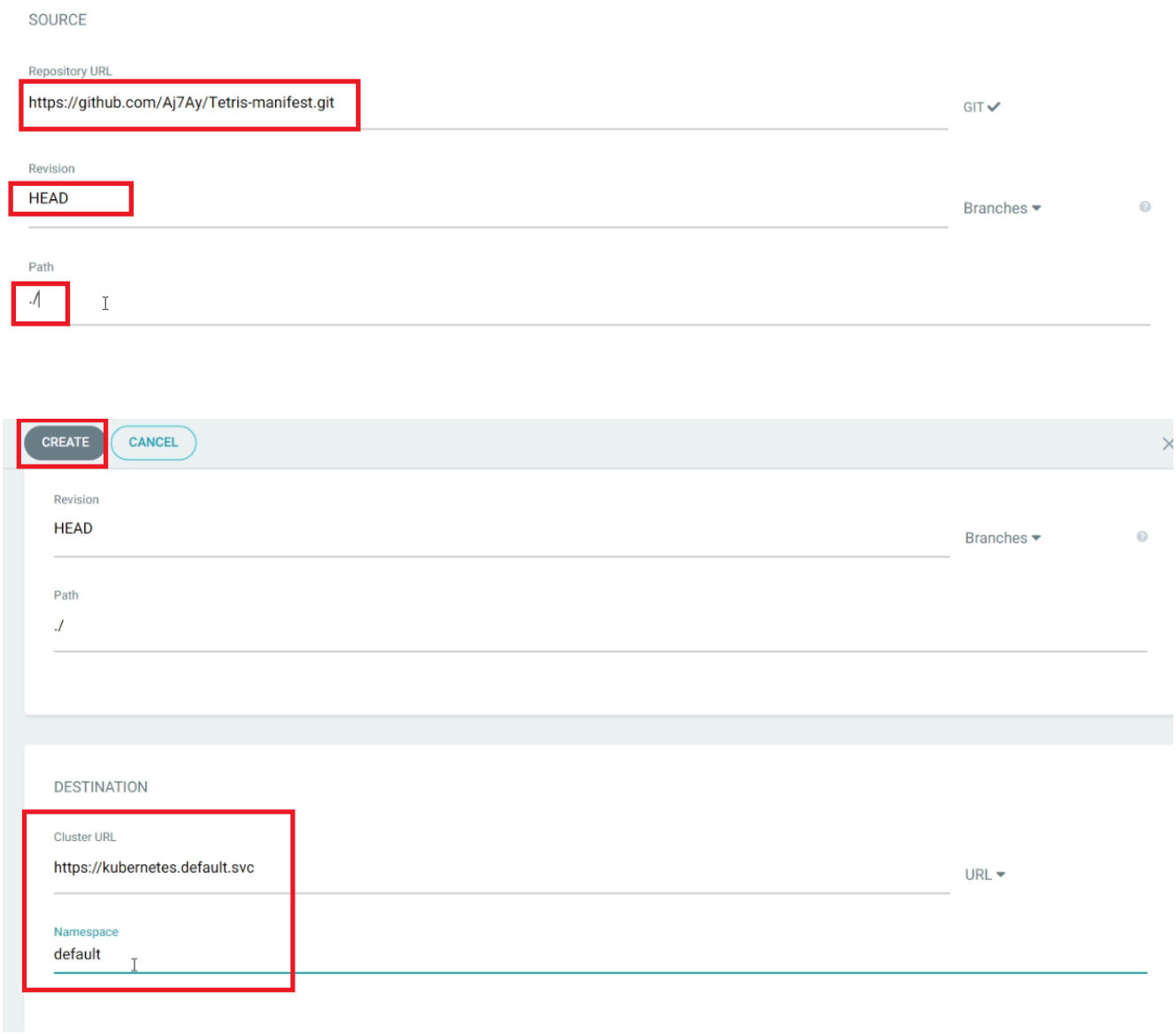



You will see this page and click on New App



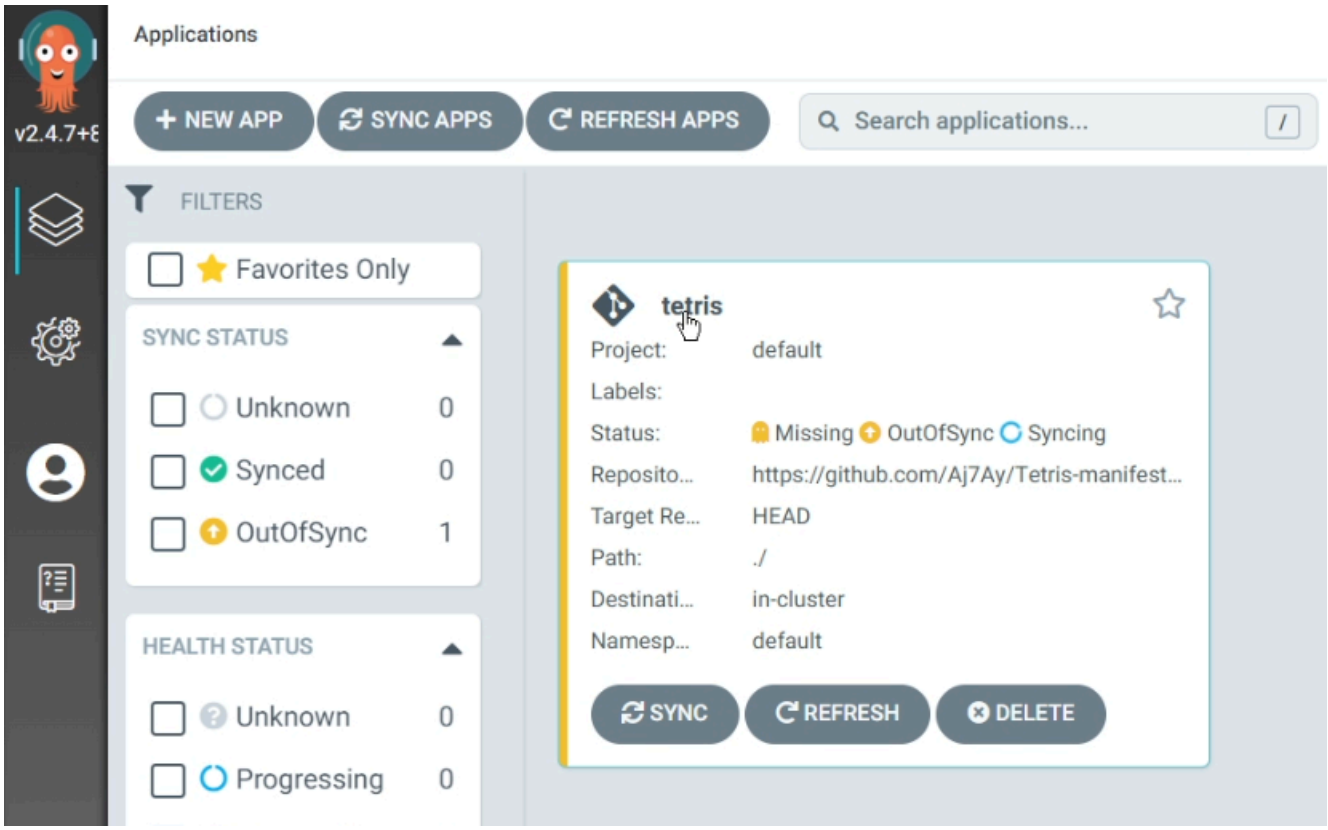

Now provide the following details as in the image



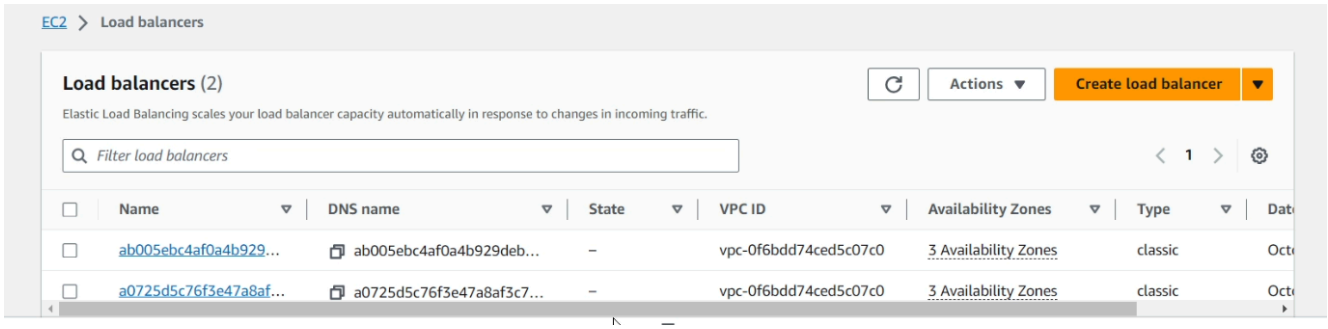



Click on Create.

