DevOps

Netflix Clone CI/CD with Monitoring | Jenkins | Docker| Kubernetes| Monitoring | DevSecOps

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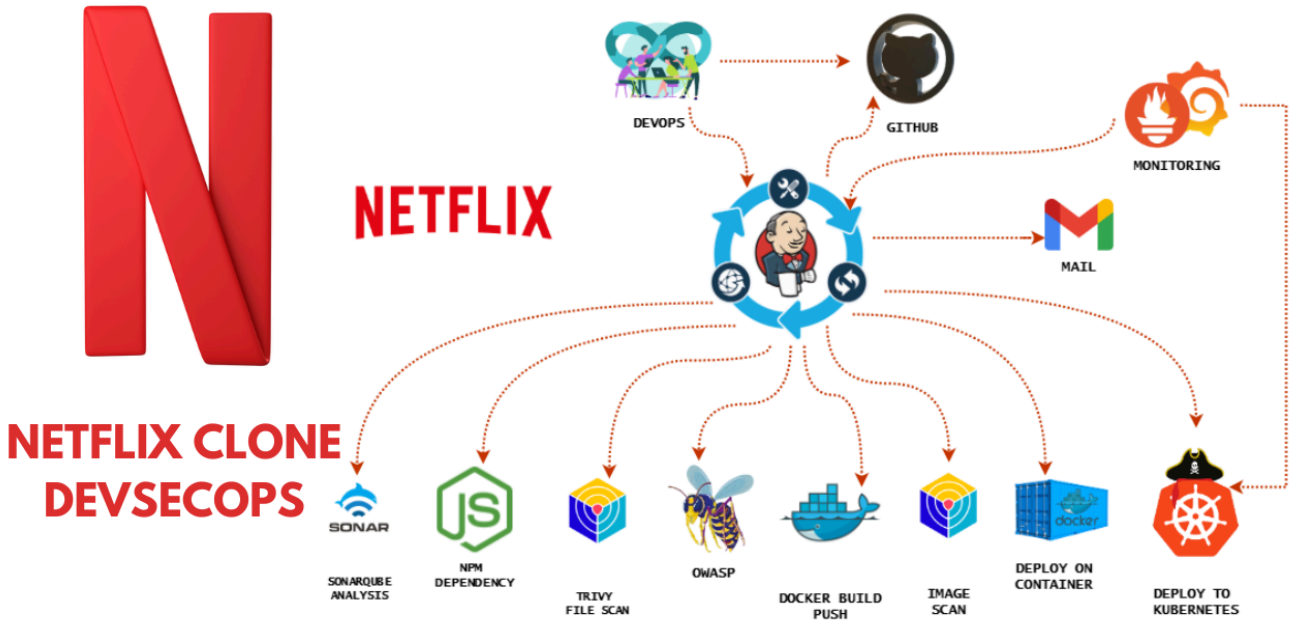

Hello friends, we will be deploying a Netflix clone. We will be using Jenkins as a CICD tool and deploying our application on a Docker container and Kubernetes Cluster and we will monitor the Jenkins and Kubernetes metrics using Grafana, Prometheus and Node exporter. I Hope this detailed blog is useful.

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Steps:-

Step 1 – Launch an Ubuntu(22.04) T2 Large Instance

Step 2 – Install Jenkins, Docker and Trivy. Create a Sonarqube Container using Docker.

Step 3 – Create a TMDB API Key.

Step 4 – Install Prometheus and Grafana On the new Server.

Step 5 – Install the Prometheus Plugin and Integrate it with the Prometheus server.

Step 6 – Email Integration With Jenkins and Plugin setup.

Step 7 – Install Plugins like JDK, Sonarqube Scanner, Nodejs, and OWASP Dependency Check.

Step 8 – Create a Pipeline Project in Jenkins using a Declarative Pipeline

Step 9 – Install OWASP Dependency Check Plugins

Step 10 – Docker Image Build and Push

Step 11 – Deploy the image using Docker

Step 12 – Kubernetes master and slave setup on Ubuntu (20.04)

Step 13 – Access the Netflix app on the Browser.

Step 14 – Terminate the AWS EC2 Instances.

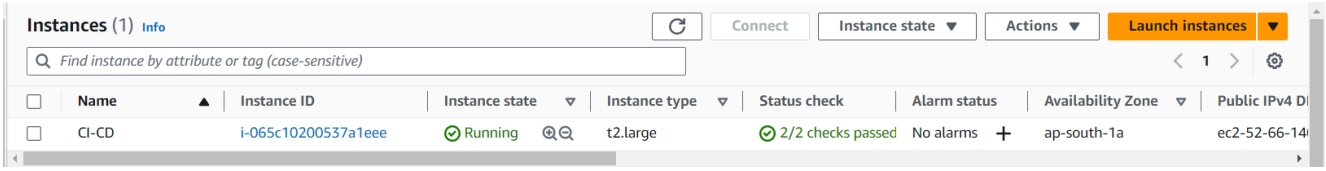
Now, let's get started and dig deeper into each of these steps:-

Contents [hide]

STEP1:Launch an Ubuntu(22.04) T2 Large Instance
Step 2 – Install Jenkins, Docker and Trivy
2A – To Install Jenkins
2B – Install Docker
2C – Install Trivy
Step 3: Create a TMDB API Key
Step 4 – Install Prometheus and Grafana On the new Server
Install Node Exporter on Ubuntu 22.04
Install Grafana on Ubuntu 22.04
Step 5 – Install the Prometheus Plugin and Integrate it with the Prometheus server
Step 6 – Email Integration With Jenkins and Plugin Setup
Step 7 – Install Plugins like JDK, Sonarqube Scanner, NodeJs, OWASP Dependency Check
7A – Install Plugin
7B – Configure Java and Nodejs in Global Tool Configuration
7C – Create a Job
Step 8 – Configure Sonar Server in Manage Jenkins
Step 9 – Install OWASP Dependency Check Plugins
Step 10 – Docker Image Build and Push
Step 11 – Kuberenetes Setup
Kubectl is to be installed on Jenkins also
Part 1 ––––-Master Node–––––
––––-Worker Node–––––
Part 2 ––––Both Master & Node ––––
Part 3 –––––– Master ––––––
––––-Worker Node–––––
Install Node_exporter on both master and worker
STEP 12:Access from a Web browser with
Step 13: Terminate instances.
Complete Pipeline

STEP1:Launch an Ubuntu(22.04) T2 Large Instance

Launch an AWS T2 Large Instance. Use the image as Ubuntu. You can create a new key pair or use an existing one. Enable HTTP and HTTPS settings in the Security Group and open all ports (not best case to open all ports but just for learning purposes it's okay).



Step 2 – Install Jenkins, Docker and Trivy

2A – To Install Jenkins

Connect to your console, and enter these commands to Install Jenkins

```
vi jenkins.sh #make sure run in Root (or) add at userdata while ec2 laur
```

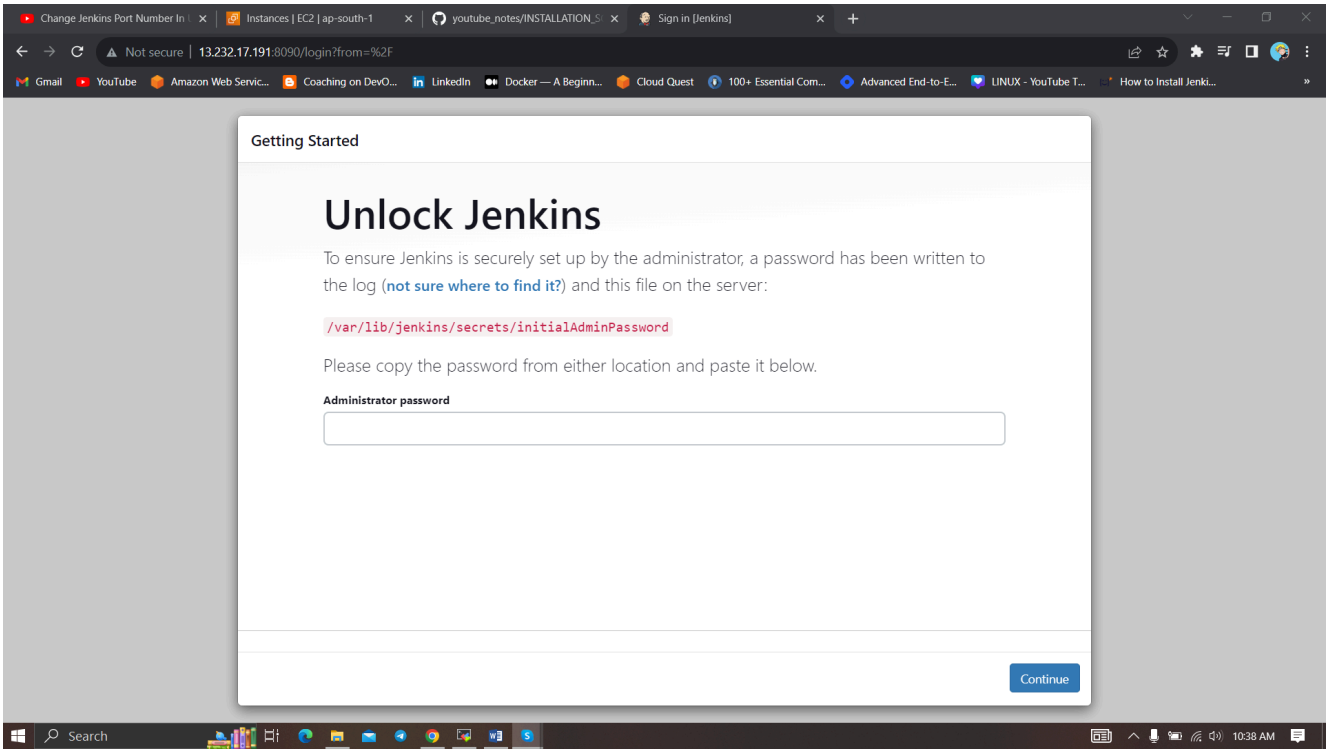
```
#!/bin/bash
sudo apt update -y
#sudo apt upgrade -y
wget -O - https://packages.adoptium.net/artifactory/api/gpg/key/public
echo "deb [signed-by=/etc/apt/keyrings/adoptium.asc] https://packages.ad
sudo apt update -y
sudo apt install temurin-17-jdk -y
/usr/bin/java --version
curl -fsSL https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key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

```
sudo chmod 777 jenkins.sh
./jenkins.sh    # this will installl jenkins
```

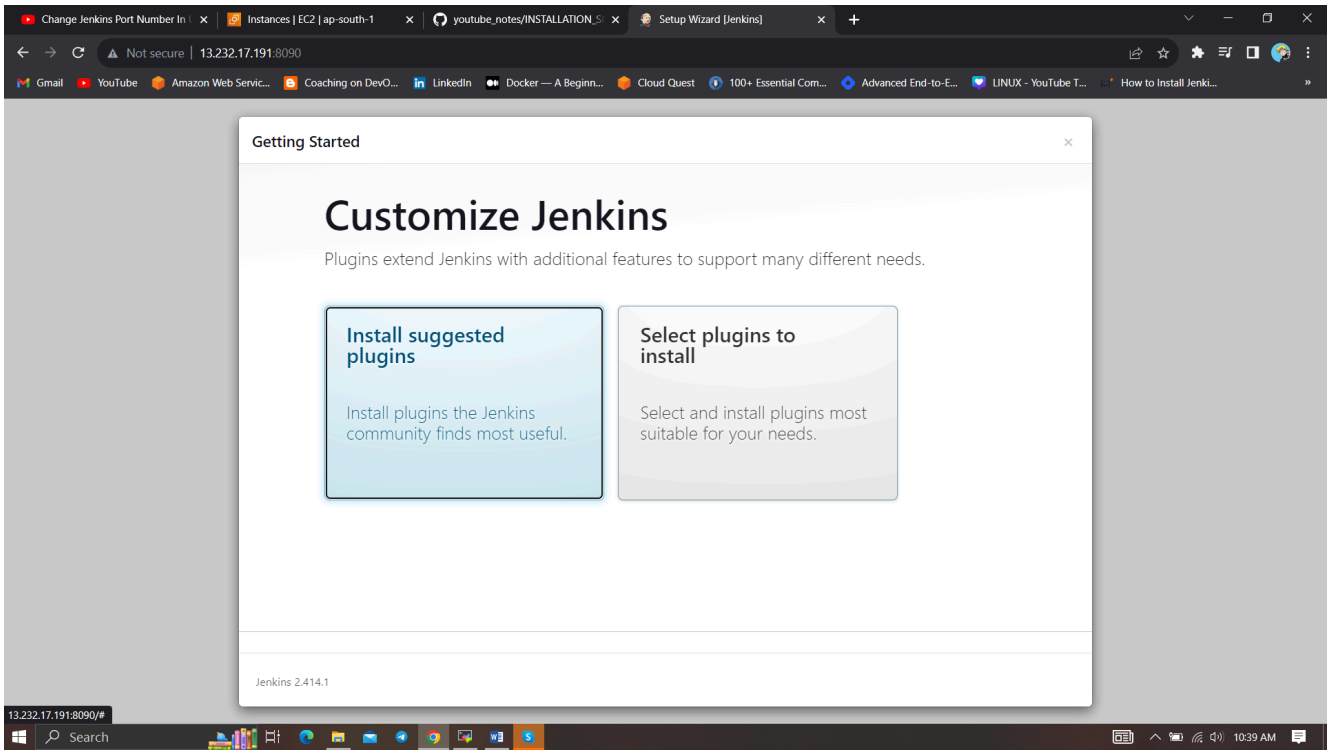
Once Jenkins is installed, you will need to go to your AWS EC2 Security Group and open Inbound Port 8080, since Jenkins works on Port 8080.

Now, grab your Public IP Address

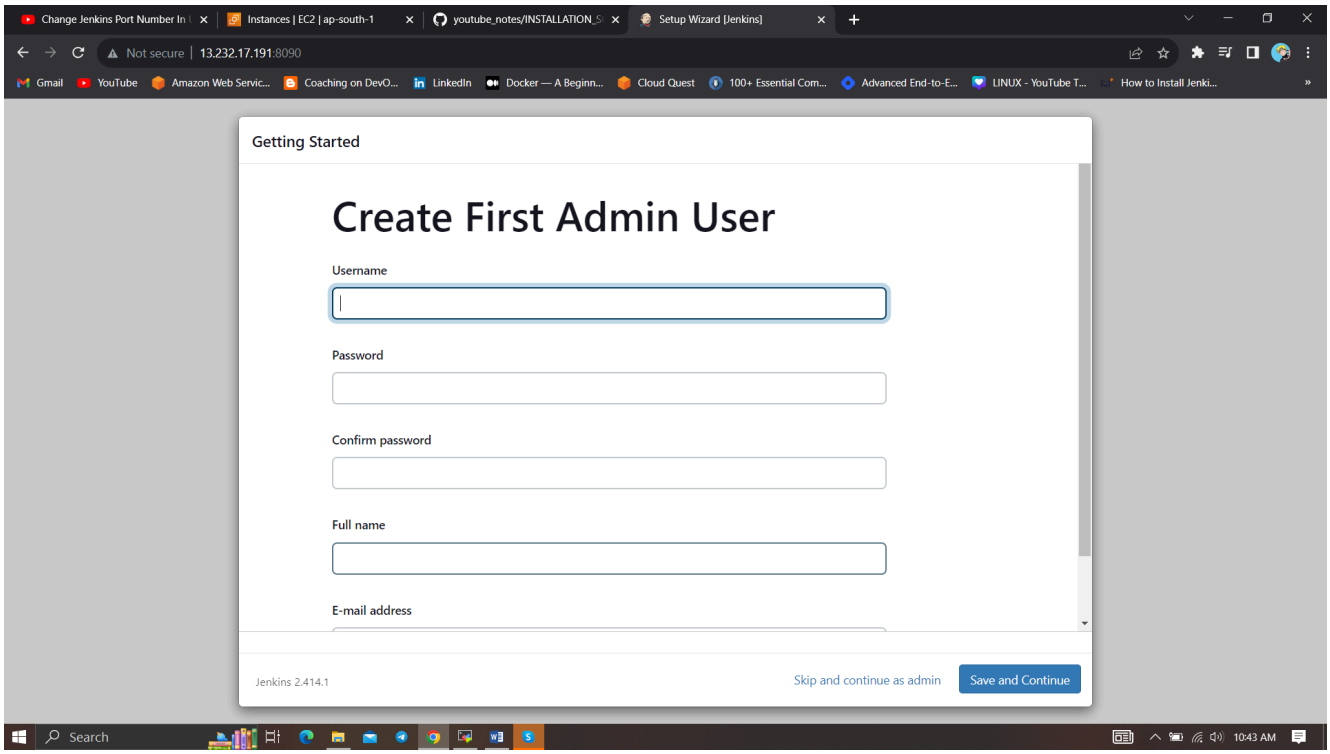
```
<EC2 Public IP Address:8080>
sudo cat /var/lib/jenkins/secrets/initialAdminPassword
```



Unlock Jenkins using an administrative password and install the suggested plugins.

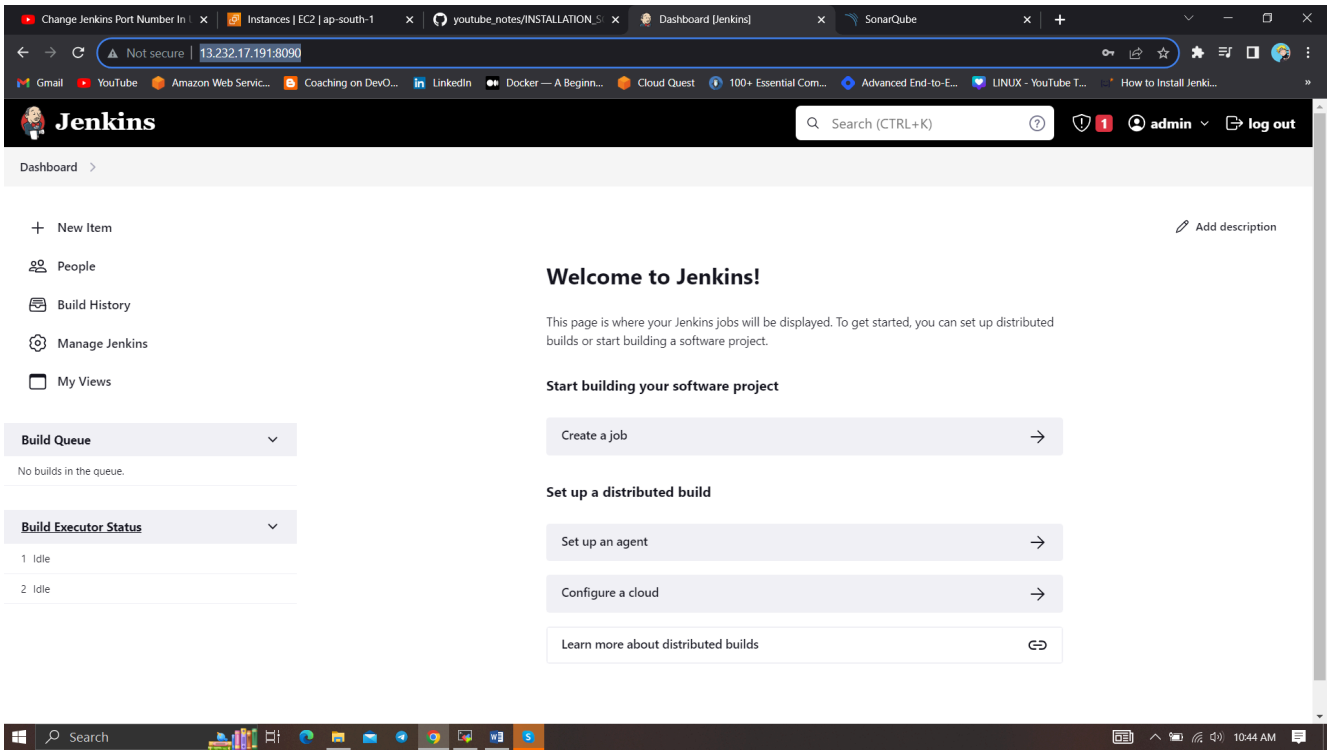


Jenkins will now get installed and install all the libraries.



Create a user click on save and continue.

Jenkins Getting Started Screen.



2B – Install Docker

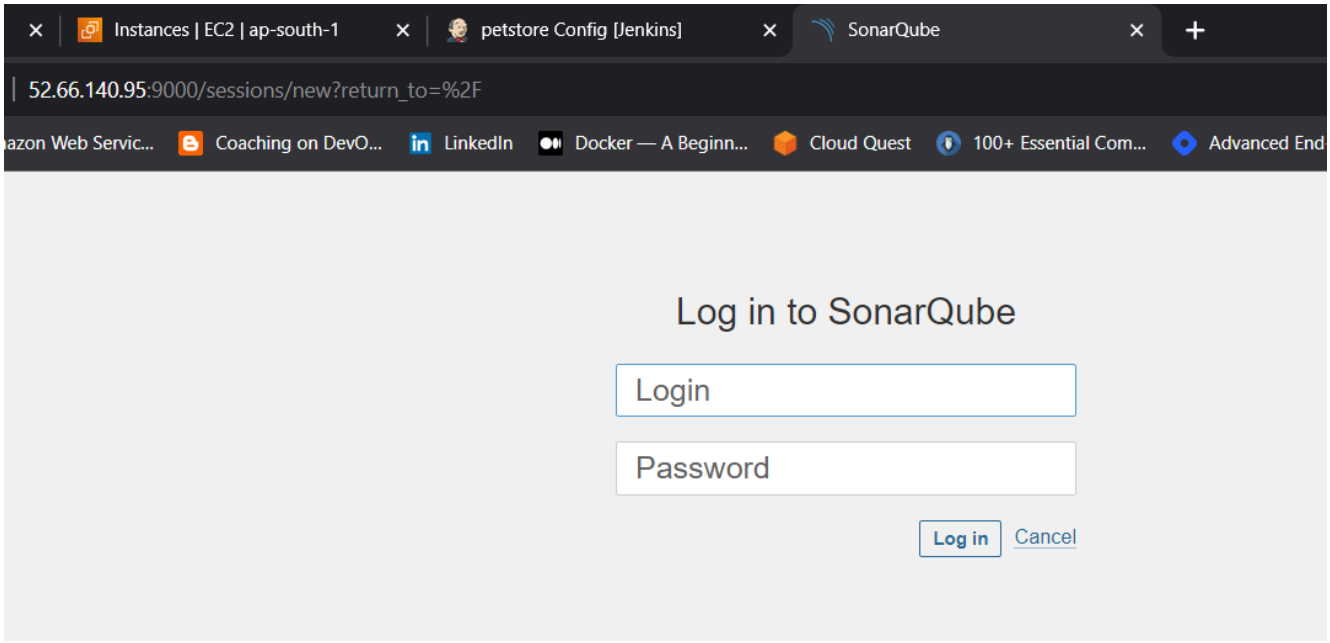
```
sudo apt-get update
sudo apt-get install docker.io -y
sudo usermod -aG docker $USER   #my case is ubuntu
newgrp docker
sudo chmod 777 /var/run/docker.sock
```

After the docker installation, we create a sonarqube container (Remember to add 9000 ports in the security group).

```
docker run -d --name sonar -p 9000:9000 sonarqube:lts-community
```

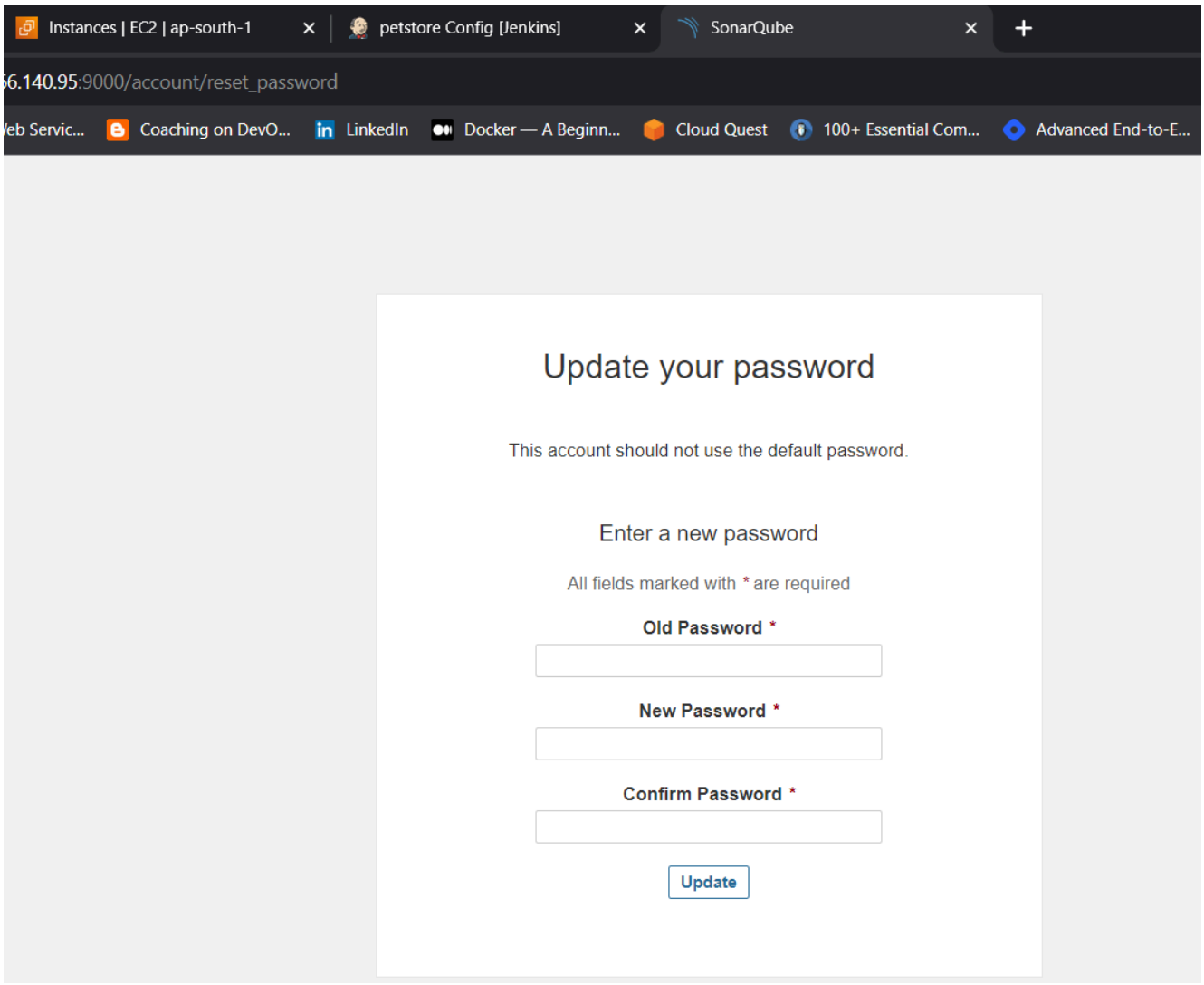
```
ubuntu@ip-172-31-42-253:~$ sudo chmod 777 /var/run/docker.sock
ubuntu@ip-172-31-42-253:~$ docker run -d --name sonar -p 9000:9000 sonarqube:lts-community
Unable to find image 'sonarqube:lts-community' locally
lts-community: Pulling from library/sonarqube
44ba2882f8eb: Pull complete
2cabec57fa36: Pull complete
c20481384b6a: Pull complete
bf7b17ee74f8: Pull complete
38617faac714: Pull complete
706f20f58f5e: Pull complete
65a29568c257: Pull complete
Digest: sha256:1a118f8ab960d6c3d4ea8b4455a5a6560654511c88a6816f1603f764d5dcc77c
Status: Downloaded newer image for sonarqube:lts-community
4b60c96bf9ad3d62289436af7f752fdb04993092d0ca3065e2f2e32301b50139
ubuntu@ip-172-31-42-253:~$ docker ps
CONTAINER ID   IMAGE                    COMMAND                  CREATED         STATUS         PORTS                                       NAMES
4b60c96bf9ad   sonarqube:lts-community   "/opt/sonarqube/dock…"   9 seconds ago   Up 5 seconds   0.0.0.0:9000->9000/tcp, :::9000->9000/tcp   sonar
ubuntu@ip-172-31-42-253:~$
```

Now our sonarqube is up and running

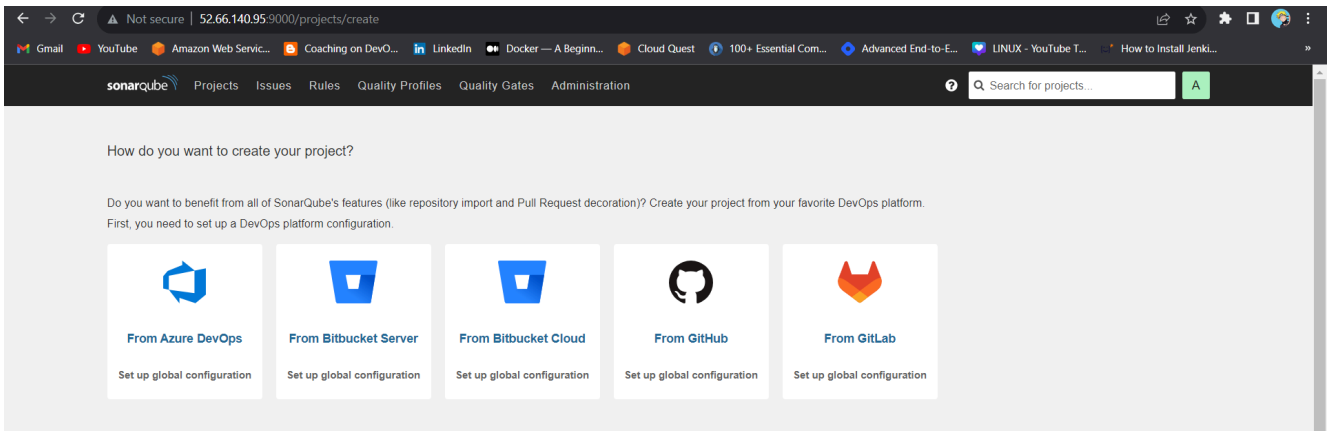


Enter username and password, click on login and change password

```
username admin
password admin
```



Update New password, This is Sonar Dashboard.



2C – Install Trivy

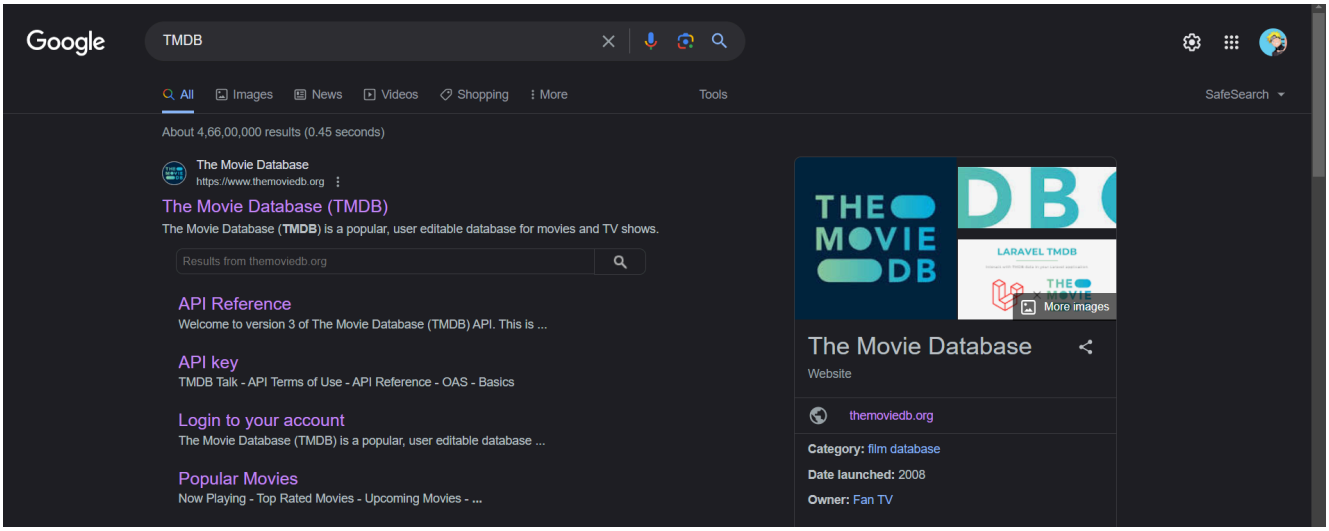
```
vi trivy.sh
```

