CAPESTONE PROJECT REPORT

Submitted By:

Cyril Doss I

Overview

In this project we are deploying a react application. First, we are cloning the application. Then we write the Docker and docker compose files. The build and deploy shell scripts are written, build.sh is used to build and push the docker image to the respective docker hub repository and deploy.sh file would pull the docker images from the respective docker hub according to the commit history.

Through Jenkins we automate the CI/CD pipeline using GitHub webhook, Jenkins would automatically build according to the recent commit history.

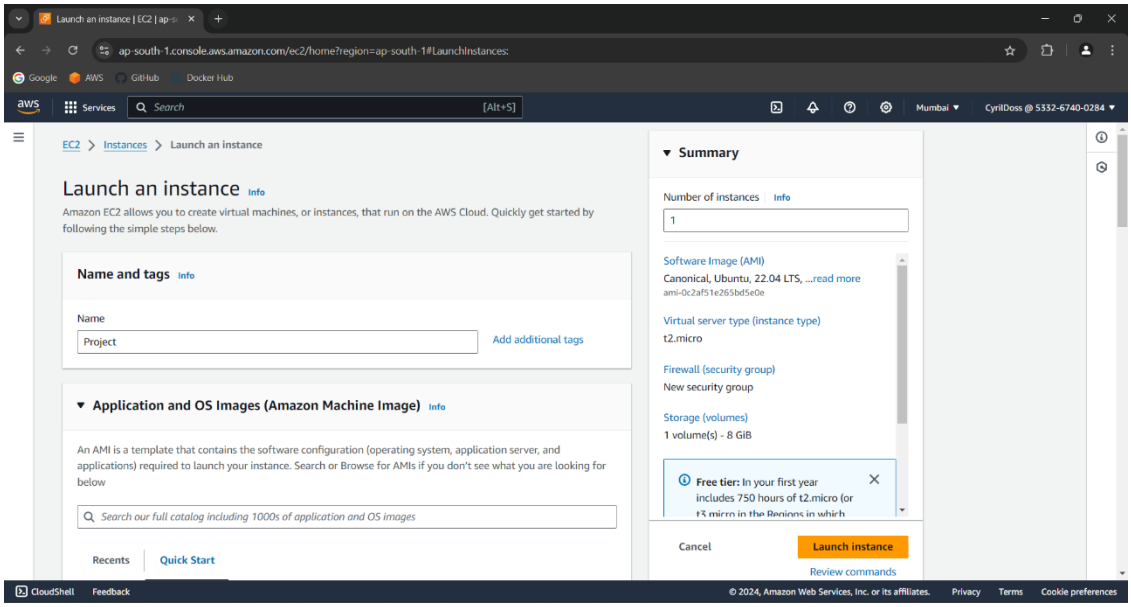
The security group of the project is configured such a way that only the application could be viewed by anyone with the IP-address, other services and login to the machine could be done only with my Ip-address.

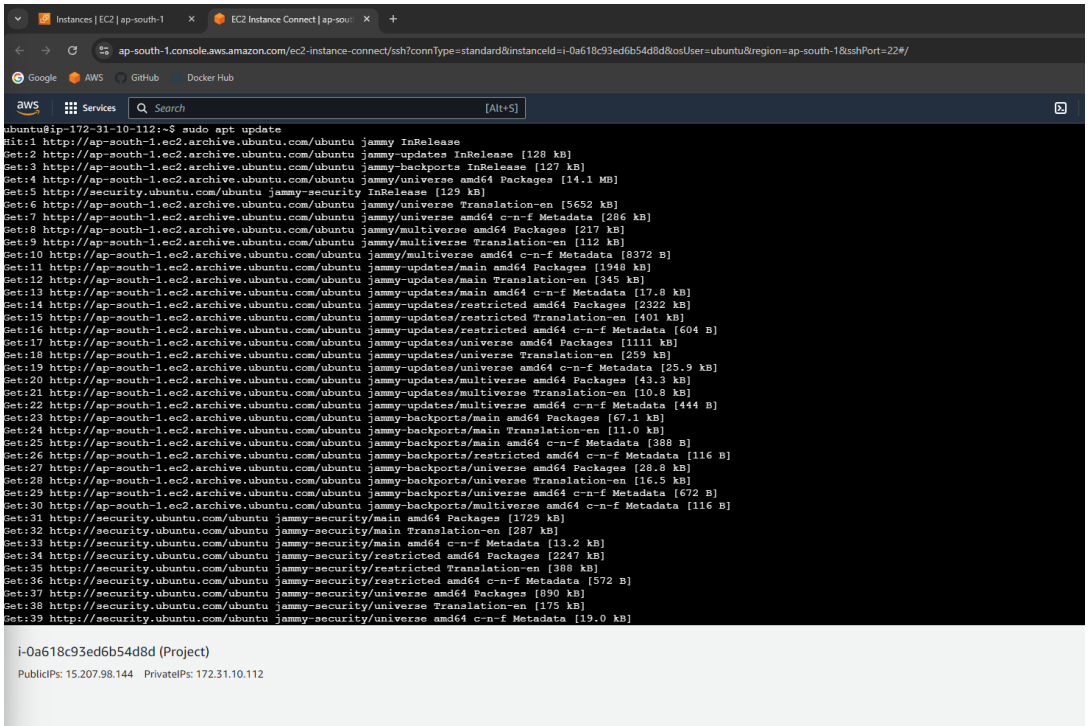
Deployed Ip-Address: http://15.207.98.144:80

GitHub Url: https://github.com/cyril-doss14/Capstone-Project.git

INDEX

1. Installing all the necessary services in the Ec2 machine





```
aws  Services  Search  [Alt+S]
ubuntu@ip-172-31-10-112:~$ sudo apt install docker.io -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  bridge-utils containerd dns-root-data dnsmasq-base pigz runc ubuntu-fan
Suggested packages:
  ifupdown aufs-tools cgroupfs-mount | cgroup-lite debootstrap docker-doc rinse zfs-fuse | zfsutils
The following NEW packages will be installed:
  bridge-utils containerd dns-root-data dnsmasq-base docker.io pigz runc ubuntu-fan
0 upgraded, 8 newly installed, 0 to remove and 34 not upgraded.
Need to get 75.5 MB of archives.
After this operation, 284 MB of additional disk space will be used.
Get:1 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy/universe amd64 pigz amd64 2.6-1 [63.6 kB]
Get:2 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy/main amd64 bridge-utils amd64 1.7-1ubuntu3 [
Get:3 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 runc amd64 1.1.12-0ubuntu2
Get:4 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 containerd amd64 1.7.12-0u
Get:5 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 dns-root-data all 2023112
Get:6 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 dnsmasq-base amd64 2.90-0u
Get:7 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 docker.io amd64 24.0.7
Get:8 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy/universe amd64 ubuntu-fan all 0.12.16 [35.2 k
Fetched 75.5 MB in 1s (72.2 MB/s)
Preconfiguring packages ...
Selecting previously unselected package pigz.
(Reading database ... 65320 files and directories currently installed.)
Preparing to unpack .../0-pigz_2.6-1_amd64.deb ...
```

```
No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-10-112:~$ sudo apt install openjdk-17-jdk -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  adwaita-icon-theme alsa-topology-conf alsa-ucm-conf at-spi2-core ca-certificates-java dconf-gsettin
  gsettings-desktop-schemas gtk-update-icon-cache hicolor-icon-theme humanity-icon-theme java-common
  libatk1.0-data libatspi2.0-0 libavahi-client3 libavahi-common-data libavahi-common3 libcairo-gobjec
  libdrm-radeon1 libfontconfig1 libfontenc1 libgail-common libgail18 libgdk-pixbuf-2.0-0 libgdk-pixbu
  libglvnd0 libglx-mesa0 libglx0 libgraphite2-3 libgtk2.0-0 libgtk2.0-bin libgtk2.0-common libharfbuz
  libpangocairo-1.0-0 libpangoft2-1.0-0 libpciaccess0 libpcsclite1 libpixman-1-0 libpthread-stubs0-de
  libtiff5 libwebp7 libx11-dev libx11-xcb1 libxau-dev libxaw7 libxcb-dri2-0 libxcb-dri3-0 libxcb-glx0
  libxcb1-dev libxcomposite1 libxcursor1 libxdamage1 libxdmcp-dev libxfixes3 libxft2 libxi6 libxinera
  libxxf86dga1 libxxf86vm1 openjdk-17-jdk-headless openjdk-17-jre openjdk-17-jre-headless session-mig
Suggested packages:
  default-jre libasound2-plugins alsa-utils cups-common gvfs libice-doc liblcms2-utils pcscd librsvg2
  libnss-mdns fonts-ipafont-gothic fonts-ipafont-mincho fonts-wqy-microhei | fonts-wqy-zenhei fonts-i
```

i-0a618c93ed6b54d8d (Project)

PublicIPs: 15.207.98.144 PrivateIPs: 172.31.10.112

```
ubuntu@ip-172-31-10-112:~$ sudo wget -O /usr/share/keyrings/jenkins-keyring.asc \
  https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key
echo "deb [signed-by=/usr/share/keyrings/jenkins-keyring.asc]" \
  https://pkg.jenkins.io/debian-stable binary/ | sudo tee \
  /etc/apt/sources.list.d/jenkins.list > /dev/null
sudo apt-get update
sudo apt-get install jenkins
--2024-08-18 07:00:11--  https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key
Resolving pkg.jenkins.io (pkg.jenkins.io)... 151.101.154.133, 2a04:4e42:24::645
Connecting to pkg.jenkins.io (pkg.jenkins.io)|151.101.154.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 3175 (3.1K) [application/pgp-keys]
Saving to: '/usr/share/keyrings/jenkins-keyring.asc'

/usr/share/keyrings/jenkins-keyring.asc            100%[=============================================
```

i-0a618c93ed6b54d8d (Project)

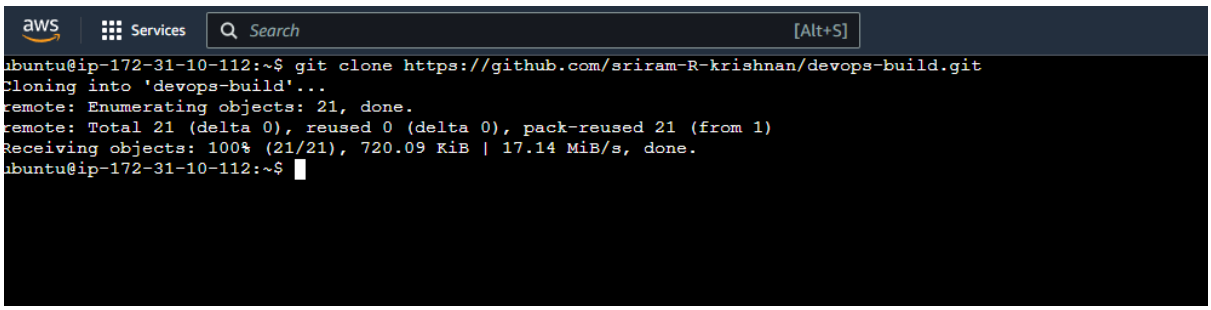
PublicIPs: 15.207.98.144 PrivateIPs: 172.31.10.112

```
ubuntu@ip-172-31-10-112:~$ sudo usermod -aG docker jenkins
ubuntu@ip-172-31-10-112:~$ sudo usermod -aG docker ubuntu
ubuntu@ip-172-31-10-112:~$ sudo systemctl restart jenkins
ubuntu@ip-172-31-10-112:~$
```

i-0a618c93ed6b54d8d (Project)

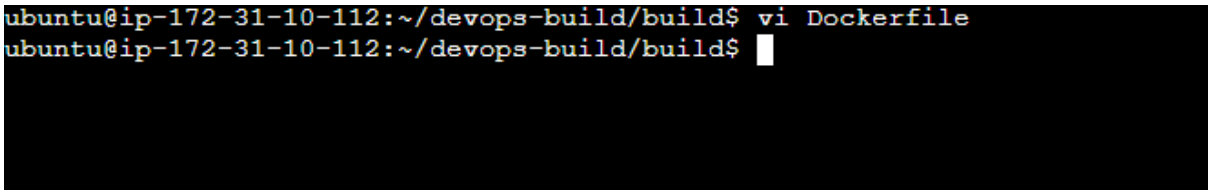
PublicIPs: 15.207.98.144 PrivateIPs: 172.31.10.112