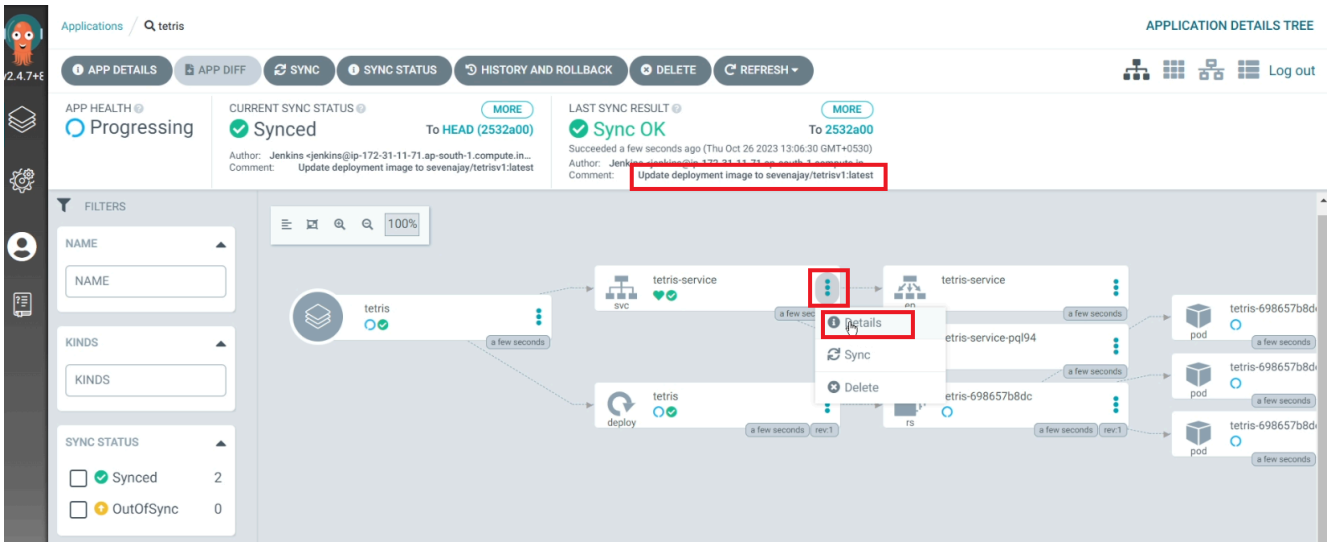
You can see our app is created in Argo-cd