```
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
```

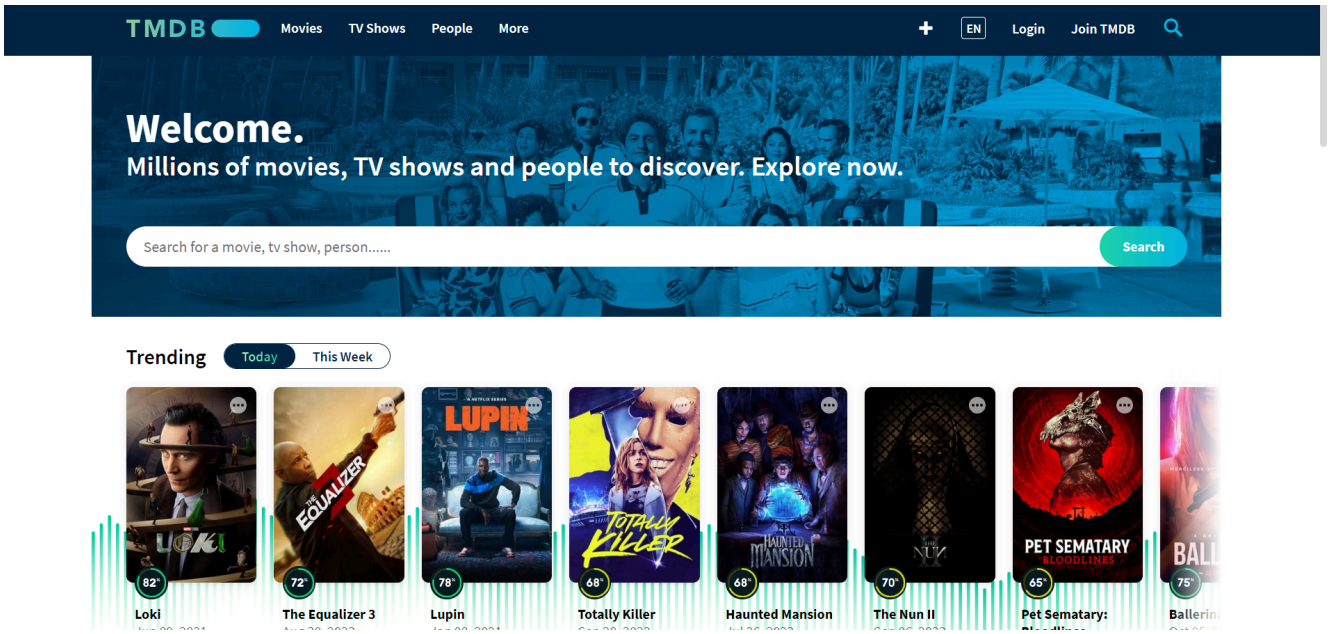
Step 3: Create a TMDB API Key

Next, we will create a TMDB API key

Open a new tab in the Browser and search for TMDB

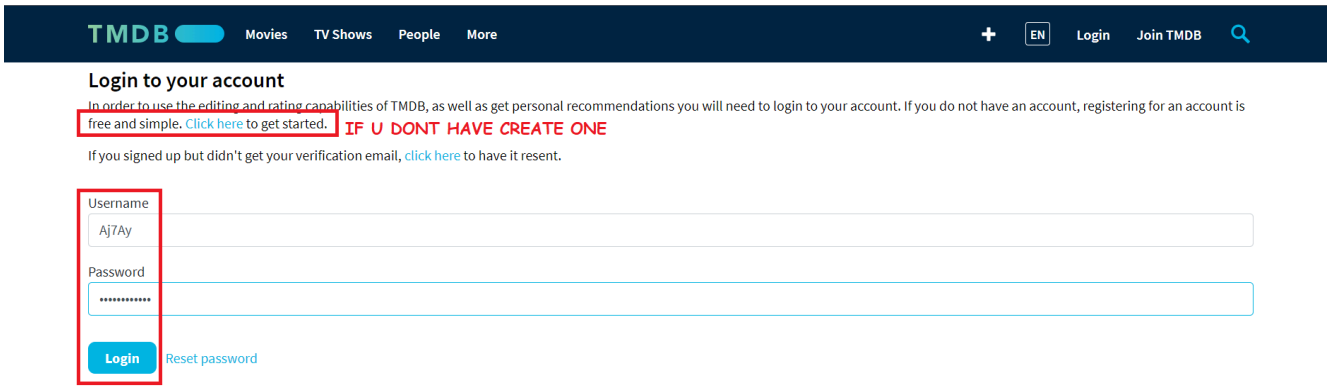


Click on the first result, you will see this page

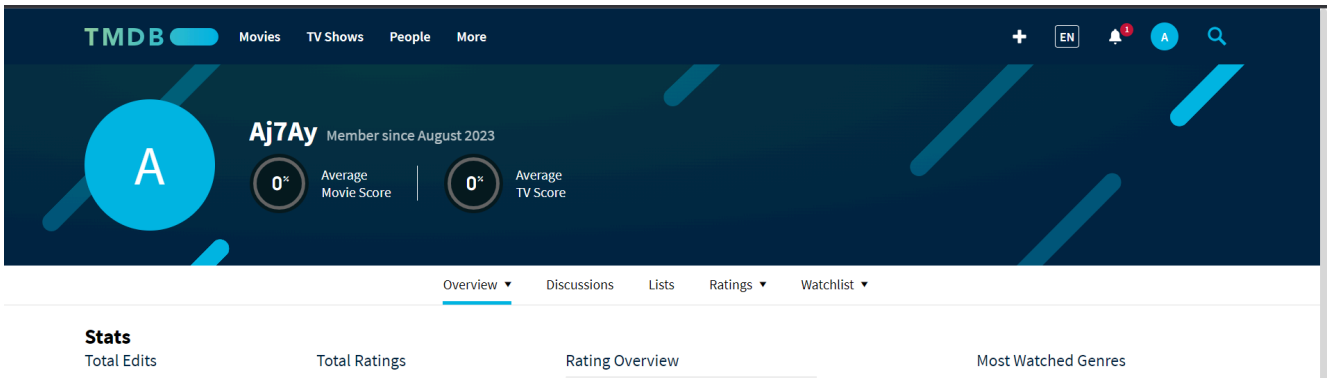


Click on the Login on the top right. You will get this page.

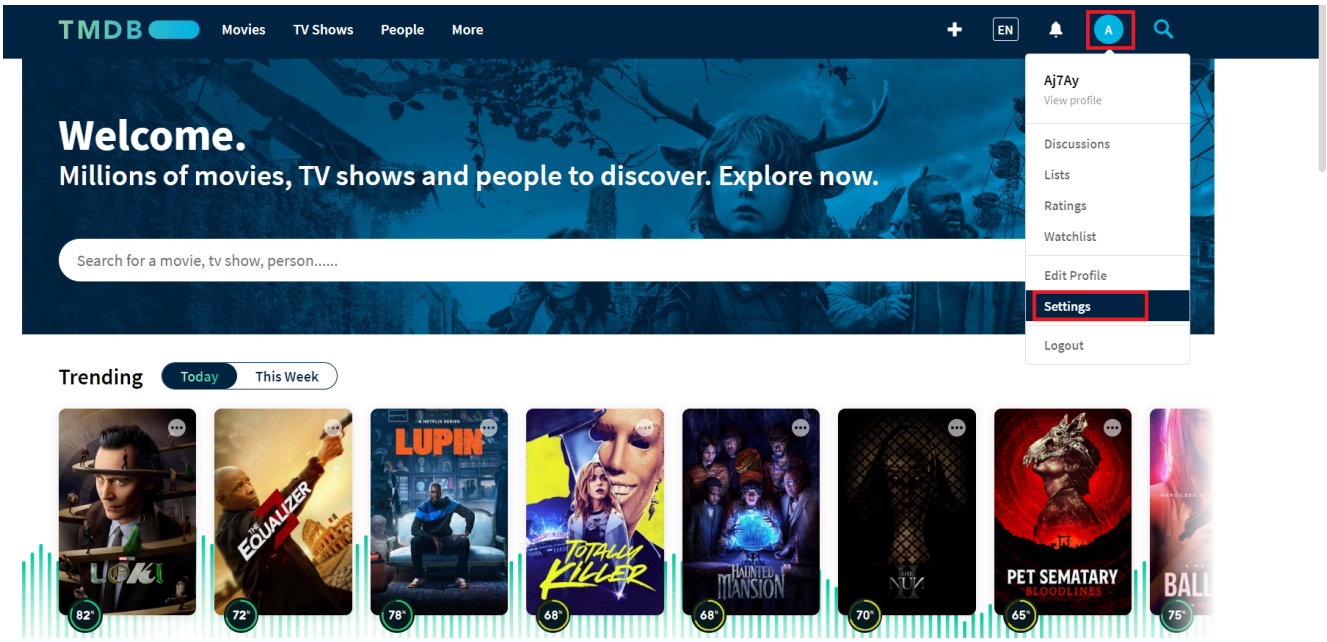
You need to create an account here. click on click here. I have account that's why i added my details there.



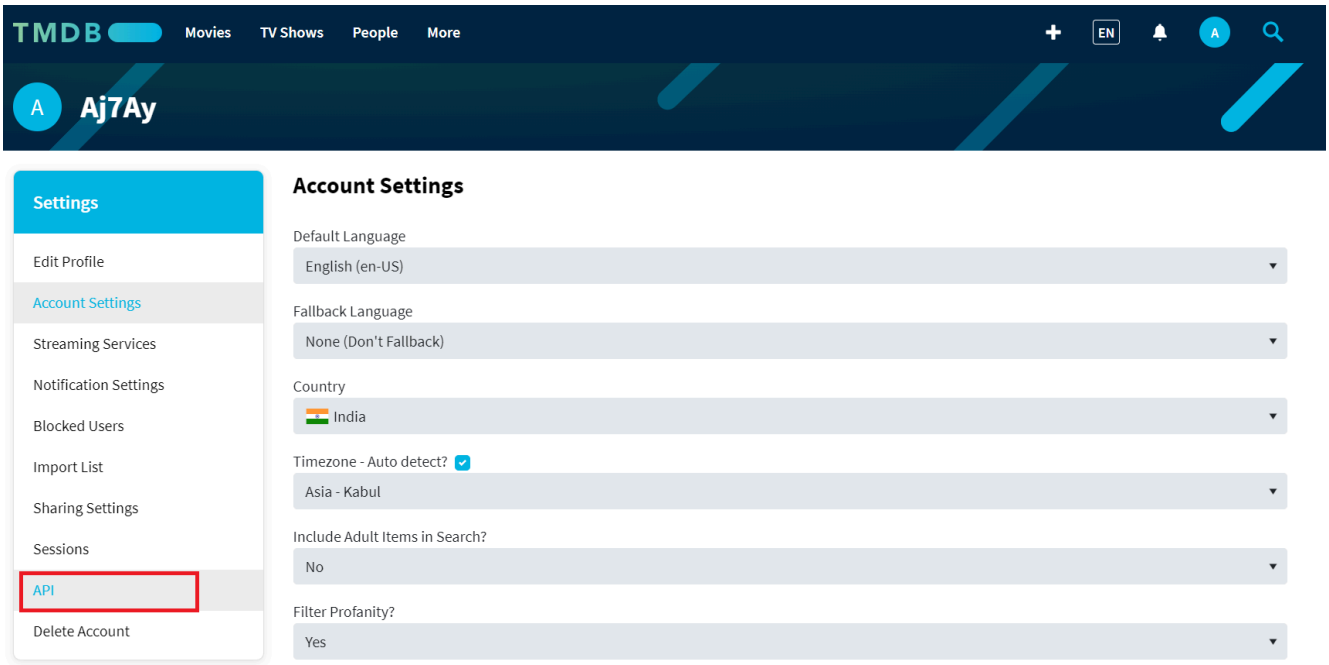
once you create an account you will see this page.



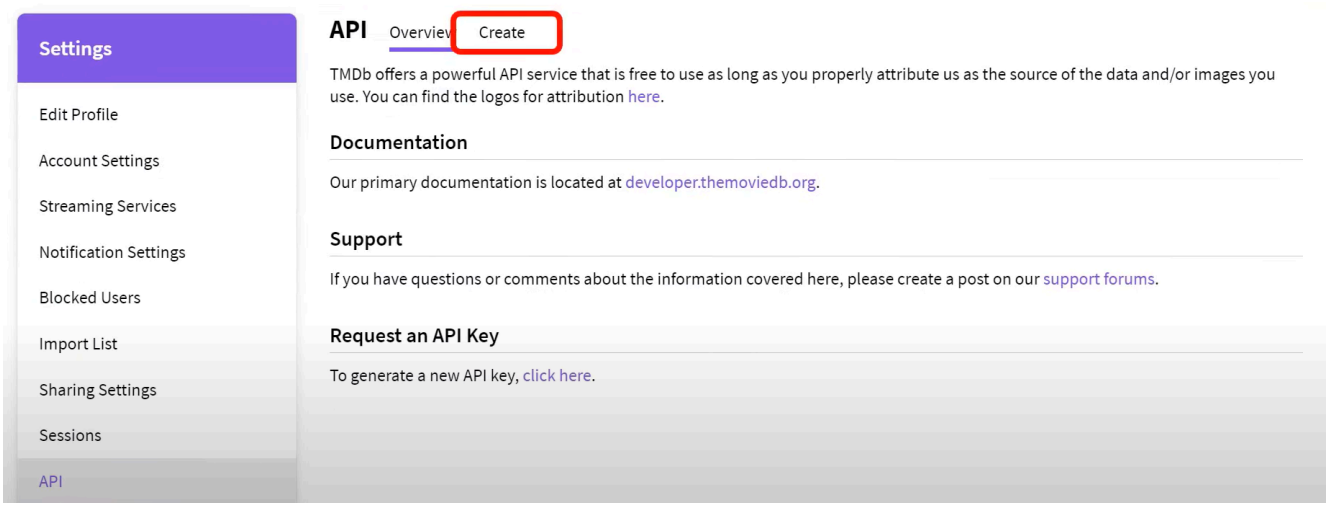
Let's create an API key, By clicking on your profile and clicking settings.



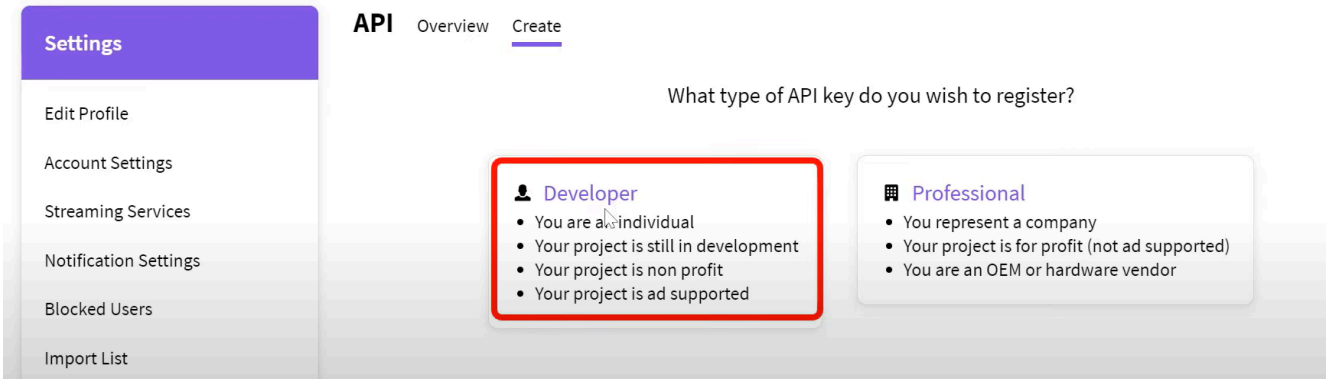
Now click on API from the left side panel.



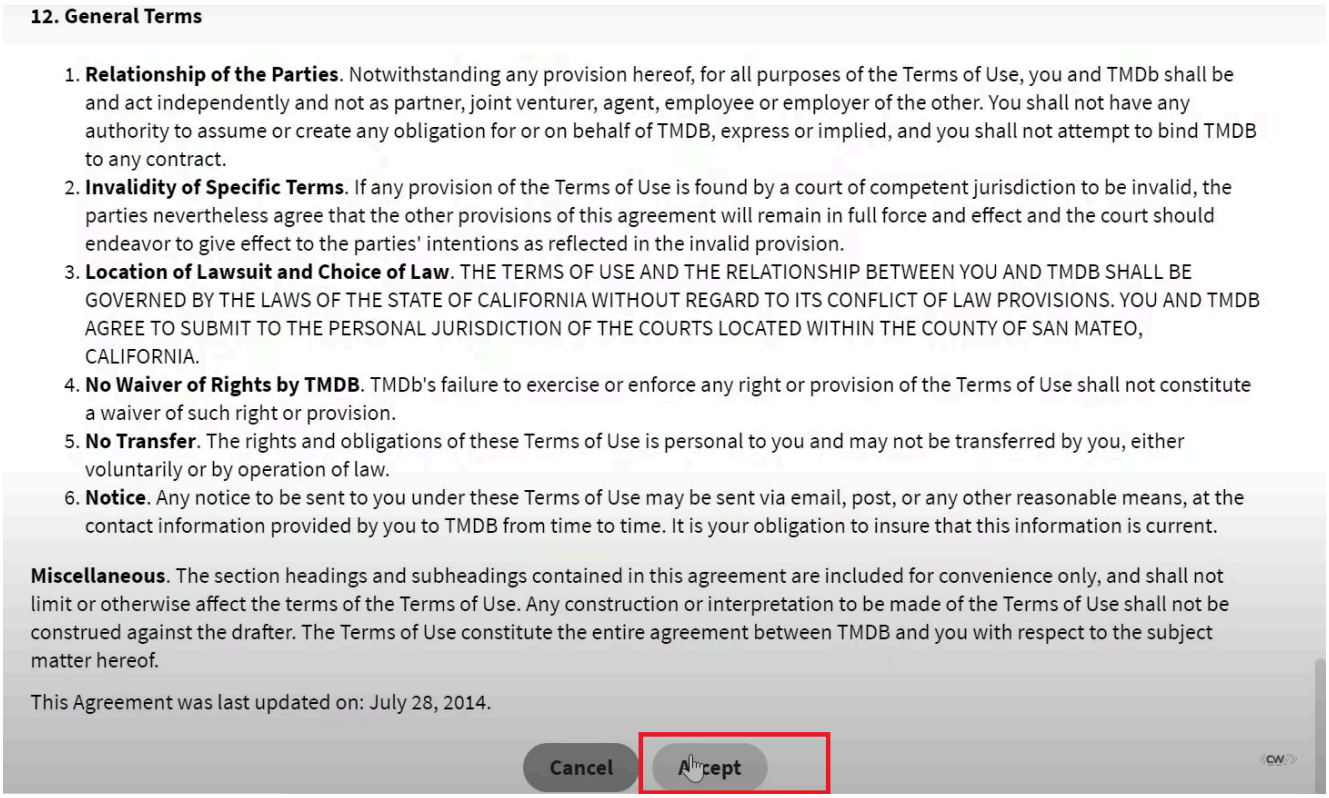
Now click on create



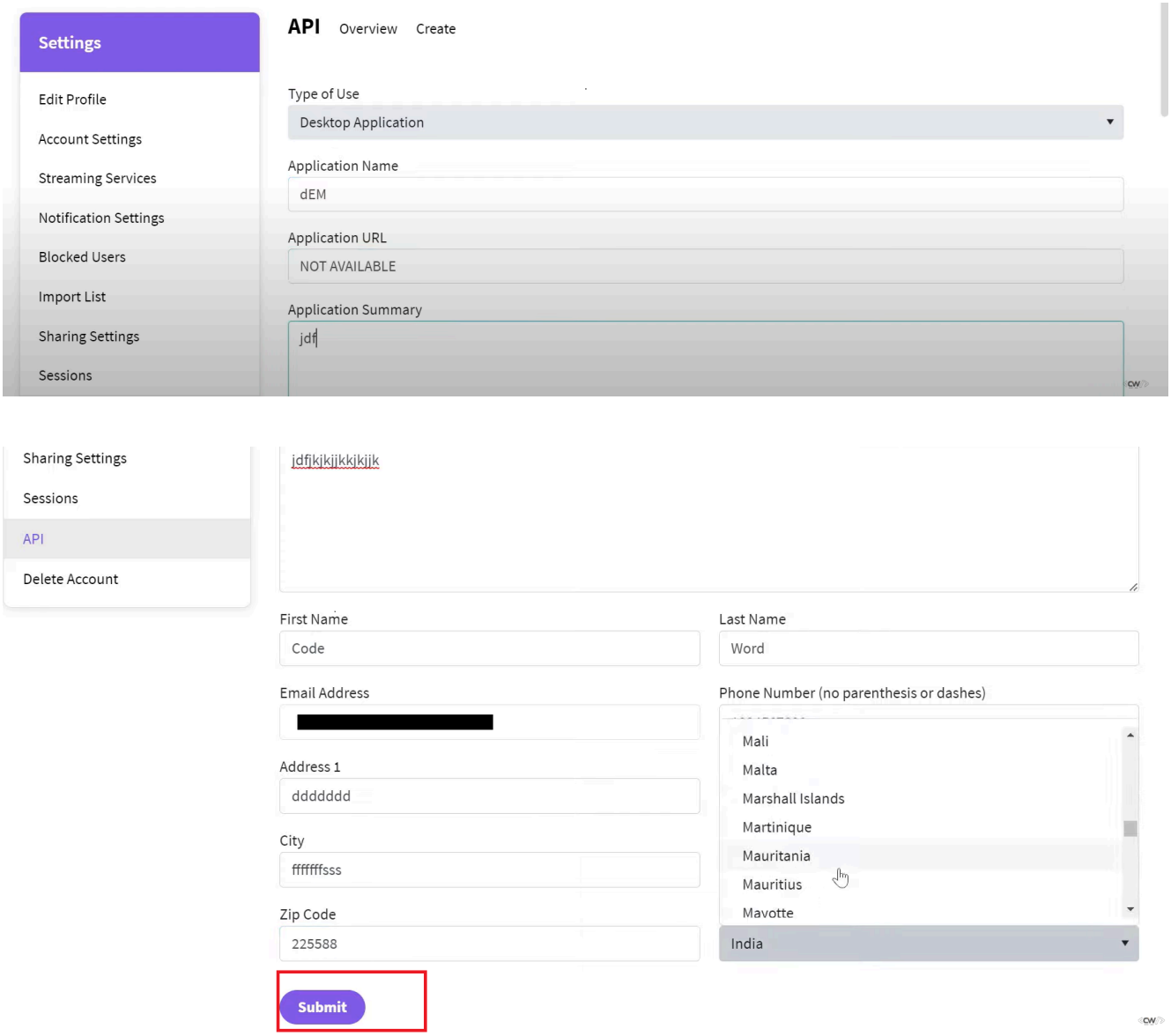
Click on Developer



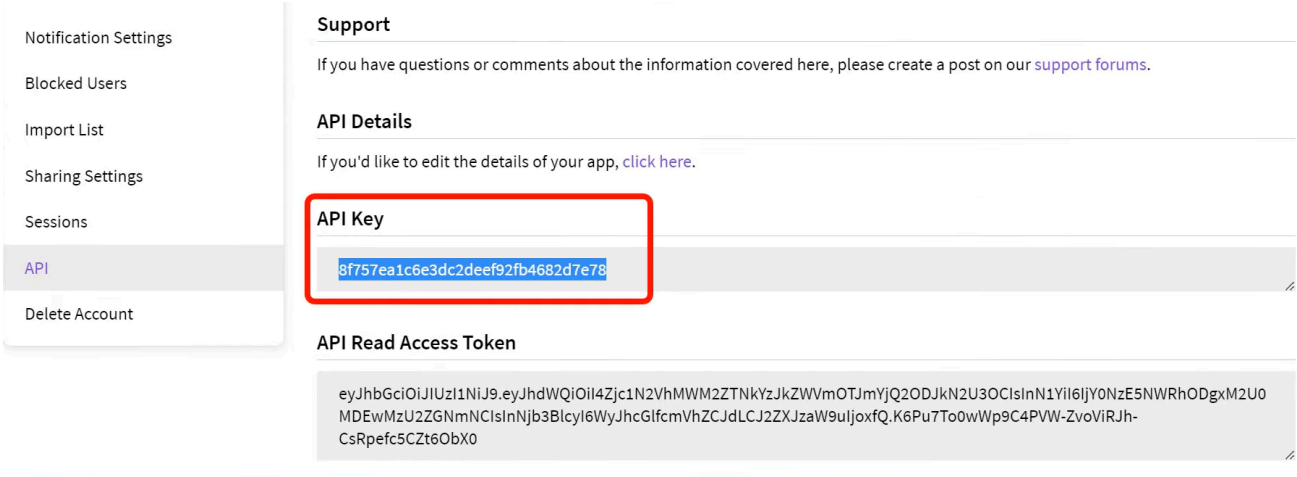
Now you have to accept the terms and conditions.



Provide basic details



Click on submit and you will get your API key.



Step 4 – Install Prometheus and Grafana On the new Server

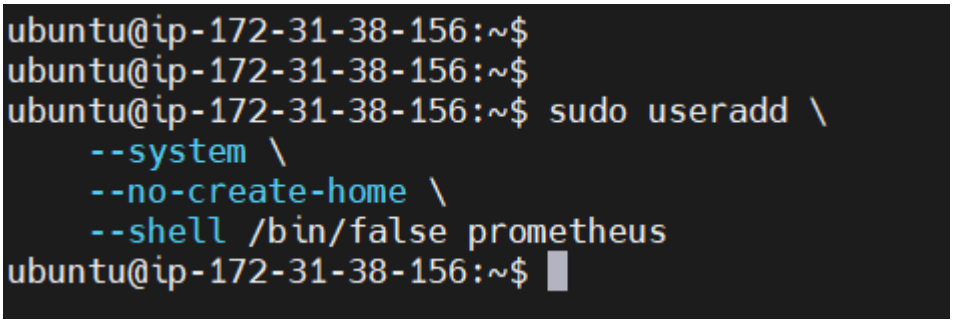
First of all, let's create a dedicated Linux user sometimes called a system account for Prometheus. Having individual users for each service serves two main purposes:

It is a security measure to reduce the impact in case of an incident with the service.

It simplifies administration as it becomes easier to track down what resources belong to which service.

To create a system user or system account, run the following command:

```
sudo useradd \
    --system \
    --no-create-home \
    --shell /bin/false prometheus
```

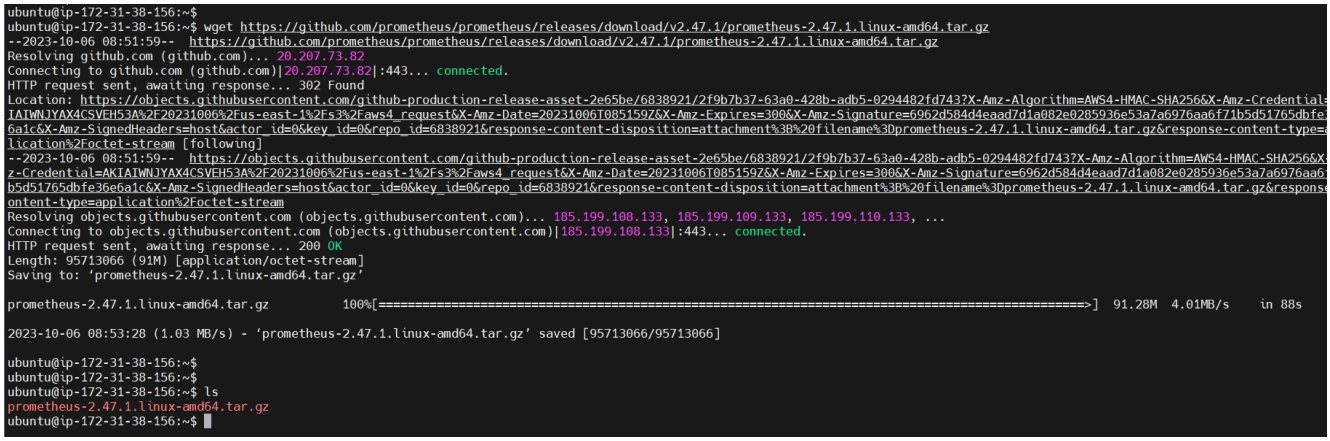


–system – Will create a system account.
–no-create-home – We don't need a home directory for Prometheus or any other system accounts in our case.
–shell /bin/false – It prevents logging in as a Prometheus user.
Prometheus – Will create a Prometheus user and a group with the same name.

Let's check the latest version of Prometheus from the **download page**.

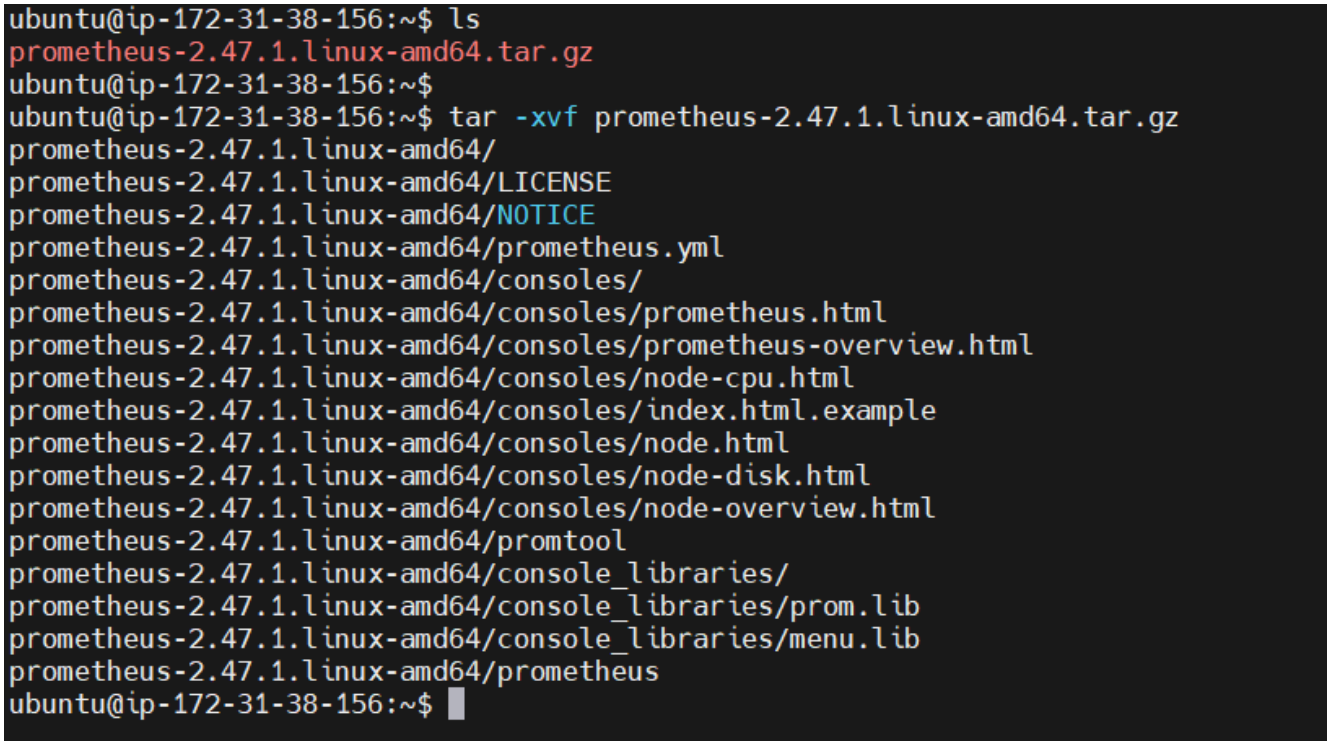
You can use the curl or wget command to download Prometheus.

```
wget https://github.com/prometheus/prometheus/releases/download/v2.47.1/
```



Then, we need to extract all Prometheus files from the archive.

```
tar -xvf prometheus-2.47.1.linux-amd64.tar.gz
```



Usually, you would have a disk mounted to the data directory. For this tutorial, I will simply create a /data directory. Also, you need a folder for Prometheus

configuration files.

```
sudo mkdir -p /data /etc/prometheus
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo mkdir -p /data /etc/prometheus
ubuntu@ip-172-31-38-156:~$
```

Now, let's change the directory to Prometheus and move some files.

```
cd prometheus-2.47.1.linux-amd64/
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ cd prometheus-2.47.1.linux-amd64/
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$ ls -l
total 236852
-rw-r--r-- 1 ubuntu ubuntu     11357 Oct  4 11:05 LICENSE
-rw-r--r-- 1 ubuntu ubuntu      3773 Oct  4 11:05 NOTICE
drwxr-xr-x 2 ubuntu ubuntu      4096 Oct  4 11:05 console_libraries
drwxr-xr-x 2 ubuntu ubuntu      4096 Oct  4 11:05 consoles
-rwxr-xr-x 1 ubuntu ubuntu 124158156 Oct  4 10:35 prometheus
-rw-r--r-- 1 ubuntu ubuntu       934 Oct  4 11:05 prometheus.yml
-rwxr-xr-x 1 ubuntu ubuntu 118343283 Oct  4 10:38 promtool
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
```

First of all, let's move the Prometheus binary and a promtool to the /usr/local/bin/. promtool is used to check configuration files and Prometheus rules.

```
sudo mv prometheus promtool /usr/local/bin/
```

```
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$ sudo mv prometheus promtool /usr/local/bin/
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
```

Optionally, we can move console libraries to the Prometheus configuration directory. Console templates allow for the creation of arbitrary consoles using the Go templating language. You don't need to worry about it if you're just getting started.

```
sudo mv consoles/ console_libraries/ /etc/prometheus/
```

```
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$ sudo mv consoles/ console_libraries/ /etc/prometheus/
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
```

Finally, let's move the example of the main Prometheus configuration file.

```
sudo mv prometheus.yml /etc/prometheus/prometheus.yml
```

```
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$ sudo mv prometheus.yml /etc/prometheus/prometheus.yml
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
```

To avoid permission issues, you need to set the correct ownership for the /etc/prometheus/ and data directory.

```
sudo chown -R prometheus:prometheus /etc/prometheus/ /data/
```

```
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$ sudo chown -R prometheus:prometheus /etc/prometheus/ /data/
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
```

You can delete the archive and a Prometheus folder when you are done.

```
cd
rm -rf prometheus-2.47.1.linux-amd64.tar.gz
```

```
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$
ubuntu@ip-172-31-38-156:~/prometheus-2.47.1.linux-amd64$ cd ..
ubuntu@ip-172-31-38-156:~$ ll
total 93516
drwxr-x--- 5 ubuntu ubuntu     4096 Oct  6 08:54 ./
drwxr-xr-x 3 root   root       4096 Oct  6 08:49 ../
-rw------- 1 ubuntu ubuntu       62 Oct  6 08:50 .Xauthority
-rw-r--r-- 1 ubuntu ubuntu      220 Jan  6  2022 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu     3771 Jan  6  2022 .bashrc
drwx------ 2 ubuntu ubuntu     4096 Oct  6 08:50 .cache/
-rw-r--r-- 1 ubuntu ubuntu      807 Jan  6  2022 .profile
drwx------ 2 ubuntu ubuntu     4096 Oct  6 08:49 .ssh/
-rw-r--r-- 1 ubuntu ubuntu        0 Oct  6 08:50 .sudo_as_admin_successful
-rw-rw-r-- 1 ubuntu ubuntu      165 Oct  6 08:53 .wget-hsts
drwxr-xr-x 2 ubuntu ubuntu     4096 Oct  6 08:56 prometheus-2.47.1.linux-amd64/
-rw-rw-r-- 1 ubuntu ubuntu 95713066 Oct  4 11:15 prometheus-2.47.1.linux-amd64.tar.gz
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ rm -rf prometheus-2.47.1.linux-amd64.tar.gz
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ ls
prometheus-2.47.1.linux-amd64
ubuntu@ip-172-31-38-156:~$
```

Verify that you can execute the Prometheus binary by running the following command:

```
prometheus --version
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ prometheus --version
prometheus, version 2.47.1 (branch: HEAD, revision: c4d1a8beff37cc004f1dc4ab9d2e73193f51aaeb)
  build user:       root@4829330363be
  build date:       20231004-10:31:16
  go version:       go1.21.1
  platform:         linux/amd64
  tags:             netgo,builtinassets,stringlabels
ubuntu@ip-172-31-38-156:~$
```

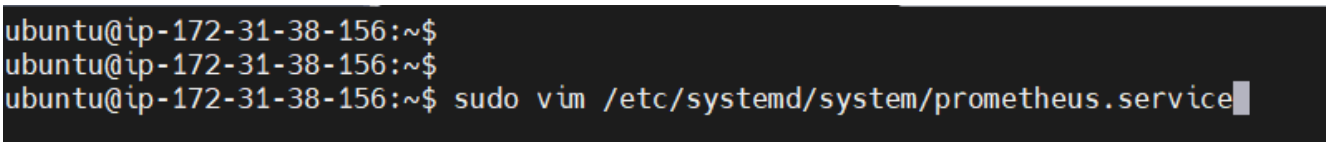
To get more information and configuration options, run Prometheus Help.