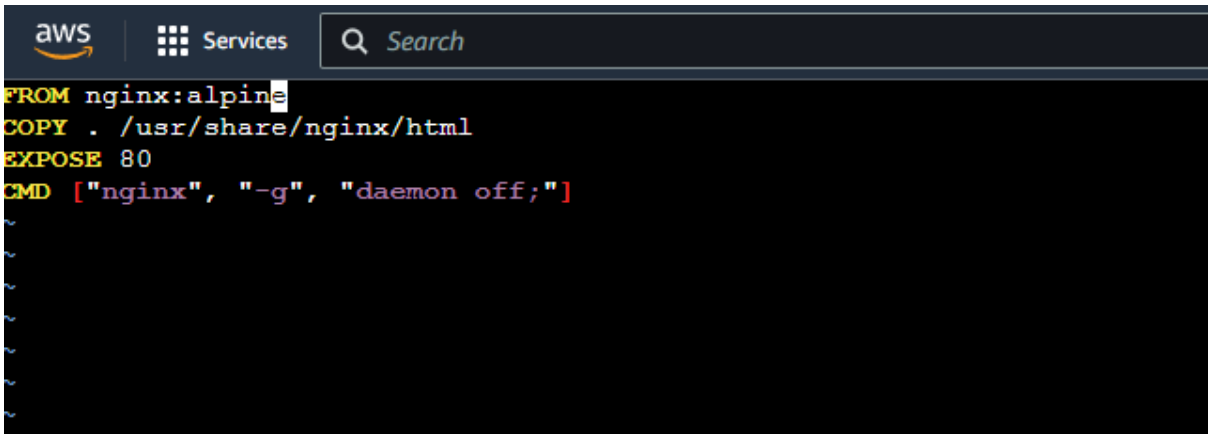
2. Cloning git repo



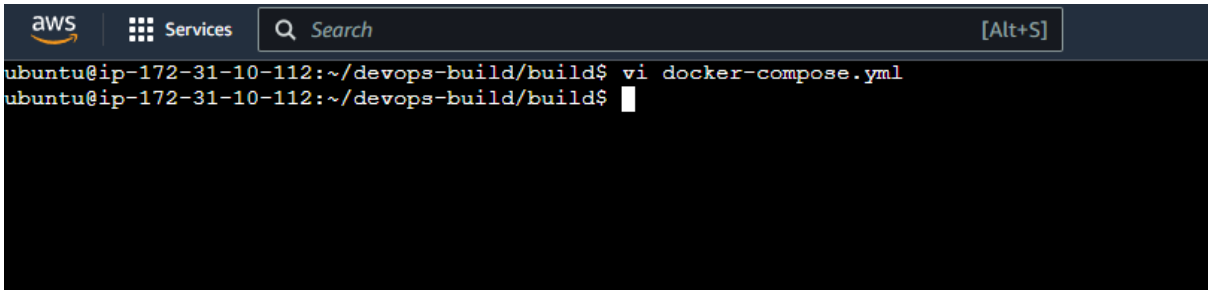
3. Dockerfile and docker-compose.yml files

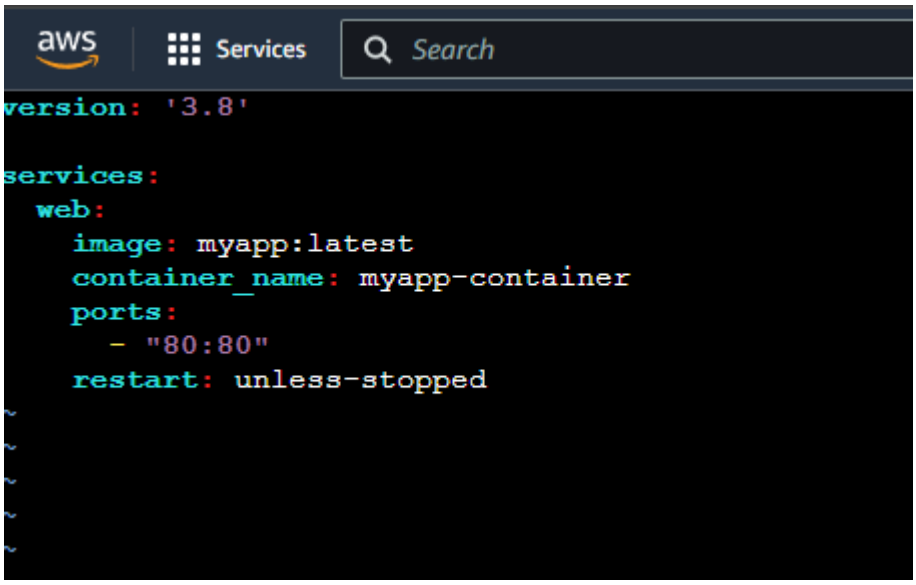
Dockerfile:





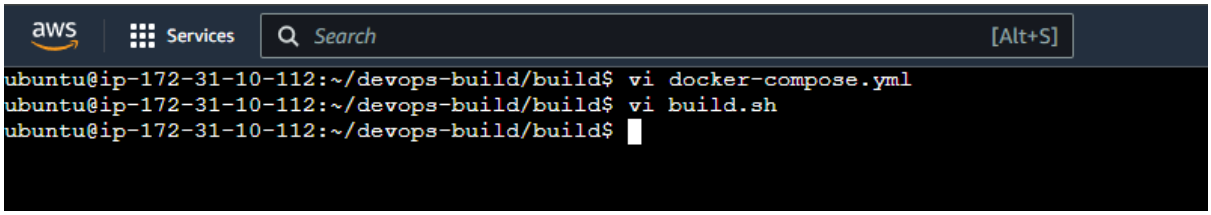
docker-compose.yml

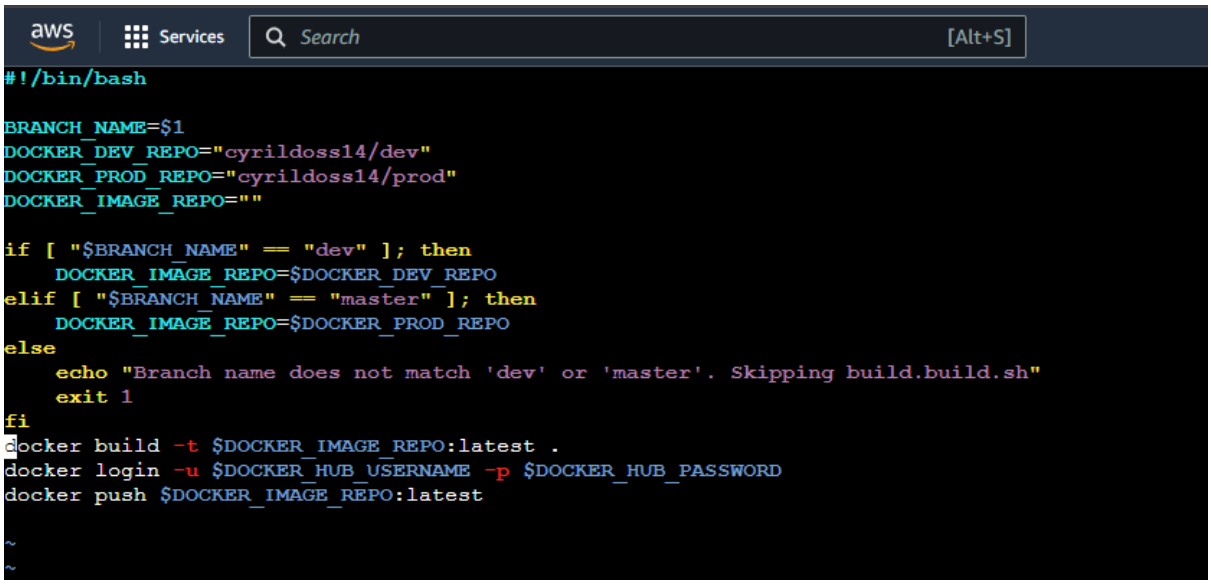




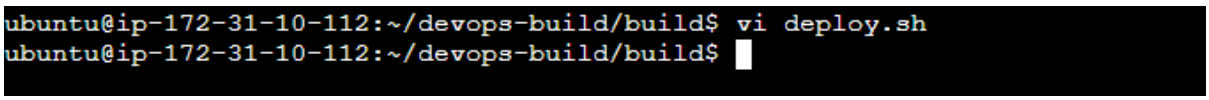
4. Writing shell scripts

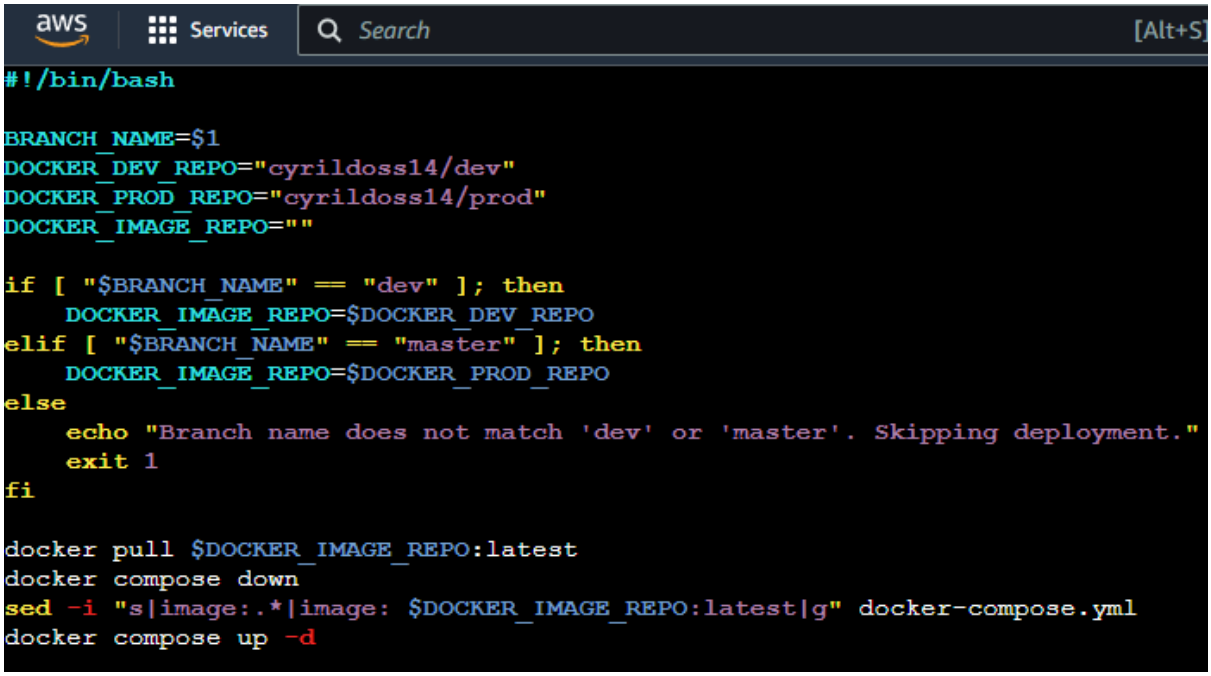
Build.sh:



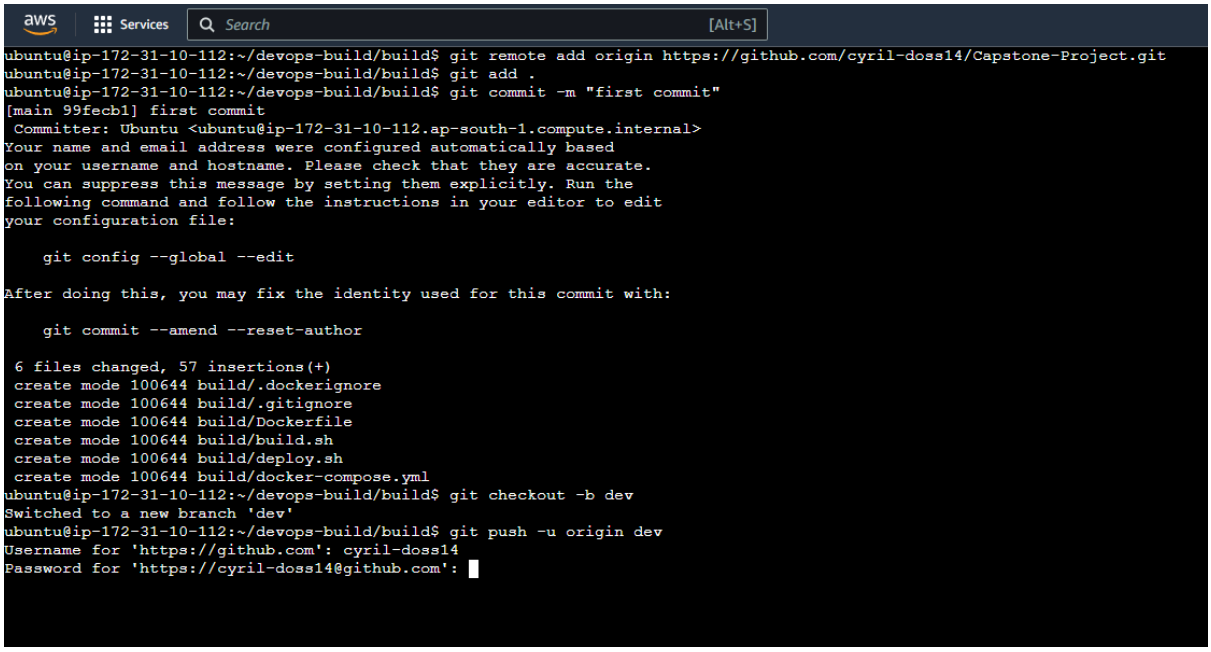


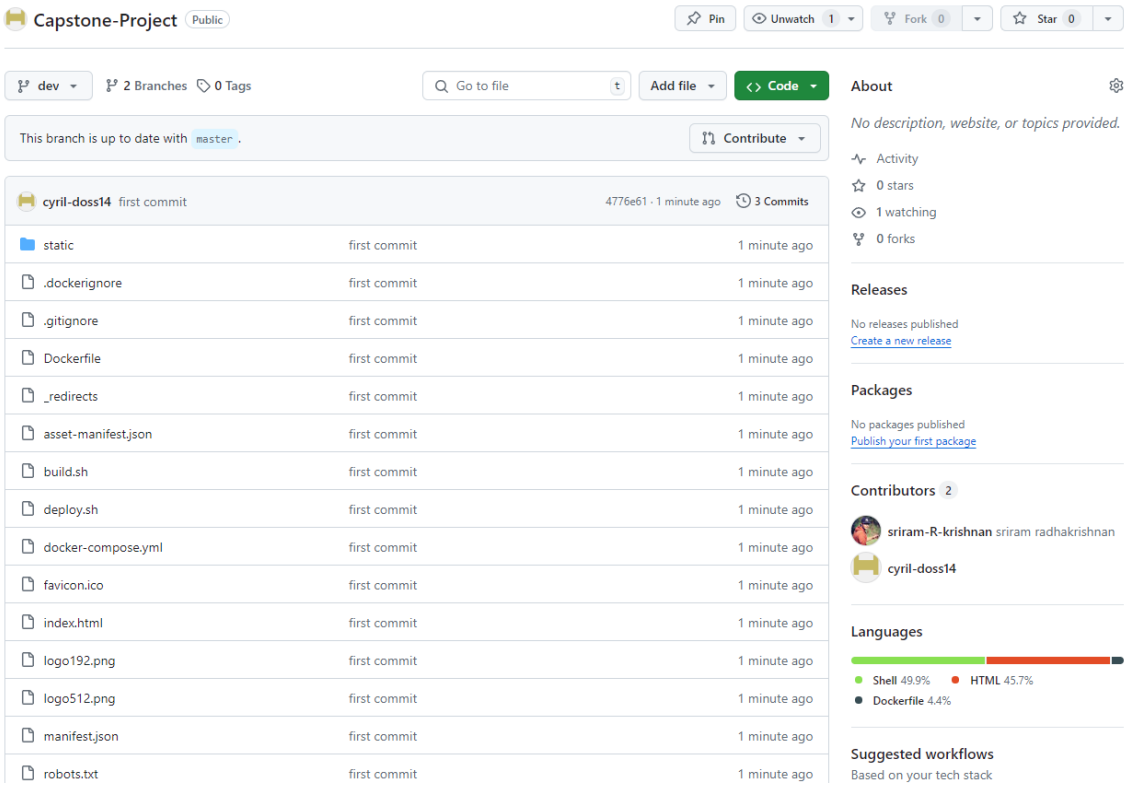
Deploy.sh





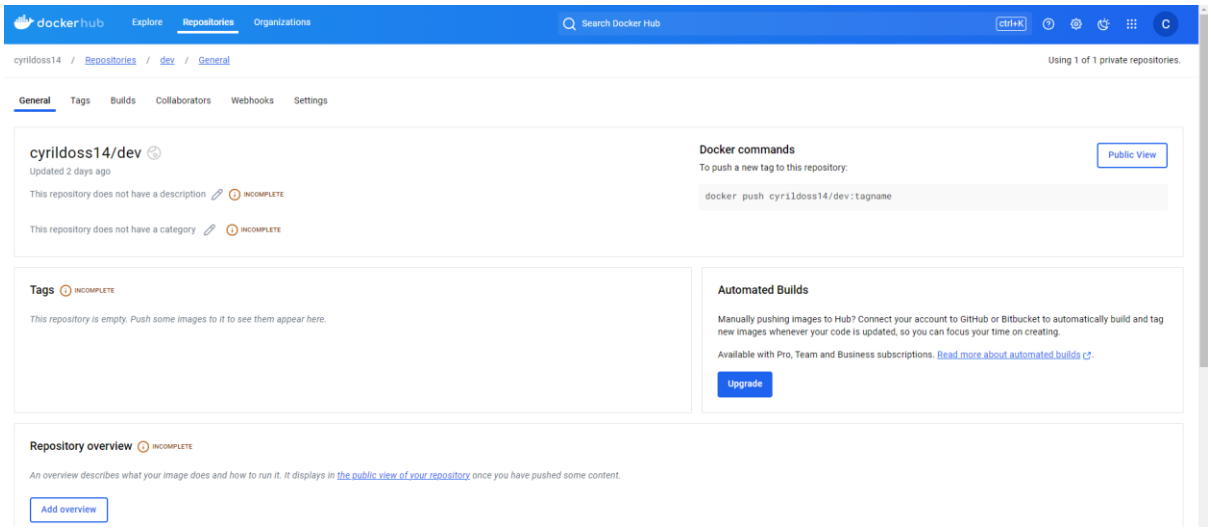
Pushing the files to GitHub



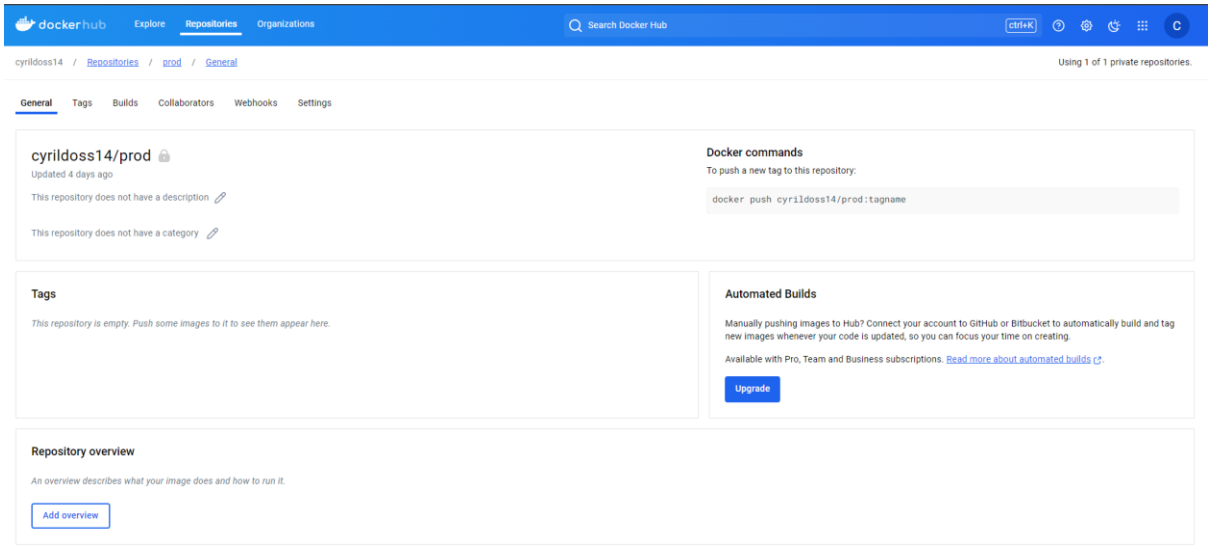


5. Docker hub Repo creation

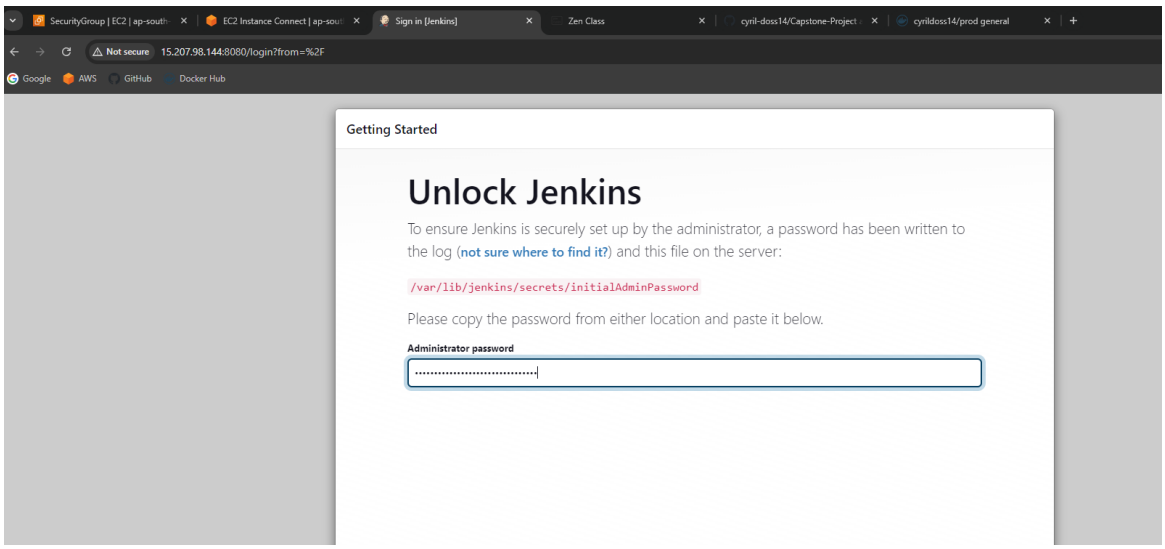
Creating dev(public) repo:

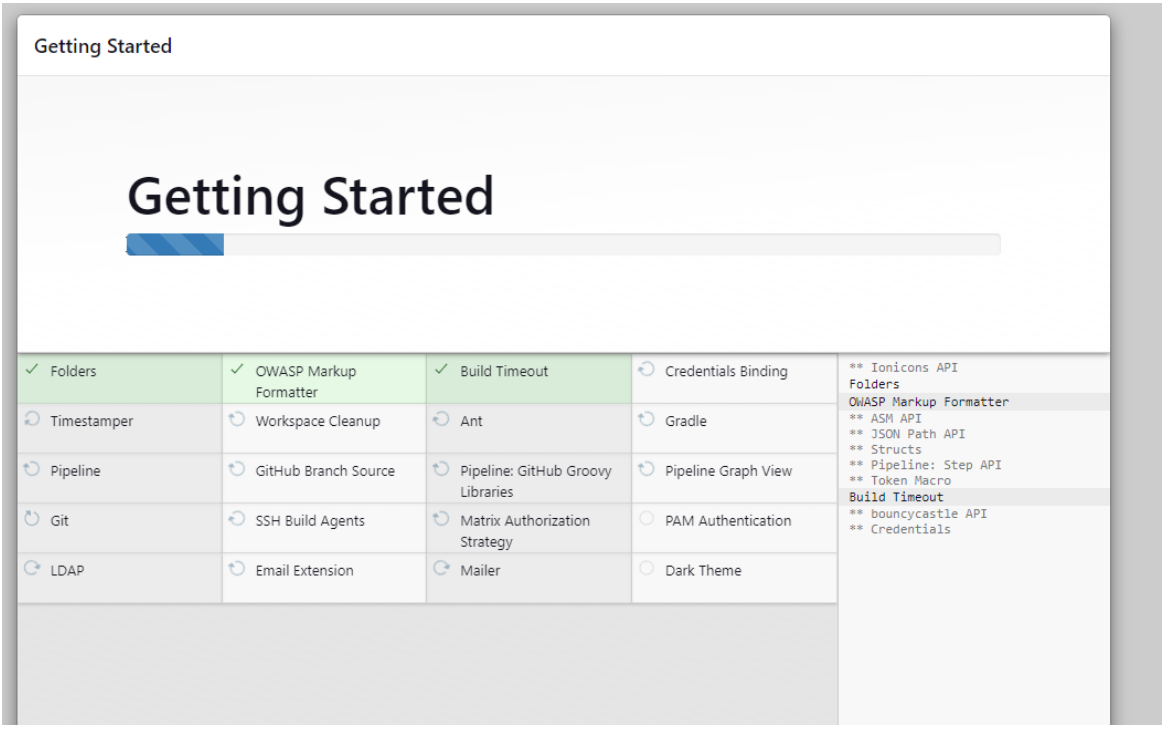


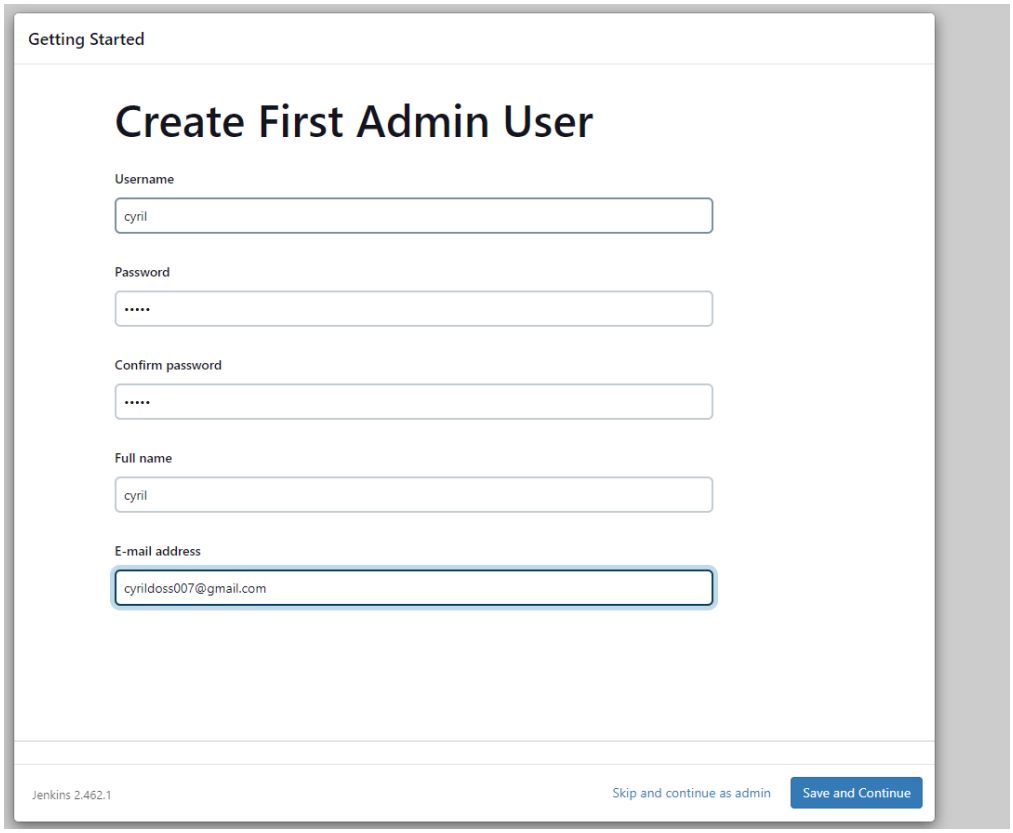
Creating prod(private) repo:

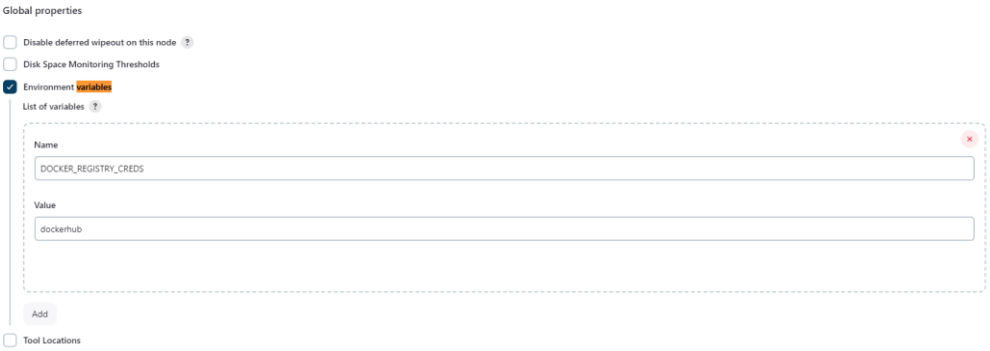


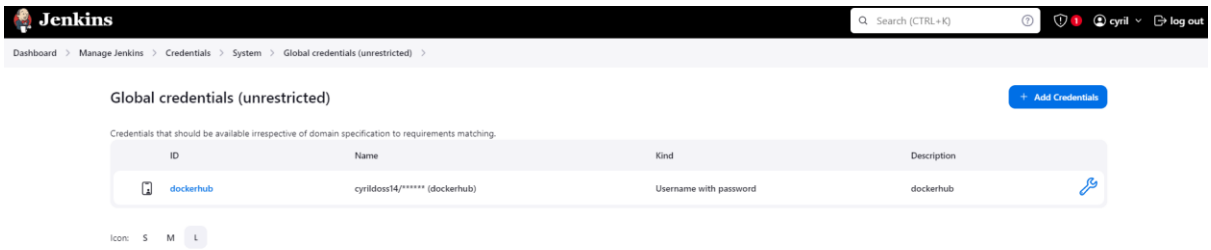
6. Configuring Jenkins

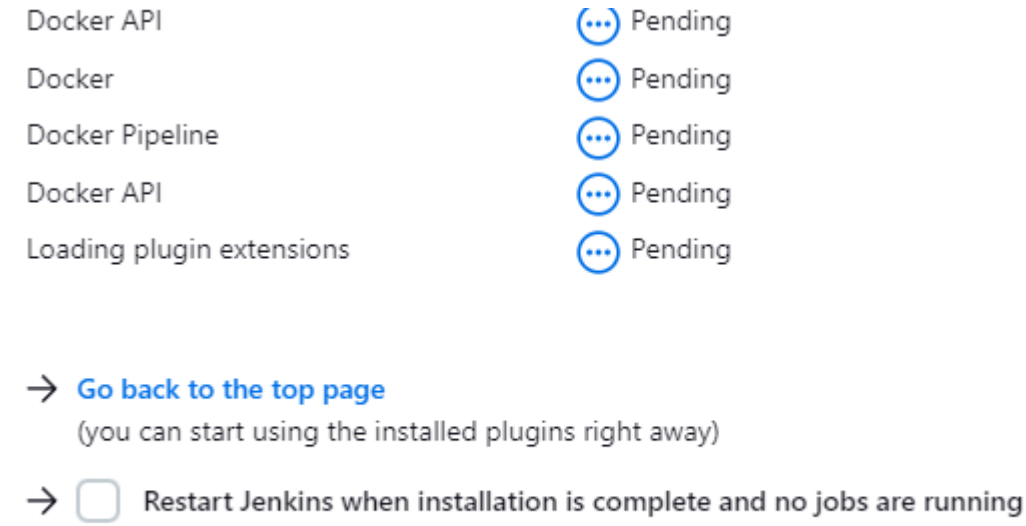




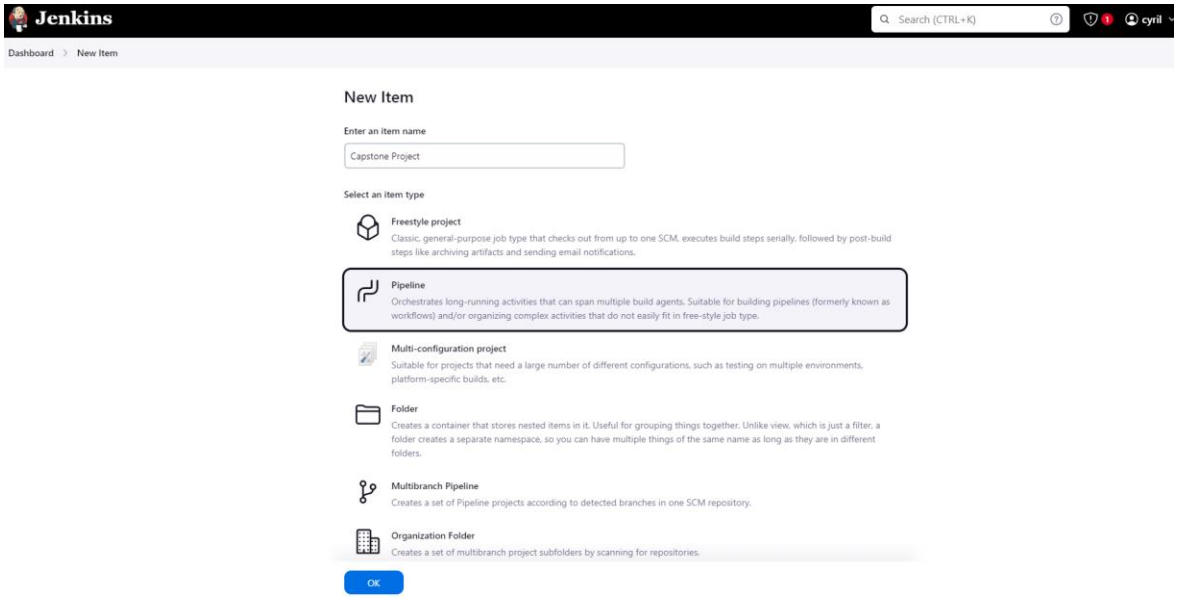

Getting Started
Create First Admin User
Username
cyril
Password
Confirm password
Full name
cyril
E-mail address
cyrildoss007@gmail.com
Jenkins 2.462.1
Skip and continue as admin
Save and Continue

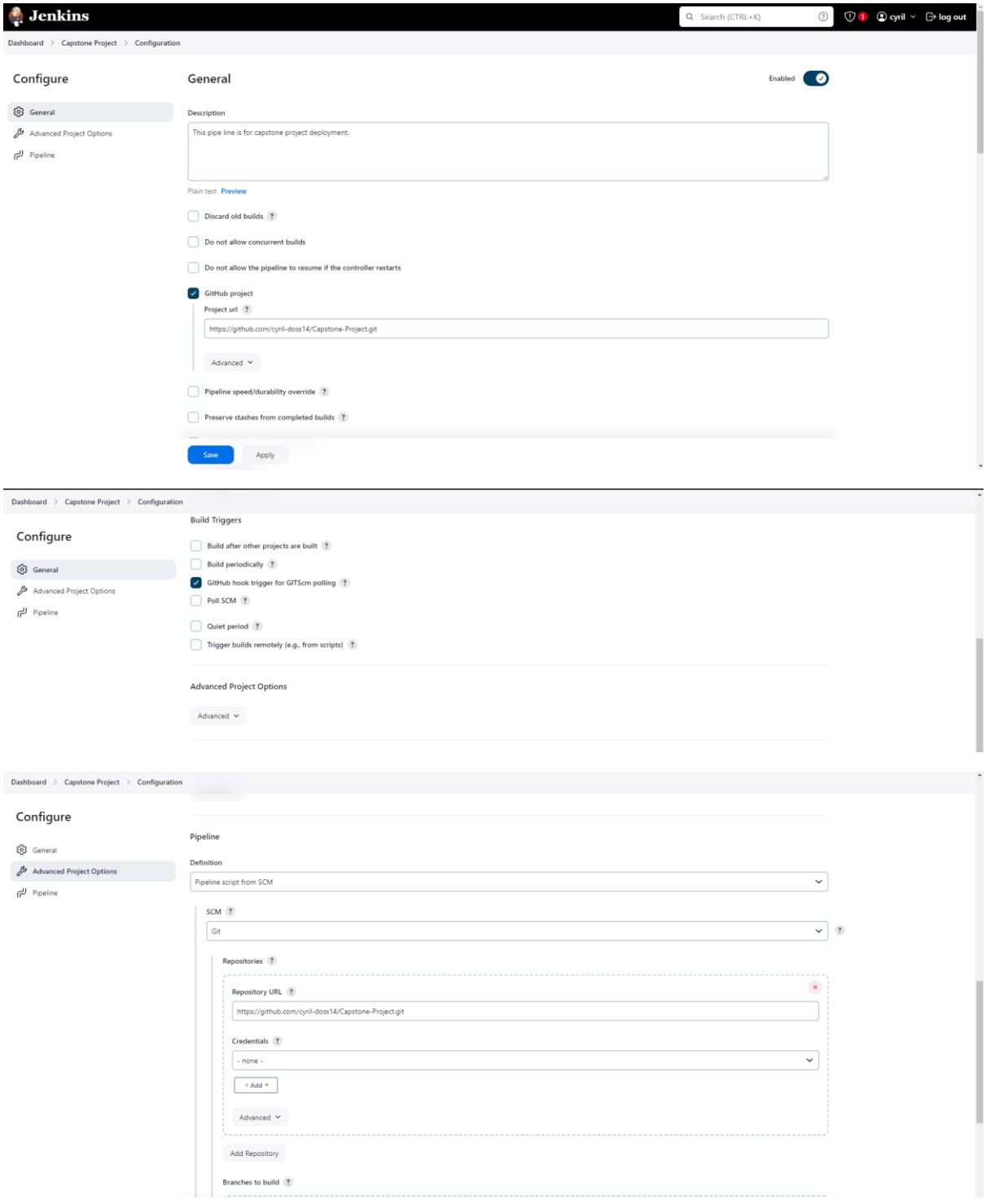

Global properties
Disable deferred wipeout on this node
Disk Space Monitoring Thresholds
Environment variables
List of variables
Name
DOCKER_REGISTRY_CREDS
Value
dockerhub
Add
Tool Locations