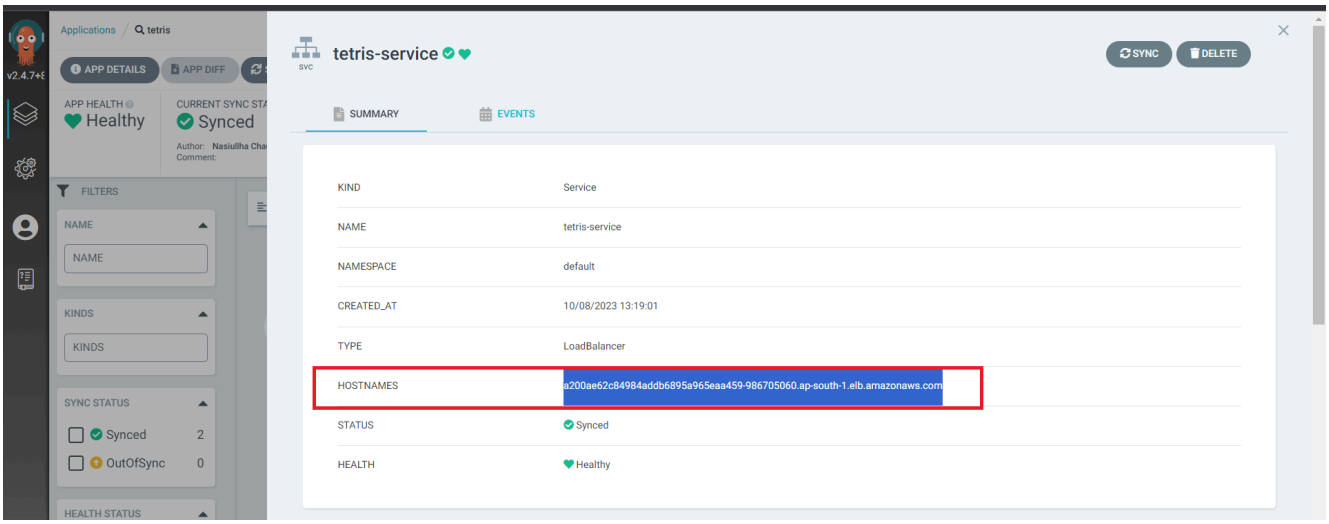

Click on tetris and it will create another load balancer in AWS



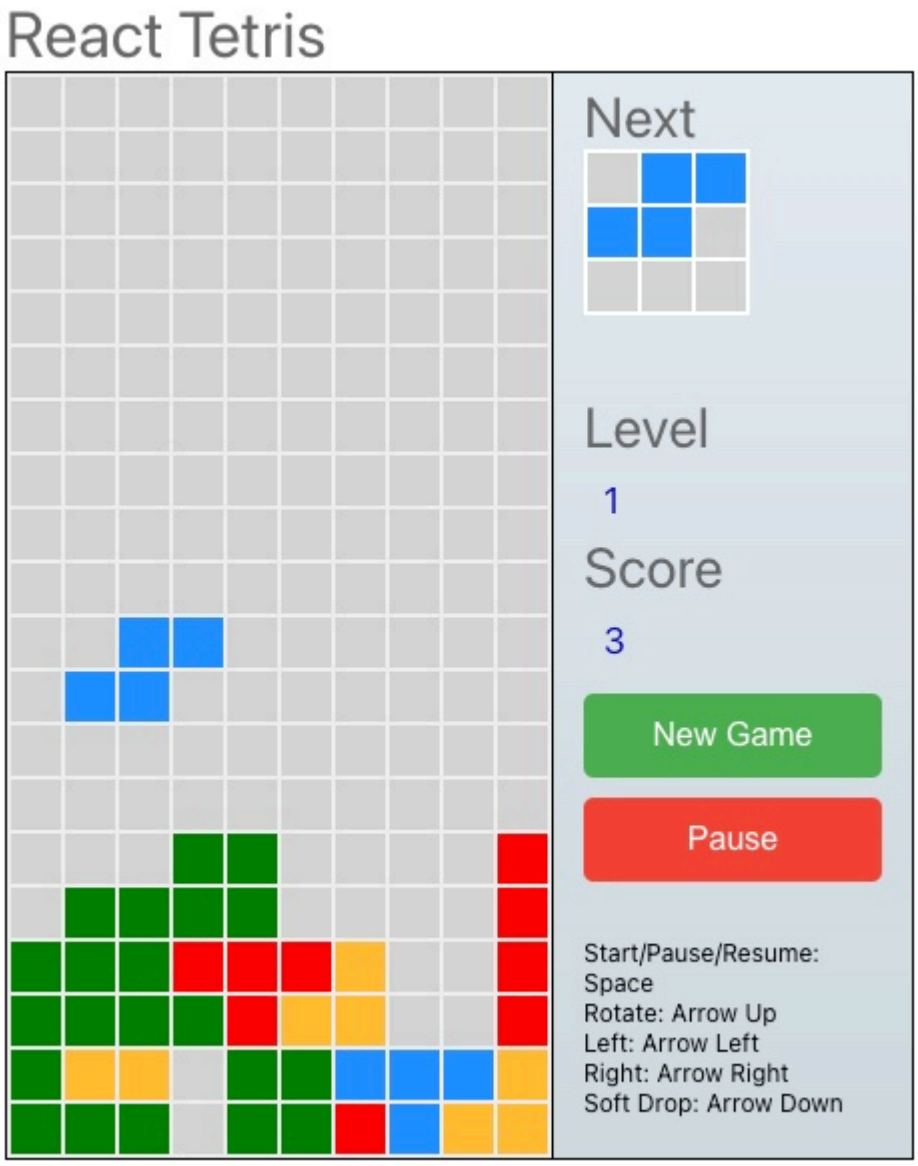

Now click on three dots beside tetris-service and click on the details



Now copy the hostname address



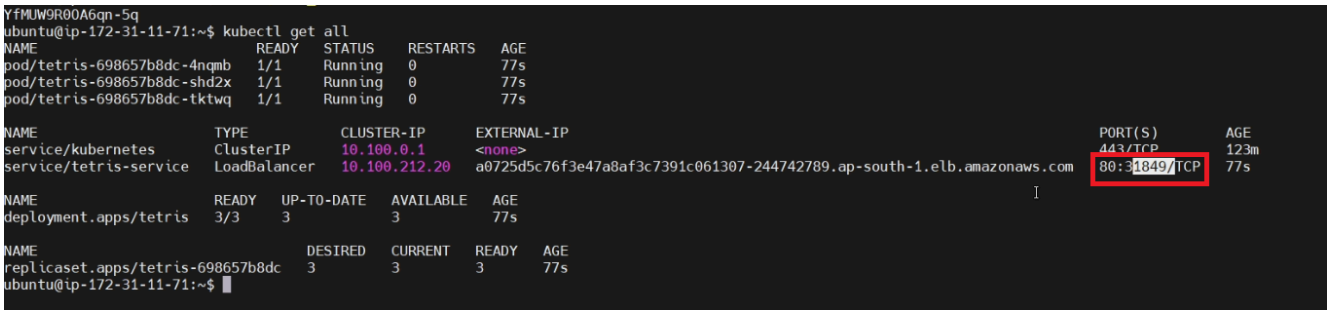

Paste it in a browser you will see this page



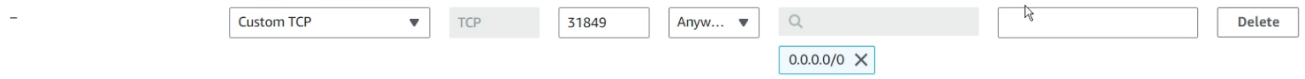
If you don't get the output

Go to Jenkins machine SSH Putty and provide the below the command

```
kubectl get all
```

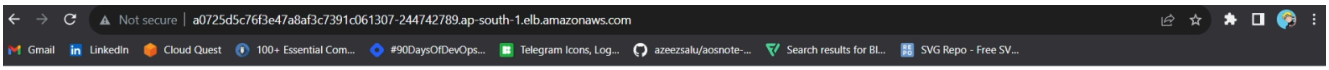


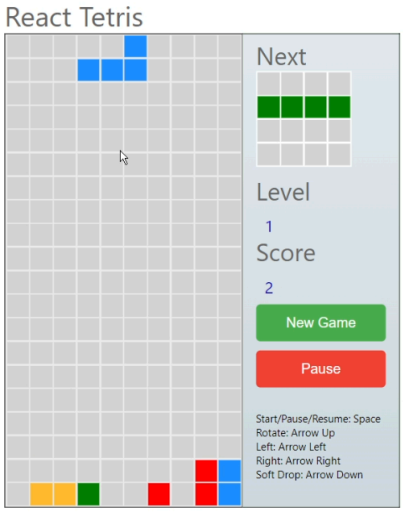

Open the port that you get like on the above page for the Node group Ec2 instance.




You have to open whatever port you get on The Node group EC2 instance security group

Then you can play the version 1 game




## Version 2.0

Let's Build version 2.0 Tetris game

Add this pipeline to the Job

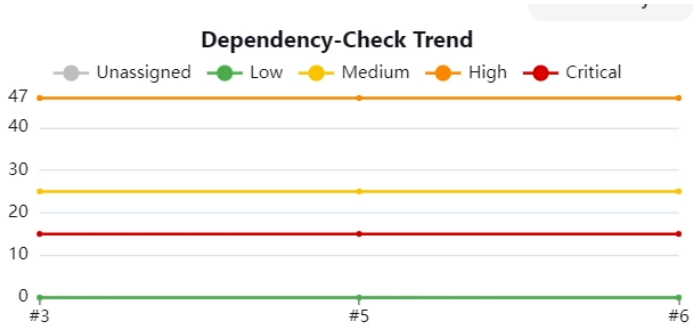
```
pipeline{
    agent any
    tools{
        jdk 'jdk17'
        nodejs 'node16'
    }
```

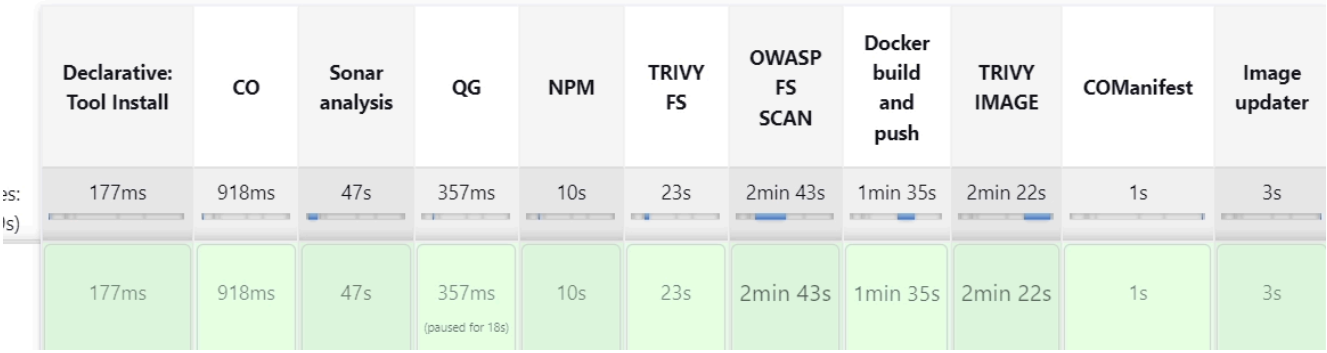
```
environment {
    SCANNER_HOME=tool 'sonar-scanner'
    GIT_REPO_NAME = "Tetris-manifest"
    GIT_USER_NAME = "Aj7Ay"      # change your Github Username here
}
stages {
    stage('clean workspace'){
        steps{
            cleanWs()
        }
    }
    stage('Checkout from Git'){
        steps{
            git branch: 'main', url: 'https://github.com/Aj7Ay/Tetri
        }
    }
    stage("Sonarqube Analysis "){
        steps{
            withSonarQubeEnv('sonar-server') {
                sh ''' $SCANNER_HOME/bin/sonar-scanner -Dsonar.proje
                -Dsonar.projectKey=TetrisVersion2.0 '''
            }
        }
    }
    stage("quality gate"){
       steps {
            script {
                waitForQualityGate abortPipeline: false, credentials
            }
        }
    }
    stage('Install Dependencies') {
        steps {
            sh "npm install"
        }
    }
    stage('OWASP FS SCAN') {
        steps {
            dependencyCheck additionalArguments: '--scan ./ --disab
            dependencyCheckPublisher pattern: '**/dependency-check-r
        }
    }
    stage('TRIVY FS SCAN') {
        steps {
            sh "trivy fs . > trivyfs.txt"
```

```
        }
    }
    stage("Docker Build & Push"){
        steps{
            script{
               withDockerRegistry(credentialsId: 'docker', toolName
                   sh "docker build -t tetrisv2 ."
                   sh "docker tag tetrisv2 sevenajay/tetrisv2:latest
                   sh "docker push sevenajay/tetrisv2:latest "
                }
            }
        }
    }
    stage("TRIVY"){
        steps{
            sh "trivy image sevenajay/tetrisv2:latest > trivyimage.t
        }
    }
    stage('Checkout Code') {
        steps {
            git branch: 'main', url: 'https://github.com/Aj7Ay/Tetri
        }
    }
    stage('Update Deployment File') {
        steps {
            script {
                withCredentials([string(credentialsId: 'github', var
                   NEW_IMAGE_NAME = "sevenajay/tetrisv2:latest"   #u
                   sh "sed -i 's|image: .*|image: $NEW_IMAGE_NAME|'
                   sh 'git add deployment.yml'
                   sh "git commit -m 'Update deployment image to $NE
                   sh "git push https://${GITHUB_TOKEN}@github.com/$
                }
            }
        }
    }
```

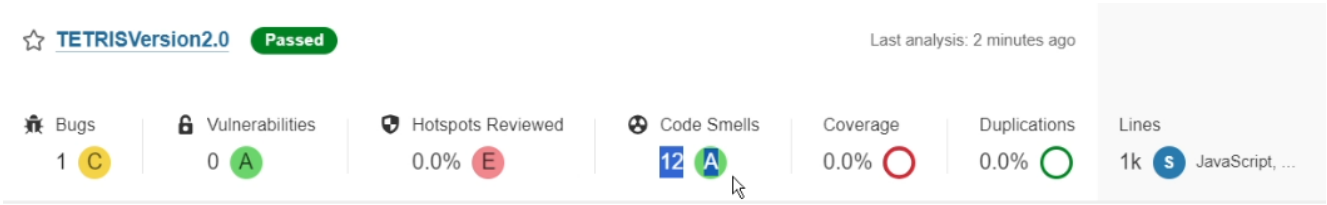


Stage view




To see the report, you can go to Sonarqube Server and go to Projects




You can see the report has been generated and the status shows as passed. You can see that there are 1k lines it scanned. To see a detailed report, you can go to issues.