```
prometheus --help
```

We're going to use some of these options in the service definition.

We're going to use Systemd, which is a system and service manager for Linux operating systems. For that, we need to create a Systemd unit configuration file.

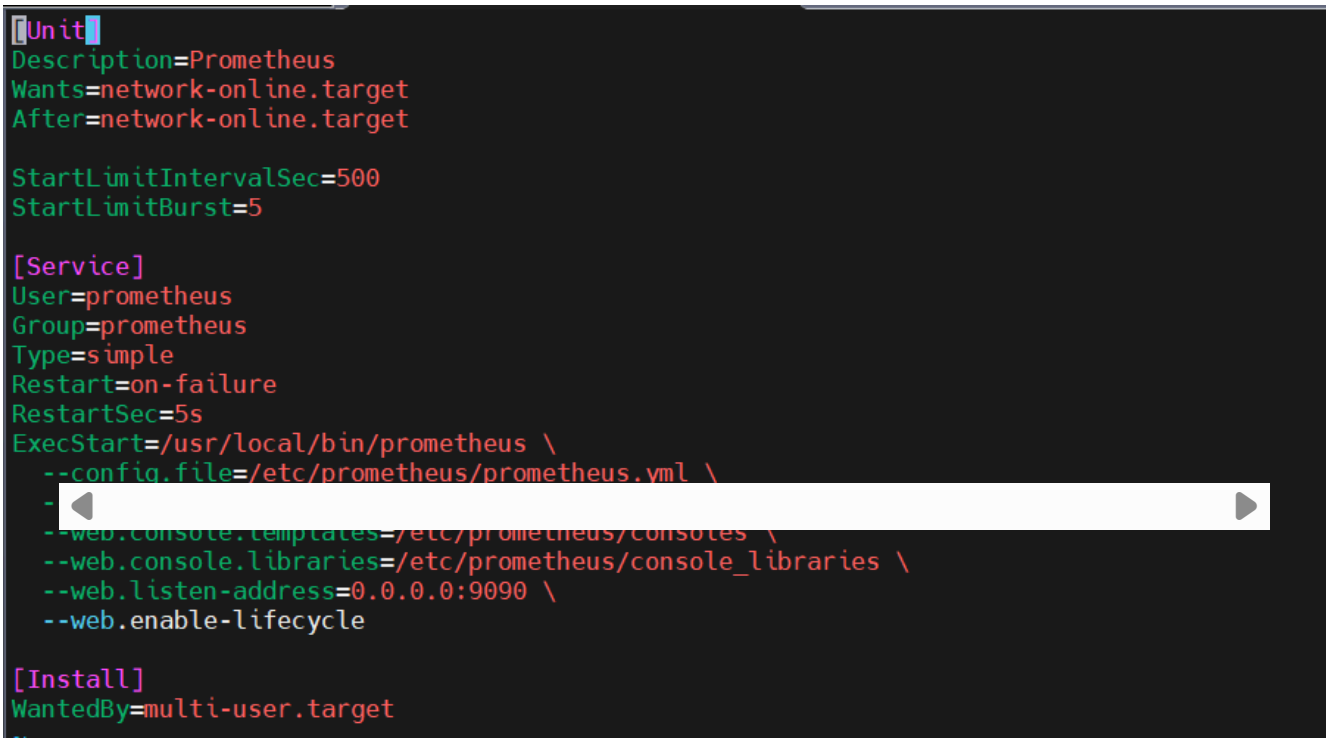
```
sudo vim /etc/systemd/system/prometheus.service
```



Prometheus.service

```
[Unit]
Description=Prometheus
Wants=network-online.target
After=network-online.target
StartLimitIntervalSec=500
StartLimitBurst=5
[Service]
User=prometheus
Group=prometheus
Type=simple
Restart=on-failure
RestartSec=5s
ExecStart=/usr/local/bin/prometheus \
```

```
  --config.file=/etc/prometheus/prometheus.yml \
  --storage.tsdb.path=/data \
  --web.console.templates=/etc/prometheus/consoles \
  --web.console.libraries=/etc/prometheus/console_libraries \
  --web.listen-address=0.0.0.0:9090 \
  --web.enable-lifecycle
[Install]
WantedBy=multi-user.target
```



Let's go over a few of the most important options related to Systemd and Prometheus. Restart – Configures whether the service shall be restarted when the service process exits, is killed, or a timeout is reached.
RestartSec – Configures the time to sleep before restarting a service.
User and Group – Are Linux user and a group to start a Prometheus process.
–config.file=/etc/prometheus/prometheus.yml – Path to the main Prometheus configuration file.
–storage.tsdb.path=/data – Location to store Prometheus data.
–web.listen-address=0.0.0.0:9090 – Configure to listen on all network interfaces. In some situations, you may have a proxy such as nginx to redirect requests to Prometheus. In that case, you would configure Prometheus to listen only on **localhost**.
–web.enable-lifecycle – Allows to manage Prometheus, for example, to reload configuration without restarting the service.

To automatically start the Prometheus after reboot, run enable.

```
sudo systemctl enable prometheus
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo systemctl enable prometheus
Created symlink /etc/systemd/system/multi-user.target.wants/prometheus.service → /etc/systemd/system/prometheus.service.
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
```

Then just start the Prometheus.

```
sudo systemctl start prometheus
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo systemctl start prometheus
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
```

To check the status of Prometheus run the following command:

```
sudo systemctl status prometheus
```

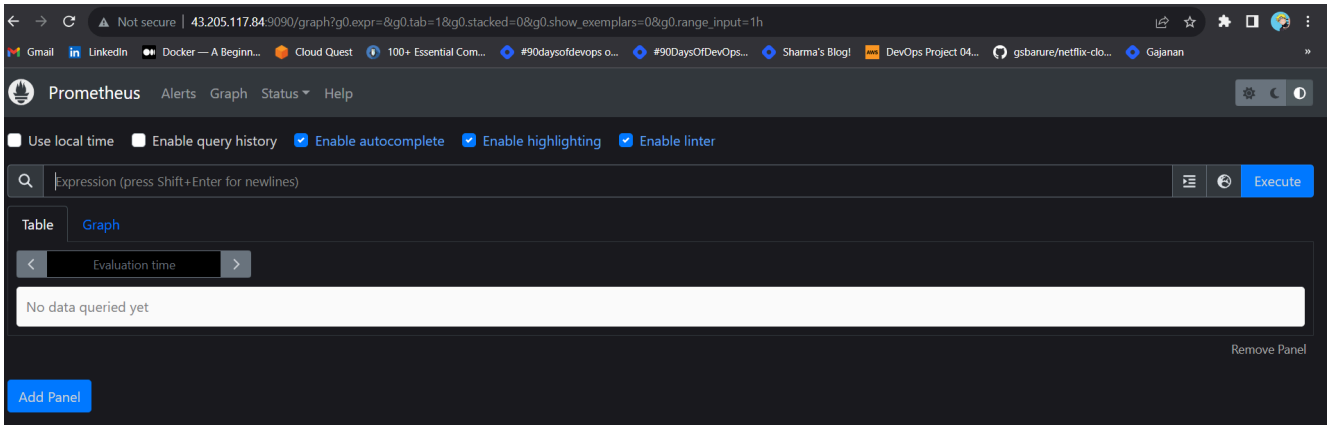
```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo systemctl status prometheus
● prometheus.service - Prometheus
     Loaded: loaded (/etc/systemd/system/prometheus.service; enabled; vendor preset: enabled)
     Active: active (running) since Fri 2023-10-06 09:00:39 UTC; 13s ago
   Main PID: 1941 (prometheus)
      Tasks: 6 (limit: 1141)
     Memory: 16.2M
        CPU: 64ms
     CGroup: /system.slice/prometheus.service
             └─1941 /usr/local/bin/prometheus --config.file=/etc/prometheus/prometheus.yml --storage.tsdb.path=/data --web.console.templates=/etc/prometheus/consoles --web.console.lib>

Oct 06 09:00:39 ip-172-31-38-156 prometheus[1941]: ts=2023-10-06T09:00:39.798Z caller=tls_config.go:274 level=info component=web msg="Listening on" address=[::]:9090
Oct 06 09:00:39 ip-172-31-38-156 prometheus[1941]: ts=2023-10-06T09:00:39.798Z caller=tls_config.go:277 level=info component=web msg="TLS is disabled." http2=false address=[::]:9090
Oct 06 09:00:39 ip-172-31-38-156 prometheus[1941]: ts=2023-10-06T09:00:39.798Z caller=head.go:760 level=info component=tsdb msg="WAL segment loaded" segment=0 maxSegment=0
Oct 06 09:00:39 ip-172-31-38-156 prometheus[1941]: ts=2023-10-06T09:00:39.798Z caller=head.go:797 level=info component=tsdb msg="WAL replay completed" checkpoint_replay_duration=42.05>
Oct 06 09:00:39 ip-172-31-38-156 prometheus[1941]: ts=2023-10-06T09:00:39.801Z caller=main.go:1045 level=info fs_type=EXT4_SUPER_MAGIC
Oct 06 09:00:39 ip-172-31-38-156 prometheus[1941]: ts=2023-10-06T09:00:39.801Z caller=main.go:1048 level=info msg="TSDB started"
Oct 06 09:00:39 ip-172-31-38-156 prometheus[1941]: ts=2023-10-06T09:00:39.801Z caller=main.go:1229 level=info msg="Loading configuration file" filename=/etc/prometheus/prometheus.yml
Oct 06 09:00:39 ip-172-31-38-156 prometheus[1941]: ts=2023-10-06T09:00:39.805Z caller=main.go:1266 level=info msg="Completed loading of configuration file" filename=/etc/prometheus/pr>
Oct 06 09:00:39 ip-172-31-38-156 prometheus[1941]: ts=2023-10-06T09:00:39.805Z caller=main.go:1009 level=info msg="Server is ready to receive web requests."
Oct 06 09:00:39 ip-172-31-38-156 prometheus[1941]: ts=2023-10-06T09:00:39.805Z caller=manager.go:1009 level=info component="rule manager" msg="Starting rule manager..."
lines 1-20/20 (END)
```

Suppose you encounter any issues with Prometheus or are unable to start it. The easiest way to find the problem is to use the journalctl command and search for errors.

```
journalctl -u prometheus -f --no-pager
```

Now we can try to access it via the browser. I'm going to be using the IP address of the Ubuntu server. You need to append port 9090 to the IP.

```
<public-ip:9090>
```



If you go to targets, you should see only one – Prometheus target. It scrapes itself every 15 seconds by default.

Install Node Exporter on Ubuntu 22.04

Next, we're going to set up and configure Node Exporter to collect Linux system metrics like CPU load and disk I/O. Node Exporter will expose these as Prometheus-style metrics. Since the installation process is very similar, I'm not going to cover as deep as Prometheus.

First, let's create a system user for Node Exporter by running the following command:

```
sudo useradd \
    --system \
    --no-create-home \
    --shell /bin/false node_exporter
```

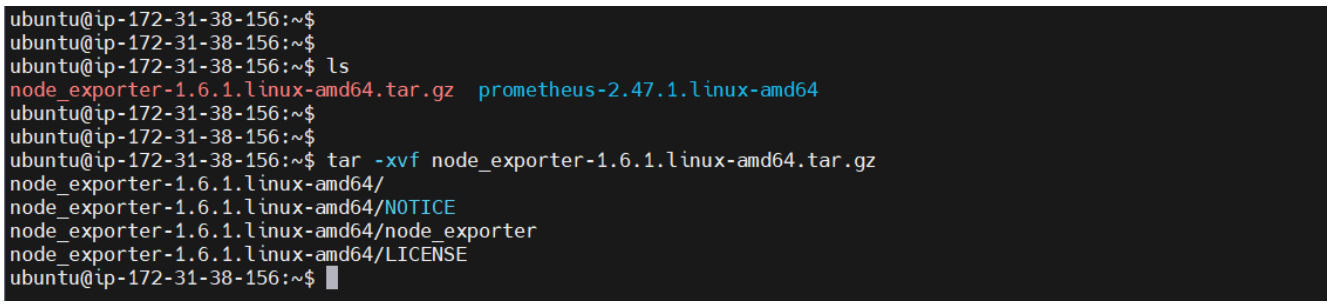
You can **download Node Exporter** from the same page.

Use the wget command to download the binary.

```
wget https://github.com/prometheus/node_exporter/releases/download/v1.6
```

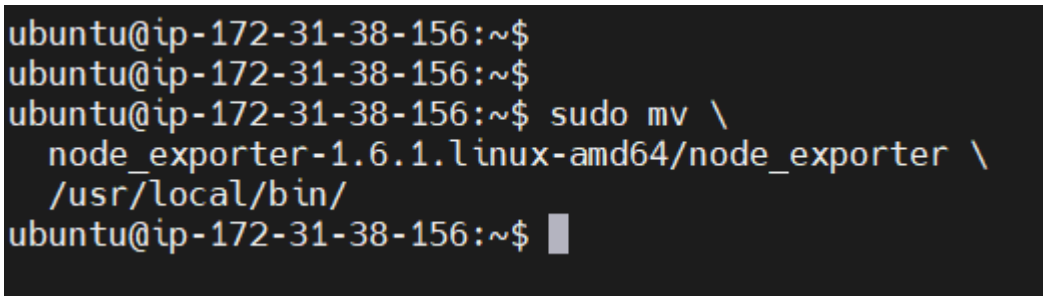
Extract the node exporter from the archive.

```
tar -xvf node_exporter-1.6.1.linux-amd64.tar.gz
```



Move binary to the /usr/local/bin.

```
sudo mv \
  node_exporter-1.6.1.linux-amd64/node_exporter \
  /usr/local/bin/
```



Clean up, and delete node_exporter archive and a folder.

```
rm -rf node_exporter*
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ ls
node_exporter-1.6.1.linux-amd64  node_exporter-1.6.1.linux-amd64.tar.gz  prometheus-2.47.1.linux-amd64
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ rm -rf node_exporter*
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ ls
prometheus-2.47.1.linux-amd64
ubuntu@ip-172-31-38-156:~$
```

Verify that you can run the binary.

```
node_exporter --version
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ node_exporter --version
node_exporter, version 1.6.1 (branch: HEAD, revision: 4a1b77600c1873a8233f3ffb55afcedbb63b8d84)
  build user:       root@586879db11e5
  build date:       20230717-12:10:52
  go version:       go1.20.6
  platform:         linux/amd64
  tags:             netgo osusergo static_build
ubuntu@ip-172-31-38-156:~$
```

Node Exporter has a lot of plugins that we can enable. If you run Node Exporter help you will get all the options.

```
node_exporter --help
```

–collector.logind We're going to enable the login controller, just for the demo.

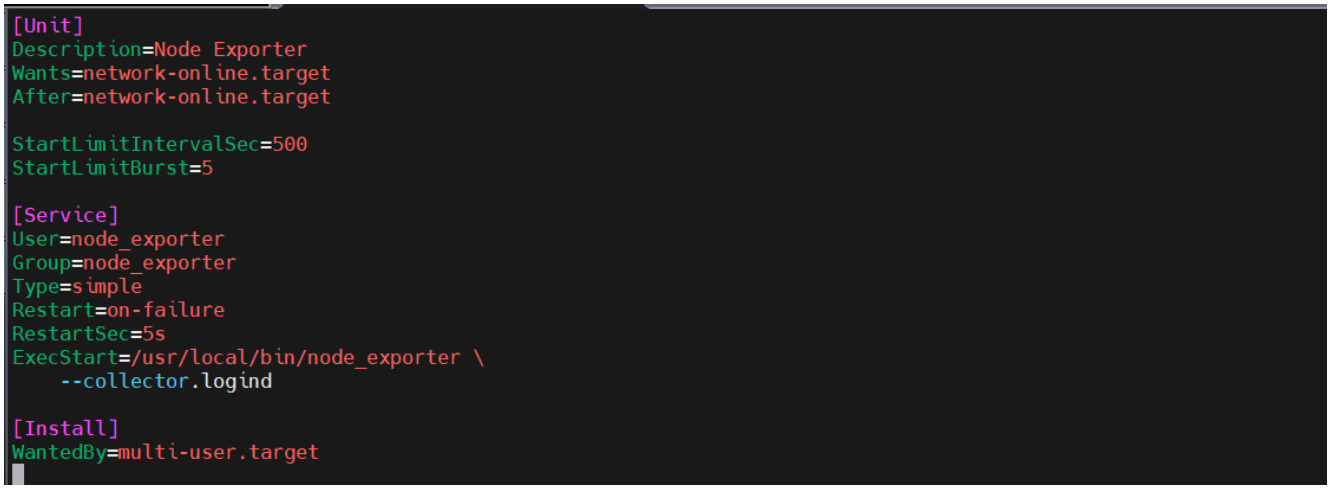
Next, create a similar systemd unit file.

```
sudo vim /etc/systemd/system/node_exporter.service
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo vim /etc/systemd/system/node_exporter.service
```

node_exporter.service

```
[Unit]
Description=Node Exporter
Wants=network-online.target
After=network-online.target
StartLimitIntervalSec=500
StartLimitBurst=5
[Service]
User=node_exporter
Group=node_exporter
Type=simple
Restart=on-failure
RestartSec=5s
ExecStart=/usr/local/bin/node_exporter \
    --collector.logind
[Install]
WantedBy=multi-user.target
```



Replace Prometheus user and group to node_exporter, and update the ExecStart command.

To automatically start the Node Exporter after reboot, enable the service.

```
sudo systemctl enable node_exporter
```

Then start the Node Exporter.

```
sudo systemctl start node_exporter
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo systemctl enable node_exporter
Created symlink /etc/systemd/system/multi-user.target.wants/node_exporter.service → /etc/systemd/system/node_exporter.service.
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo systemctl start node_exporter
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
```

Check the status of Node Exporter with the following command:

```
sudo systemctl status node_exporter
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo systemctl status node_exporter
● node_exporter.service - Node Exporter
     Loaded: loaded (/etc/systemd/system/node_exporter.service; enabled; vendor preset: enabled)
     Active: active (running) since Fri 2023-10-06 09:07:39 UTC; 8s ago
   Main PID: 2030 (node_exporter)
      Tasks: 3 (limit: 1141)
     Memory: 2.0M
        CPU: 9ms
     CGroup: /system.slice/node_exporter.service
             └─2030 /usr/local/bin/node_exporter --collector.logind

Oct 06 09:07:39 ip-172-31-38-156 node_exporter[2030]: ts=2023-10-06T09:07:39.414Z caller=node_exporter.go:117 level=info collector=thermal_zone
Oct 06 09:07:39 ip-172-31-38-156 node_exporter[2030]: ts=2023-10-06T09:07:39.414Z caller=node_exporter.go:117 level=info collector=time
Oct 06 09:07:39 ip-172-31-38-156 node_exporter[2030]: ts=2023-10-06T09:07:39.414Z caller=node_exporter.go:117 level=info collector=timex
Oct 06 09:07:39 ip-172-31-38-156 node_exporter[2030]: ts=2023-10-06T09:07:39.414Z caller=node_exporter.go:117 level=info collector=udp_queues
Oct 06 09:07:39 ip-172-31-38-156 node_exporter[2030]: ts=2023-10-06T09:07:39.414Z caller=node_exporter.go:117 level=info collector=uname
Oct 06 09:07:39 ip-172-31-38-156 node_exporter[2030]: ts=2023-10-06T09:07:39.414Z caller=node_exporter.go:117 level=info collector=vmstat
Oct 06 09:07:39 ip-172-31-38-156 node_exporter[2030]: ts=2023-10-06T09:07:39.414Z caller=node_exporter.go:117 level=info collector=xfs
Oct 06 09:07:39 ip-172-31-38-156 node_exporter[2030]: ts=2023-10-06T09:07:39.414Z caller=node_exporter.go:117 level=info collector=zfs
Oct 06 09:07:39 ip-172-31-38-156 node_exporter[2030]: ts=2023-10-06T09:07:39.415Z caller=tls_config.go:274 level=info msg="Listening on" address=[::]:9100
Oct 06 09:07:39 ip-172-31-38-156 node_exporter[2030]: ts=2023-10-06T09:07:39.415Z caller=tls_config.go:277 level=info msg="TLS is disabled." http2=false address=[::]:9100
ubuntu@ip-172-31-38-156:~$
```

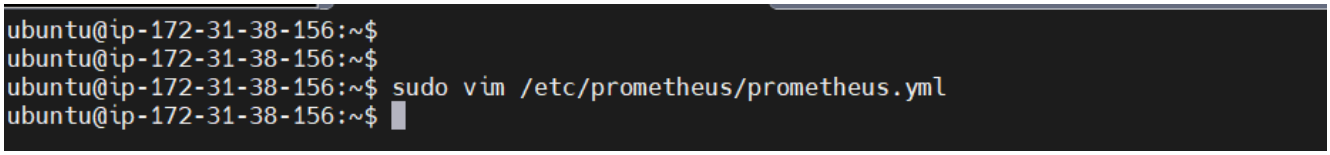
If you have any issues, check logs with journalctl

```
journalctl -u node_exporter -f --no-pager
```

At this point, we have only a single target in our Prometheus. There are many different service discovery mechanisms built into Prometheus. For example, Prometheus can dynamically discover targets in AWS, GCP, and other clouds based on the labels. In the following tutorials, I'll give you a few examples of deploying Prometheus in a cloud-specific environment. For this tutorial, let's keep it simple and keep adding static targets. Also, I have a lesson on how to deploy and manage Prometheus in the Kubernetes cluster.

To create a static target, you need to add job_name with static_configs.

```
sudo vim /etc/prometheus/prometheus.yml
```



prometheus.yml

```
- job_name: node_export
    static_configs:
      - targets: ["localhost:9100"]
```

```
# my global config
global:
  scrape_interval: 15s # Set the scrape interval to every 15 seconds. Default is every 1 minute.
  evaluation_interval: 15s # Evaluate rules every 15 seconds. The default is every 1 minute.
  # scrape_timeout is set to the global default (10s).

# Alertmanager configuration
alerting:
  alertmanagers:
    - static_configs:
        - targets:
          # - alertmanager:9093

# Load rules once and periodically evaluate them according to the global 'evaluation_interval'.
rule_files:
  # - "first_rules.yml"
  # - "second_rules.yml"

# A scrape configuration containing exactly one endpoint to scrape:
# Here it's Prometheus itself.
scrape_configs:
  # The job name is added as a label `job=<job_name>` to any timeseries scraped from this config.
  - job_name: "prometheus"

    # metrics_path defaults to '/metrics'
    # scheme defaults to 'http'.

    static_configs:
      - targets: ["localhost:9090"]

  - job_name: node_export
    static_configs:
      - targets: ["localhost:9100"]

~
```

By default, Node Exporter will be exposed on port 9100.

Since we enabled lifecycle management via API calls, we can reload the Prometheus config without restarting the service and causing downtime.

Before, restarting check if the config is valid.

```
promtool check config /etc/prometheus/prometheus.yml
```

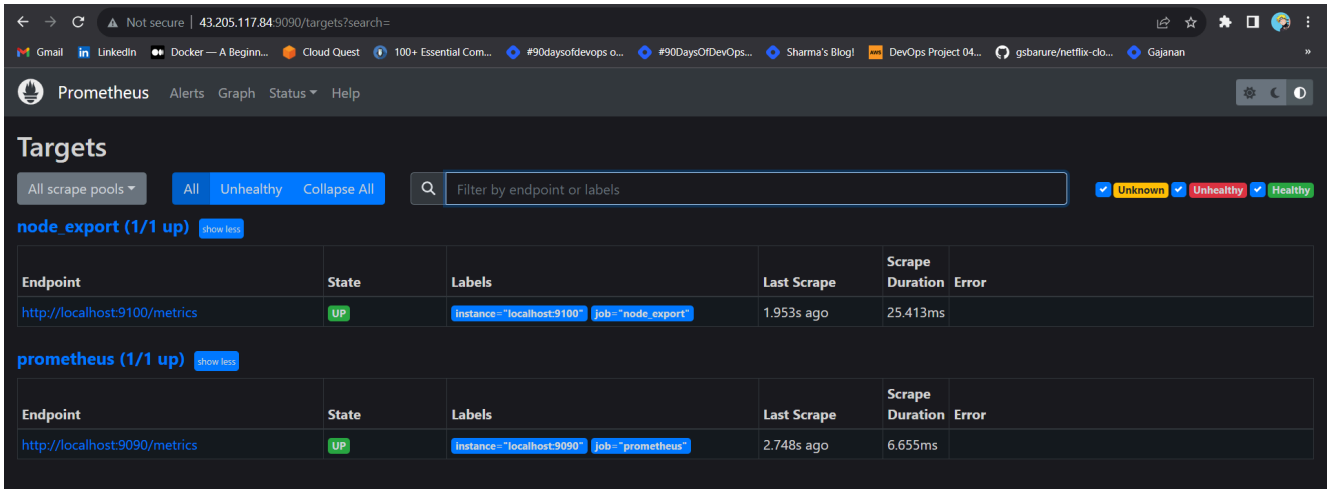
```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ promtool check config /etc/prometheus/prometheus.yml
Checking /etc/prometheus/prometheus.yml
 SUCCESS: /etc/prometheus/prometheus.yml is valid prometheus config file syntax

ubuntu@ip-172-31-38-156:~$
```

Then, you can use a POST request to reload the config.

```
curl -X POST http://localhost:9090/-/reload
```

Check the targets section

```
http://<ip>:9090/targets
```



Install Grafana on Ubuntu 22.04

To visualize metrics we can use Grafana. There are many different data sources that Grafana supports, one of them is Prometheus.

First, let's make sure that all the dependencies are installed.

```
sudo apt-get install -y apt-transport-https software-properties-common
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo apt-get install -y apt-transport-https software-properties-common
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  python3-software-properties
The following NEW packages will be installed:
  apt-transport-https
The following packages will be upgraded:
  python3-software-properties software-properties-common
2 upgraded, 1 newly installed, 0 to remove and 127 not upgraded.
Need to get 44.4 kB of archives.
After this operation, 169 kB of additional disk space will be used.
Get:1 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 apt-transport-https all 2.4.10 [1510 B]
Get:2 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 software-properties-common all 0.99.22.7 [14.1 kB]
Get:3 http://ap-south-1.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3-software-properties all 0.99.22.7 [28.8 kB]
Fetched 44.4 kB in 0s (2002 kB/s)
Selecting previously unselected package apt-transport-https.
(Reading database ... 64295 files and directories currently installed.)
Preparing to unpack .../apt-transport-https_2.4.10_all.deb ...
Unpacking apt-transport-https (2.4.10) ...
Preparing to unpack .../software-properties-common_0.99.22.7_all.deb ...
Unpacking software-properties-common (0.99.22.7) over (0.99.22.6) ...
Preparing to unpack .../python3-software-properties_0.99.22.7_all.deb ...
Unpacking python3-software-properties (0.99.22.7) over (0.99.22.6) ...
Setting up apt-transport-https (2.4.10) ...
Setting up python3-software-properties (0.99.22.7) ...
Setting up software-properties-common (0.99.22.7) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for dbus (1.12.20-2ubuntu4.1) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.
```

Next, add the GPG key.

```
wget -q -O - https://packages.grafana.com/gpg.key | sudo apt-key add -
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ wget -q -O - https://packages.grafana.com/gpg.key | sudo apt-key add -
Warning: apt-key is deprecated. Manage keyring files in trusted.gpg.d instead (see apt-key(8)).
OK
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
```

Add this repository for stable releases.

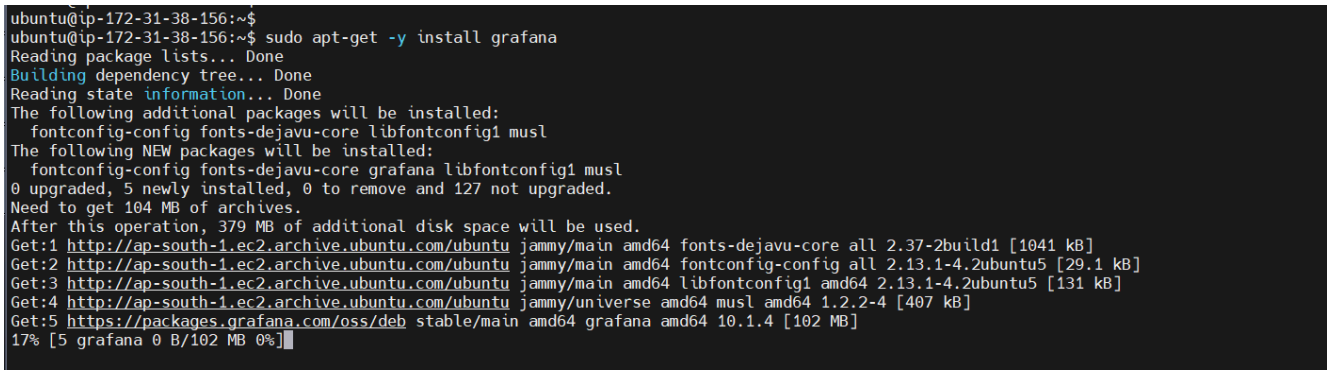
```
echo "deb https://packages.grafana.com/oss/deb stable main" | sudo tee -
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ echo "deb https://packages.grafana.com/oss/deb stable main" | sudo tee -a /etc/apt/sources.list.d/grafana.list
deb https://packages.grafana.com/oss/deb stable main
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
```

After you add the repository, update and install Garafana.

```
sudo apt-get update
```

```
sudo apt-get -y install grafana
```

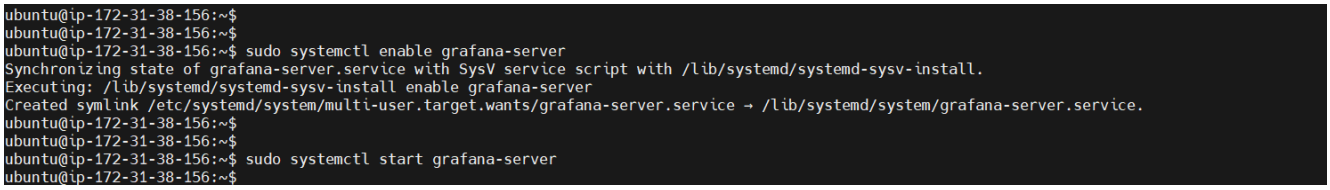


To automatically start the Grafana after reboot, enable the service.

```
sudo systemctl enable grafana-server
```

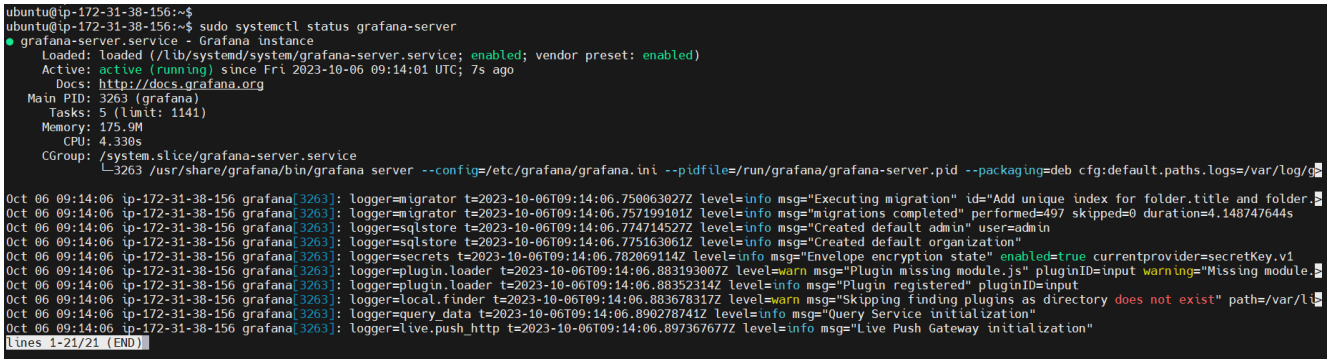
Then start the Grafana.