Jenkins
Search (CTRL+K)
cyril
log out
Dashboard
Manage Jenkins
Credentials
System
Global credentials (unrestricted)
Global credentials (unrestricted)
Add Credentials
Credentials that should be available irrespective of domain specification to requirements matching.
ID
Name
Kind
Description
dockerhub
cyrildoss14/****** (dockerhub)
Username with password
dockerhub
Icon: S M L



Creating new job in Jenkins:




Jenkins
Search (CTRL+K)
cyril
log out
Dashboard > Capstone Project > Configuration
Configure
General
Advanced Project Options
Pipeline
General
Enabled
Description
This pipe line is for capstone project deployment.
Plain text Preview
Discard old builds
Do not allow concurrent builds
Do not allow the pipeline to resume if the controller restarts
GitHub project
Project url
https://github.com/cyril-doss14/Capstone-Project.git
Advanced
Pipeline speed/durability override
Preserve stashes from completed builds
Save
Apply
Dashboard > Capstone Project > Configuration
Configure
General
Advanced Project Options
Pipeline
Build Triggers
Build after other projects are built
Build periodically
GitHub hook trigger for GITScm polling
Poll SCM
Quiet period
Trigger builds remotely (e.g., from scripts)
Advanced Project Options
Advanced
Dashboard > Capstone Project > Configuration
Configure
General
Advanced Project Options
Pipeline
Pipeline
Definition
Pipeline script from SCM
SCM
Git
Repositories
Repository URL
https://github.com/cyril-doss14/Capstone-Project.git
Credentials
- none -
+ Add
Advanced
Add Repository
Branches to build

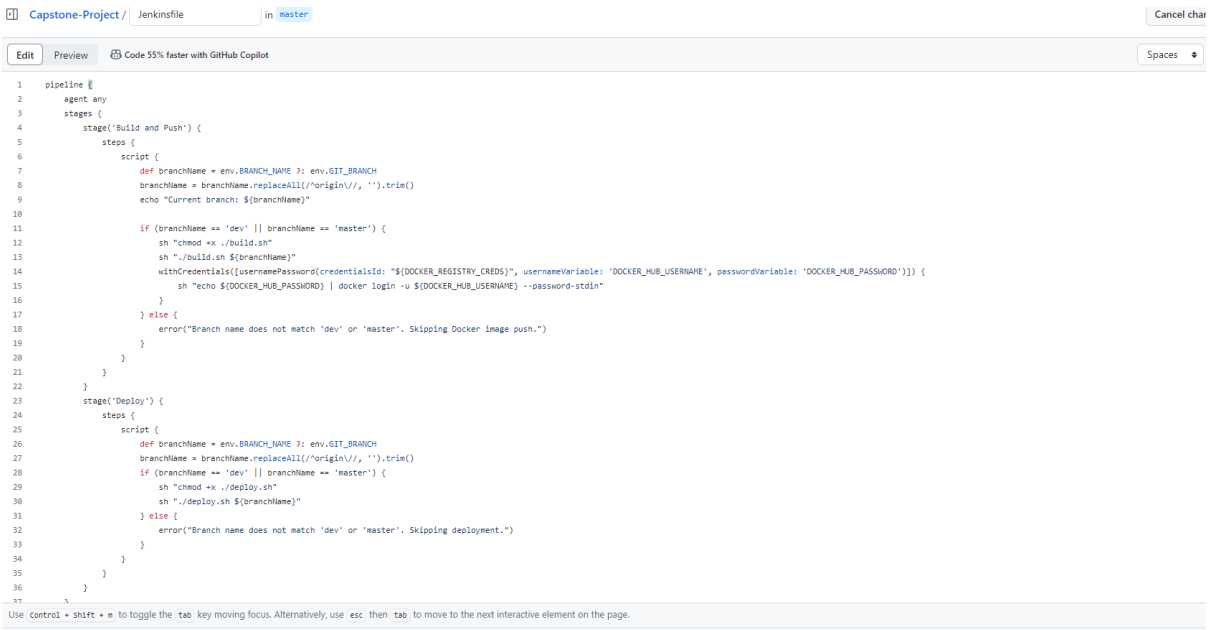
Writing Jenkins file and storing it in git:

Script ?

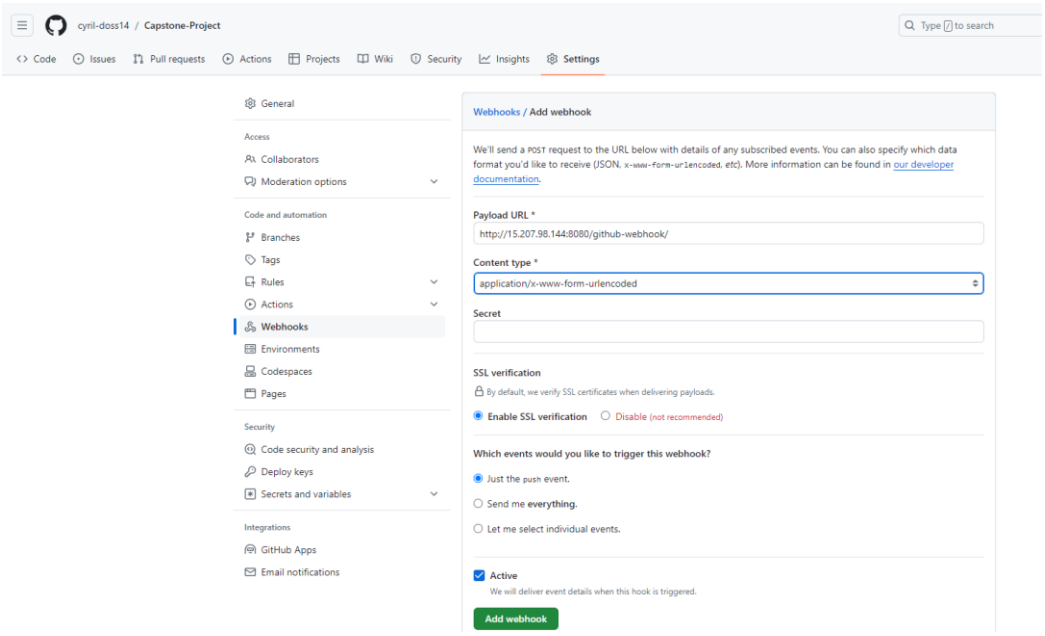
try sample Pipeline...

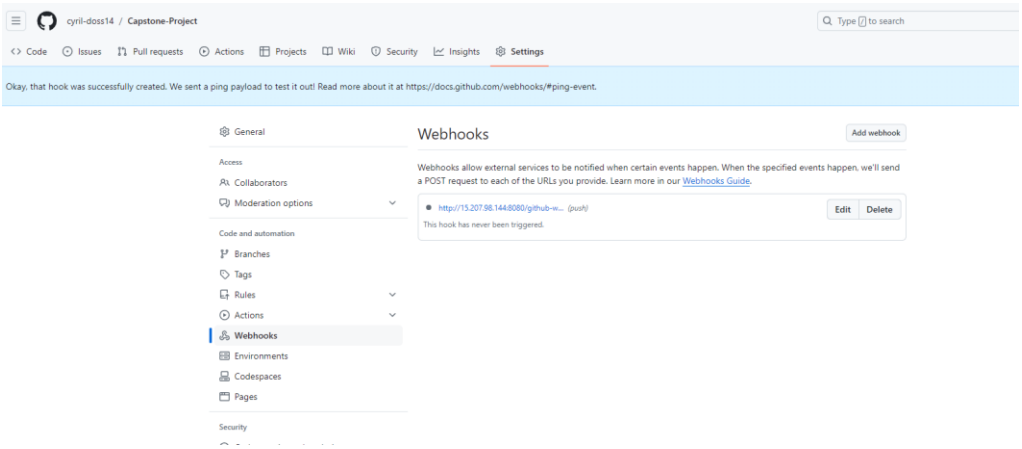
```
pipeline {
    agent any
    stages {
        stage('Build and Push') {
            steps {
                script {
                    def branchName = env.BRANCH_NAME ?: env.GIT_BRANCH
                    branchName = branchName.replaceAll(/^origin\//, '').trim()
                    echo "Current branch: ${branchName}"

                    if (branchName == 'dev' || branchName == 'master') {
                        sh "chmod +x ./build.sh"
                        sh "./build.sh ${branchName}"
                        withCredentials([usernamePassword(credentialsId: "${DOCKER_REGISTRY_CREDS}", usernameVariable: 'DOCKER_HUB_USERNAME', passwordVariable: 'DOCKER_HUB_PASSW
                            sh "echo ${DOCKER_HUB_PASSWORD} | docker login -u ${DOCKER_HUB_USERNAME} --password-stdin"
                        }
                    } else {
                        error("Branch name does not match 'dev' or 'master'. Skipping Docker image push.")
                    }
                }
            }
        }
        stage('Deploy') {
            steps {
                script {
                    def branchName = env.BRANCH_NAME ?: env.GIT_BRANCH
                    branchName = branchName.replaceAll(/^origin\//, '').trim()
                    if (branchName == 'dev' || branchName == 'master') {
                        sh "chmod +x ./deploy.sh"
                        sh "./deploy.sh ${branchName}"
                    } else {
                        error("Branch name does not match 'dev' or 'master'. Skipping deployment.")
                    }
                }
            }
        }
    }
}
```

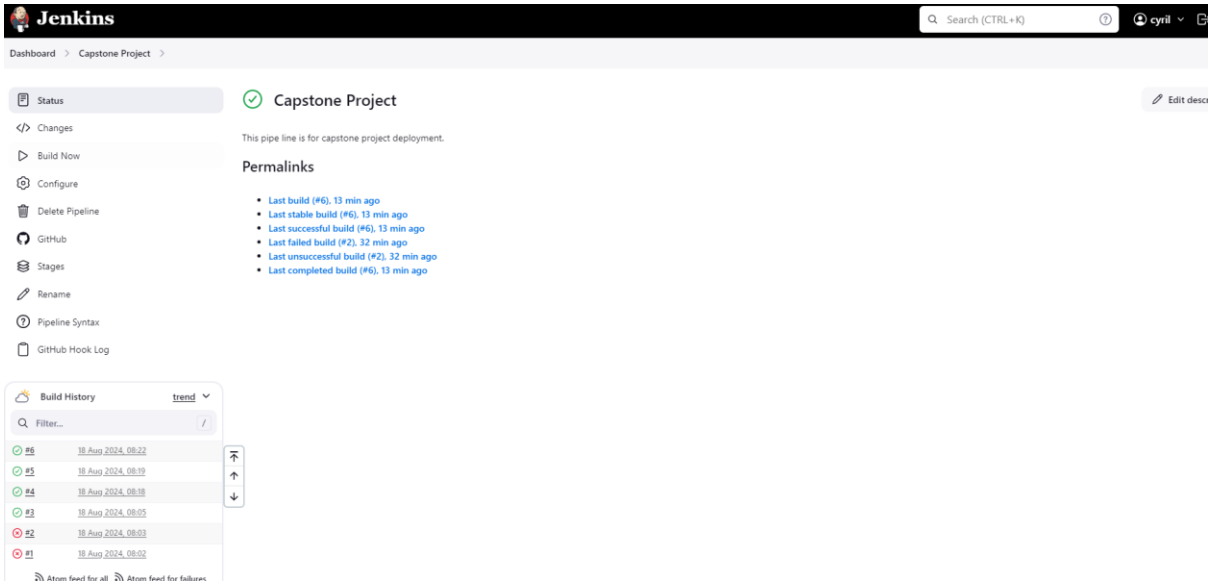


Adding GitHub webhook:



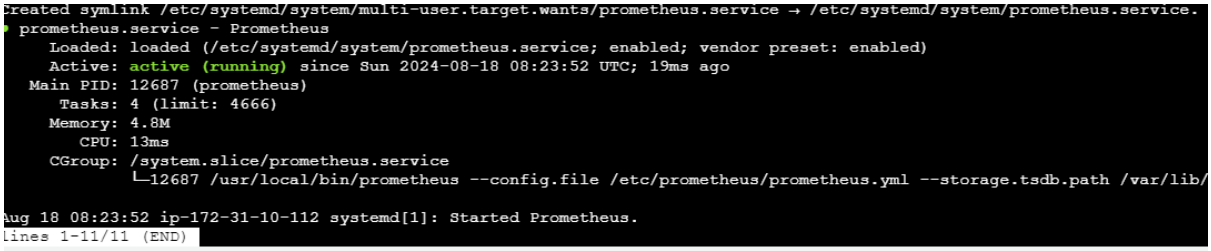


Building the application:

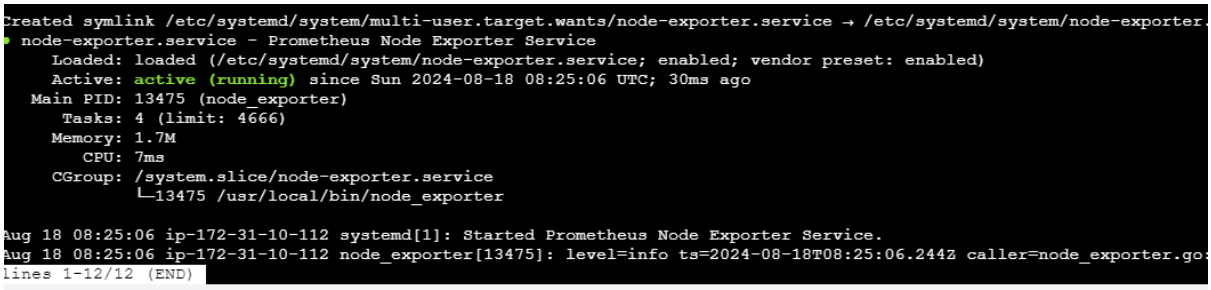


7. Monitoring and visualization

Installing Prometheus, node-exporter and Grafana:

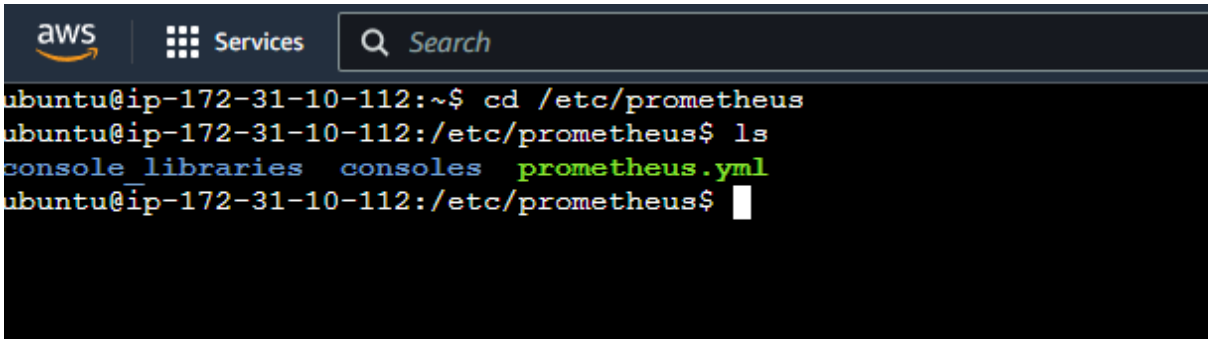


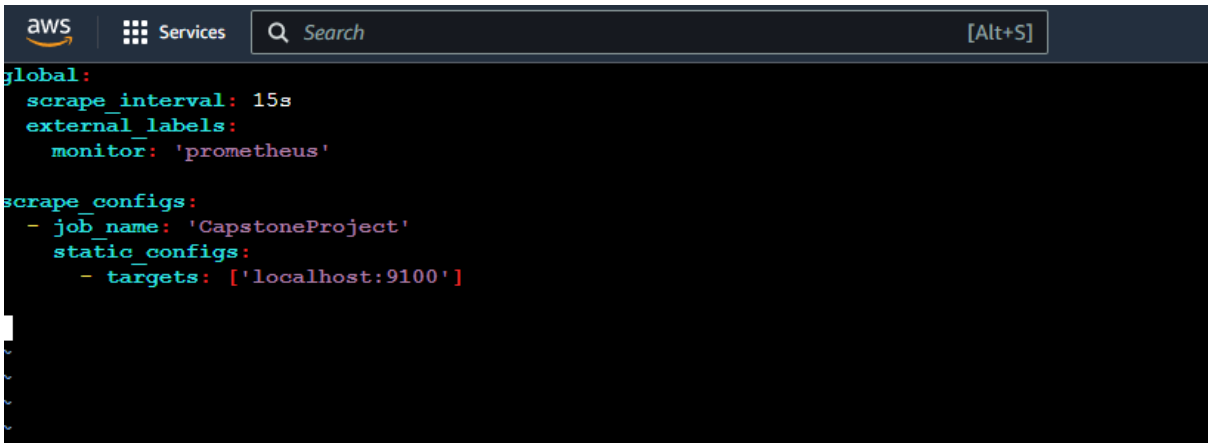
i-0a618c93ed6b54d8d (Project)



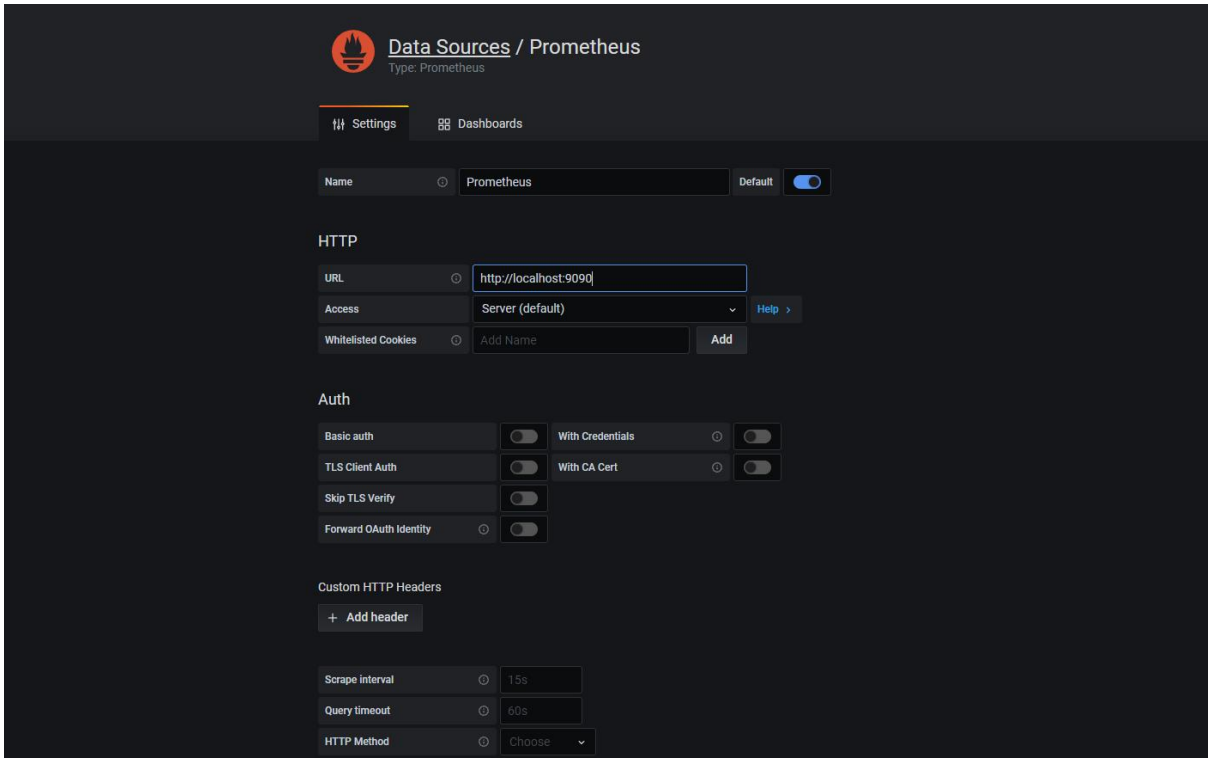
i-0a618c93ed6b54d8d (Project)

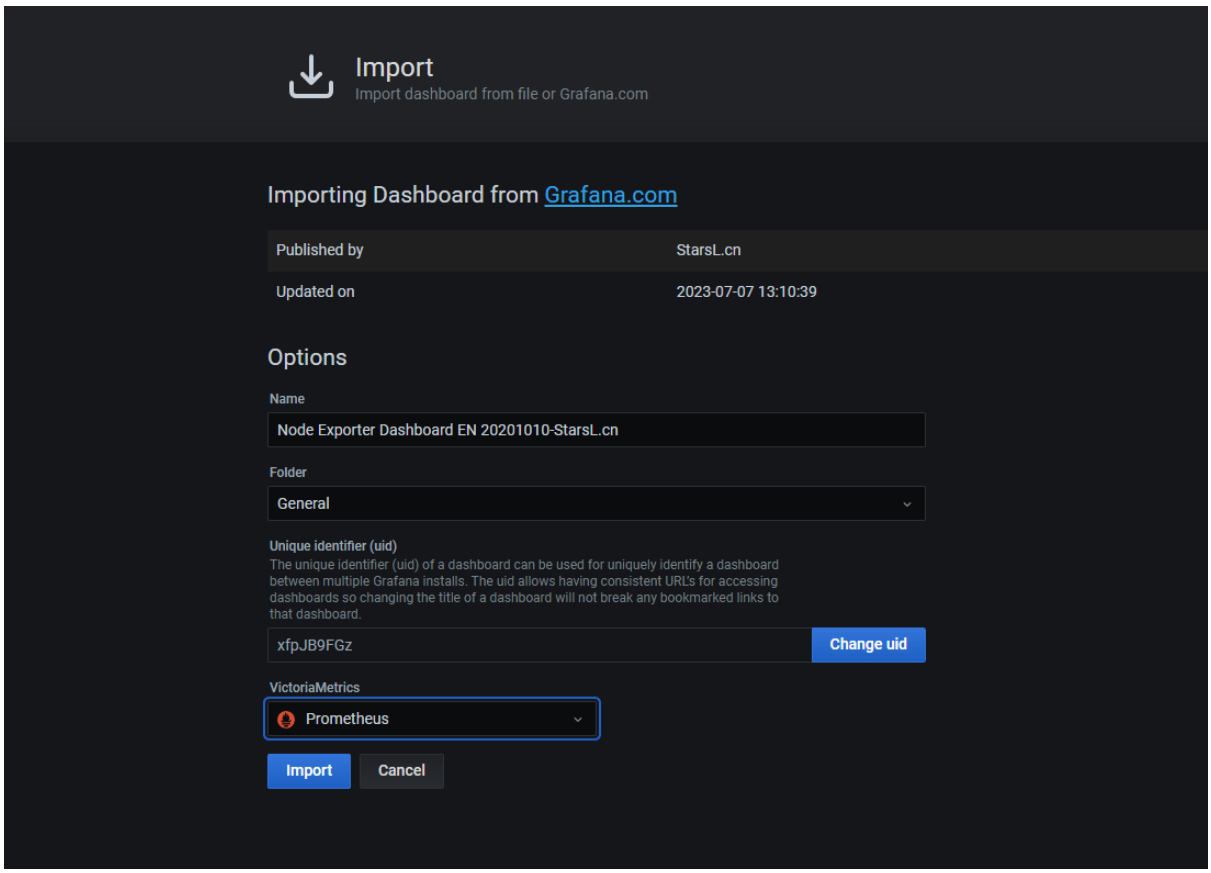
Editing the Prometheus.yml file:



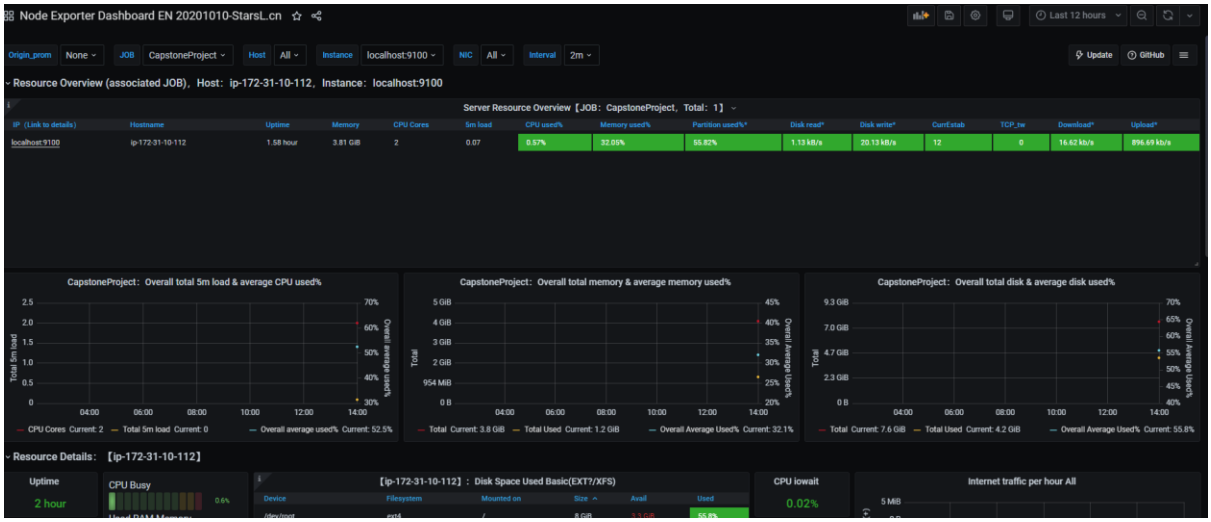


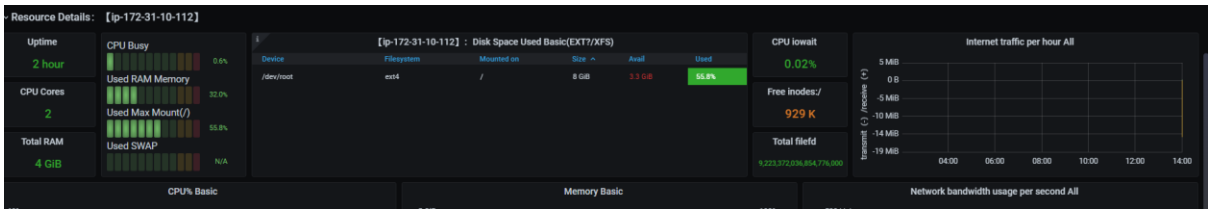
Grafana:

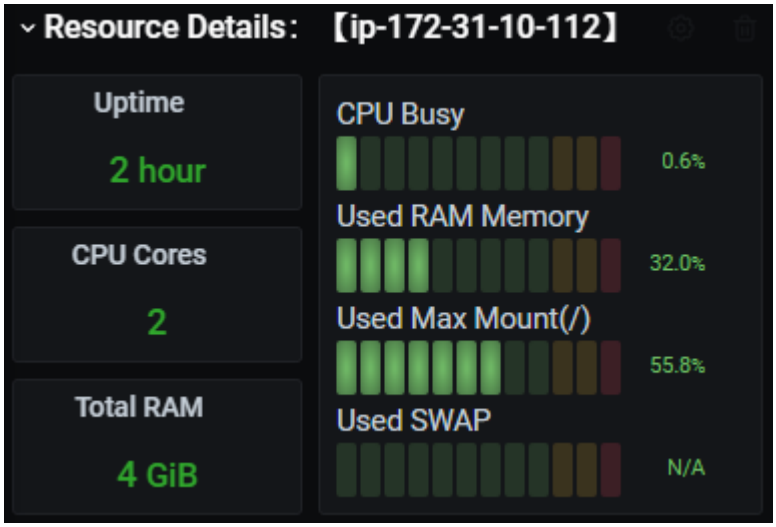

Data Sources / Prometheus
Type: Prometheus
Settings
Dashboards
Name
Prometheus
Default
HTTP
URL
http://localhost:9090
Access
Server (default)
Help
Whitelisted Cookies
Add Name
Add
Auth
Basic auth
With Credentials
TLS Client Auth
With CA Cert
Skip TLS Verify
Forward OAuth Identity
Custom HTTP Headers
Add header
Scrape interval
15s
Query timeout
60s
HTTP Method
Choose


Import
Import dashboard from file or Grafana.com
Importing Dashboard from Grafana.com
Published by
StarsL.cn
Updated on
2023-07-07 13:10:39
Options
Name
Node Exporter Dashboard EN 20201010-StarsL.cn
Folder
General
Unique identifier (uid)
The unique identifier (uid) of a dashboard can be used for uniquely identify a dashboard between multiple Grafana installs. The uid allows having consistent URL's for accessing dashboards so changing the title of a dashboard will not break any bookmarked links to that dashboard.
xfpJB9FGz
Change uid
VictoriaMetrics
Prometheus
Import
Cancel

Application health monitoring through Grafana:

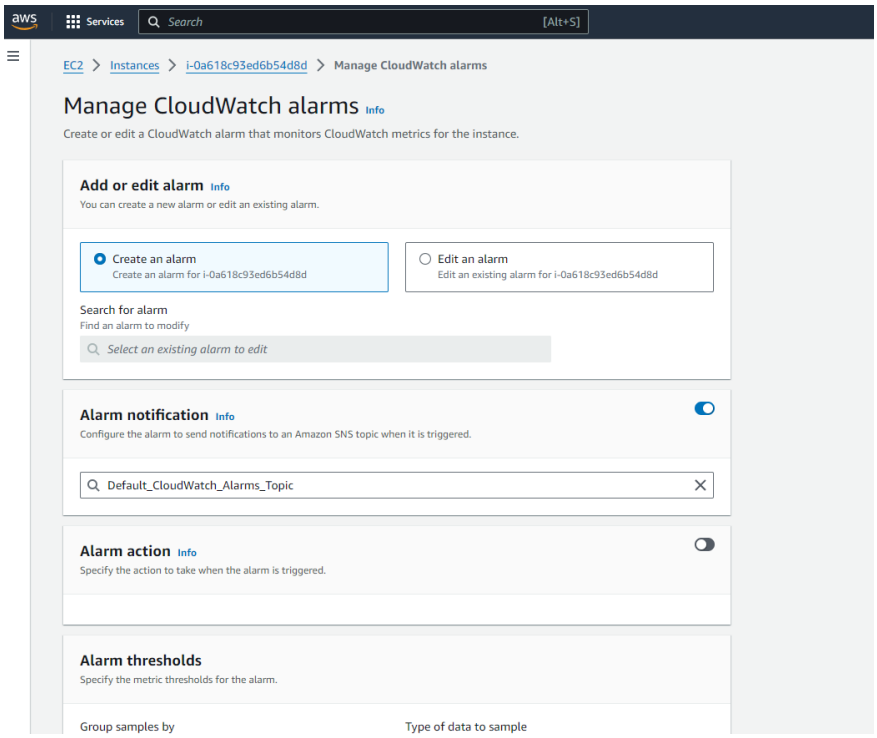


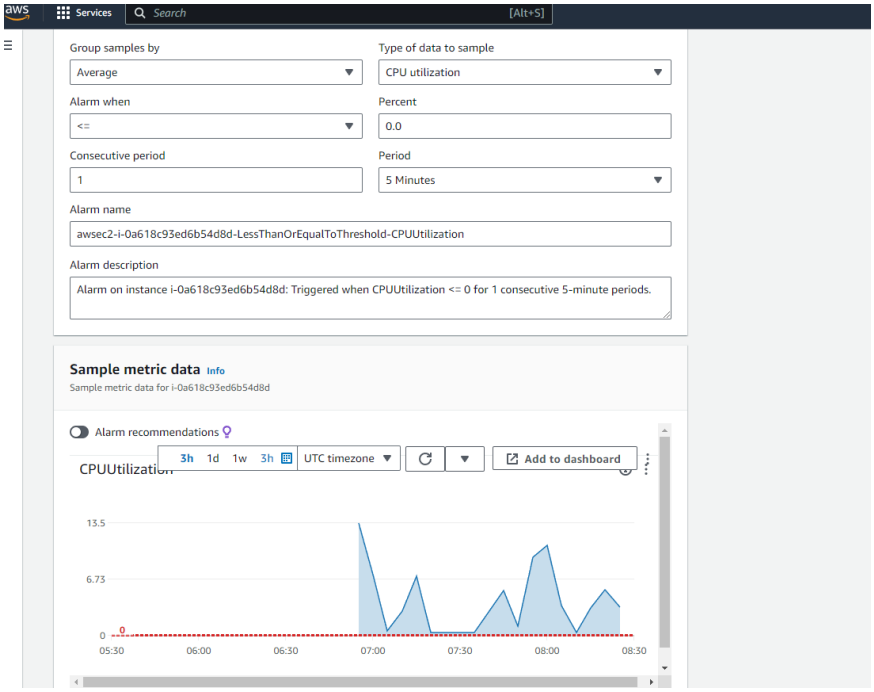




8. Alarm

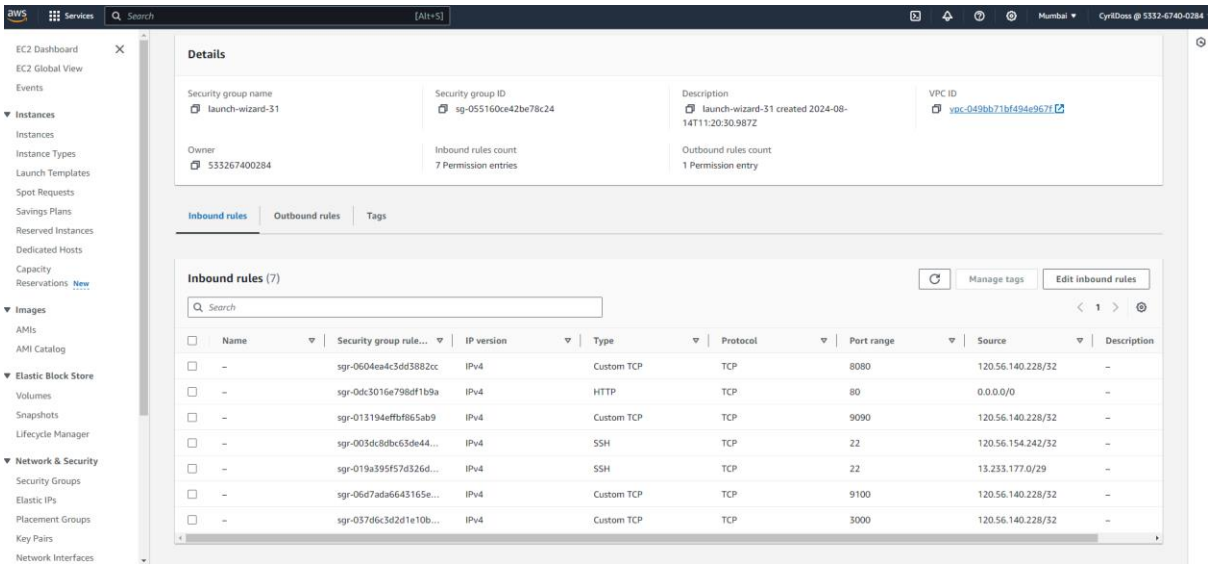
Setting alarm when the system goes down:

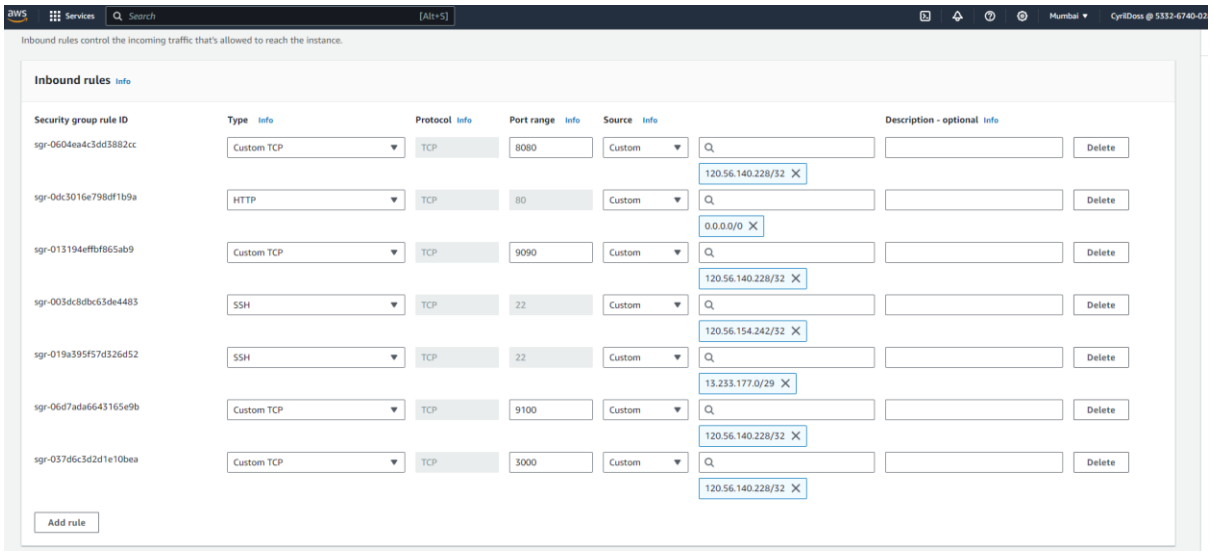




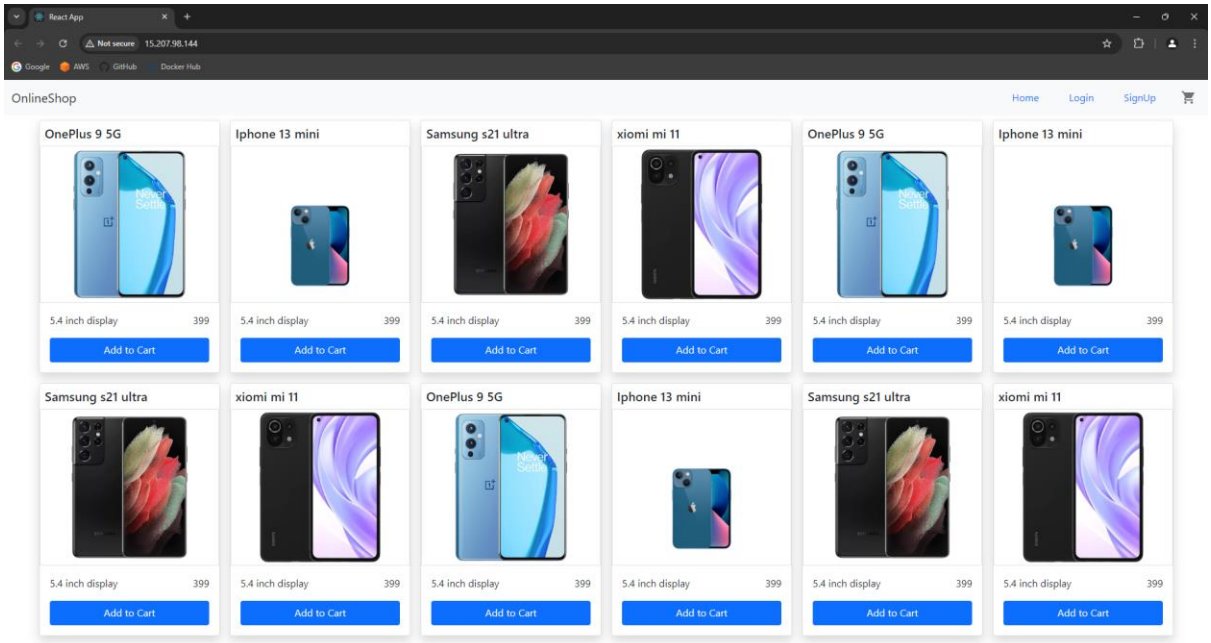
9. Configuring security group

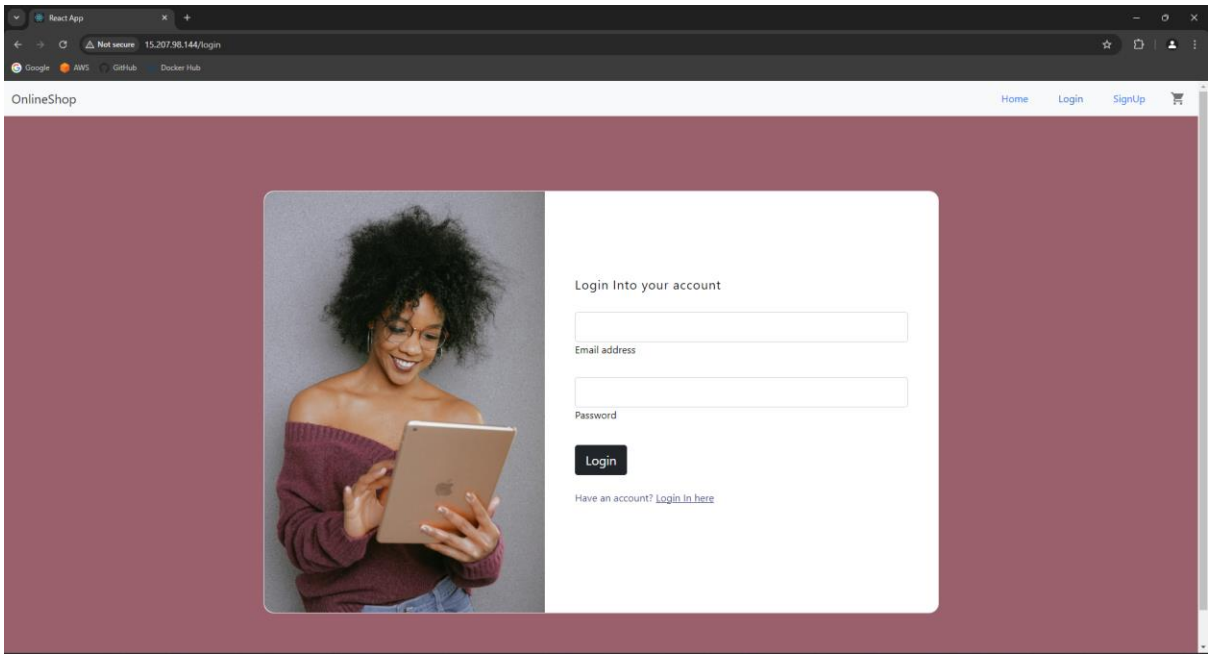
SG is set in a way only the application could be viewed by anyone and the rest services and login could be done from only my Ip-address.

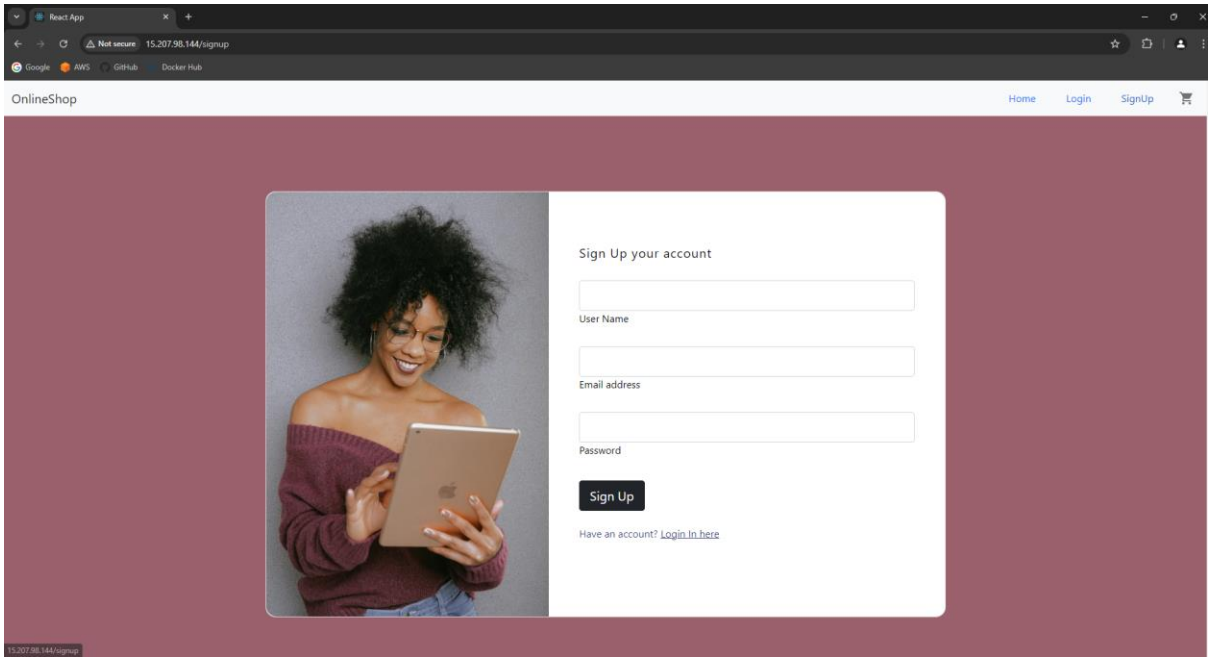




10. Deployed Site



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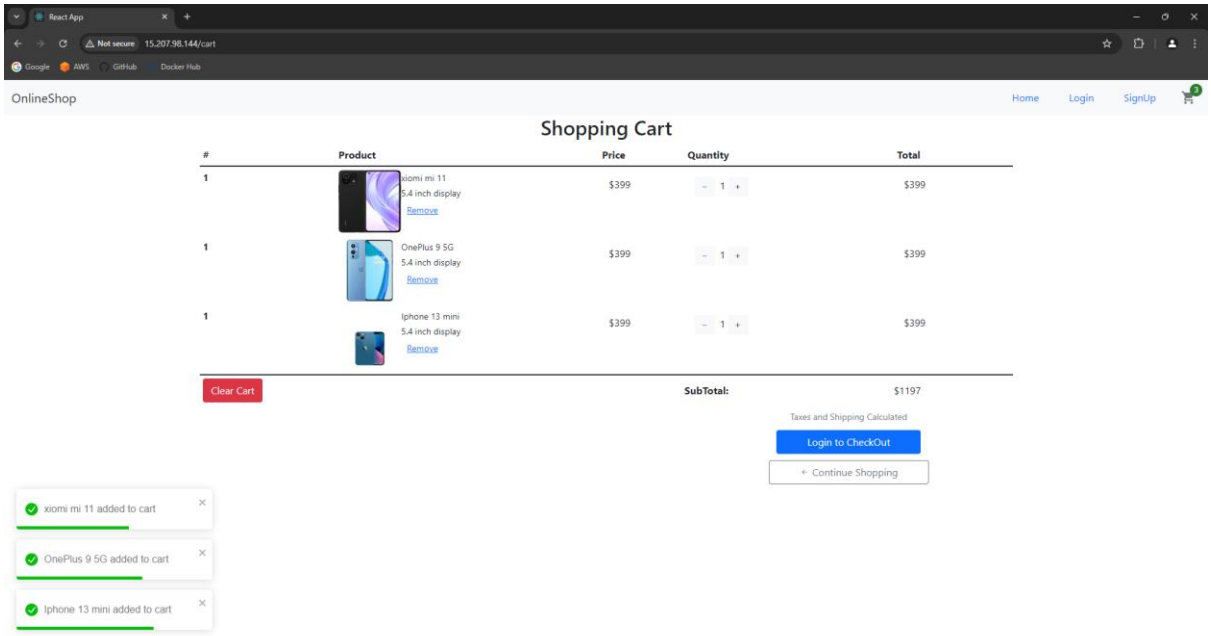
Google AWS GitHub Docker Hub
OnlineShop
Home Login SignUp
Sign Up your account
User Name
Email address
Password
Sign Up
Have an account? Login In here
15.207.98.144/signup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Not secure 15.207.98.144/cart
Google AWS GitHub Docker Hub
OnlineShop
Home Login SignUp
Shopping Cart
Product Price Quantity Total
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1 OnePlus 9 5G 5.4 inch display Remove $399 - 1 + $399
1 Iphone 13 mini 5.4 inch display Remove $399 - 1 + $399
Clear Cart
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Taxes and Shipping Calculated
Login to CheckOut
Continue Shopping
xiomi mi 11 added to cart
OnePlus 9 5G added to cart
Iphone 13 mini added to cart