OWASP, You will see that in status, a graph will also be generated and Vulnerabilities.

## Dependency-Check Results

SEVERITY DISTRIBUTION

15 | 47 | 25

Search

| File Name | Vulnerability | Severity | Weakness |
|---|---|---|---|
| @babel/preset-env:7.12.1 | NVD CVE-2023-45133 | High | CWE-697 |
| ansi-html:0.0.7 | NVD CVE-2021-23424 | High | NVD-CWE-noinfo |
| ansi-regex:4.1.0 | NVD CVE-2021-3807 | High | CWE-1333 |
| ansi-regex:5.0.0 | NVD CVE-2021-3807 | High | CWE-1333 |
| async:2.6.3 | NVD CVE-2021-43138 | High | CWE-1321 |
| browserslist:4.14.2 | NVD CVE-2021-23364 | Medium | CWE-1333 |
| browserslist:4.16.3 | NVD CVE-2021-23364 | Medium | CWE-1333 |
| css-what:3.4.2 | OSSINDEX CVE-2022-21222 | High | CWE-1333 |
| decode-uri-component:0.2.0 | NVD CVE-2022-38778 | Medium | CWE-20 |
| decode-uri-component:0.2.0 | NVD CVE-2022-38900 | High | CWE-20 |

When you log in to Dockerhub, you will see a new image is created

sevenajay / **tetrisv2**

**Description**

This repository does not have a description

**Docker commands**

To push a new tag to this repository:

Public View

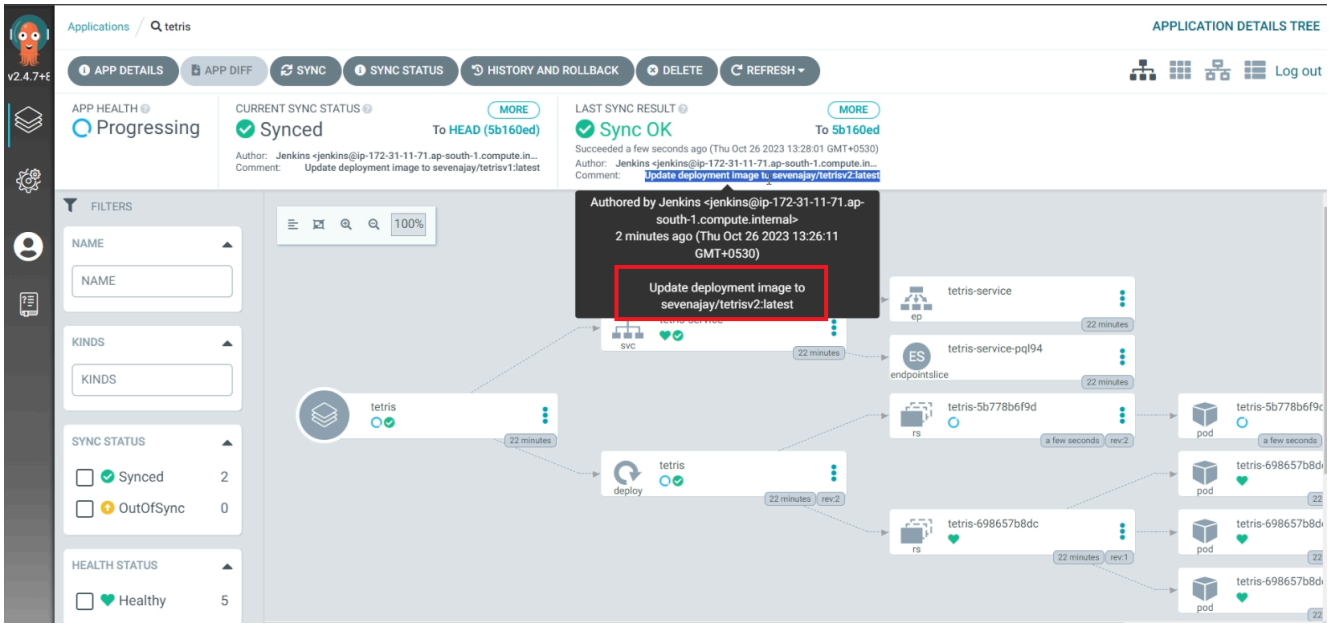
```
docker push sevenajay/tetrisv2:tagname
```

Now if you go to GitHub Tetris manifest image is updated automatically

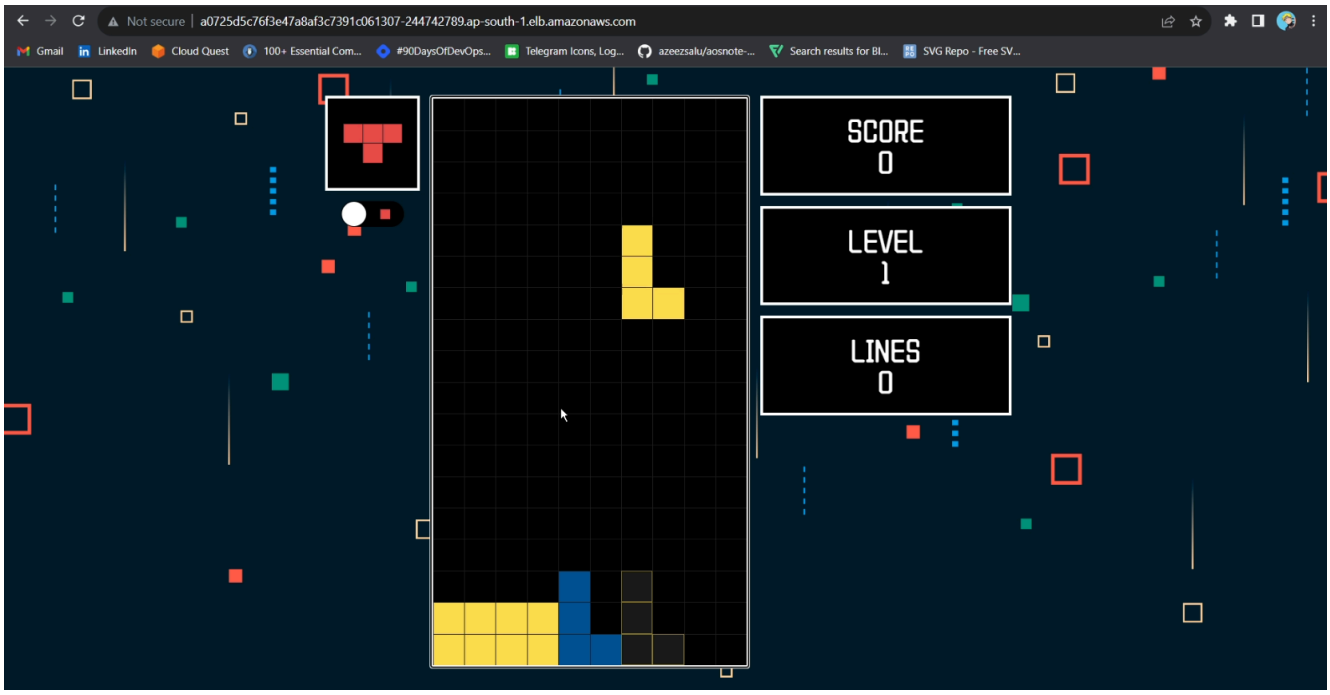
Code Blame 35 lines (33 loc) · 563 Bytes