```
sudo systemctl start grafana-server
```



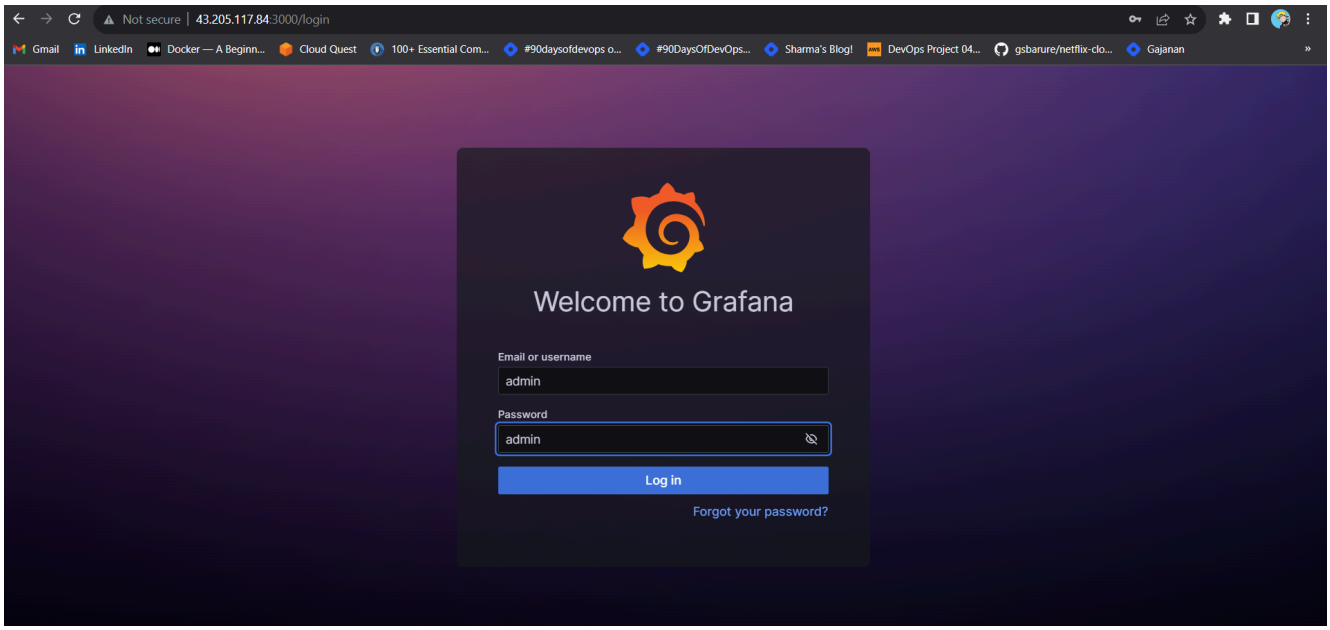
To check the status of Grafana, run the following command:

```
sudo systemctl status grafana-server
```

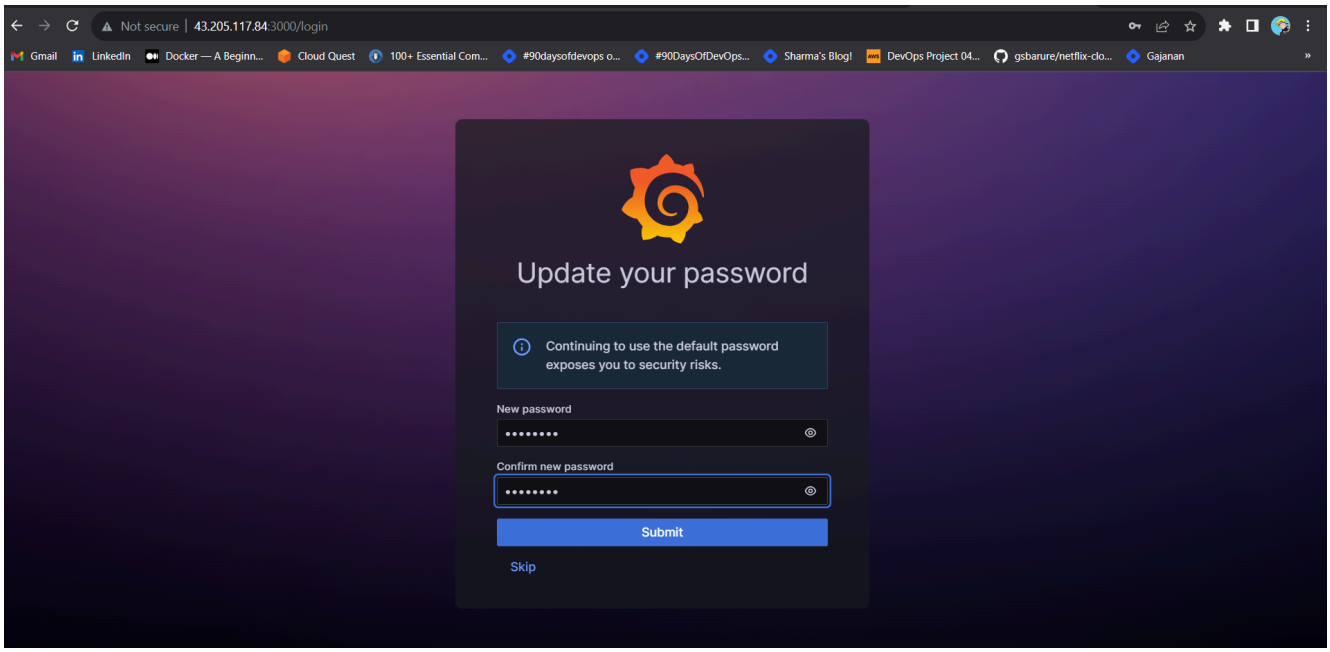


Go to `http://<ip>:3000` and log in to the Grafana using default credentials. The username is admin, and the password is admin as well.

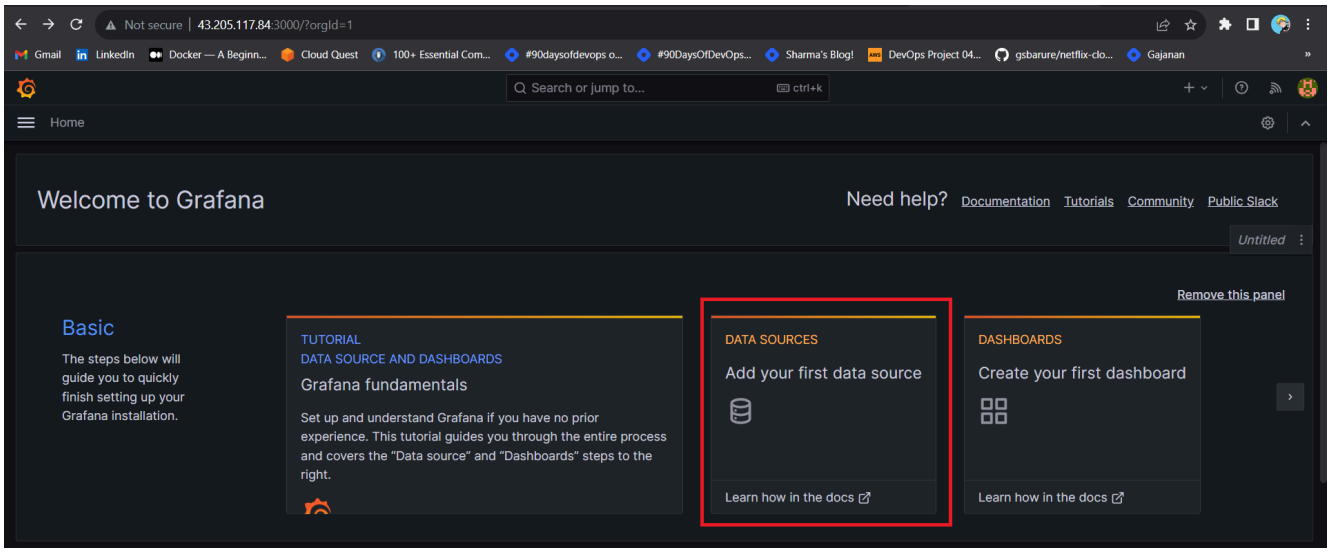
```
username admin
password admin
```



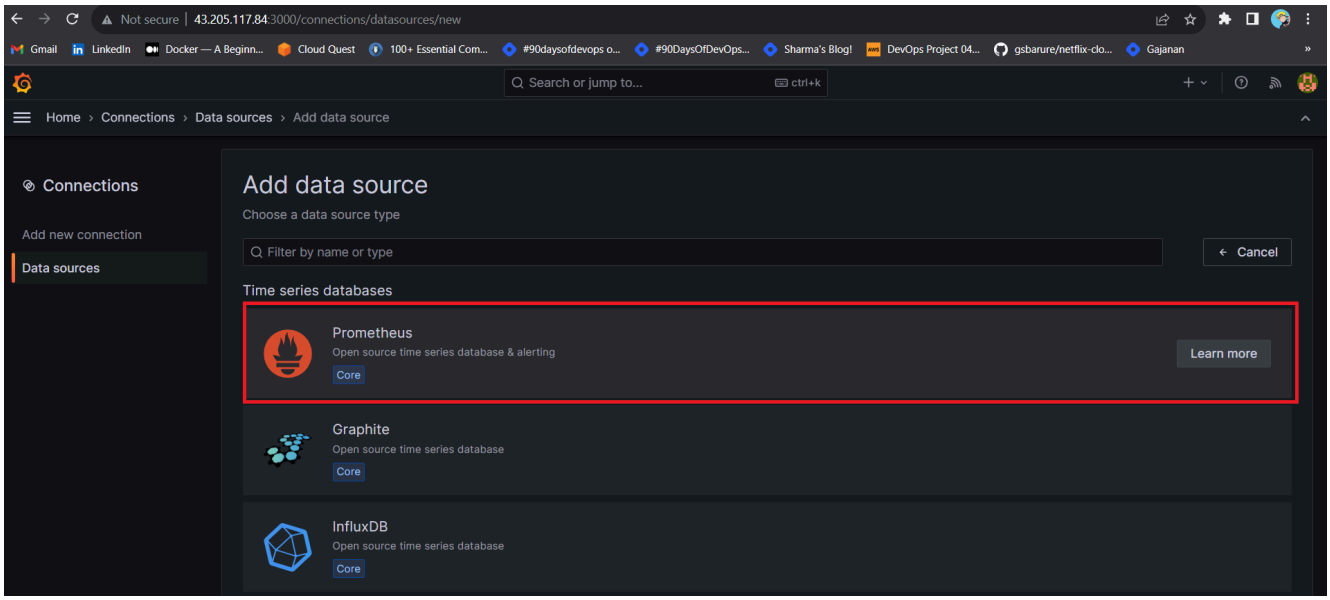
When you log in for the first time, you get the option to change the password.



To visualize metrics, you need to add a data source first.

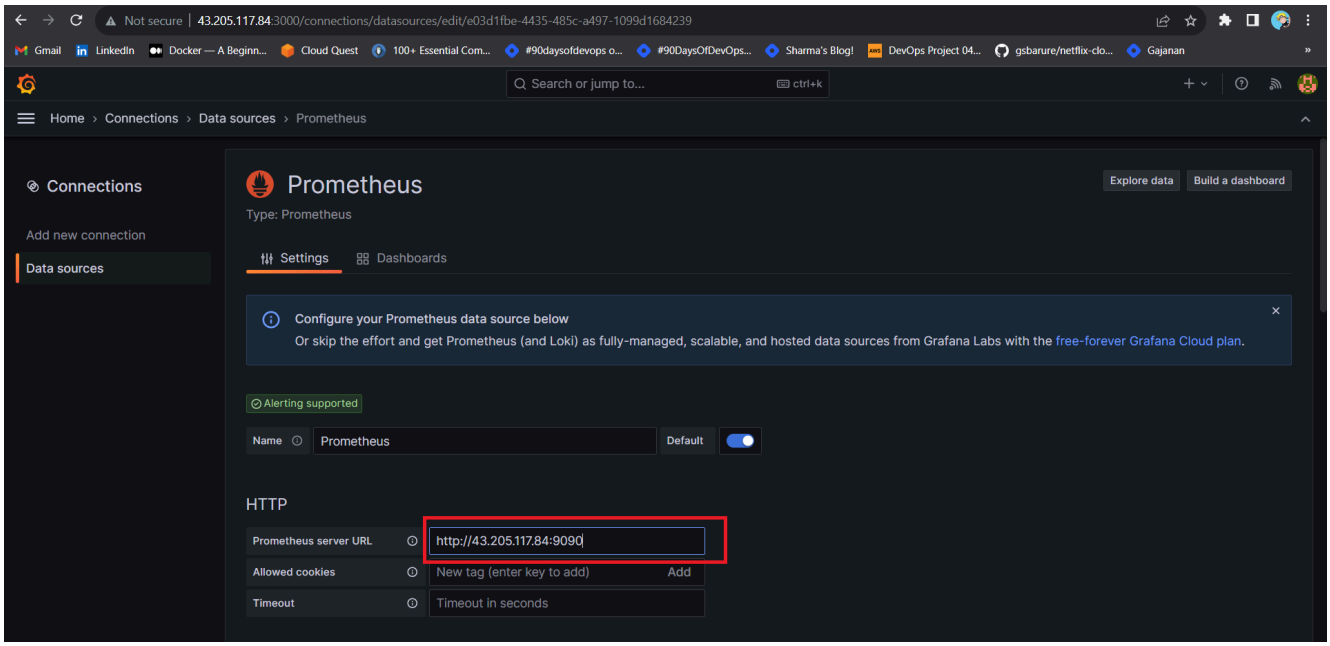


Click Add data source and select Prometheus.

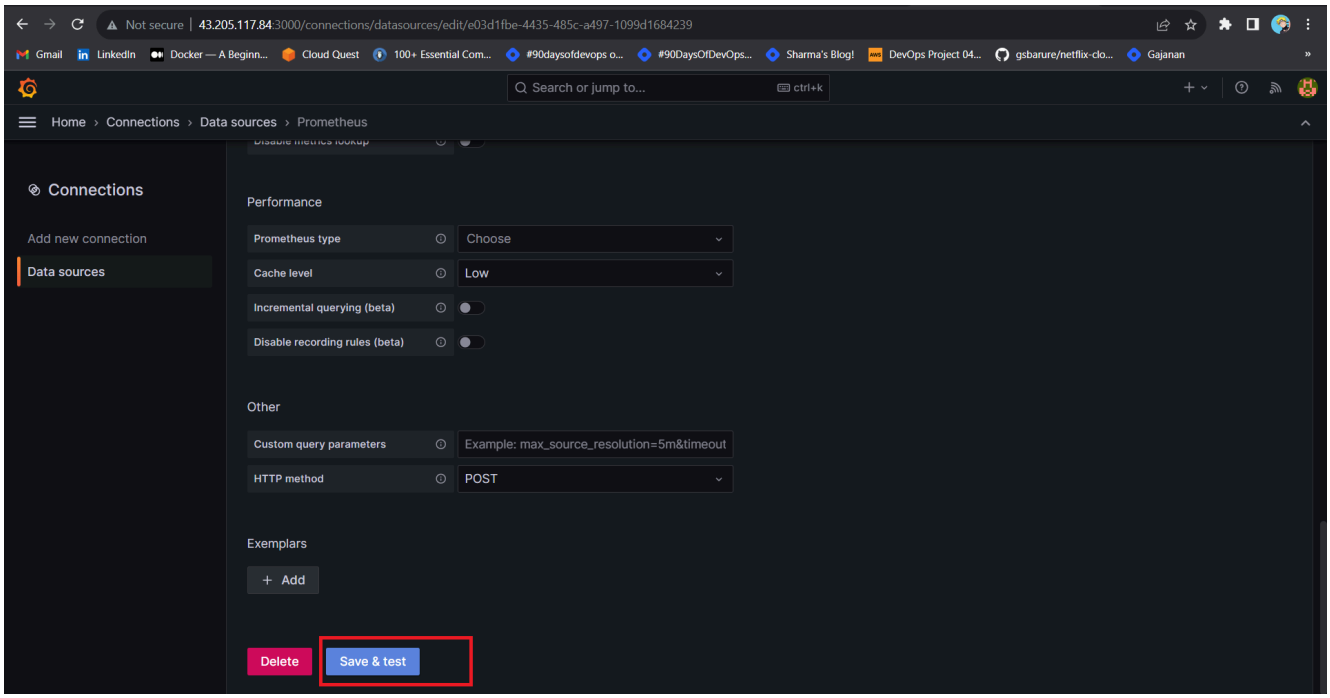


For the URL, enter **localhost:9090** and click Save and test. You can see Data source is working.

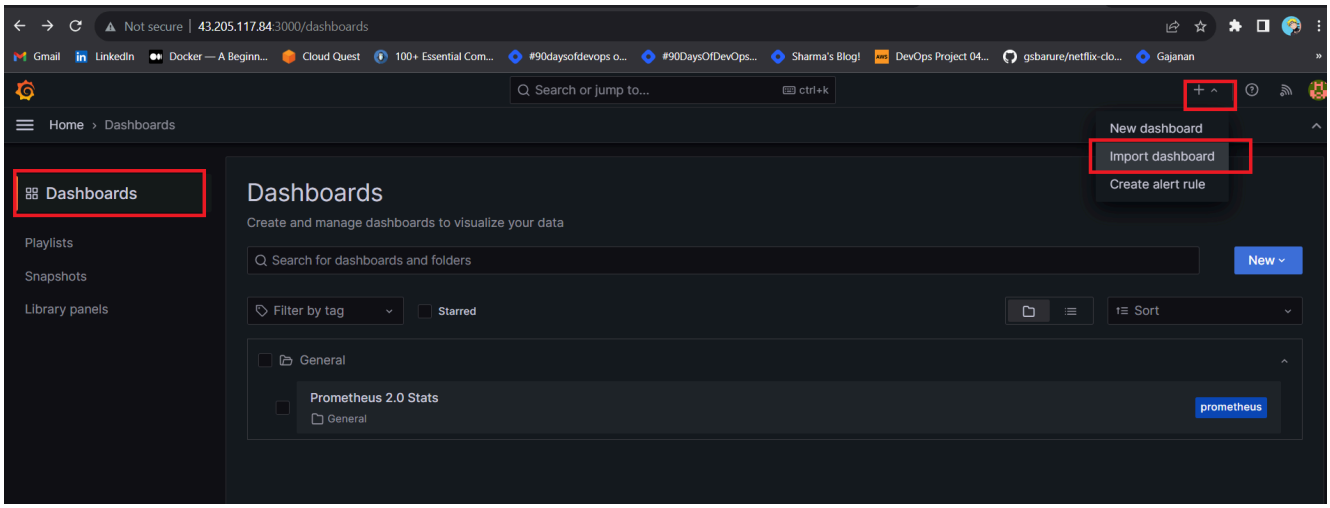
```
<public-ip:9090>
```



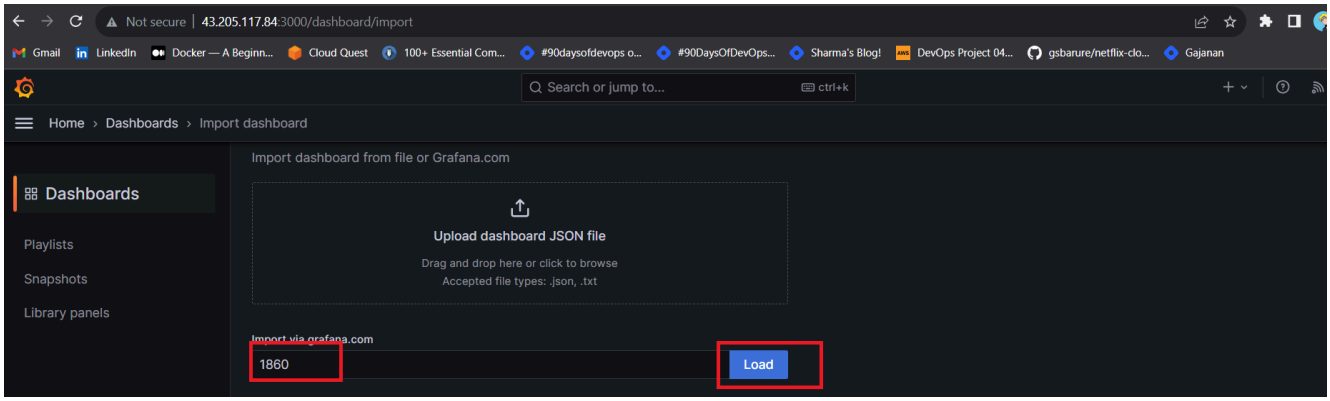
Click on Save and Test.



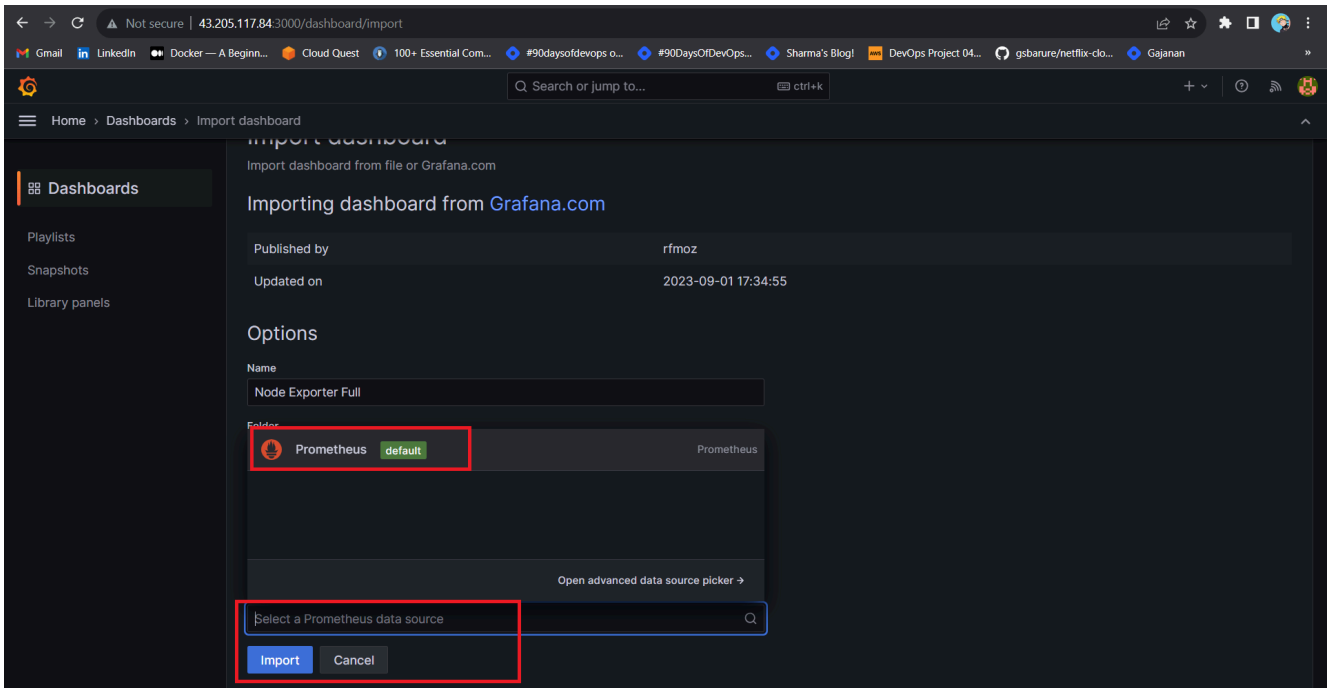
Let's add Dashboard for a better view



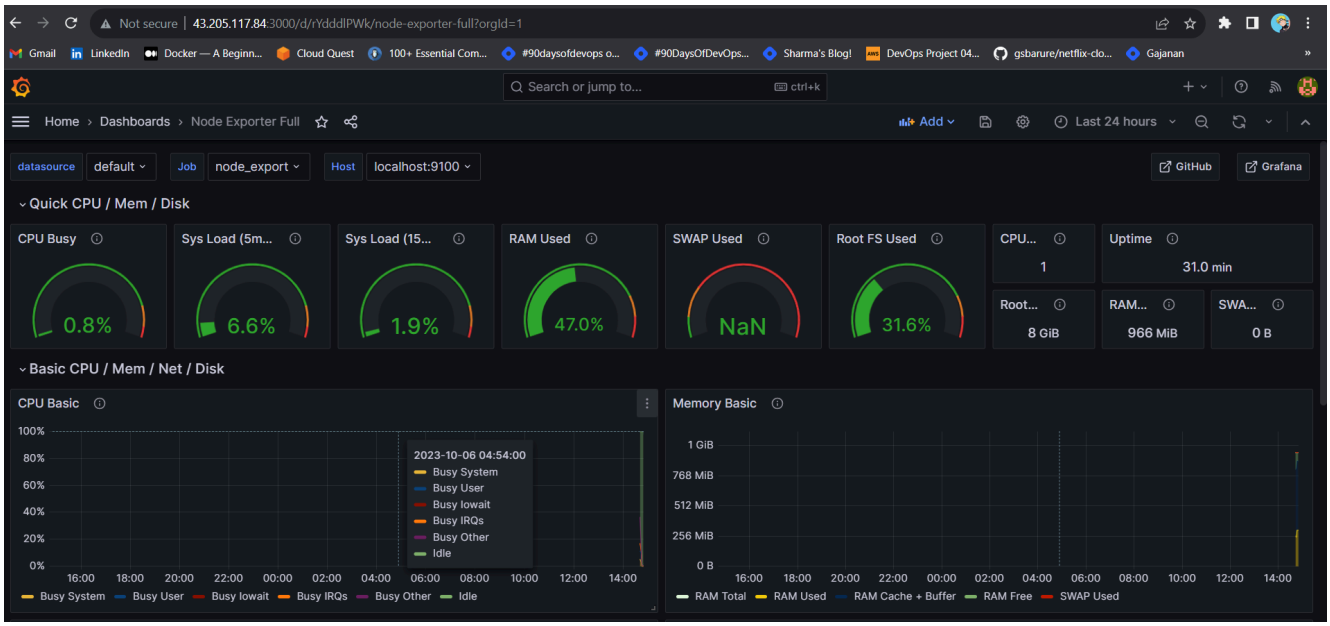
Click on Import Dashboard paste this code 1860 and click on load



Select the Datasource and click on Import



You will see this output



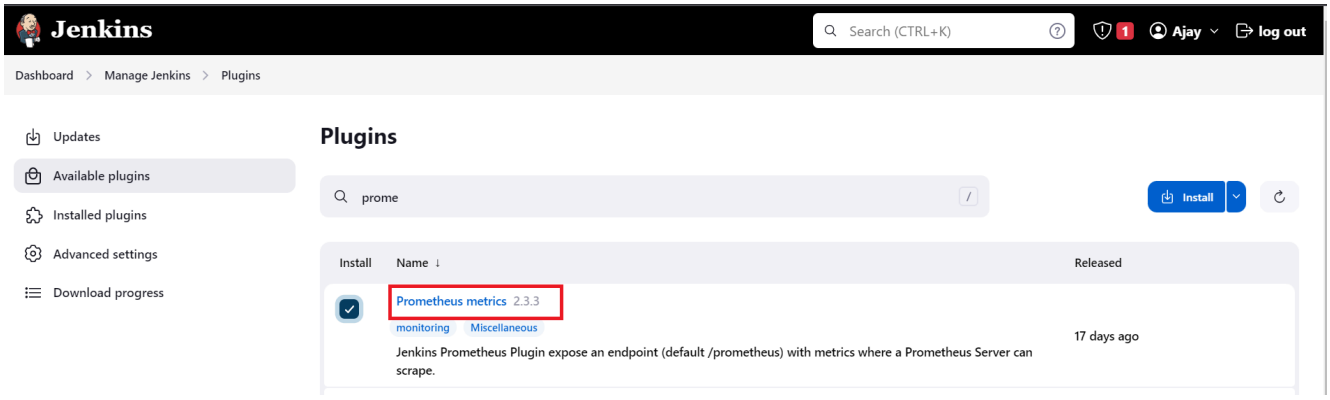
Step 5 – Install the Prometheus Plugin and Integrate it with the Prometheus server

Let's Monitor JENKINS SYSTEM

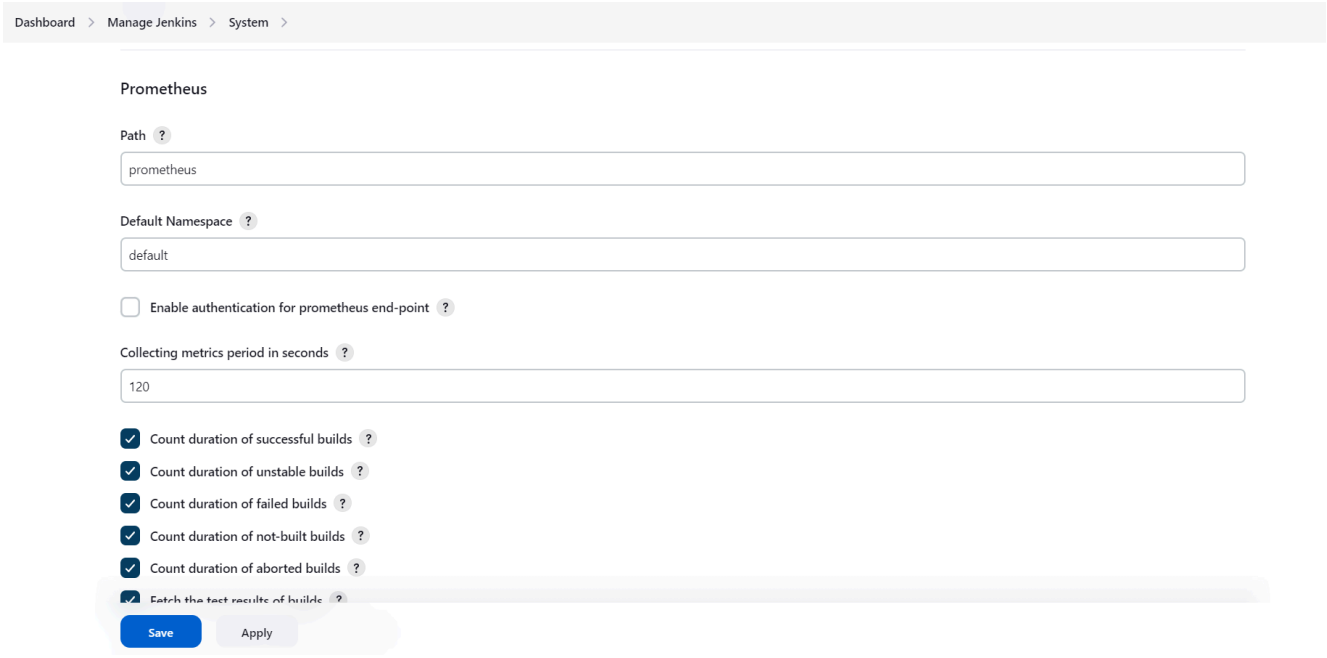
Need Jenkins up and running machine

Goto Manage Jenkins –> Plugins –> Available Plugins

Search for `Prometheus and install it`



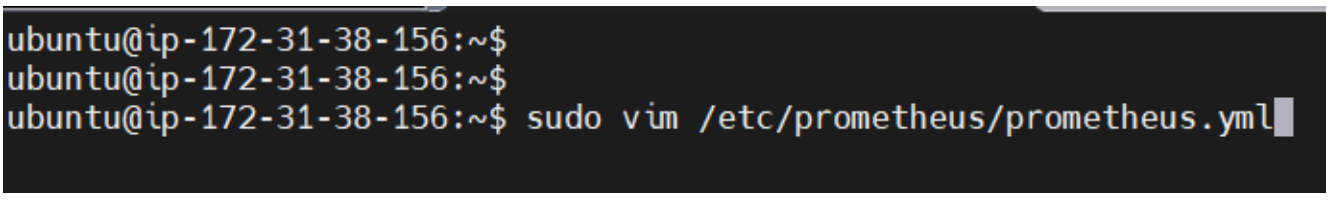
Once that is done you will Prometheus is set to `/Prometheus` path in system configurations



Nothing to change click on apply and save

To create a static target, you need to add job_name with static_configs. go to Prometheus server

```
sudo vim /etc/prometheus/prometheus.yml
```



Paste below code

```
- job_name: 'jenkins'
    metrics_path: '/prometheus'
    static_configs:
      - targets: ['<jenkins-ip>:8080']
```

```
# my global config
global:
  scrape_interval: 15s # Set the scrape interval to every 15 seconds. Default is every 1 minute.
  evaluation_interval: 15s # Evaluate rules every 15 seconds. The default is every 1 minute.
  # scrape_timeout is set to the global default (10s).

# Alertmanager configuration
alerting:
  alertmanagers:
    - static_configs:
        - targets:
          # - alertmanager:9093

# Load rules once and periodically evaluate them according to the global 'evaluation_interval'.
rule_files:
  # - "first_rules.yml"
  # - "second_rules.yml"

# A scrape configuration containing exactly one endpoint to scrape:
# Here it's Prometheus itself.
scrape_configs:
  # The job name is added as a label `job=<job_name>` to any timeseries scraped from this config.
  - job_name: "prometheus"

    # metrics_path defaults to '/metrics'
    # scheme defaults to 'http'.

    static_configs:
      - targets: ["localhost:9090"]

  - job_name: node_export
    static_configs:
      - targets: ["localhost:9100"]

  - job_name: 'jenkins'
    metrics_path: '/prometheus'
    static_configs:
      - targets: ['3.111.170.92:8080']
```

Before, restarting check if the config is valid.