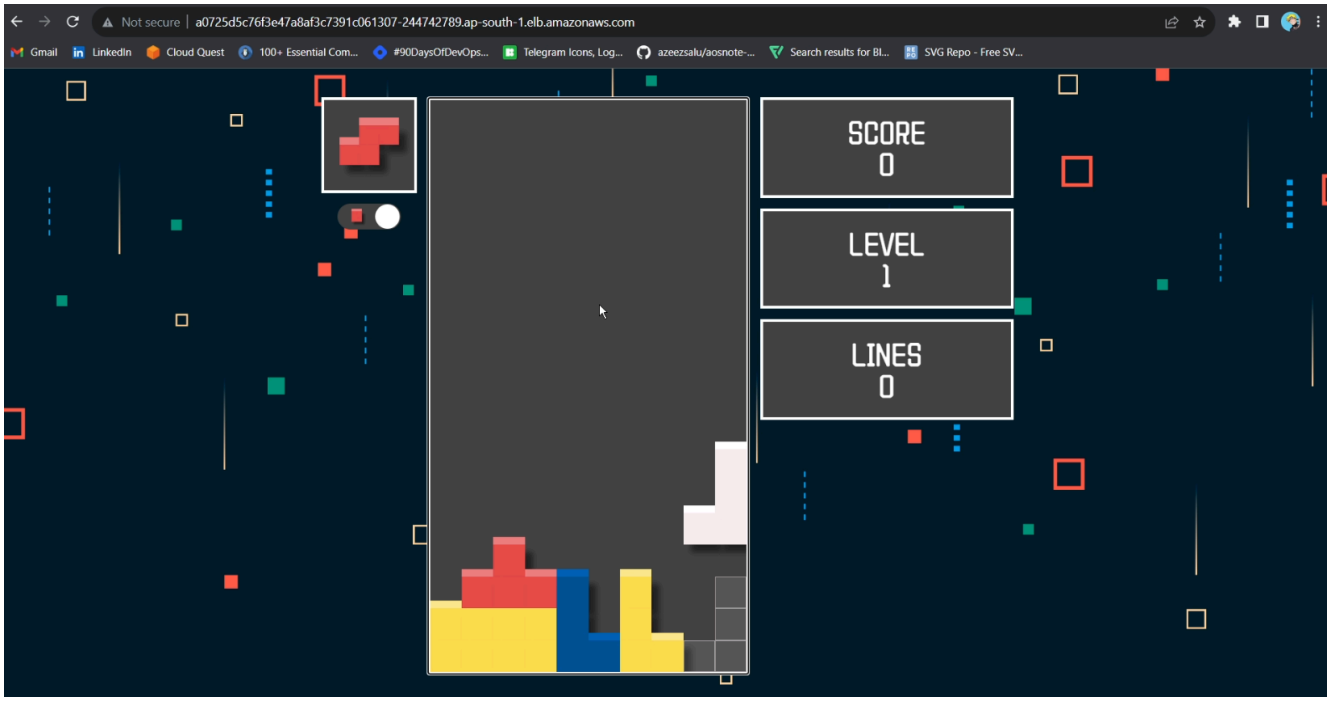
```yaml
---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: tetris
spec:
  replicas: 3
  selector:
    matchLabels:
      app: tetris
  template:
    metadata:
      labels:
        app: tetris
    spec:
      containers:
      - name: tetris
        image: sevenajay/tetrisv2:latest
        ports:
        - containerPort: 3000   # Use port 3000

---
```

If you go to Argo CD Now it will automatically update the image and you can play the version 2 game



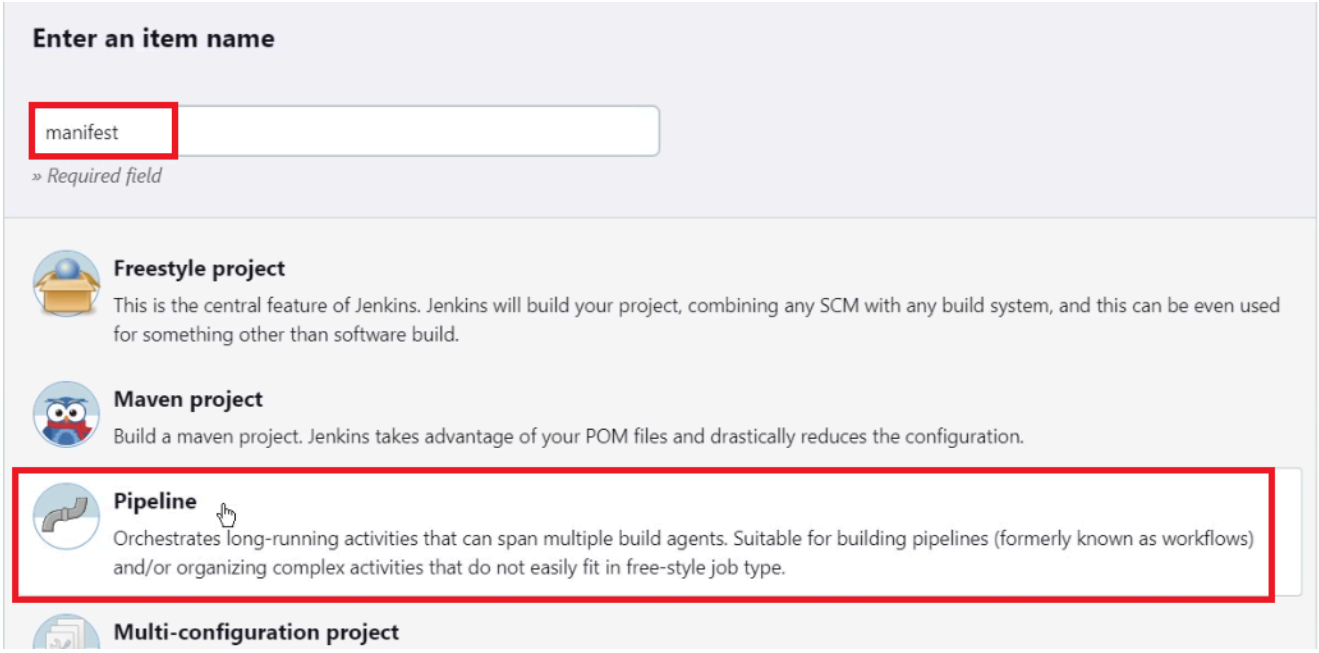

You can play version 2 in the browser now. Just refresh the old link




## YOUTUBE VERSION OF SECOND TETRIS USED TRIGGER JOB

create a job for manifest (I mean image updater)




Add the below pipeline

```
pipeline{
    agent any
    environment {
        GIT_REPO_NAME = "Tetris-manifest"
        GIT_USER_NAME = "Aj7Ay"      # change your Github Username here
    }
    stages {
        stage('Checkout Code') {
            steps {
                git branch: 'main', url: 'https://github.com/Aj7Ay/Tetri
            }
        }
        stage('Update Deployment File') {
            steps {
                script {
                    withCredentials([string(credentialsId: 'github', var
                       NEW_IMAGE_NAME = "sevenajay/tetrisv2:latest"   #u
                       sh "sed -i 's|image: .*|image: $NEW_IMAGE_NAME|'
                       sh 'git add deployment.yml'
                       sh "git commit -m 'Update deployment image to $NI
                       sh "git push https://${GITHUB_TOKEN}@github.com/$
                    }
                }
            }
        }
```

```
        }
    }
```

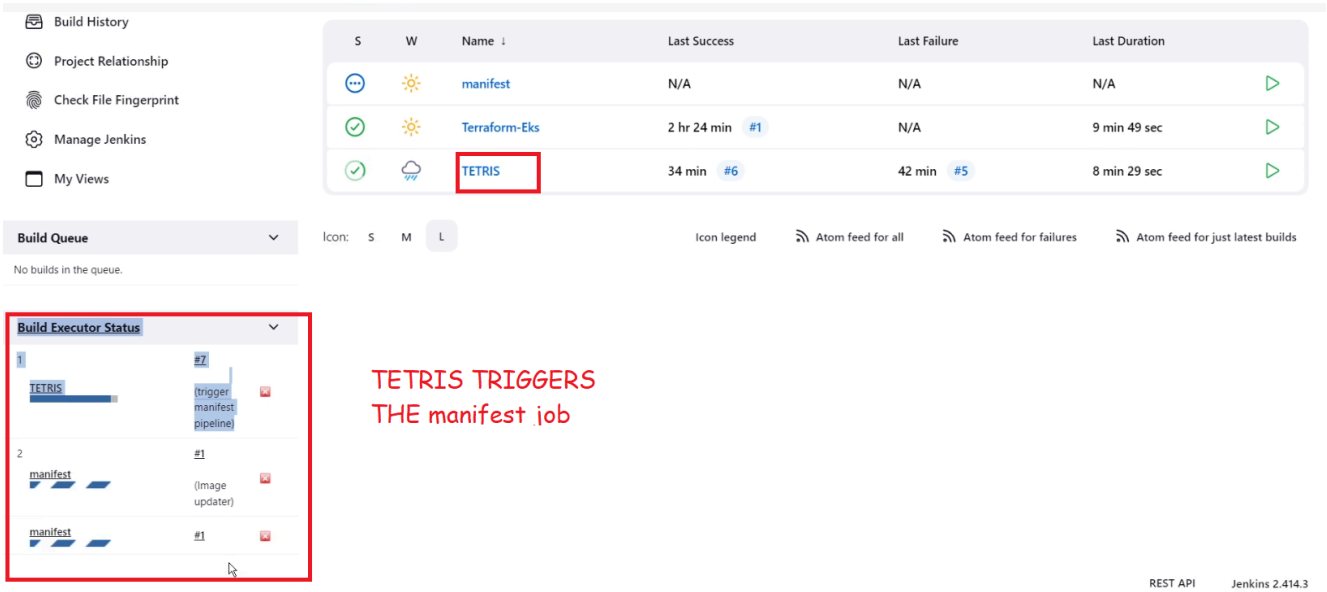
Click on Apply and save

In the Tetris Job Use the below pipeline

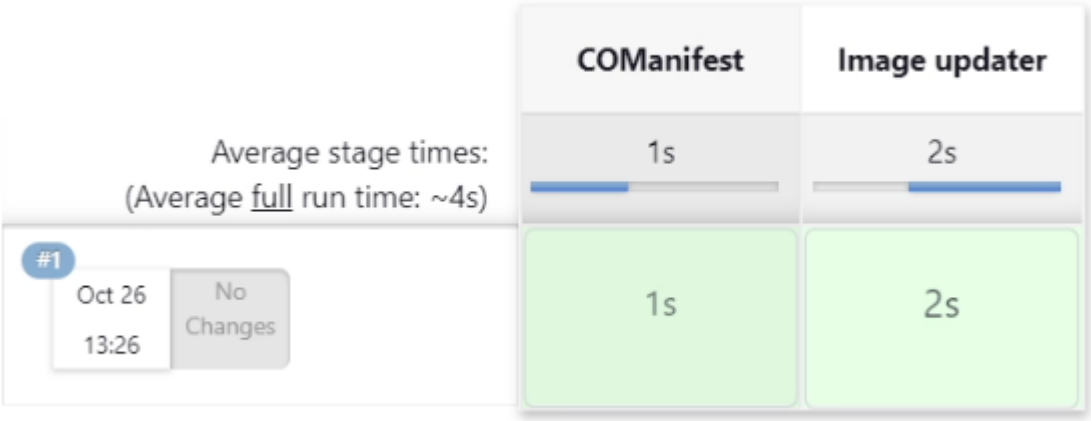
```
pipeline{
    agent any
    tools{
        jdk 'jdk17'
        nodejs 'node16'
    }
    environment {
        SCANNER_HOME=tool 'sonar-scanner'
    }
    stages {
        stage('clean workspace'){
            steps{
                cleanWs()
            }
        }
        stage('Checkout from Git'){
            steps{
                git branch: 'main', url: 'https://github.com/Aj7Ay/Tetri
            }
        }
        stage("Sonarqube Analysis "){
            steps{
                withSonarQubeEnv('sonar-server') {
                    sh ''' $SCANNER_HOME/bin/sonar-scanner -Dsonar.proje
                    -Dsonar.projectKey=TetrisVersion2.0 '''
                }
            }
        }
        stage("quality gate"){
           steps {
                script {
                    waitForQualityGate abortPipeline: false, credentials
```

```
                }
            }
        }
        stage('Install Dependencies') {
            steps {
                sh "npm install"
            }
        }
        stage('OWASP FS SCAN') {
            steps {
                dependencyCheck additionalArguments: '--scan ./ --disab
                dependencyCheckPublisher pattern: '**/dependency-check-r
            }
        }
        stage('TRIVY FS SCAN') {
            steps {
                sh "trivy fs . > trivyfs.txt"
            }
        }
        stage("Docker Build & Push"){
            steps{
                script{
                   withDockerRegistry(credentialsId: 'docker', toolName
                       sh "docker build -t tetrisv2 ."
                       sh "docker tag tetrisv2 sevenajay/tetrisv2:latest
                       sh "docker push sevenajay/tetrisv2:latest "
                    }
                }
            }
        }
        stage("TRIVY"){
            steps{
                sh "trivy image sevenajay/tetrisv2:latest > trivyimage.t
            }
        }
        stage('Trigger manifest') {
            steps {
                build job: 'manifest', wait:true #paste your pipeline na
            }
        }
    }
}
```

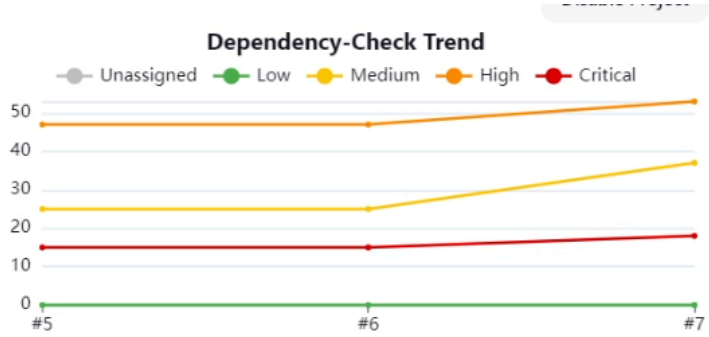
The last stage will trigger the Above manifest job and it will update the deployment file and update the latest image




Manifest stage view




Tetris stage view



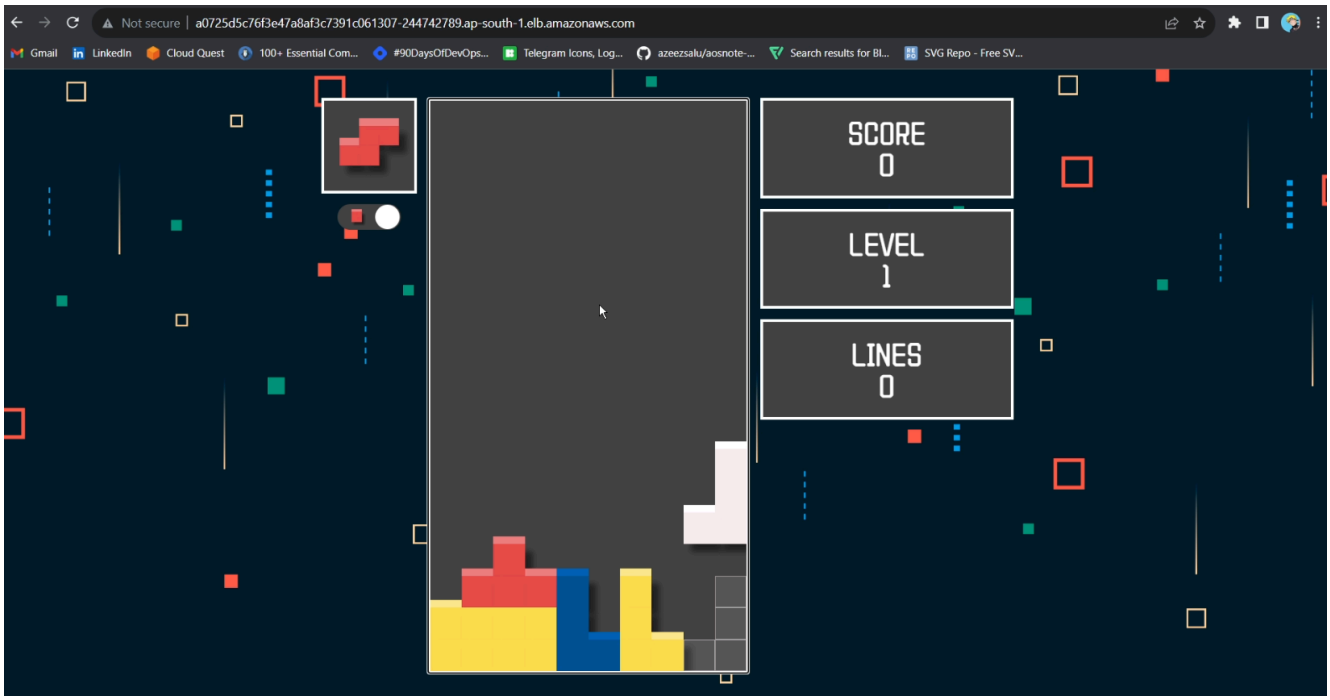

| Declarative: Tool Install | CO | Sonar analysis | QG | NPM | TRIVY FS | OWASP FS SCAN | Docker build and push | TRIVY IMAGE | trigger manifest pipeline |
|---|---|---|---|---|---|---|---|---|---|
| 349ms | 2s | 59s | 604ms | 39s | 24s | 2min 36s | 2min 31s | 2min 38s | 11s |
| 349ms | 2s | 59s | 604ms (paused for 13s) | 39s | 24s | 2min 36s | 2min 31s | 2min 38s | 11s |

## Image updated

Code Blame 35 lines (33 loc) · 563 Bytes

```yaml
---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: tetris
spec:
  replicas: 3
  selector:
    matchLabels:
      app: tetris
  template:
    metadata:
      labels:
        app: tetris
    spec:
      containers:
      - name: tetris
        image: sevenajay/tetrisv2:latest
        ports:
        - containerPort: 3000   # Use port 3000

---
```