```
promtool check config /etc/prometheus/prometheus.yml
```

Then, you can use a POST request to reload the config.

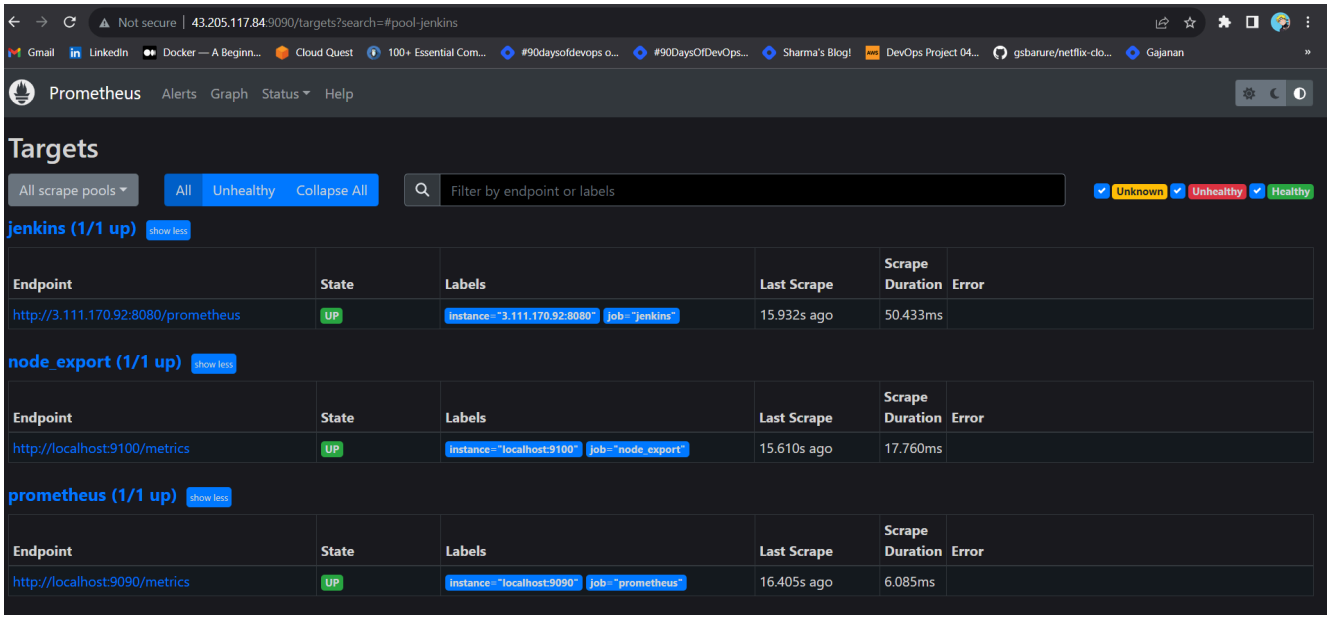
```
curl -X POST http://localhost:9090/-/reload
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ promtool check config /etc/prometheus/prometheus.yml
Checking /etc/prometheus/prometheus.yml
 SUCCESS: /etc/prometheus/prometheus.yml is valid prometheus config file syntax

ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ curl -X POST http://localhost:9090/-/reload
ubuntu@ip-172-31-38-156:~$
```

Check the targets section

```
http://<ip>:9090/targets
```

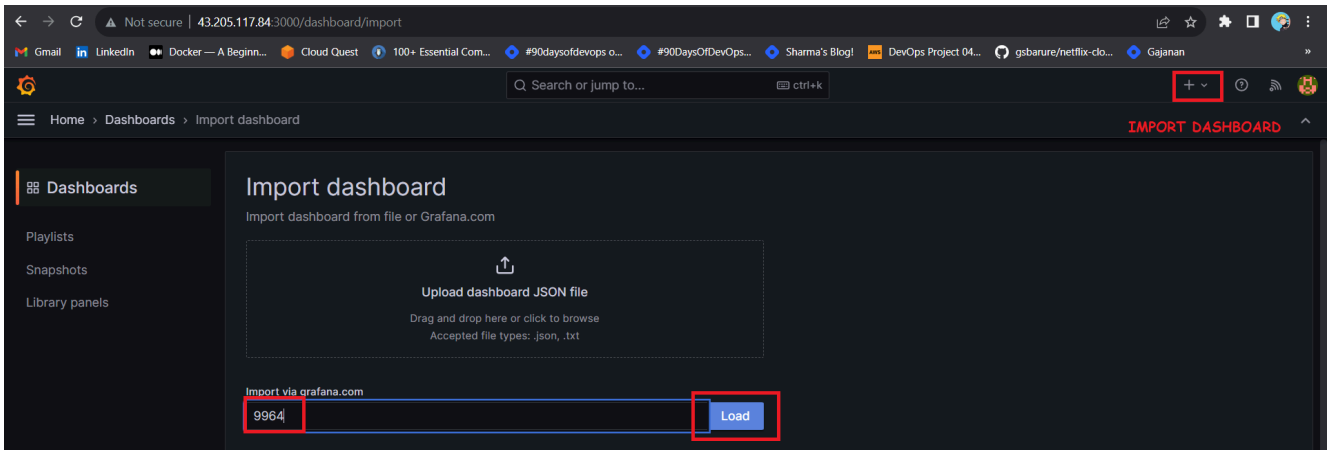
You will see Jenkins is added to it



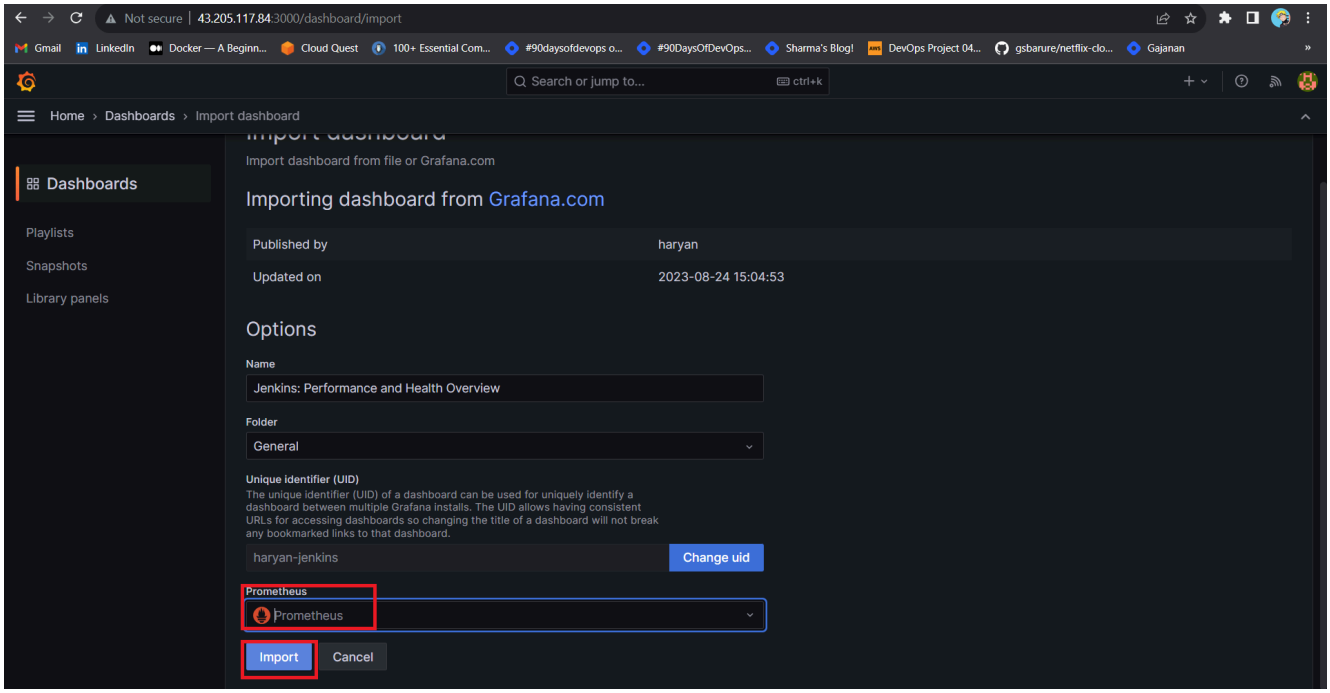
Let's add Dashboard for a better view in Grafana

Click On Dashboard –> + symbol –> Import Dashboard

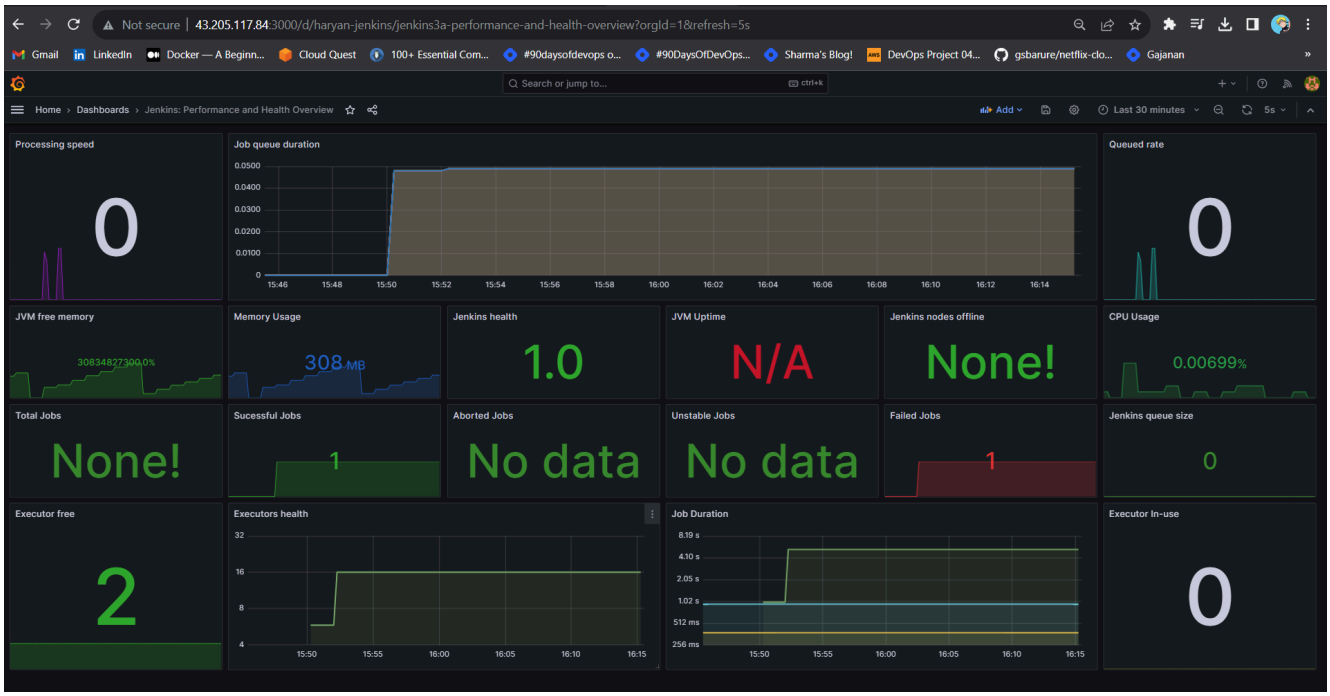
Use Id `9964` and click on load



Select the data source and click on Import

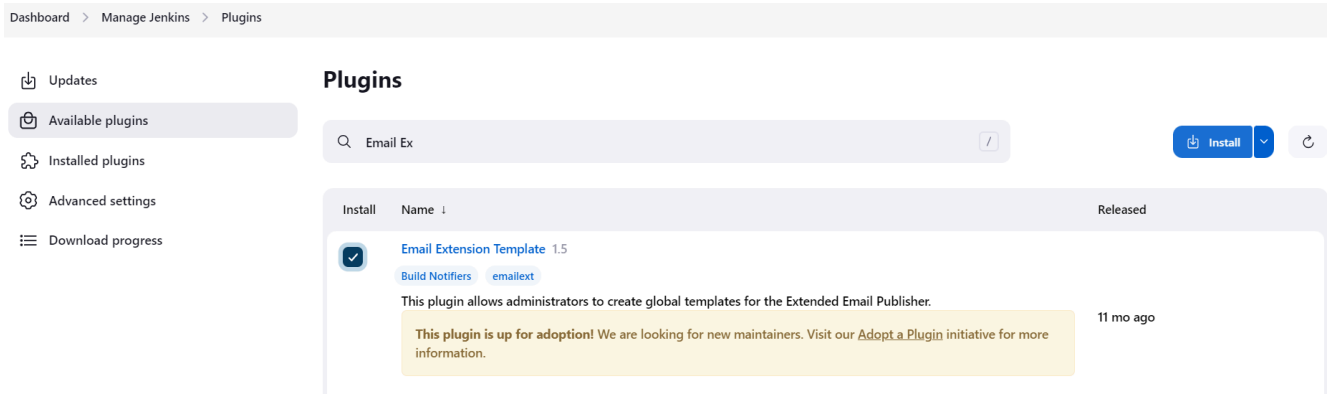


Now you will see the Detailed overview of Jenkins



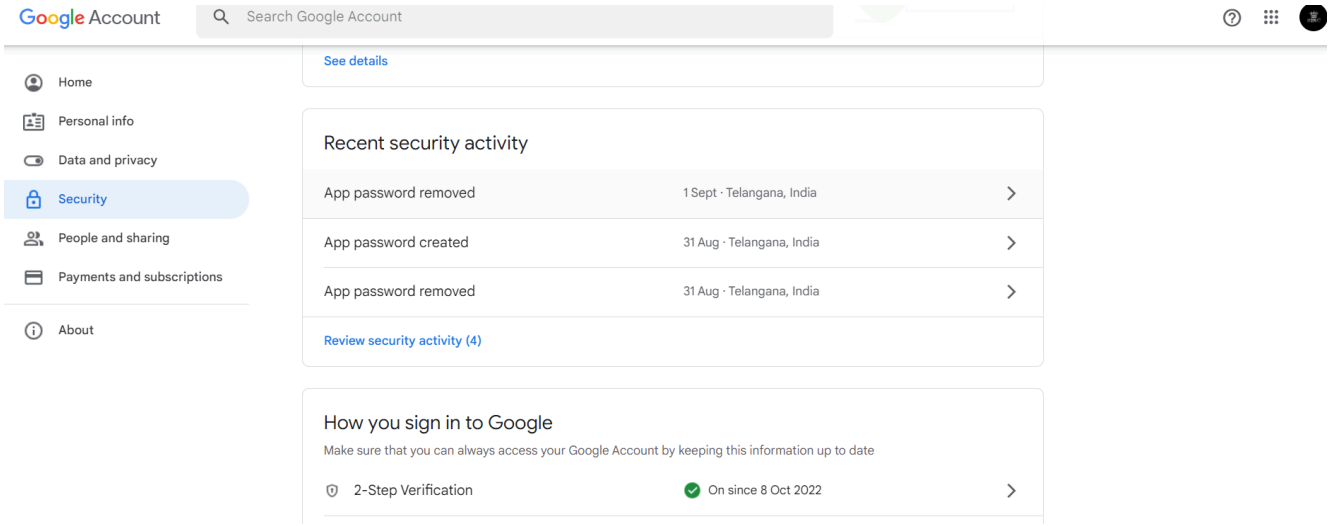
Step 6 – Email Integration With Jenkins and Plugin Setup

Install `Email Extension Plugin` in Jenkins



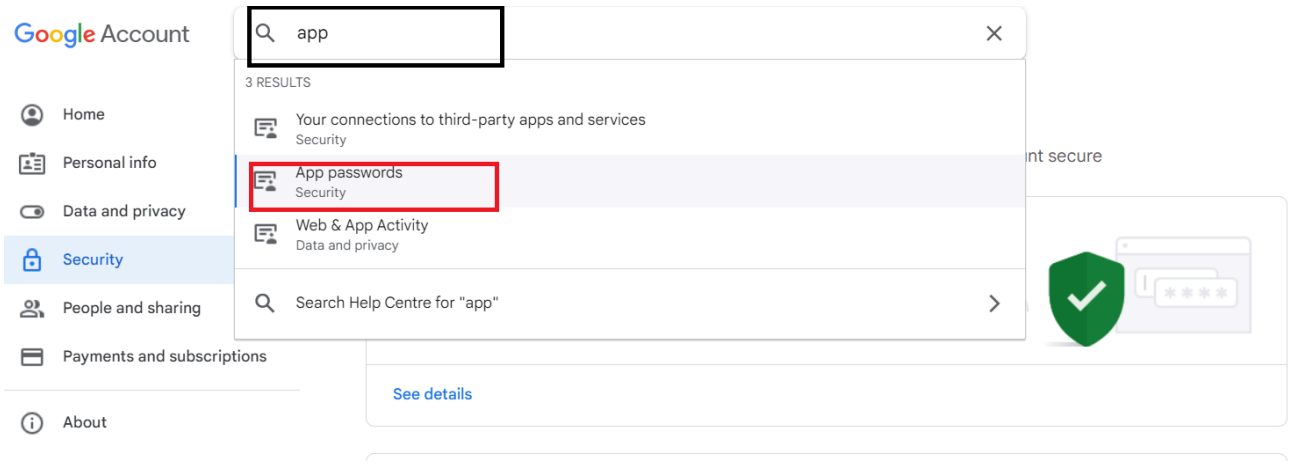
Go to your Gmail and click on your profile

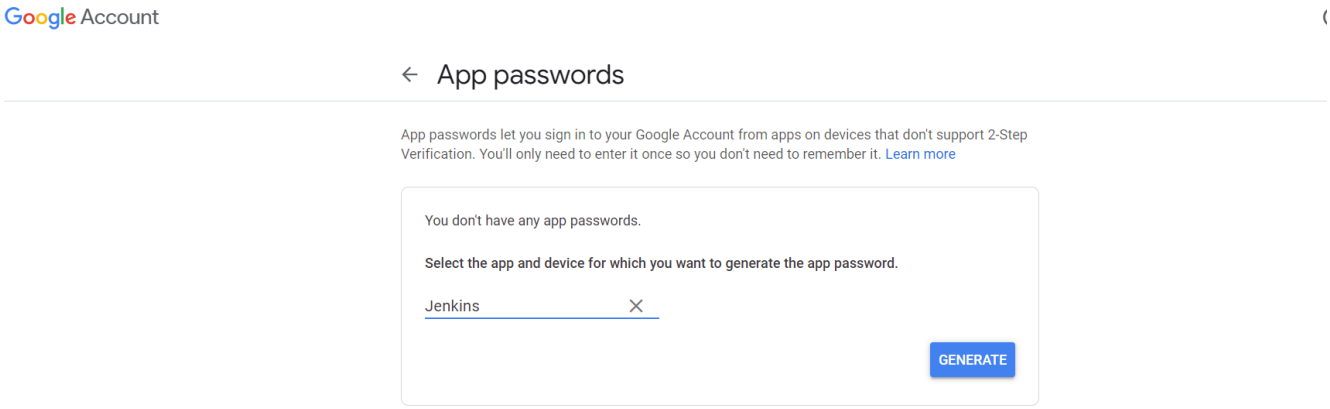
Then click on Manage Your Google Account –> click on the security tab on the left side panel you will get this page(provide mail password).



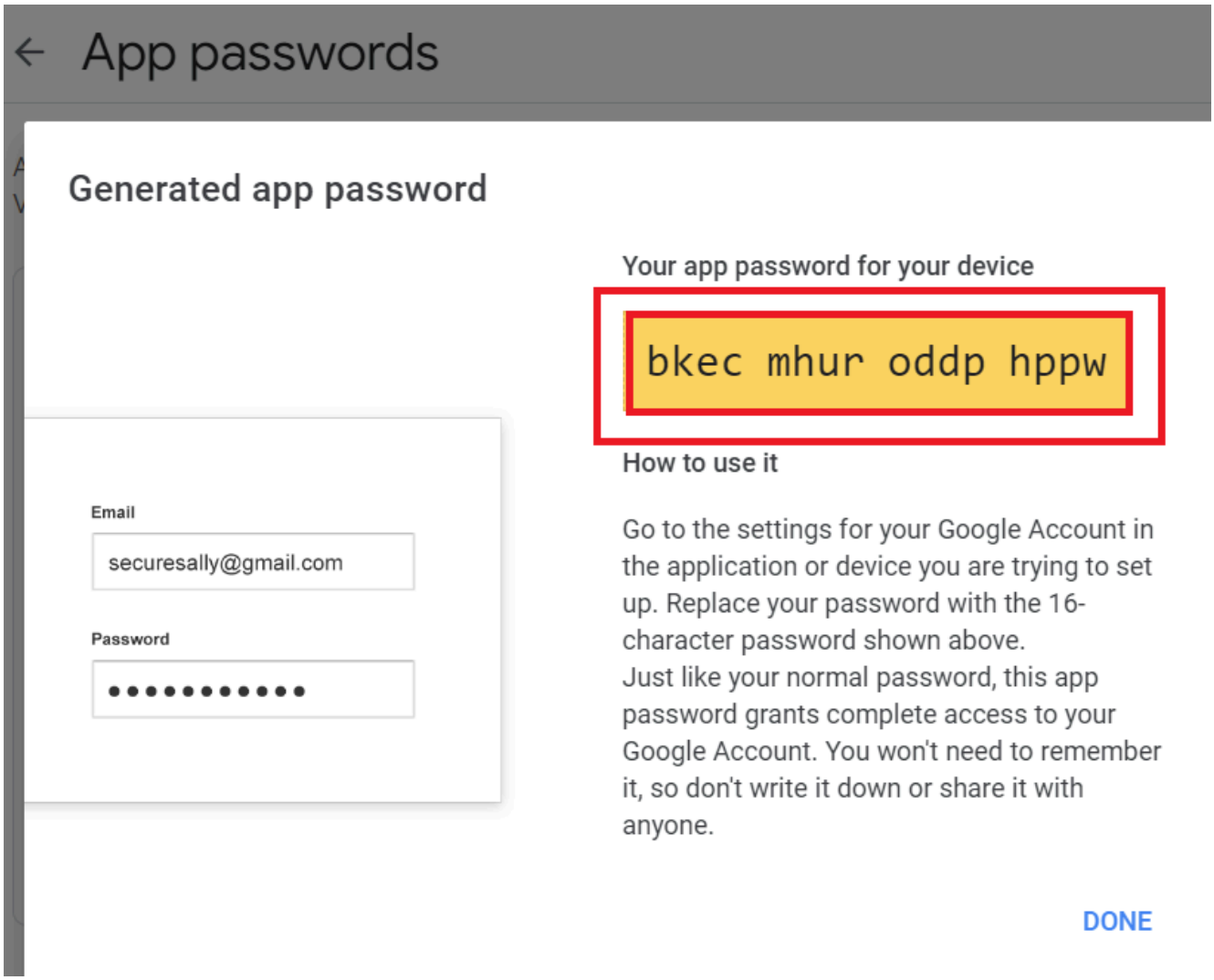
2-step verification should be enabled.

Search for the app in the search bar you will get app passwords like the below image

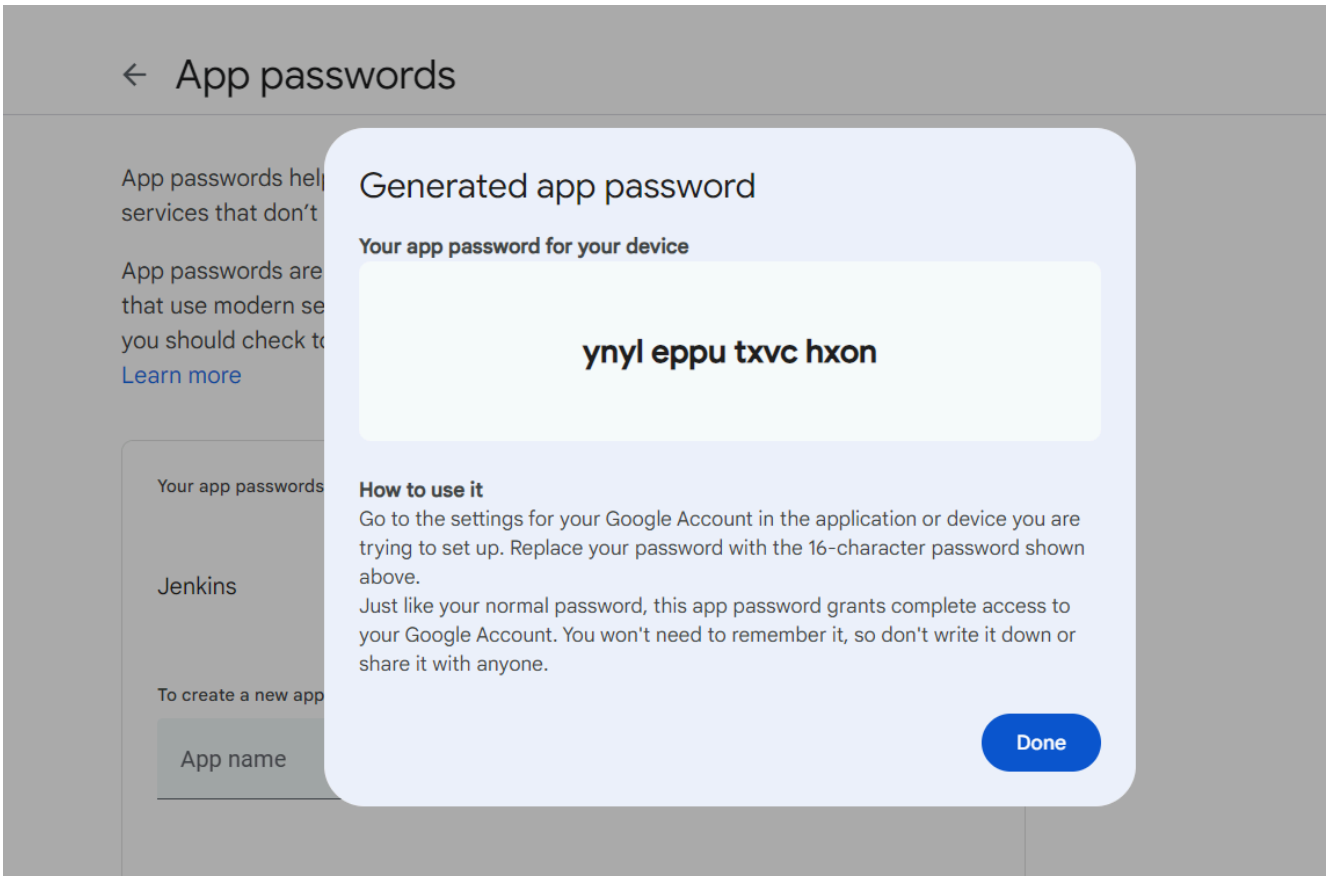




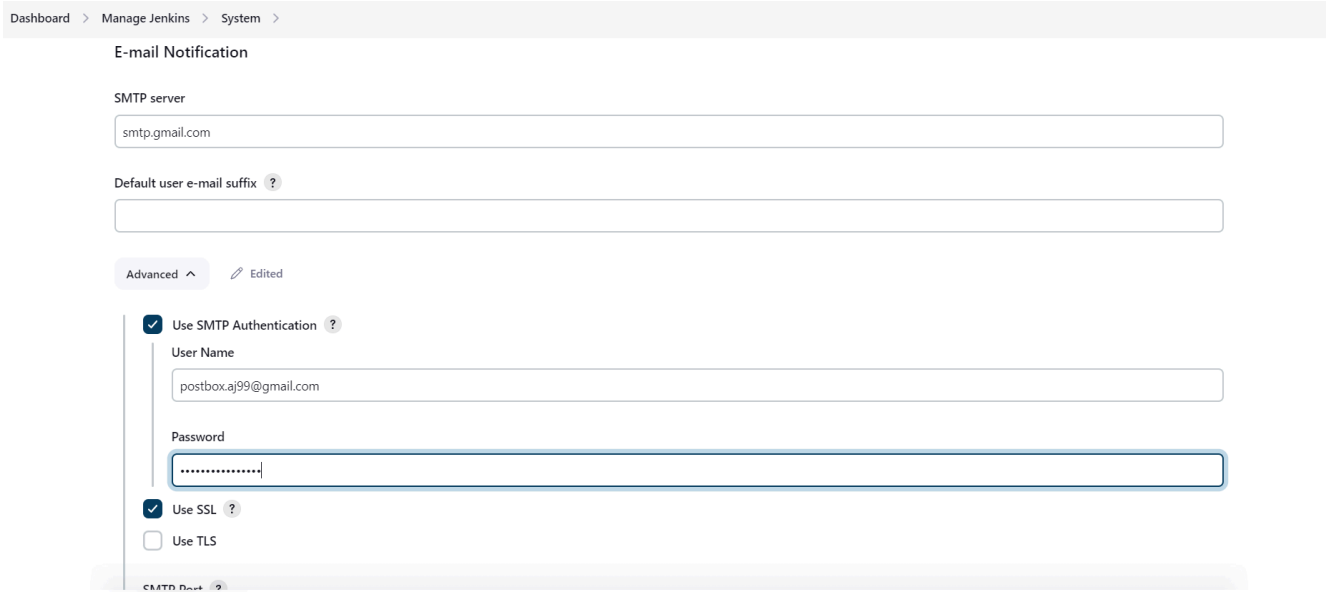
Click on other and provide your name and click on Generate and copy the password

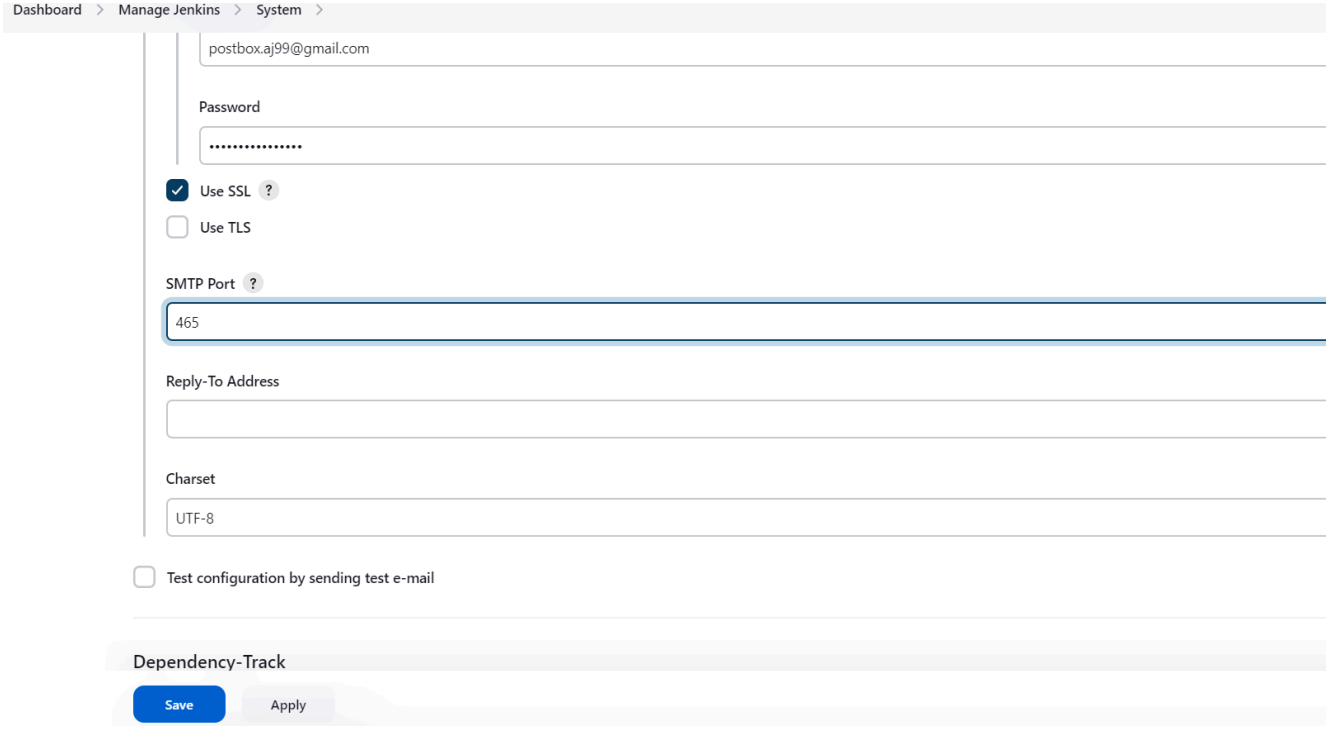


In the new update, you will get a password like this



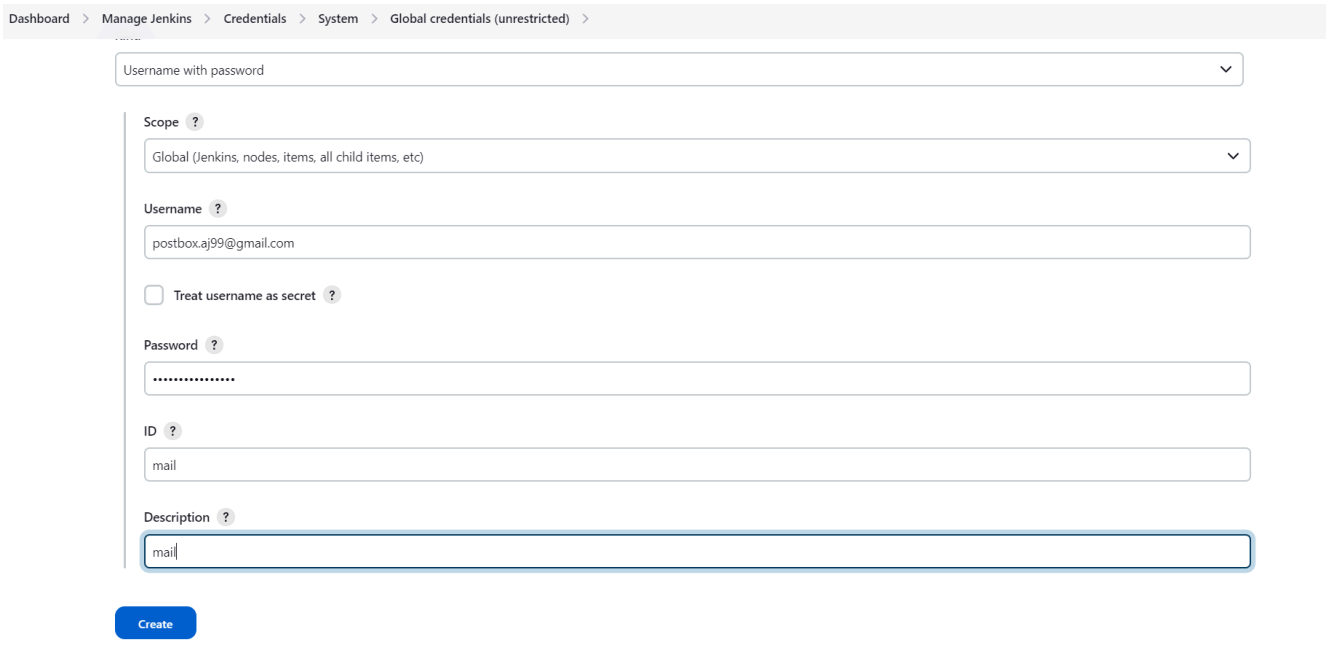
Once the plugin is installed in Jenkins, click on manage Jenkins –> configure system there under the E-mail Notification section configure the details as shown in the below image





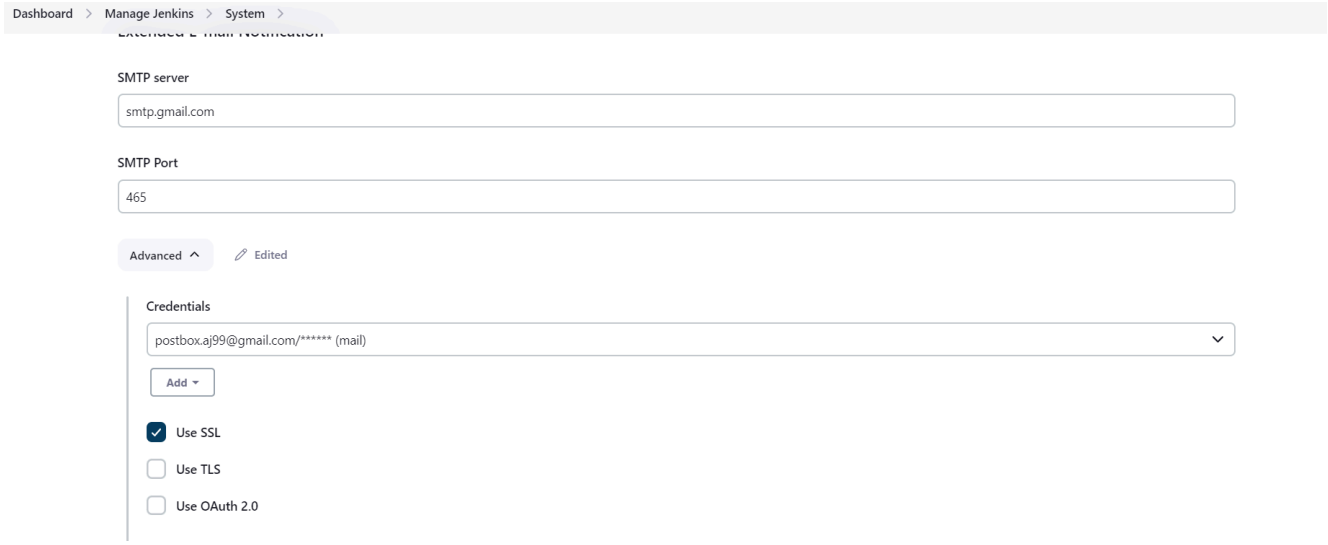
Click on Apply and save.

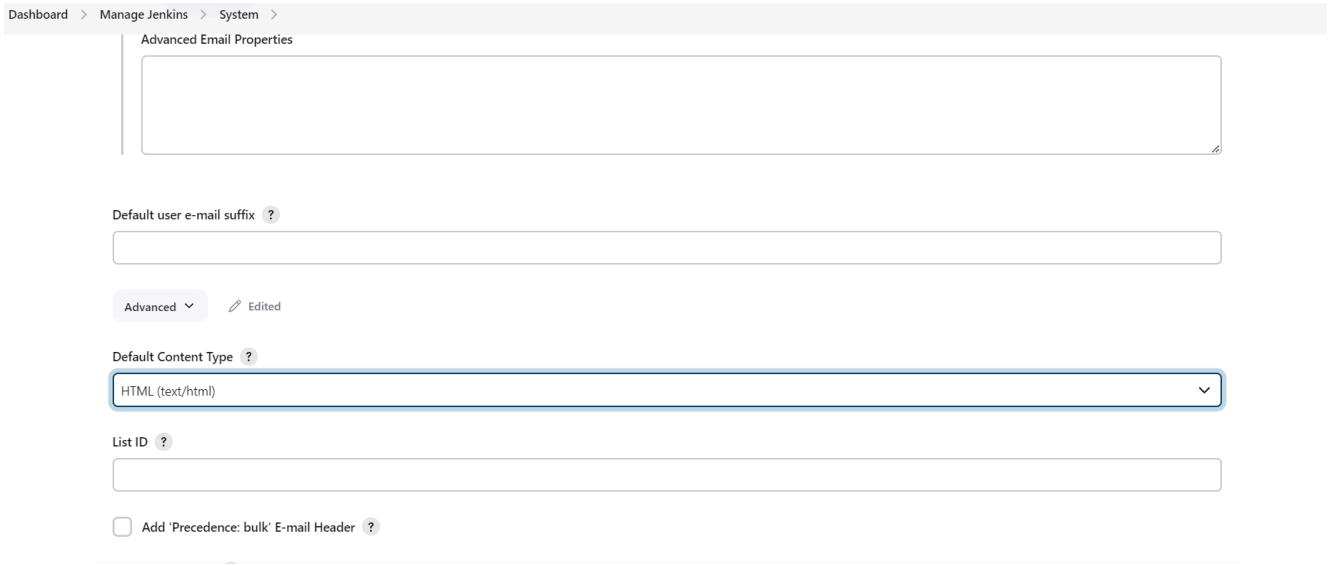
Click on Manage Jenkins–> credentials and add your mail username and generated password

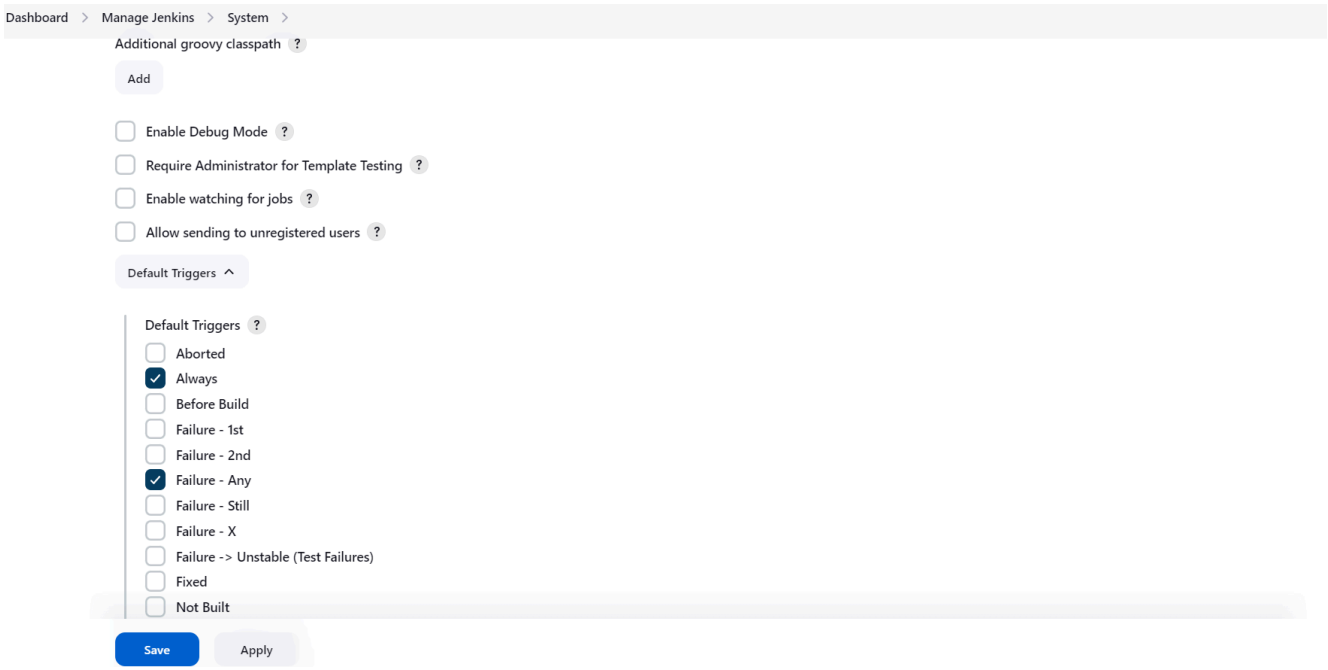


This is to just verify the mail configuration

Now under the Extended E-mail Notification section configure the details as shown in the below images







Click on Apply and save.

```
post {
     always {
        emailext attachLog: true,
            subject: "'${currentBuild.result}'",
            body: "Project: ${env.JOB_NAME}<br/>" +
                "Build Number: ${env.BUILD_NUMBER}<br/>" +
                "URL: ${env.BUILD_URL}<br/>",
            to: 'postbox.aj99@gmail.com',  #change Your mail
            attachmentsPattern: 'trivyfs.txt,trivyimage.txt'
        }
    }
```

Next, we will log in to Jenkins and start to configure our Pipeline in Jenkins

Step 7 – Install Plugins like JDK, Sonarqube Scanner, NodeJs, OWASP Dependency Check

7A – Install Plugin

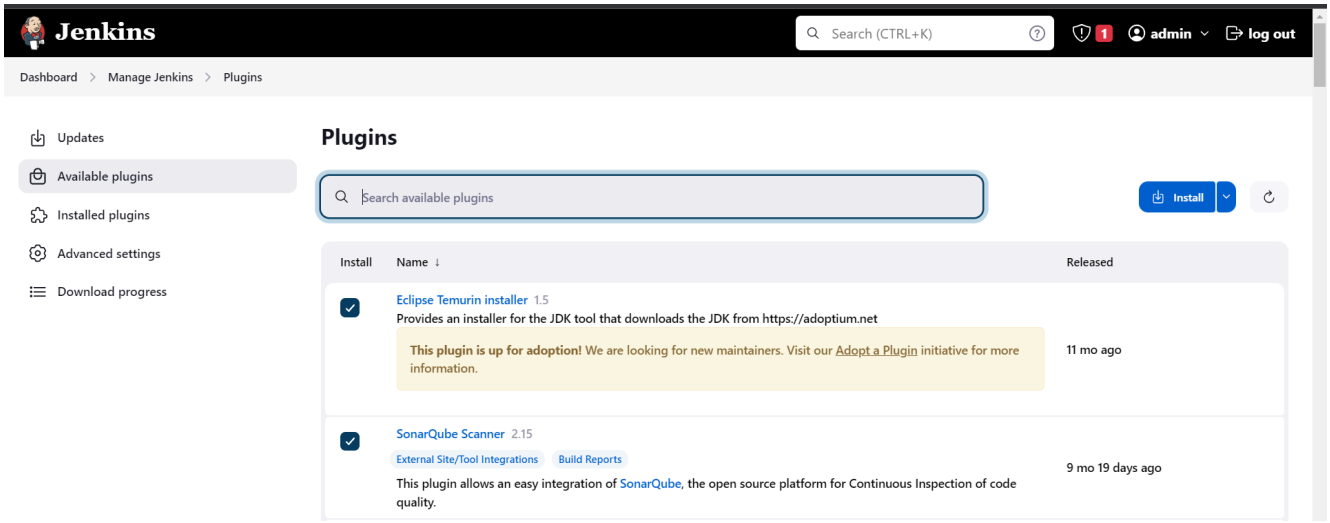
Goto Manage Jenkins →Plugins → Available Plugins →

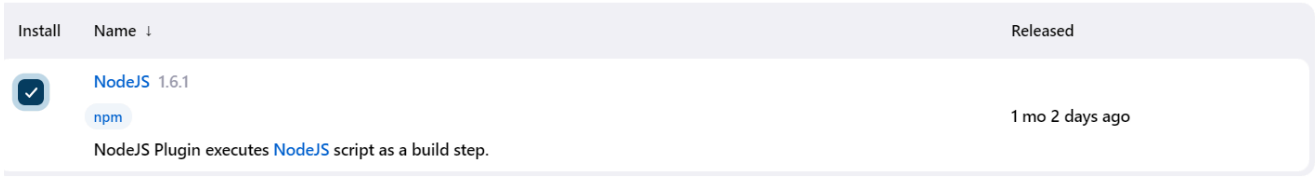
Install below plugins

1 → Eclipse Temurin Installer (Install without restart)

2 → SonarQube Scanner (Install without restart)

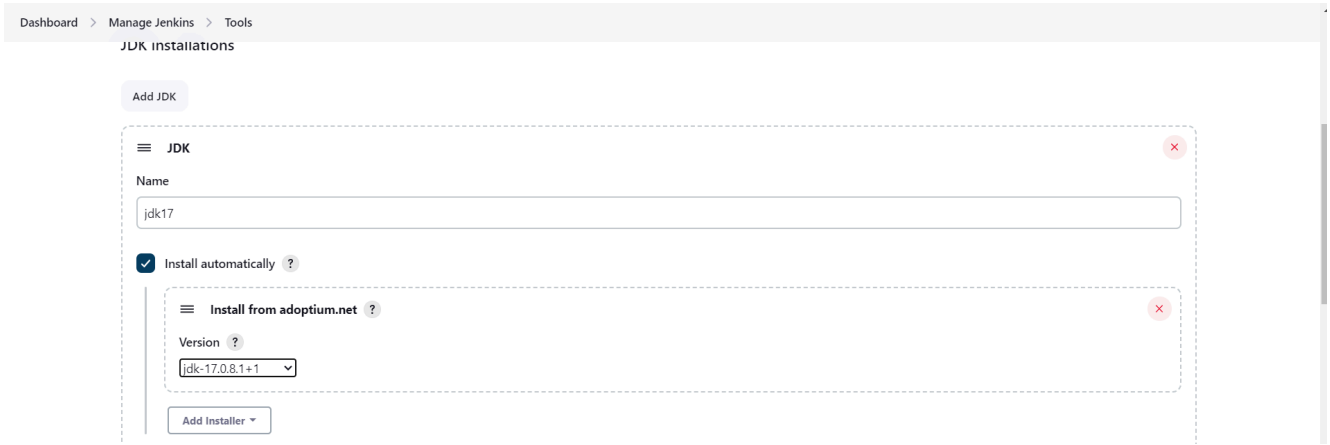
3 → NodeJs Plugin (Install Without restart)





7B – Configure Java and Nodejs in Global Tool Configuration

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

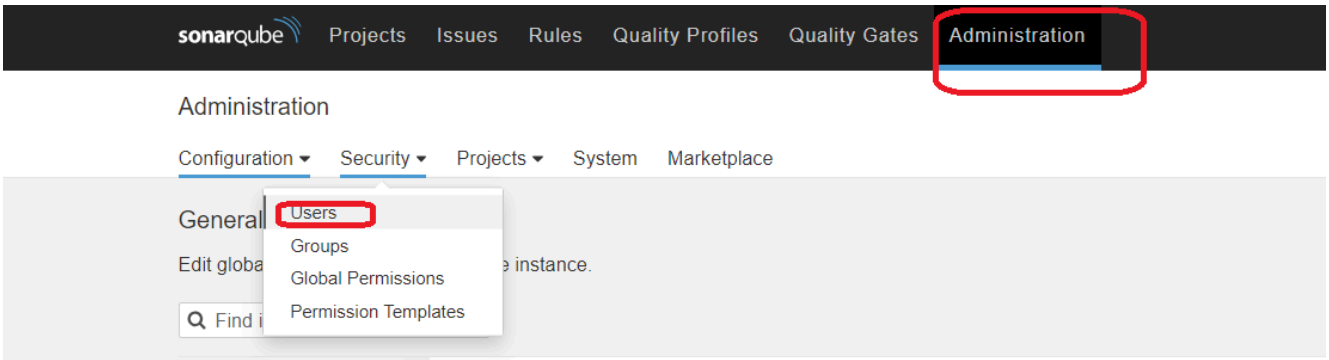


7C – Create a Job

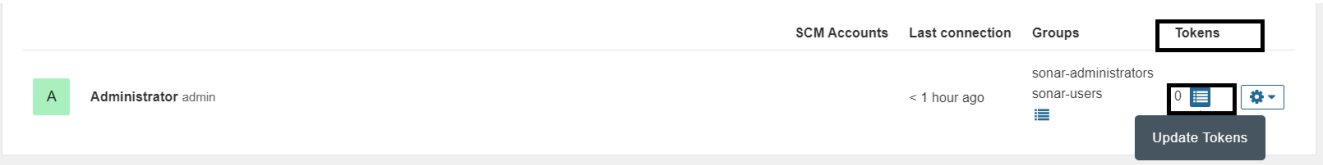
create a job as Netflix Name, select pipeline and click on ok.

Step 8 – Configure Sonar Server in Manage Jenkins

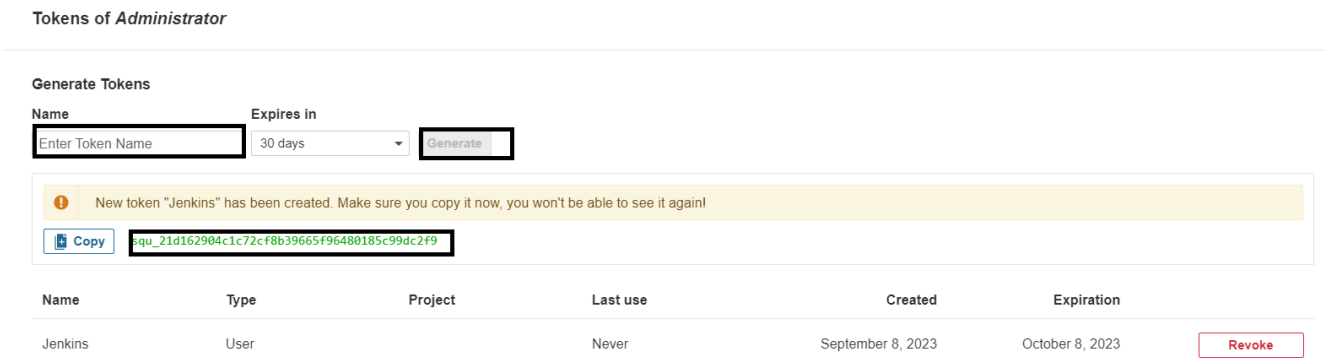
Grab the Public IP Address of your EC2 Instance, Sonarqube works on Port 9000, so <Public IP>:9000. Goto your Sonarqube Server. Click on Administration → Security → Users → Click on Tokens and Update Token → Give it a name → and click on Generate Token



click on update Token

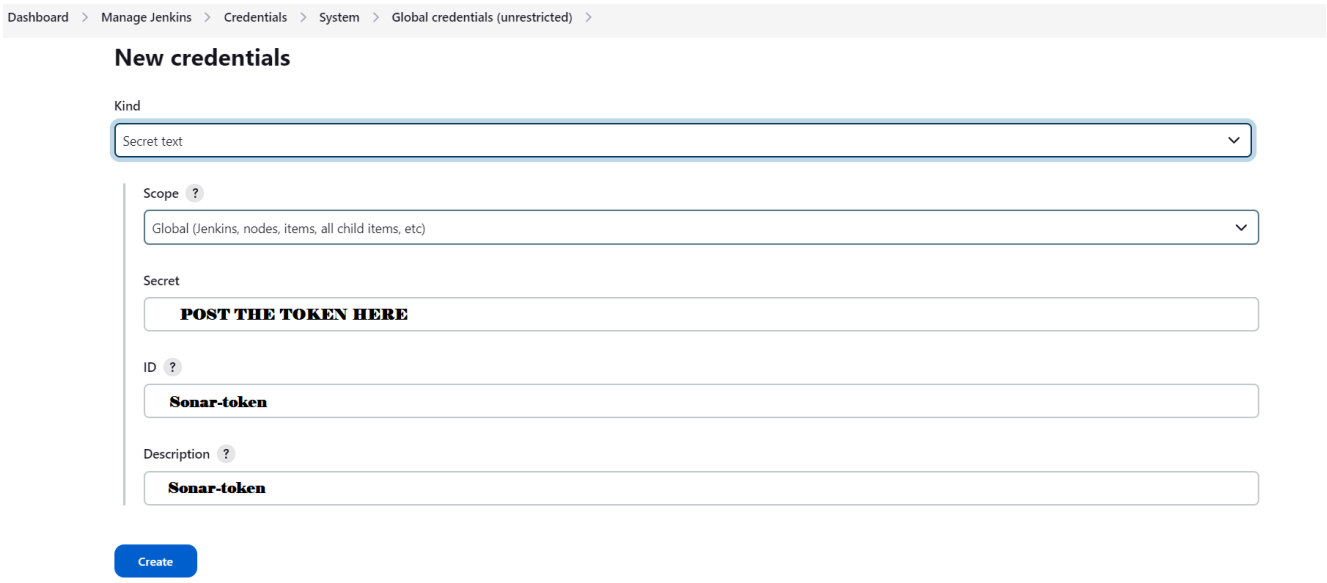


Create a token with a name and generate



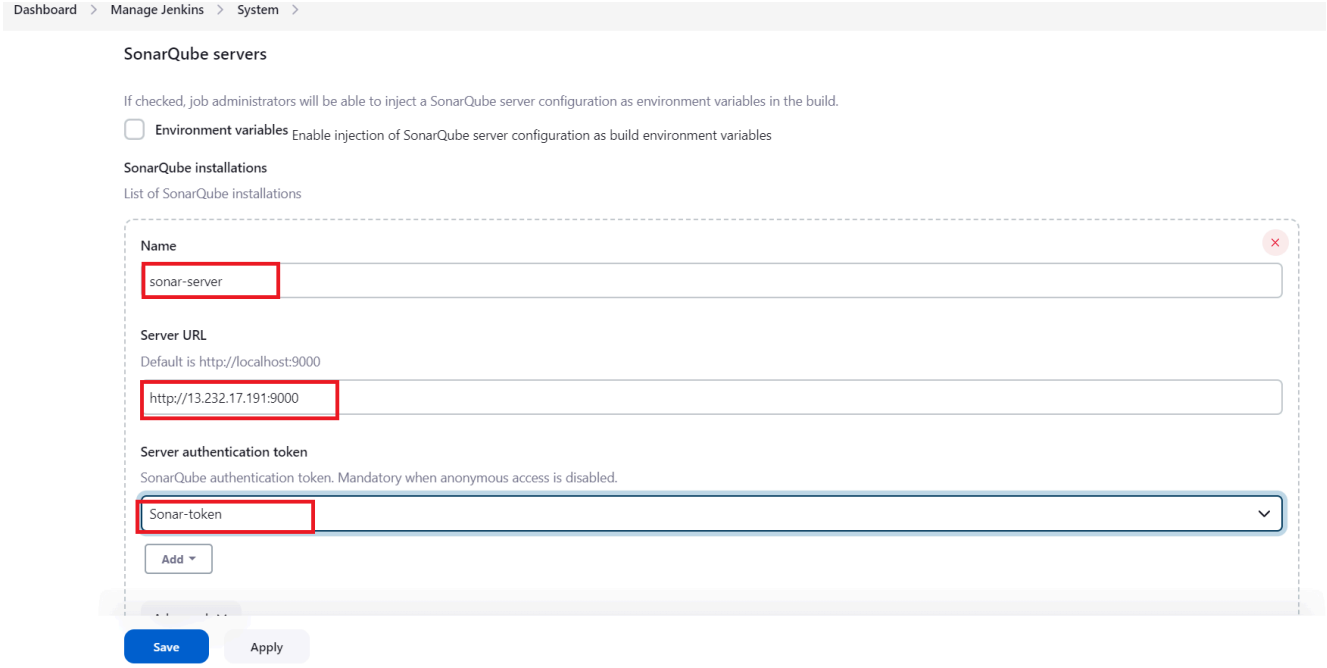
copy Token

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.

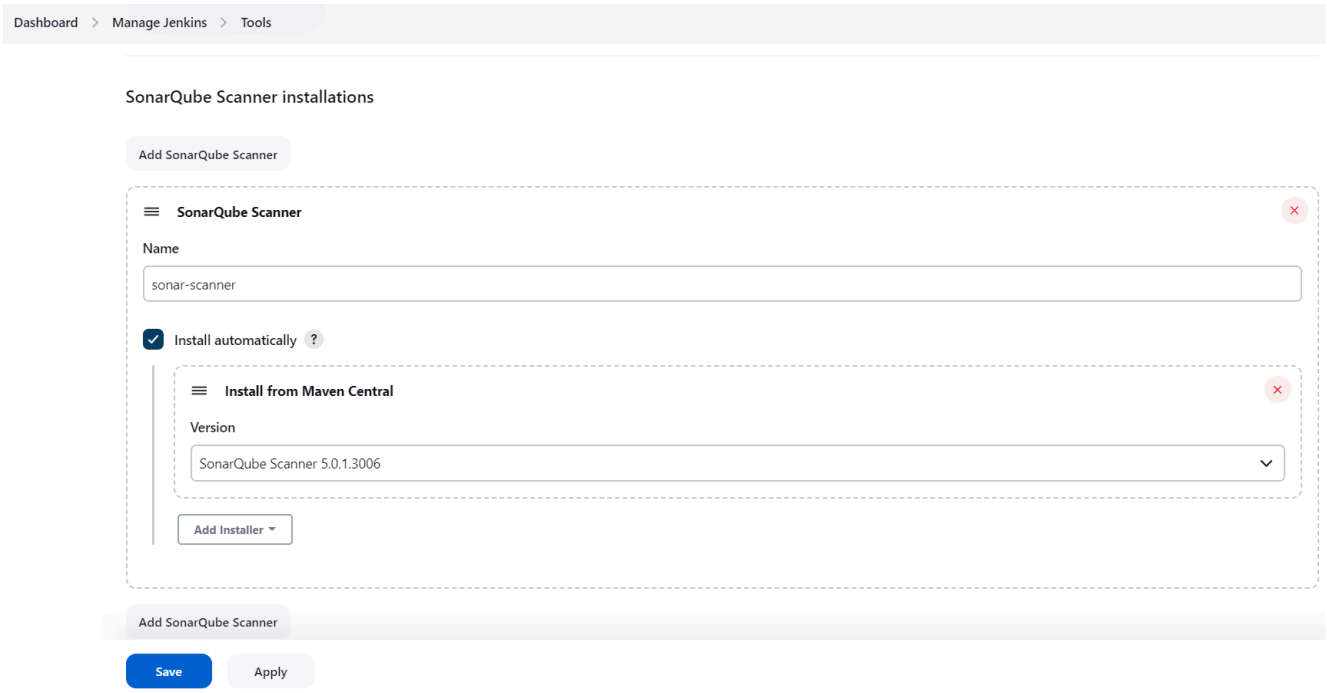


Click on Apply and Save

The Configure System option is used in Jenkins to configure different server

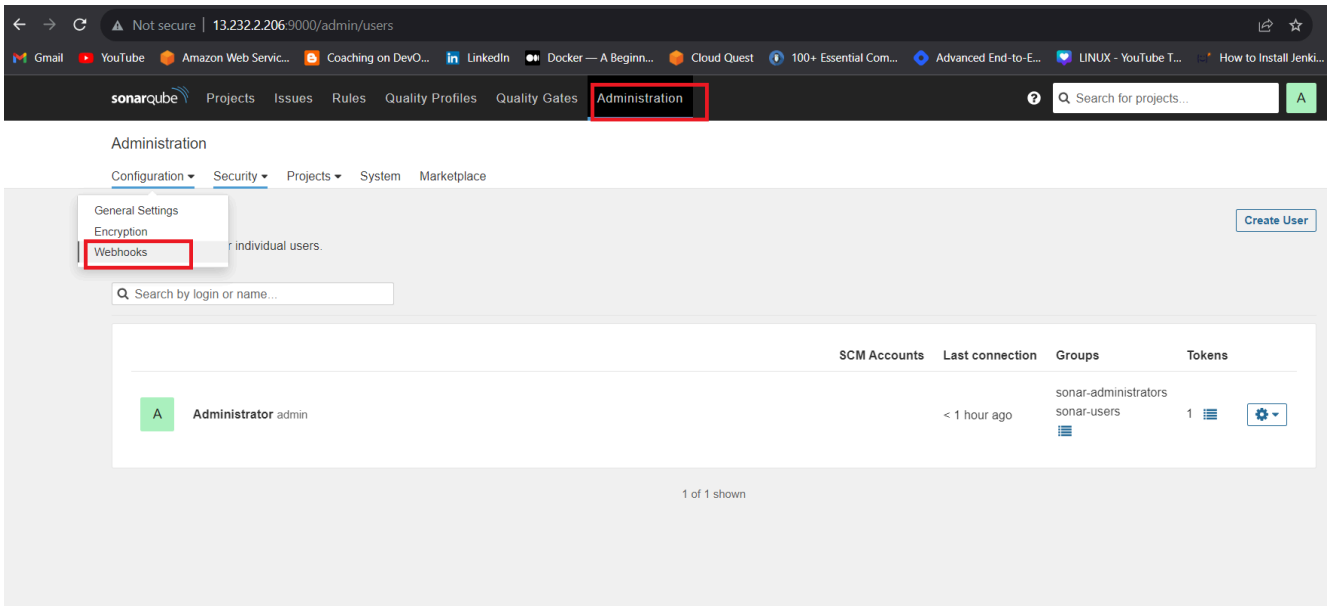
Global Tool Configuration is used to configure different tools that we install using Plugins

We will install a sonar scanner in the tools.

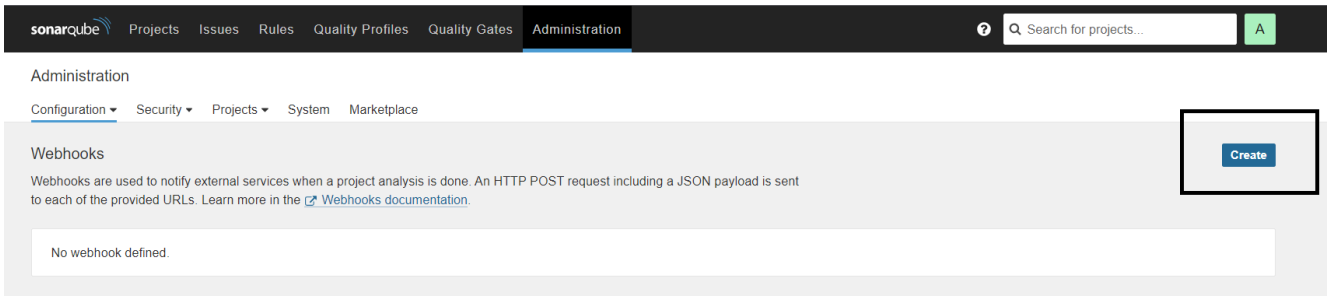


In the Sonarqube Dashboard add a quality gate also

Administration–> Configuration–>Webhooks

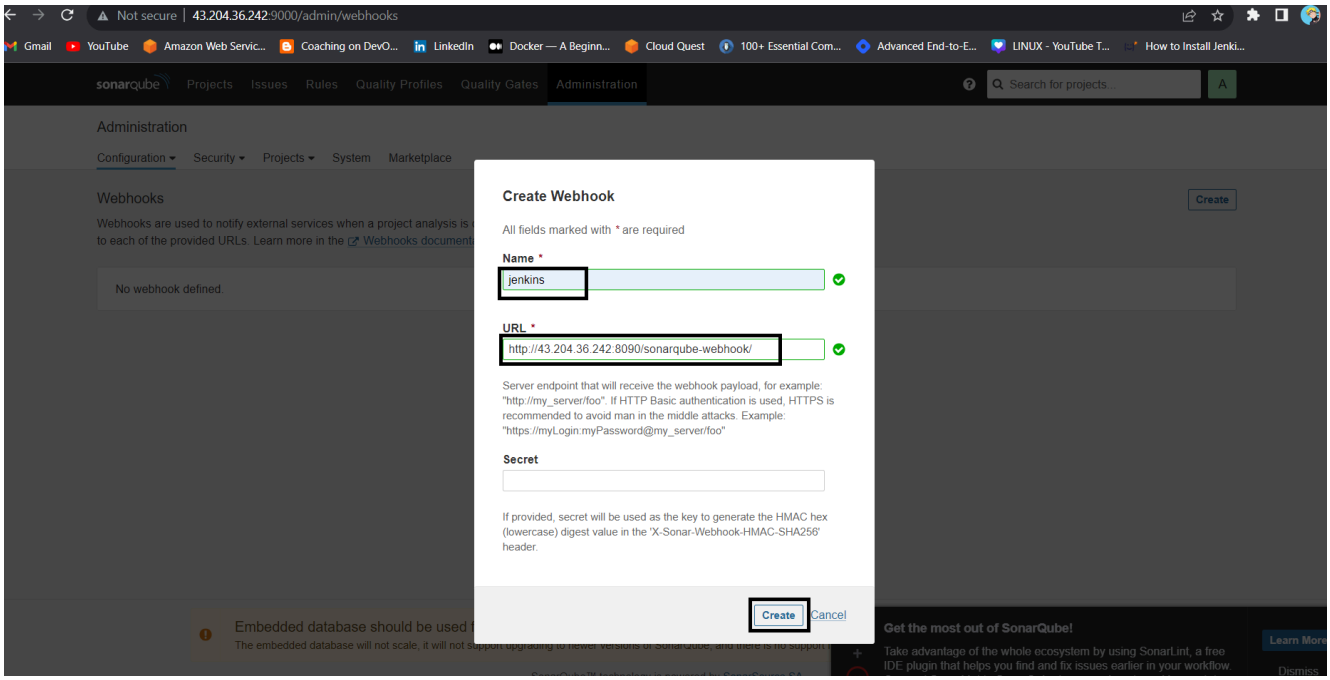


Click on Create



Add details

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

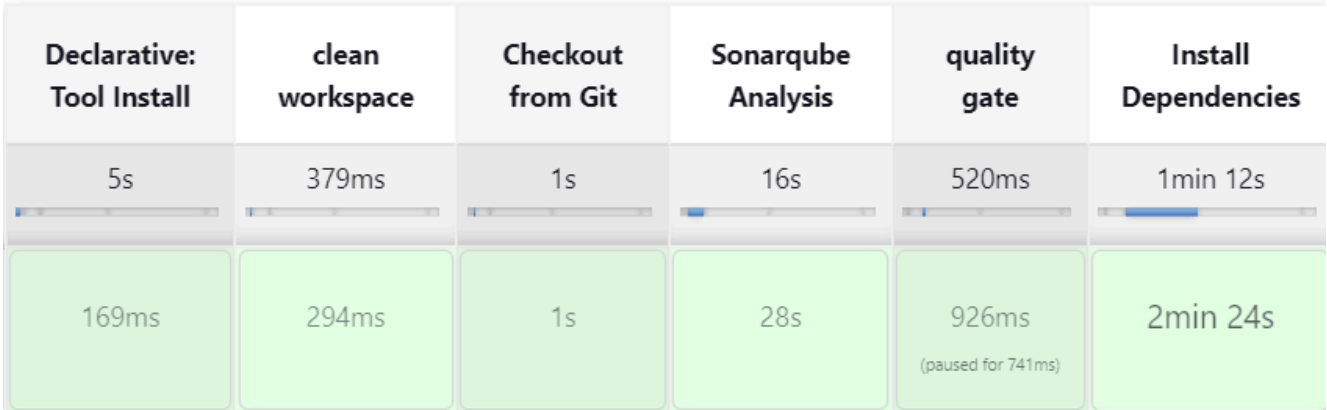


Let's go to our Pipeline and add the script in our Pipeline Script.

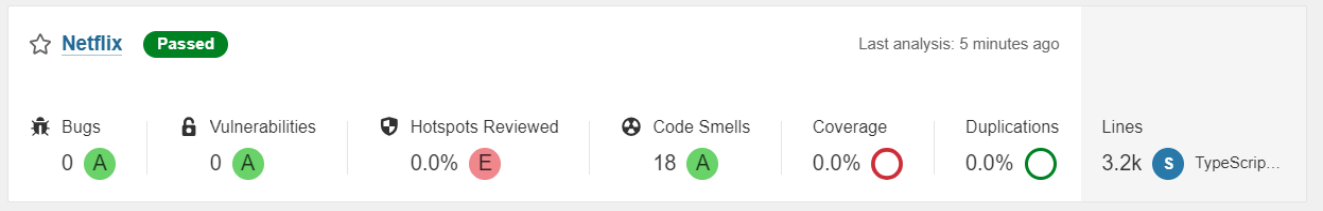
```
pipeline{
    agent any
    tools{
        jdk 'jdk17'
        nodejs 'node16'
    }
    environment {
        SCANNER_HOME=tool 'sonar-scanner'
    }
    stages {
        stage('clean workspace'){
            steps{
                cleanWs()
            }
        }
        stage('Checkout from Git'){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

```
                    -Dsonar.projectKey=Netflix '''
                }
            }
        }
        stage("quality gate"){
           steps {
                script {
                    waitForQualityGate abortPipeline: false, credentials
                }
            }
        }
        stage('Install Dependencies') {
            steps {
                sh "npm install"
            }
        }
    }
    post {
     always {
        emailext attachLog: true,
            subject: "'${currentBuild.result}'",
            body: "Project: ${env.JOB_NAME}<br/>" +
                "Build Number: ${env.BUILD_NUMBER}<br/>" +
                "URL: ${env.BUILD_URL}<br/>",
            to: 'postbox.aj99@gmail.com',
            attachmentsPattern: 'trivyfs.txt,trivyimage.txt'
        }
    }
}
```

Click on Build now, you will see the stage view like this



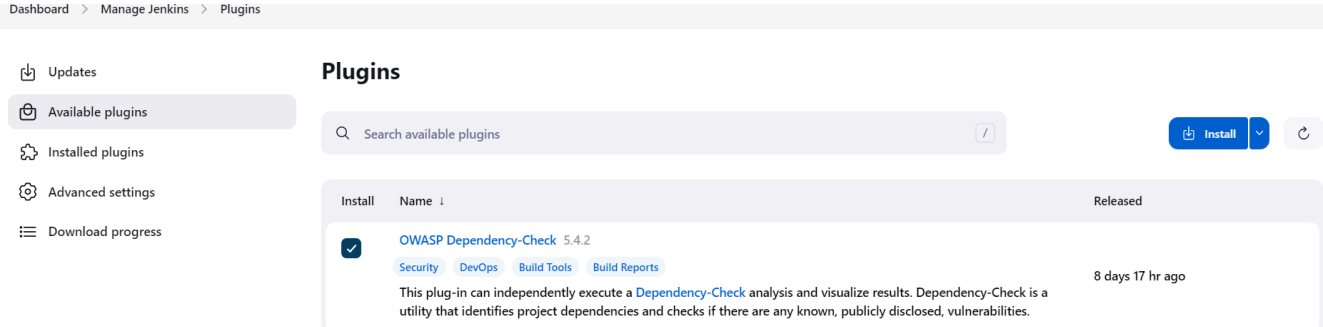
To see the report, you can go to Sonarqube Server and go to Projects.