## Play Game in the browser

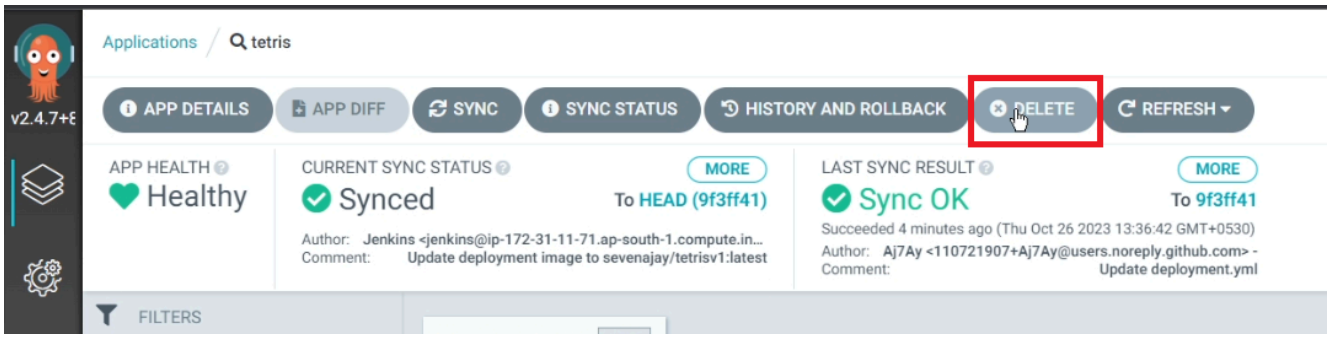



## DESTRUCTION OF RESOURCES

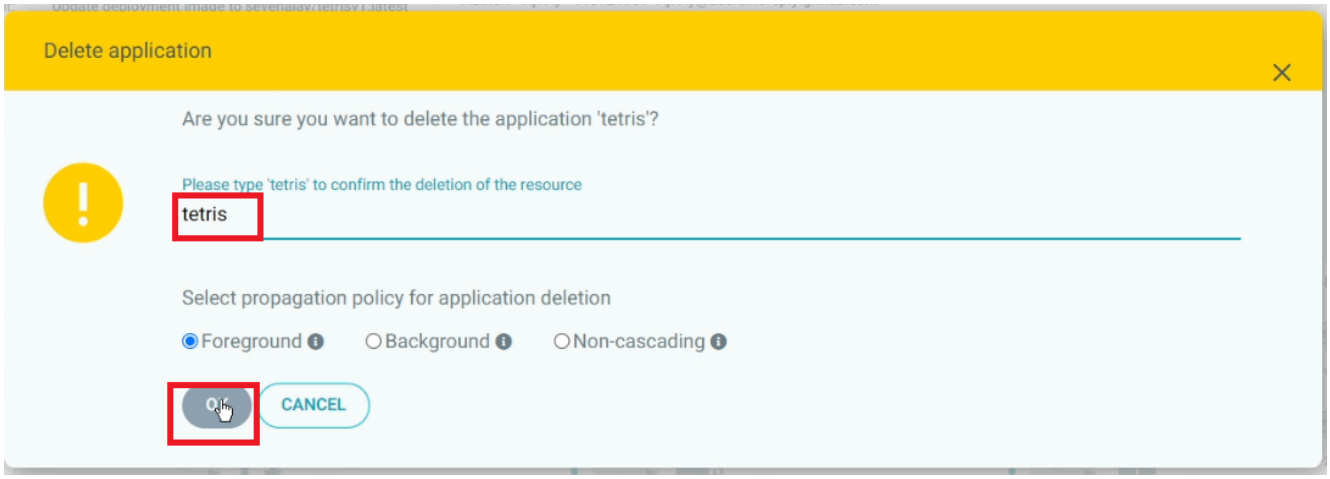
First, delete the app in ARGO CD

Go to Argo CD and click on Tetris App

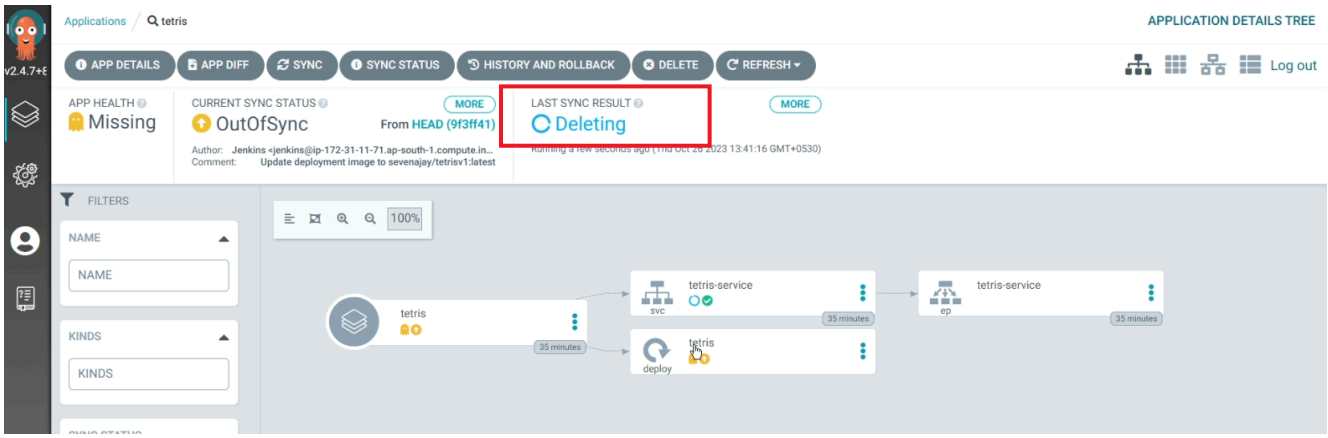
Click on Delete




Now Provide the app name and click on OK

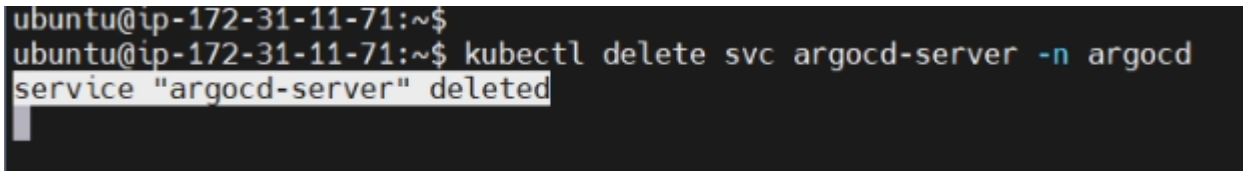



The app is deleted now

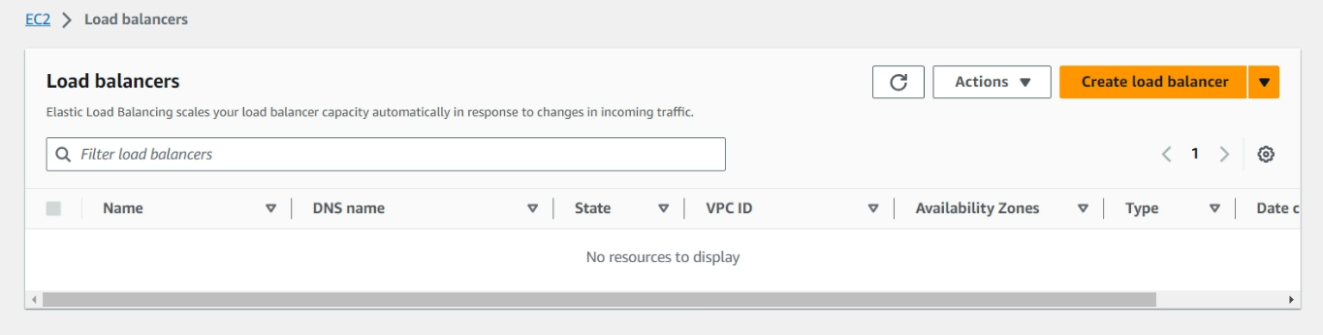



Now go to Putty and Remove Argo CD Service

```
kubectl delete svc argocd-server -n argocd
```



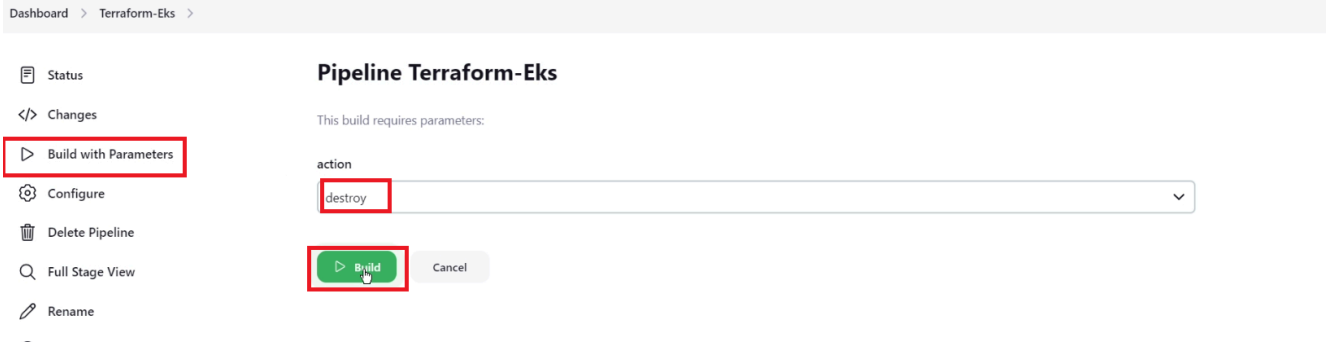

Now you can see in the Aws console that load balancers will be deleted.