You can see the report has been generated and the status shows as passed. You can see that there are 3.2k lines it scanned. To see a detailed report, you can go to issues.

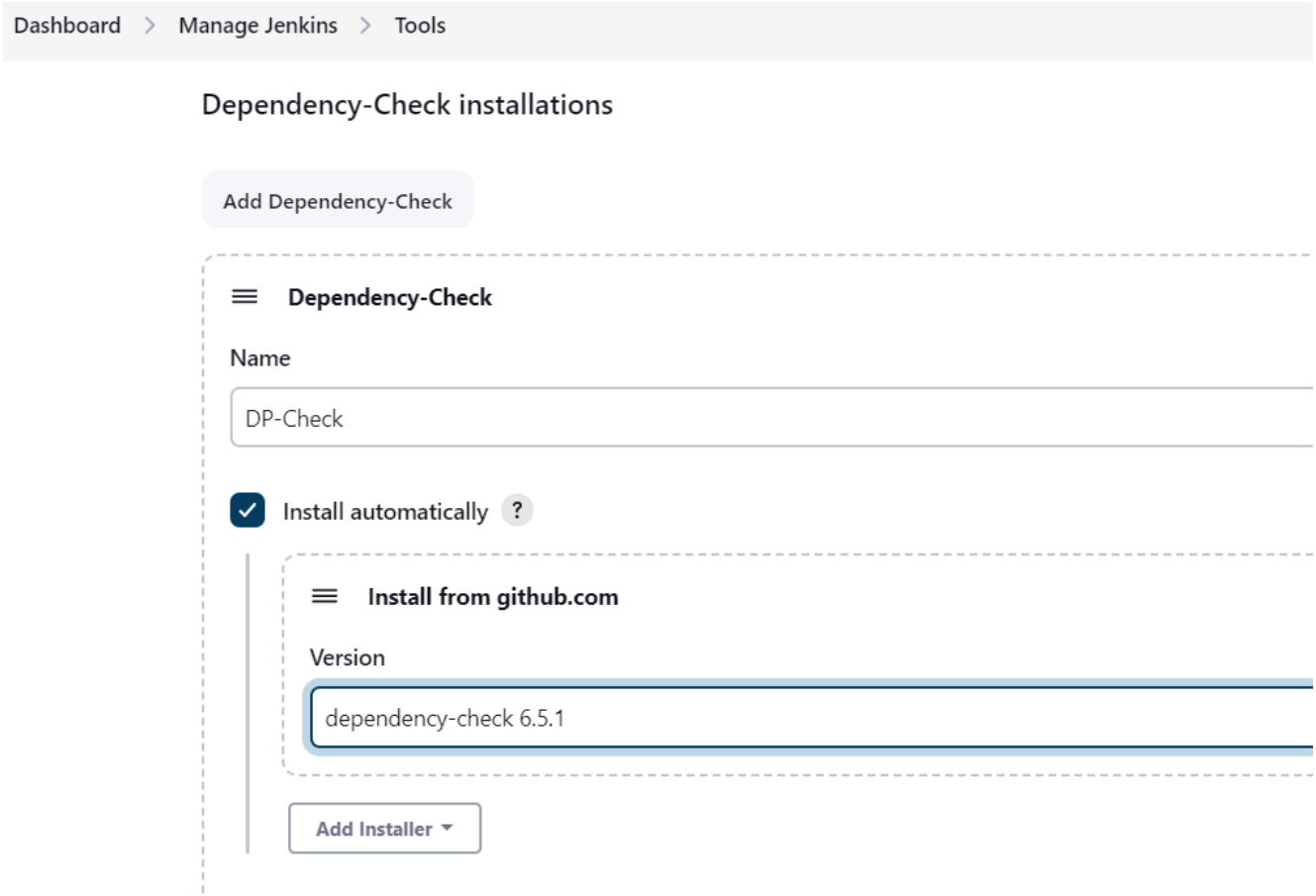
Step 9 – Install OWASP Dependency Check Plugins

GotoDashboard → Manage Jenkins → Plugins → OWASP Dependency-Check. Click on it and install it without restart.



First, we configured the Plugin and next, we had to configure the Tool

Goto Dashboard → Manage Jenkins → Tools →



Click on Apply and Save here.

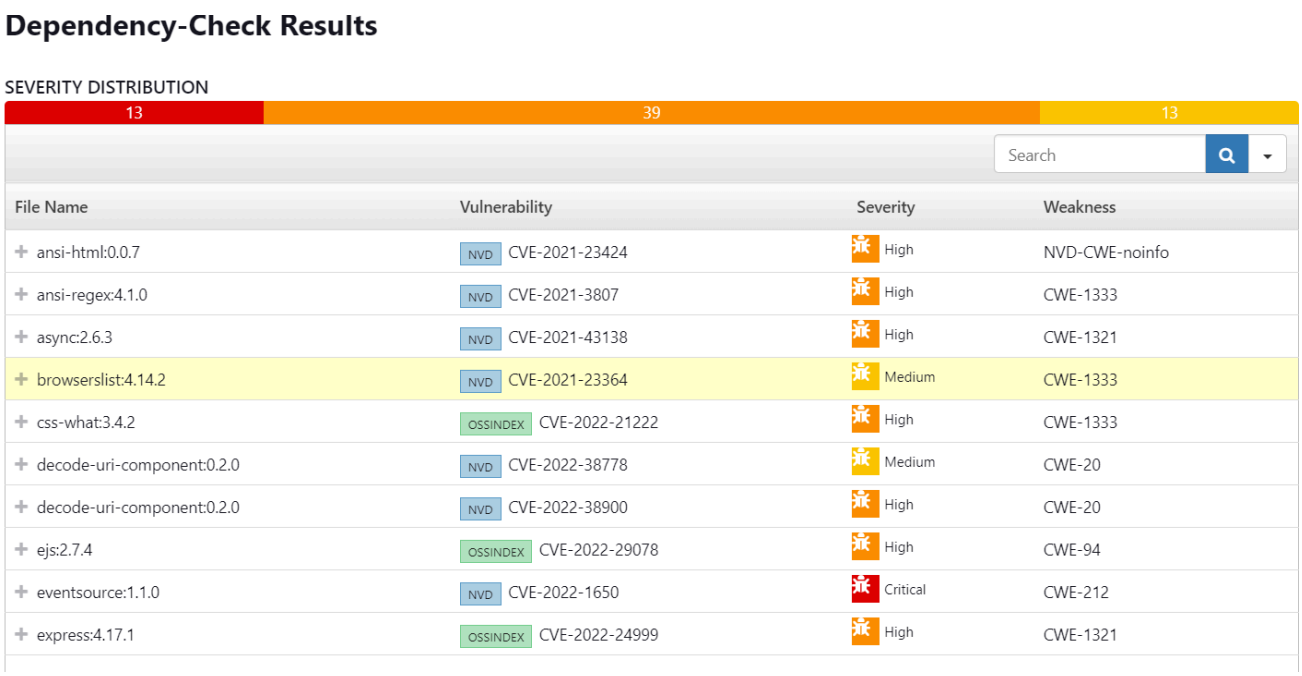
Now go configure → Pipeline and add this stage to your pipeline and build.

```
stage('OWASP FS SCAN') {
            steps {
                dependencyCheck additionalArguments: '--scan ./ --disab
                dependencyCheckPublisher pattern: '**/dependency-check-
            }
        }
        stage('TRIVY FS SCAN') {
            steps {
                sh "trivy fs . > trivyfs.txt"
            }
        }
```

The stage view would look like this,

Declarative: Tool Install	clean workspace	Checkout from Git	Sonarqube Analysis	quality gate	Install Dependencies	OWASP FS SCAN	TRIVY FS SCAN
5s	379ms	1s	16s	520ms	1min 12s	1min 45s	13s
169ms	294ms	1s	28s	926ms (paused for 741ms)	2min 24s	3min 31s	27s

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



Dependency-Check Results

SEVERITY DISTRIBUTION

13 | 39 | 13

Search

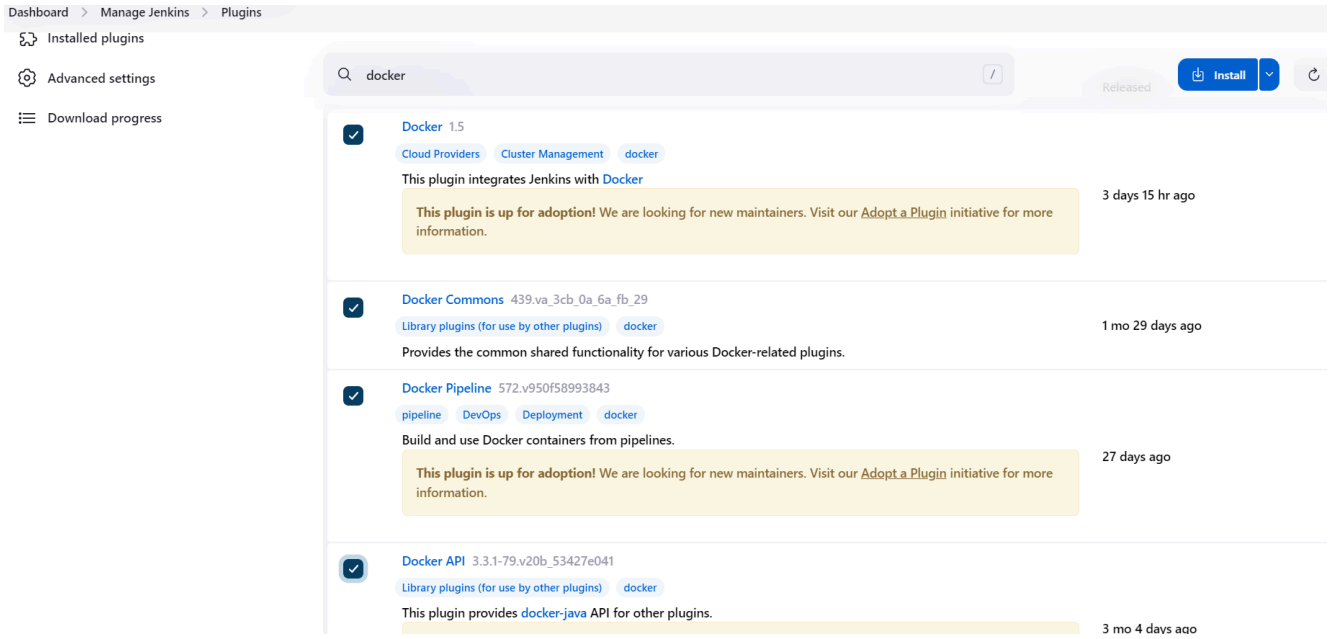
File Name	Vulnerability	Severity	Weakness
ansi-html:0.0.7	NVD CVE-2021-23424	High	NVD-CWE-noinfo
ansi-regex:4.1.0	NVD CVE-2021-3807	High	CWE-1333
async:2.6.3	NVD CVE-2021-43138	High	CWE-1321
browserslist:4.14.2	NVD CVE-2021-23364	Medium	CWE-1333
css-what:3.4.2	OSSINDEX CVE-2022-21222	High	CWE-1333
decode-uri-component:0.2.0	NVD CVE-2022-38778	Medium	CWE-20
decode-uri-component:0.2.0	NVD CVE-2022-38900	High	CWE-20
ejs:2.7.4	OSSINDEX CVE-2022-29078	High	CWE-94
eventsource:1.1.0	NVD CVE-2022-1650	Critical	CWE-212
express:4.17.1	OSSINDEX CVE-2022-24999	High	CWE-1321

Step 10 – Docker Image Build and Push

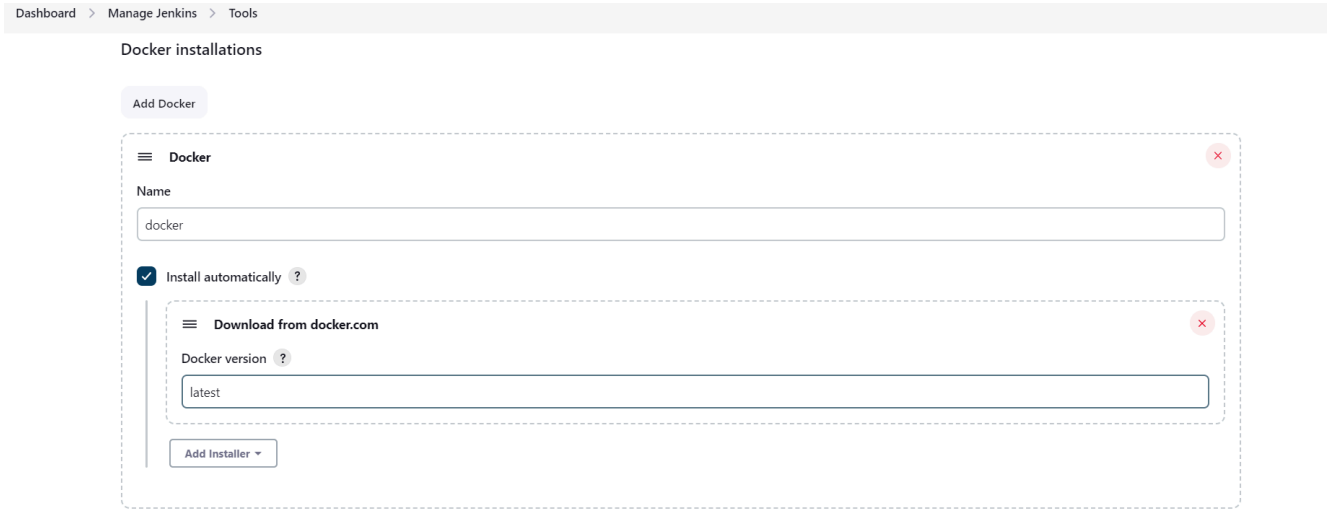
We need to install the Docker tool in our system, Goto Dashboard → Manage Plugins → Available plugins → Search for Docker and install these plugins

```
Docker

Docker Commons

Docker Pipeline

Docker API

docker-build-step
```

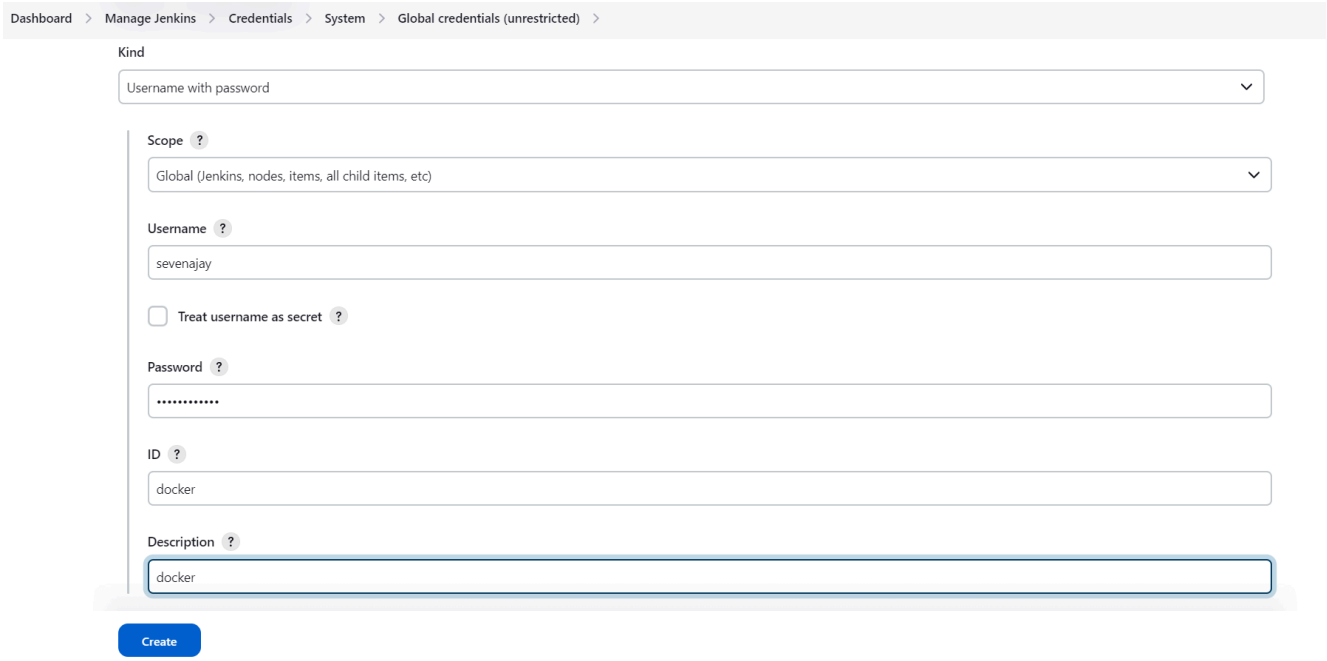
and click on install without restart



Now, goto Dashboard → Manage Jenkins → Tools →



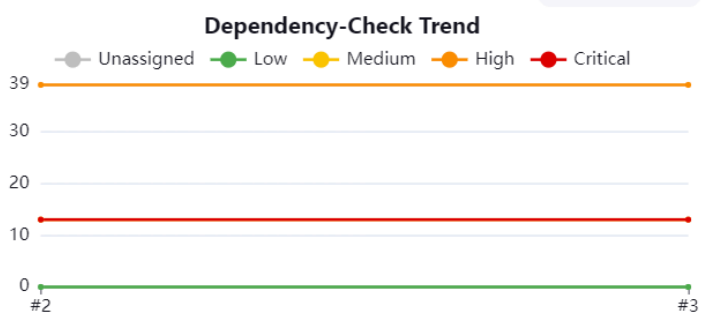
Add DockerHub Username and Password under Global Credentials



Add this stage to Pipeline Script

```
stage("Docker Build & Push"){
            steps{
                script{
                   withDockerRegistry(credentialsId: 'docker', toolName
                       sh "docker build --build-arg TMDB_V3_API_KEY=Aj7
                       sh "docker tag netflix sevenajay/netflix:latest '
                       sh "docker push sevenajay/netflix:latest "
                    }
                }
            }
        }
        stage("TRIVY"){
            steps{
                sh "trivy image sevenajay/netflix:latest > trivyimage.t
            }
        }
```

You will see the output below, with a dependency trend.



Declarative: Tool Install	clean workspace	Checkout from Git	Sonarqube Analysis	quality gate	Install Dependencies	OWASP FS SCAN	TRIVY FS SCAN	Docker Build & Push	TRIVY
3s	366ms	1s	19s	451ms	1min 20s	2min 1s	16s	3min 9s	4s
154ms	341ms	1s	25s	315ms	1min 36s	2min 31s	23s	3min 9s	4s

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

Now Run the container to see if the game coming up or not by adding the below stage

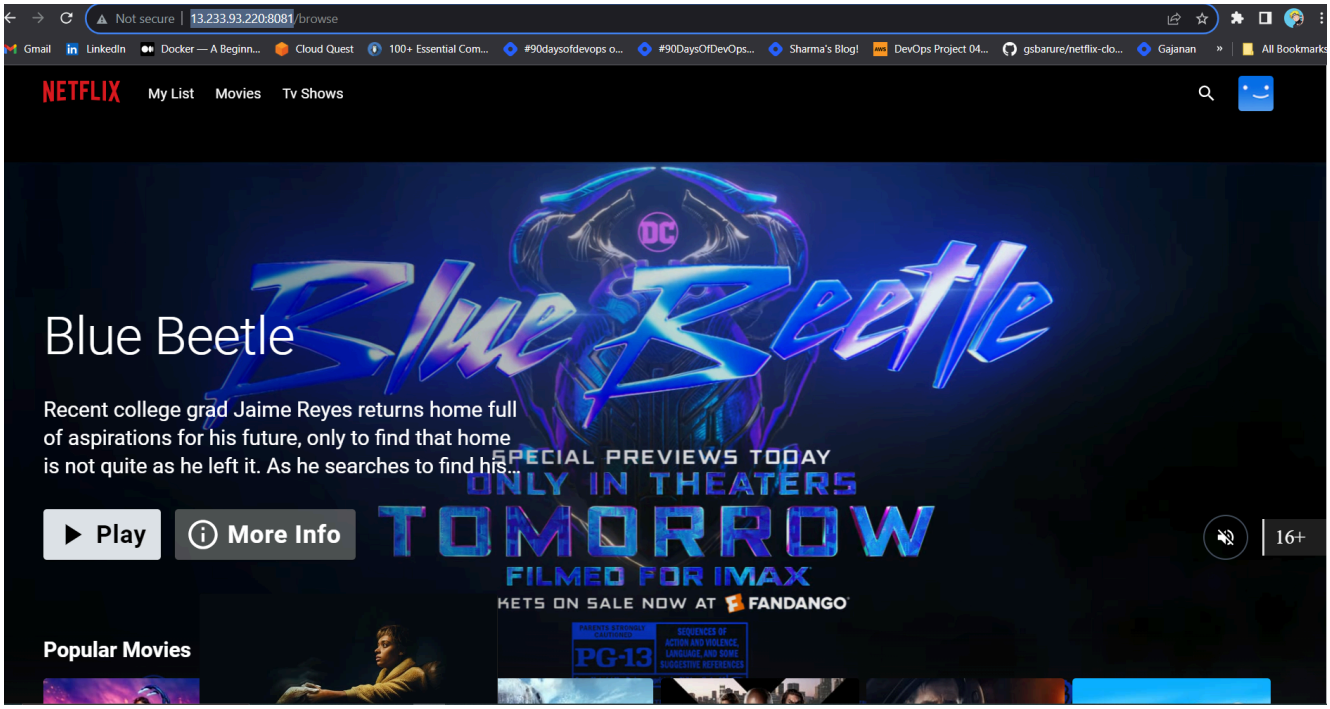
```
stage('Deploy to container'){
            steps{
                sh 'docker run -d --name netflix -p 8081:80 sevenajay/ne
            }
        }
```

stage view

Declarative: Tool Install	clean workspace	Checkout from Git	Sonarqube Analysis	quality gate	Install Dependencies	OWASP FS SCAN	TRIVY FS SCAN	Docker Build & Push	TRIVY	Deploy to container
144ms	284ms	1s	25s	410ms	1min 47s	2min 43s	23s	2min 7s	36s	789ms
146ms	251ms	1s	26s	305ms	1min 36s	2min 35s	23s	1min 50s	2min 8s	1s

```
<Jenkins-public-ip:8081>
```

You will get this output



Step 11 – Kuberenetes Setup

Connect your machines to Putty or Mobaxtreme

Take-Two Ubuntu 20.04 instances one for k8s master and the other one for worker.

Install Kubectl on Jenkins machine also.

Kubectl is to be installed on Jenkins also

```
sudo apt update
sudo apt install curl
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
```

Part 1 ———-Master Node————

```
sudo hostnamectl set-hostname K8s-Master
```

———-Worker Node————

```
sudo hostnamectl set-hostname K8s-Worker
```

Part 2 ————Both Master & Node ————

```
sudo apt-get update
sudo apt-get install -y docker.io
sudo usermod –aG docker Ubuntu
newgrp docker
sudo chmod 777 /var/run/docker.sock
```

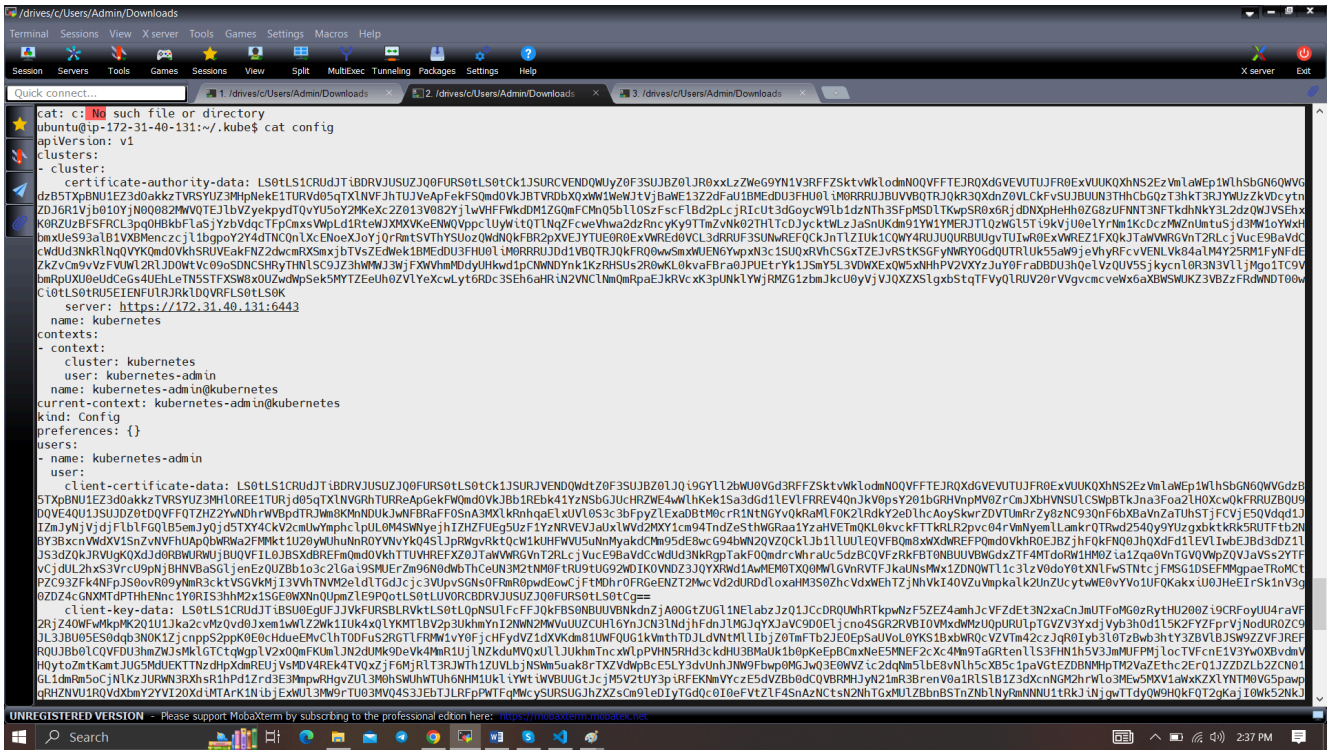
Part 3 —————— Master ——————

```
sudo apt-get update
sudo apt-get install -y apt-transport-https ca-certificates curl gpg
curl -fsSL https://pkgs.k8s.io/core:/stable:/v1.29/deb/Release.key | suc
echo 'deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg] https
sudo apt-get update
sudo apt-get install -y kubelet kubeadm kubectl
sudo apt-mark hold kubelet kubeadm kubectl
```

———-Worker Node————

```
sudo kubeadm init --pod-network-cidr=10.244.0.0/16
# in case your in root exit from it and run below commands
mkdir -p $HOME/.kube
sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
sudo chown $(id -u):$(id -g) $HOME/.kube/config
kubectl apply -f https://raw.githubusercontent.com/coreos/flannel/master
```

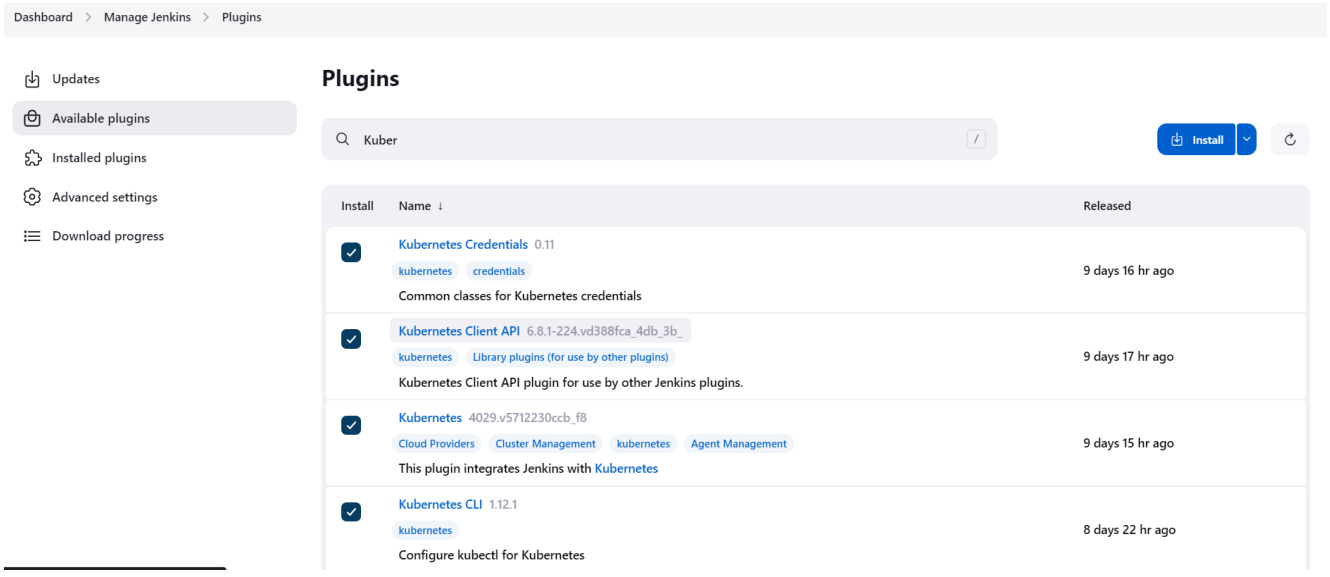
Copy the config file to Jenkins master or the local file manager and save it



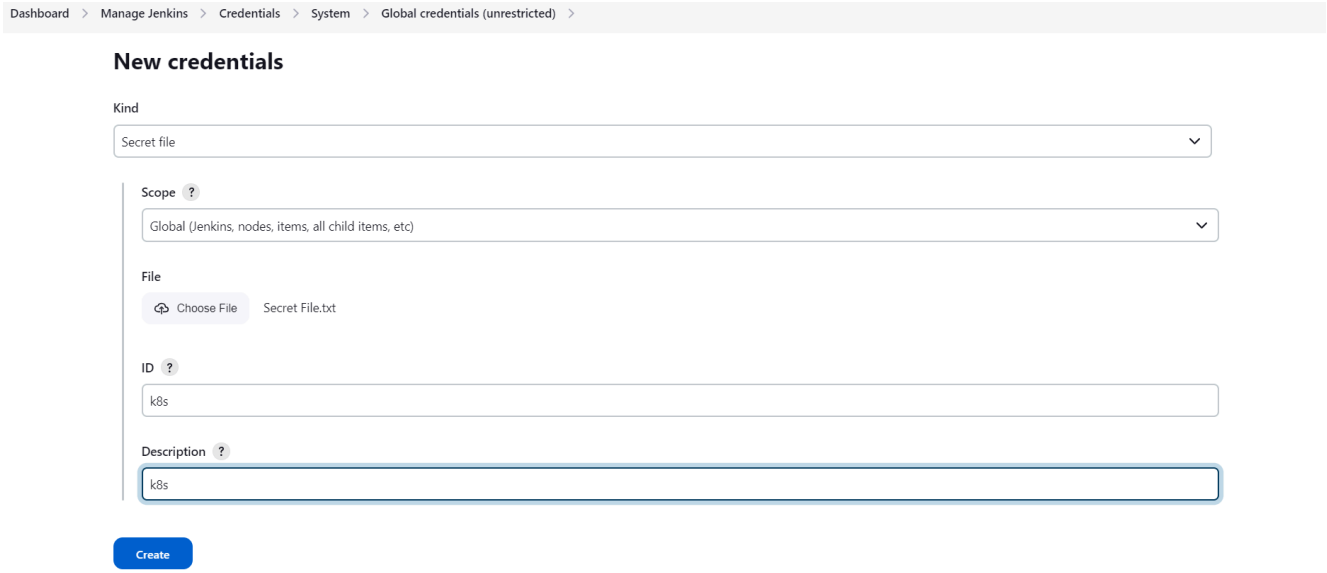
copy it and save it in documents or another folder save it as secret-file.txt

Note: create a secret-file.txt in your file explorer save the config in it and use this at the kubernetes credential section.

Install Kubernetes Plugin, Once it's installed successfully



goto manage Jenkins –> manage credentials –> Click on Jenkins global –> add credentials



Install Node_exporter on both master and worker

Let's add Node_exporter on Master and Worker to monitor the metrics

First, let's create a system user for Node Exporter by running the following command:

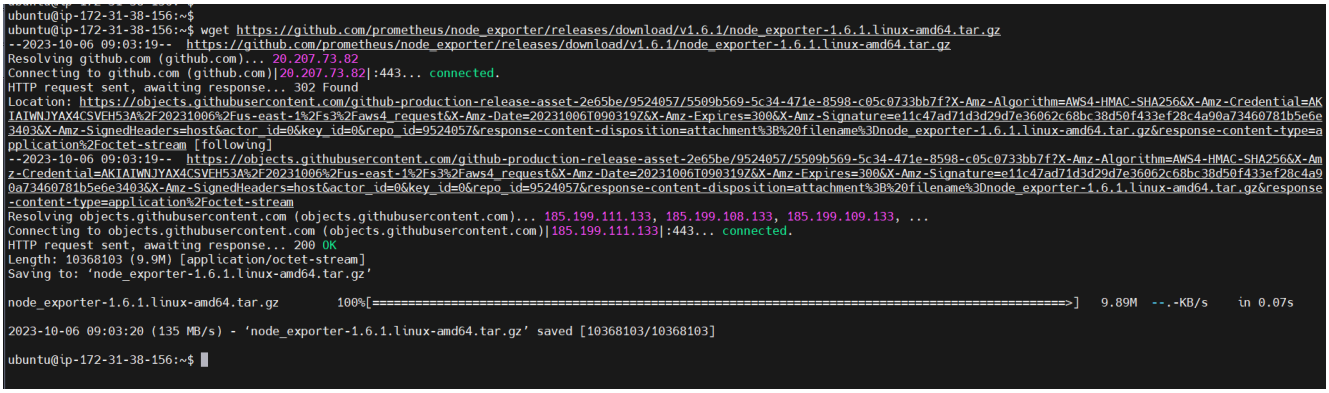
```
sudo useradd \
    --system \
    --no-create-home \
    --shell /bin/false node_exporter
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo useradd \
    --system \
    --no-create-home \
    --shell /bin/false node_exporter
ubuntu@ip-172-31-38-156:~$
```

You can **download Node Exporter** from the same page.

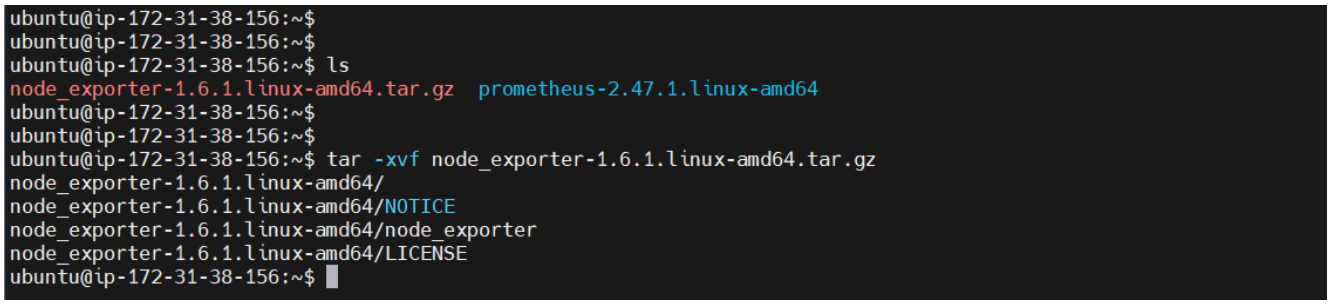
Use the wget command to download the binary.

```
wget https://github.com/prometheus/node_exporter/releases/download/v1.6
```



Extract the node exporter from the archive.

```
tar -xvf node_exporter-1.6.1.linux-amd64.tar.gz
```



Move binary to the /usr/local/bin.

```
sudo mv \
  node_exporter-1.6.1.linux-amd64/node_exporter \
  /usr/local/bin/
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo mv \
  node_exporter-1.6.1.linux-amd64/node_exporter \
  /usr/local/bin/
ubuntu@ip-172-31-38-156:~$
```

Clean up, and delete node_exporter archive and a folder.

```
rm -rf node_exporter*
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ ls
node_exporter-1.6.1.linux-amd64  node_exporter-1.6.1.linux-amd64.tar.gz  prometheus-2.47.1.linux-amd64
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ rm -rf node_exporter*
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ ls
prometheus-2.47.1.linux-amd64
ubuntu@ip-172-31-38-156:~$
```

Verify that you can run the binary.

```
node_exporter --version
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ node_exporter --version
node_exporter, version 1.6.1 (branch: HEAD, revision: 4a1b77600c1873a8233f3ffb55afcedbb63b8d84)
  build user:       root@586879db11e5
  build date:       20230717-12:10:52
  go version:       go1.20.6
  platform:         linux/amd64
  tags:             netgo osusergo static_build
ubuntu@ip-172-31-38-156:~$
```

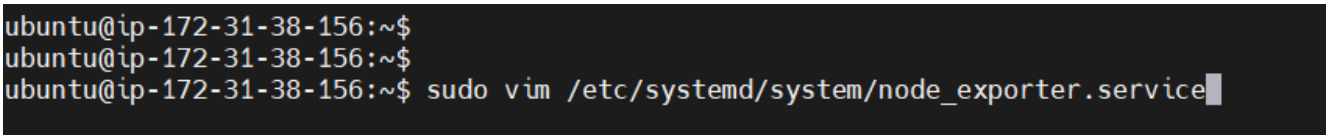
Node Exporter has a lot of plugins that we can enable. If you run Node Exporter help you will get all the options.

```
node_exporter --help
```

–collector.logind We're going to enable the login controller, just for the demo.

Next, create a similar systemd unit file.

```
sudo vim /etc/systemd/system/node_exporter.service
```



node_exporter.service

```
[Unit]
Description=Node Exporter
Wants=network-online.target
After=network-online.target
StartLimitIntervalSec=500
StartLimitBurst=5
[Service]
User=node_exporter
Group=node_exporter
Type=simple
Restart=on-failure
RestartSec=5s
ExecStart=/usr/local/bin/node_exporter \
    --collector.logind
[Install]
WantedBy=multi-user.target
```

```
[Unit]
Description=Node Exporter
Wants=network-online.target
After=network-online.target

StartLimitIntervalSec=500
StartLimitBurst=5

[Service]
User=node_exporter
Group=node_exporter
Type=simple
Restart=on-failure
RestartSec=5s
ExecStart=/usr/local/bin/node_exporter \
    --collector.logind

[Install]
WantedBy=multi-user.target
```

Replace Prometheus user and group to node_exporter, and update the ExecStart command.

To automatically start the Node Exporter after reboot, enable the service.

```
sudo systemctl enable node_exporter
```

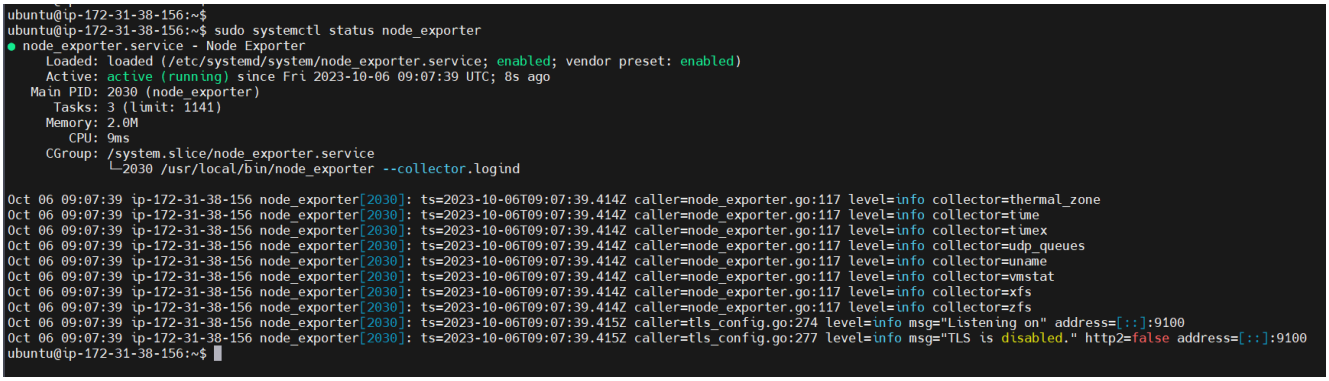
Then start the Node Exporter.

```
sudo systemctl start node_exporter
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo systemctl enable node_exporter
Created symlink /etc/systemd/system/multi-user.target.wants/node_exporter.service → /etc/systemd/system/node_exporter.service.
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo systemctl start node_exporter
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
```

Check the status of Node Exporter with the following command:

```
sudo systemctl status node_exporter
```



If you have any issues, check logs with journalctl

```
journalctl -u node_exporter -f --no-pager
```

At this point, we have only a single target in our Prometheus. There are many different service discovery mechanisms built into Prometheus. For example, Prometheus can dynamically discover targets in AWS, GCP, and other clouds based on the labels. In the following tutorials, I'll give you a few examples of deploying Prometheus in a cloud-specific environment. For this tutorial, let's keep it simple and keep adding static targets. Also, I have a lesson on how to deploy and manage Prometheus in the Kubernetes cluster.

To create a static target, you need to add job_name with static_configs. Go to Prometheus server

```
sudo vim /etc/prometheus/prometheus.yml
```

```
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$
ubuntu@ip-172-31-38-156:~$ sudo vim /etc/prometheus/prometheus.yml
ubuntu@ip-172-31-38-156:~$
```

prometheus.yml

```
  - job_name: node_export_masterk8s
      static_configs:
        - targets: ["<master-ip>:9100"]
    - job_name: node_export_workerk8s
      static_configs:
        - targets: ["<worker-ip>:9100"]
```

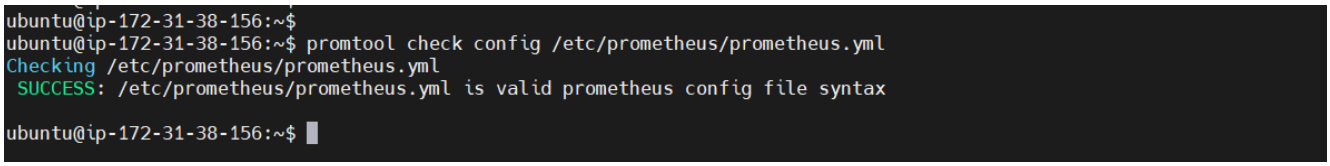
By default, Node Exporter will be exposed on port 9100.

```
alerting:
  alertmanagers:
    - static_configs:
        - targets:
          # - alertmanager:9093

# Load rules once and periodically evaluate them according to the global 'evaluation_interval'.
rule_files:
  # - "first_rules.yml"
  # - "second_rules.yml"

# A scrape configuration containing exactly one endpoint to scrape:
# Here it's Prometheus itself.
scrape_configs:
  # The job name is added as a label `job=<job_name>` to any timeseries scraped from this config.
  - job_name: "prometheus"

    # metrics_path defaults to '/metrics'
    # scheme defaults to 'http'.

    static_configs:
      - targets: ["localhost:9090"]

  - job_name: node_export
    static_configs:
      - targets: ["localhost:9100"]

  - job_name: 'jenkins'
    metrics_path: '/prometheus'
    static_configs:
      - targets: ['13.234.114.77:8080']

  - job_name: node_export_workerk8s
    static_configs:
      - targets: ["65.0.45.118:9100"]

  - job_name: node_export_master__k8s
    static_configs:
      - targets: ["43.204.100.15:9100"]
```

Since we enabled lifecycle management via API calls, we can reload the Prometheus config without restarting the service and causing downtime.

Before, restarting check if the config is valid.

```
promtool check config /etc/prometheus/prometheus.yml
```

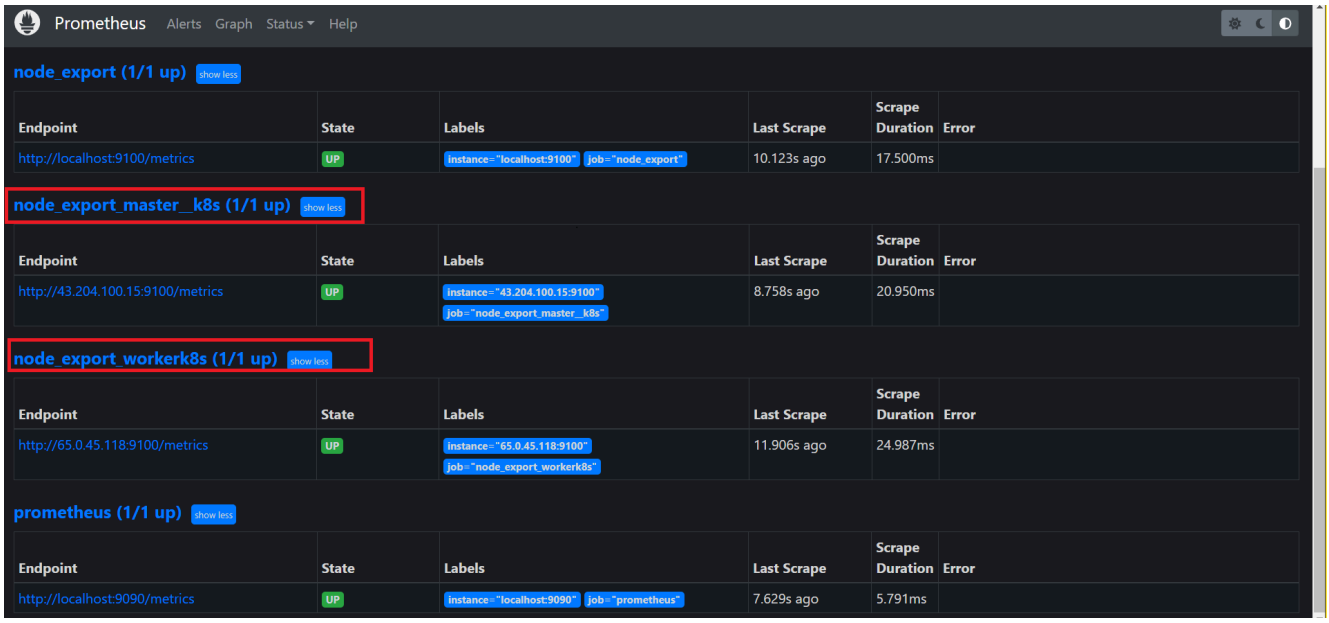


Then, you can use a POST request to reload the config.

```
curl -X POST http://localhost:9090/-/reload
```

Check the targets section

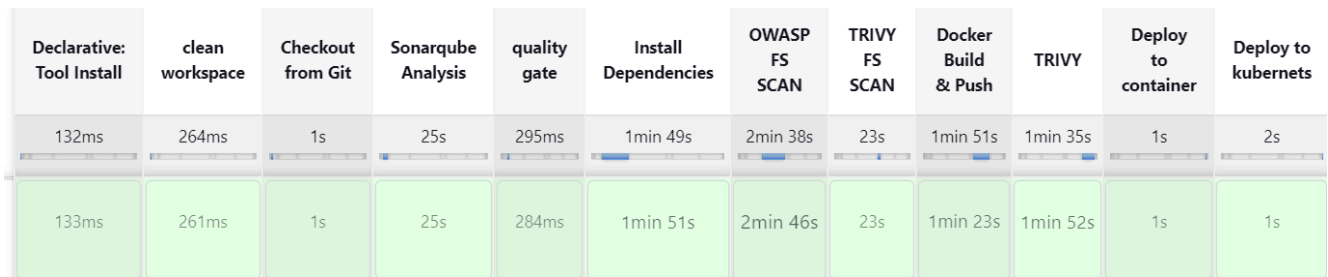
```
http://<ip>:9090/targets
```



final step to deploy on the Kubernetes cluster

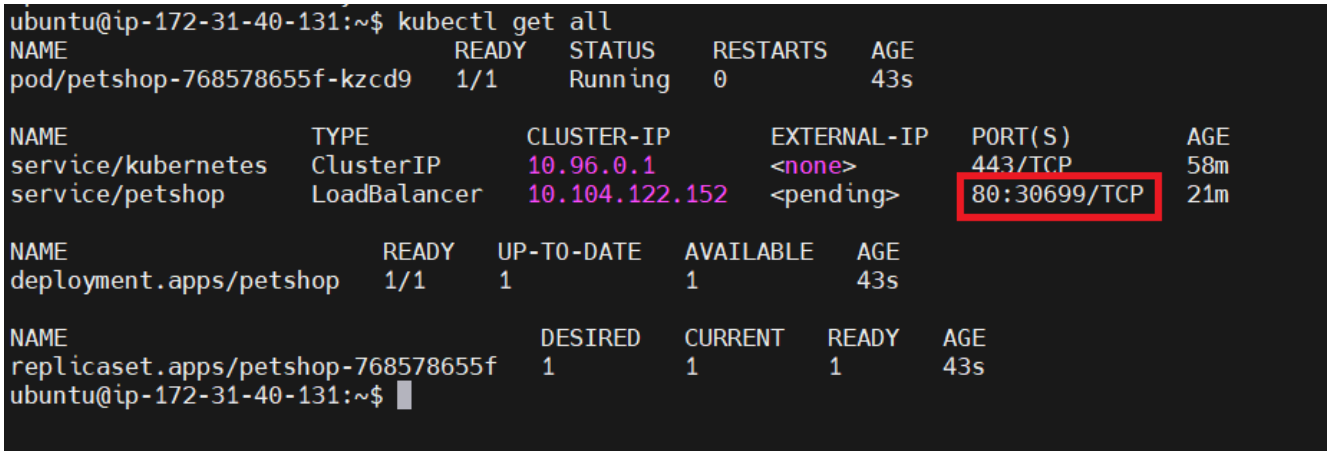
```
stage('Deploy to kubernets'){
            steps{
                script{
                    dir('Kubernetes') {
                        withKubeConfig(caCertificate: '', clusterName:
                                sh 'kubectl apply -f deployment.yml'
                                sh 'kubectl apply -f service.yml'
                        }
                    }
                }
            }
        }
```

stage view



In the Kubernetes cluster(master) give this command

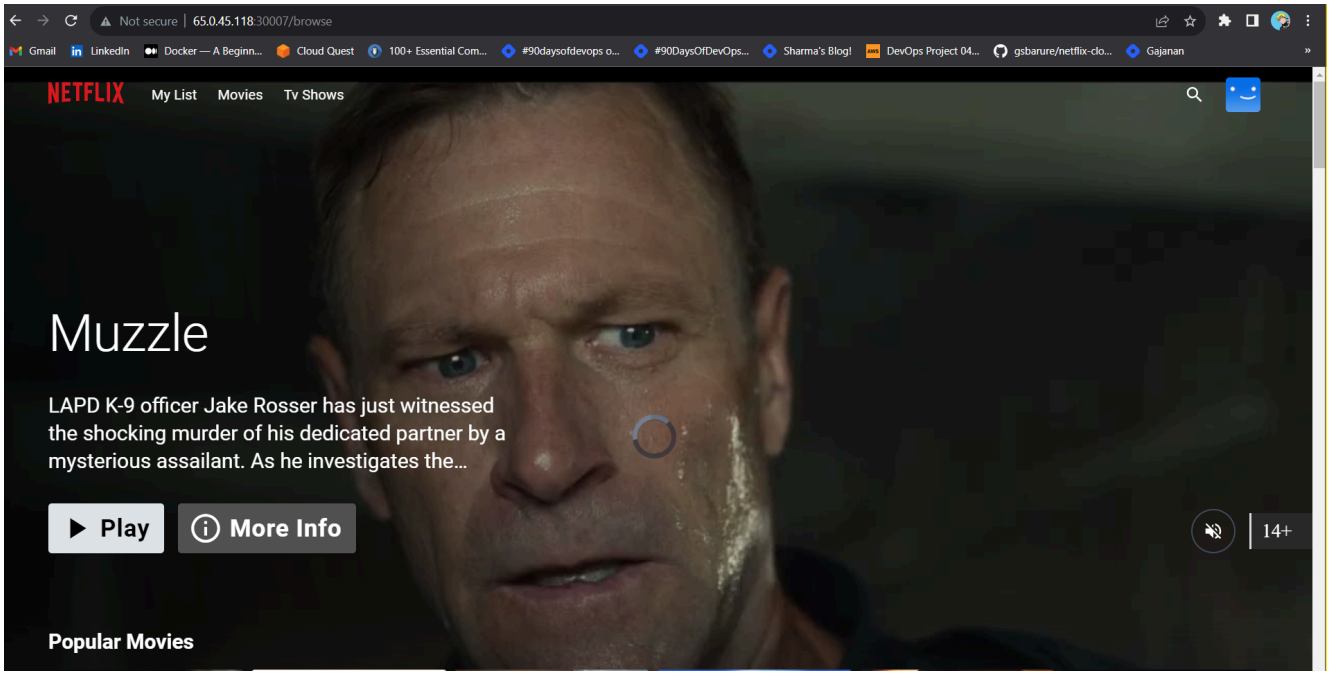
```
kubectl get all
kubectl get svc
```



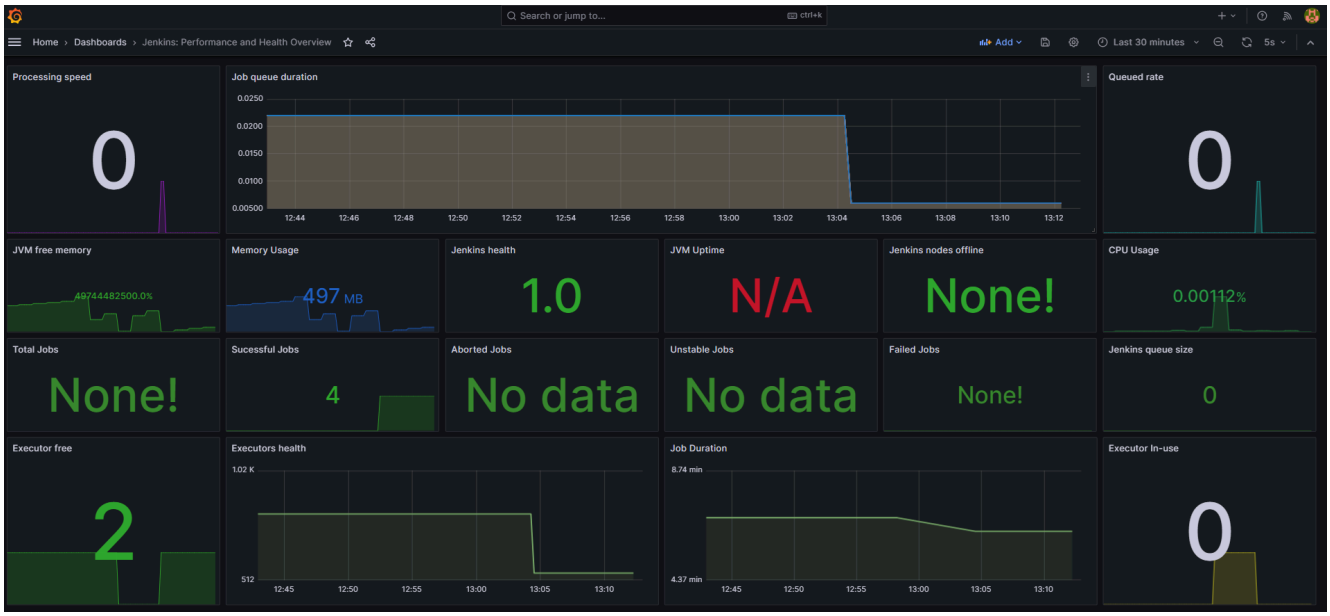
STEP 12:Access from a Web browser with

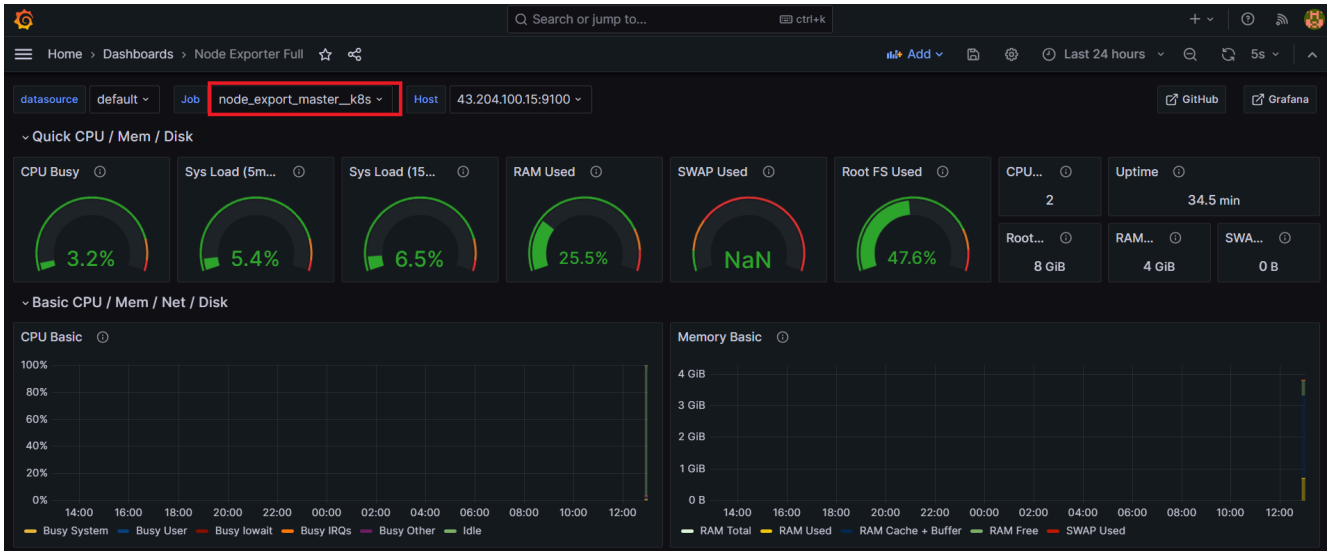
```
<public-ip-of-slave:service port>
```

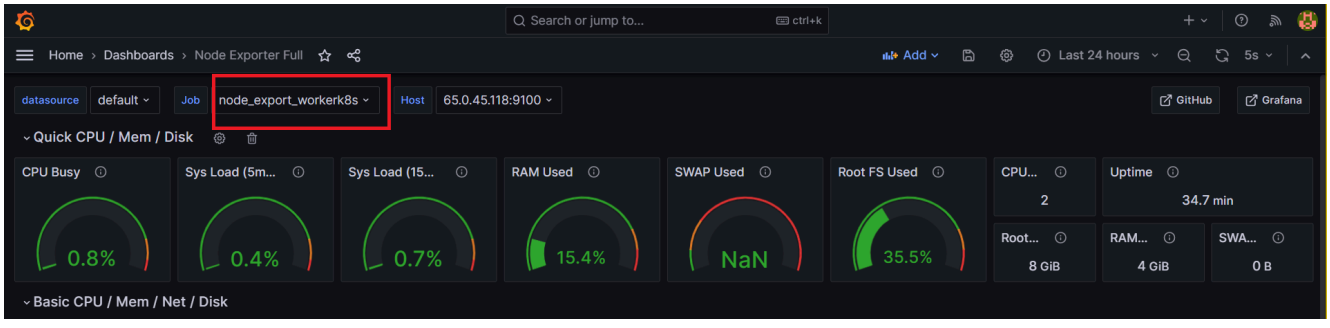
output:



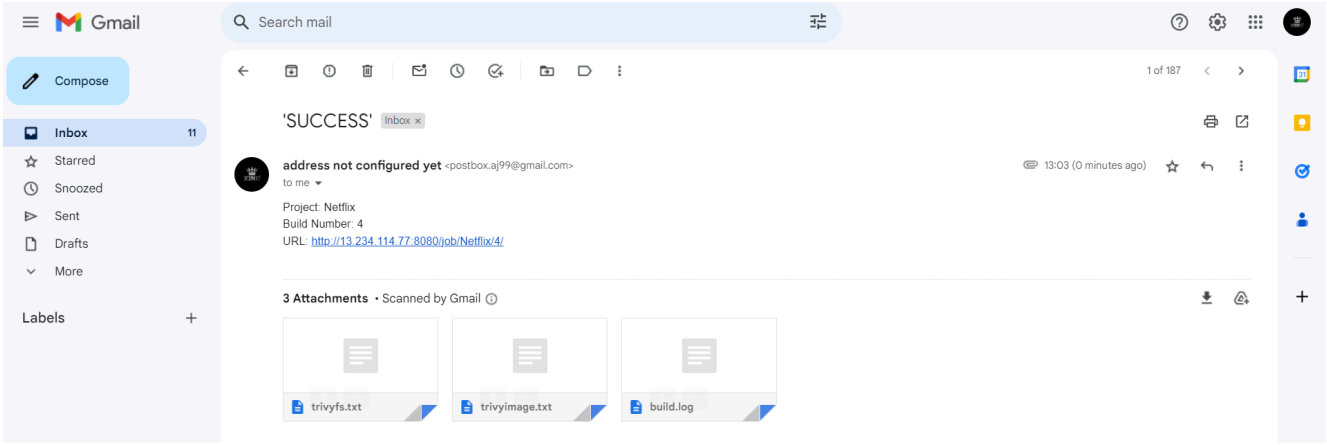
Monitoring







Mail



Step 13: Terminate instances.

Complete 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/Netf
            }
        }
        stage("Sonarqube Analysis "){
            steps{
                withSonarQubeEnv('sonar-server') {
                    sh ''' $SCANNER_HOME/bin/sonar-scanner -Dsonar.proje
                    -Dsonar.projectKey=Netflix '''
                }
```

```
        }
    }
    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 --build-arg TMDB_V3_API_KEY=AJ7A
                   sh "docker tag netflix sevenajay/netflix:latest "
                   sh "docker push sevenajay/netflix:latest "
                }
            }
        }
    }
    stage("TRIVY"){
        steps{
            sh "trivy image sevenajay/netflix:latest > trivyimage.tx
        }
    }
    stage('Deploy to container'){
        steps{
            sh 'docker run -d --name netflix -p 8081:80 sevenajay/ne
        }
```

```
            }
            stage('Deploy to kubernets'){
                steps{
                    script{
                        dir('Kubernetes') {
                            withKubeConfig(caCertificate: '', clusterName:
                                    sh 'kubectl apply -f deployment.yml'
                                    sh 'kubectl apply -f service.yml'
                            }
                        }
                    }
                }
            }

        }
        post {
         always {
            emailext attachLog: true,
                subject: "'${currentBuild.result}'",
                body: "Project: ${env.JOB_NAME}<br/>" +
                    "Build Number: ${env.BUILD_NUMBER}<br/>" +
                    "URL: ${env.BUILD_URL}<br/>",
                to: 'postbox.aj99@gmail.com',
                attachmentsPattern: 'trivyfs.txt,trivyimage.txt'
            }
        }
    }
```

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

21 responses to “Netflix Clone CI/CD with Monitoring | Jenkins | Docker| Kubernetes| Monitoring | DevSecOps”

Sampath
10 January 2024

Hi,

This was great. I learned a lot here. Keep up the good work.

I found that you were missing the Trivy installation in above. So I used the code below for the installation.

wget -qO – https://aquasecurity.github.io/trivy-repo/deb/public.key | gpg –dearmor | sudo tee /usr/share/keyrings/trivy.gpg > /dev/null
echo “deb [signed-by=/usr/share/keyrings/trivy.gpg] https://aquasecurity.github.io/trivy-repo/deb $(lsb_release -sc) main” | sudo tee -a /etc/apt/sources.list.d/trivy.list
apt-get install trivy
trivy –version

Regards,
Sampath

Reply

mrcloudbook.com
11 January 2024

I will see thaanks for Update

Reply

mrcloudbook.com
11 January 2024

The code is already in blog bro may be you missed it

Reply

Parag Vade
18 November 2024

You are correct Sampath. Thank you very much for your comment.
Was stuck at this.

And thank you so much Ajay.
Your efforts for sharing knowledge are exceptional.

Reply

snehalk
14 March 2024

Thank you for sharing such a good project.

Reply

Ravi
29 March 2024

Thank you so much for the End-to-End Pipeline with detailed presentation. One of the best in recent times.

Reply

charan
14 April 2024

blue bottle image and muzzle image coming your netflix same thing i done that image not getting how to that image coming tell me bro

Reply

mrcloudbook.com
14 April 2024

I didnt get your point brother

Reply

Rajat
21 April 2024

Wonderful project I have saw ever. Thanks

Reply

sharafat
7 May 2024

First of all thanks for sharing such a wonderfull project. My questions is why pipeline always stucks at sonar quality gate. Can we make it faster. it runs fine without quality gate. but when i add that step pipeline stucks for long time.
Thanks

Reply

Johnprxy
22 August 2024

it happened to me too, but when i use the same version of sonar used in the project, it worked and it was faster

Reply

sarvadnya
26 May 2024

Hey Ajay, thank you for this wonderful project, your documentation was also on point, I am a newbie to Grafana, why while importing the dashboard, why we using number code, what is it?

Reply

mrcloudbook.com
11 June 2024

Number code is predefined Dashboard and already existing one and you can also create one

Reply

Stephen
28 May 2024

Thank Ajay for this project

Reply

Licznik Prądu
7 June 2024

Your article is a great mix of thorough research and personal perspective. Really enjoyed it!

Reply

jagadeesh
8 July 2024

Hi Ajay,

First of all, thank you for this wonderful project and document. I have a small doubt or request—could you please create a Robot shopping cart project? I'm asking

because you explain each point clearly and provide excellent documentation. It would be great to see a project like this from you.

Thank you!

Reply

Harsh Gupta
25 December 2024

TMDB website is opening.
error :
This site can't be reached
http://www.themoviedb.org took too long to respond.

Reply

mrcloudbook.com
29 December 2024

Use VPN

Reply

Robin Rawat
27 December 2024

amazing content brother

Reply

Robin Rawat
28 December 2024

kluster is not deploying with this cmd error coming

Reply

mrcloudbook.com
29 December 2024

Use 24.04 setup

Reply

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