Now Go to Jenkins Dashboard and click on Terraform-Eks job

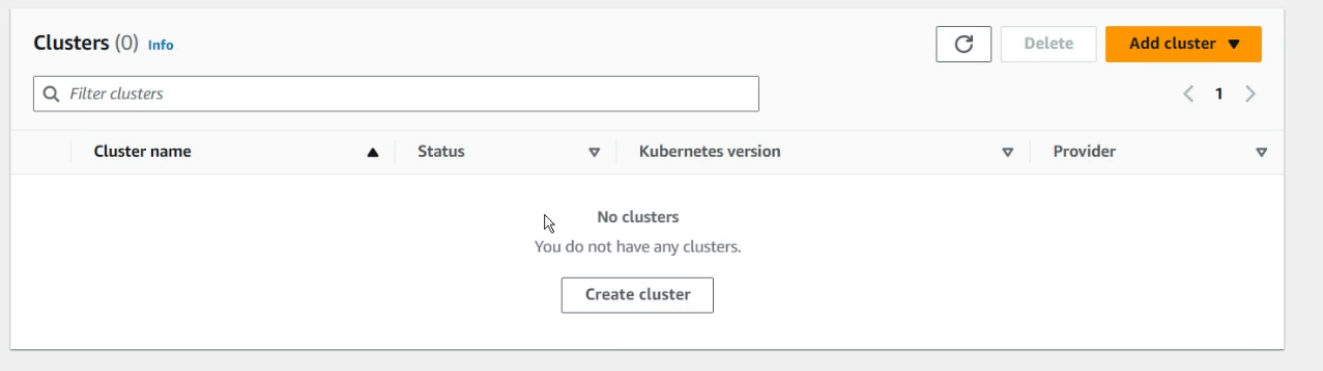
And build with parameters and destroy action

It will delete the EKS cluster that provisioned



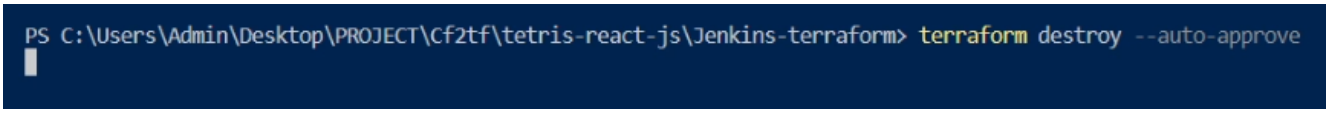

After 10 minutes cluster will delete and wait for it. Don't remove ec2 instance till that time.

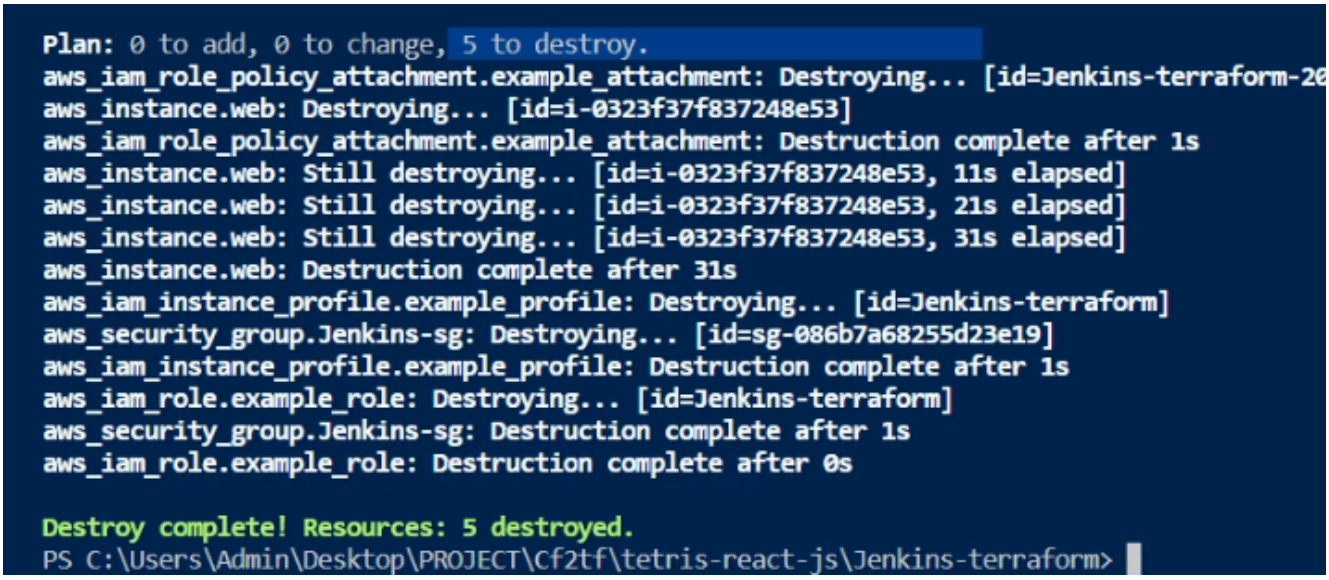

Cluster deleted




Now go to Visual Studio code and delete the Ec2 instance

```
terraform destroy --auto-approve
```




Every resource is deleted.

In this journey through the world of DevSecOps and automated deployments, we've explored the remarkable capabilities of ArgoCD, Terraform, and Jenkins. From the initial infrastructure setup to deploying not one but two versions of the beloved Tetris game, we've witnessed how these tools can work harmoniously to create a streamlined and secure DevOps pipeline.

The power of automation is not just a convenience; it's a necessity in today's fast-paced development landscape. With the right tools and practices, you can save time, reduce errors, and ensure the highest standards of security in your deployments. This blog has been a testament to the incredible possibilities that arise when you combine the art of DevOps with the precision of modern cloud-native technologies.

As you embark on your own DevSecOps journey, we hope the insights shared here inspire you to explore, innovate, and continually strive for excellence in your deployment workflows. Remember that the world of technology is ever-evolving, and your willingness to adapt and embrace automation will be a key driver of your success.

Thank you for joining us on this adventure. If you found this blog valuable, please share it with your fellow tech enthusiasts, and stay tuned for more exciting content. Until next time, happy automating and deploying!


**Ajay Kumar Yegireddi** is a DevSecOps Engineer and System Administrator, with a passion for sharing real-world DevSecOps projects and tasks. **Mr. Cloud Book**, provides hands-on tutorials and practical insights to help others master DevSecOps tools and workflows. Content is designed to bridge the gap between development, security, and operations, making complex concepts easy to understand for both beginners and professionals.

# Comments

## 6 responses to "Automating Tetris Deployments: DevSecOps with ArgoCD, Terraform, and Jenkins for Two Game Versions"

**Jay**
10 January 2024

I would like to know the entire AWS monthly cost roughly for this devsecops automation?

Reply

**mrcloudbook.com**
10 January 2024

For all projects or for one project

Reply

**Hamza**
18 March 2024

for this one project

Reply

**Abhinandan Vishwakarma**
22 January 2024

keep doing sir it's Helping a more and more students which one is not affordable to pay DevOps Engineer Course Fees thank u so much for your this contribution.

Reply

**mrcloudbook.com**
23 January 2024

Definitely

Reply

**Saketh**
20 March 2024

HELLO MRcloudbook , I have created jenkins-server instance , and then using above steps YOU mentioned I created a terraform pipeline to create the EKS-cluster , when I ran the pipeline it destroyed my jenkins instance. so then in vs code I done the terraform plan of Eks cluster , it showed .. {Plan: 8 to add, 0 to change, 5 to destroy }.

Reply

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