Project 2

Building a CI/CD Pipeline for a Tech Company

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First of all, thanks very much to edureka and instructors for giving me confidence that I can do any type of devops projects. I just loved working on this project.
I have chosen project 2 out of two projects. So I implemented the 2nd project as well.
github respository: https://github.com/IgorDems/XYZ_Technologies.git
To setup the project environment I have utilized a Virtual Box 7.0 installed on laptop, and RDP connection to PC/Hyper-V Manager.

For validation:

- run this pipeline job in Jenkins for task-3 to create a Docker image, according to Dockerfile scenario, upload to Dockerhub and to deploy the Docker container using Jenkins Declarative PipeLine.
- The Jenkins file location:
  https://github.com/IgorDems/XYZ_Technologies.git
  TASK3 run this pipeline job in Jenkins for task-4 deploying to kubernetes and docker using Jenkins Declarative PipeLine The Jenkins file location:
  https://github.com/IgorDems/XYZ_Technologies.git
  TASK4_DEPLOYMANT

Business Challenge/Requirement:

XYZ Technologies is a leading online company, and it has recently acquired a large offline business store. The business store has a large number of stores across the globe but is following the conventional pattern of development and deployment. As a result, it has landed at a great loss and is facing the following challenges.

- Low available
- Low scalable
- Low performance
- Hard to built and maintain
- Developing and deploying are time-consuming

XYZ will acquire the data from all these storage systems and plans to use it for analytics and prediction of the firm's growth and sales prospects. In the first phase, XYZ has to create the servlets to add a product and display product details. Add servlet dependencies required to compile the servlets. Create an HTML page that will be used to add a product. The team is using Git to keep all the source code.
XYZ has decided to use the DevOps model. Once source code is available in GitHub, we need to integrate it with Jenkins and provide continuous build generation for continuous delivery as well as integrate with Ansible and Kubernetes for deployment. Use Docker Hub to pull and push images between Ansible and Kubernetes.

Problem Statements/Tasks:

We need to develop a CI/CD pipeline to automate the software development, testing, packaging, and deployment, reducing the time to market the app and ensuring good quality service is experienced by end users. In this project, we need to—

- push the code to our GitHub repository.
- create a continuous integration pipeline using Jenkins to compile, test, and package the code present in GitHub.
- Write Dockerfile to push the war file to the Tomcat server.
- Integrate Docker with Ansible and write the playbook.
- Deploy artifacts to the Kubernetes cluster

• Monitor resources using Grafana.

Approach to Solve:

Task 1: Clone the project from git hub link shared in resources to your local machine. Build the code using maven commands.

Task 2: Setup git repository and push the source code. Login to Jenkins

1. create 3 jobs
    - One for compiling source code
    - Second for testing source code
    - Third for packing the code
2. Setup CICD pipeline to execute the jobs created in step1
3. Setup master-slave node to distribute the tasks in pipeline

Task 3: Write a Docket file Create an Image and container on docker host. Integrate docker host with Jenkins. - - Create CI/CD job on Jenkins to build and deploy on a container

1. Enhance the package job created in step 1 of task 2 to create a docker image
2. In the docker image add code to move the war file to tomcat server and build the image

Task 4: Integrate Docker host with Ansible. Write ansible playbook to create Image and create continuer. Integrate Ansible with Jenkins. Deploy ansible playbook. CI/CD job to build code on ansible and deploy it on docker container

a. Deploy Artifacts on Kubernetes

a. Write pod, service, and deployment manifest file

b. Integrate Kubernetes with ansible

c. Ansible playbook to create deployment and service

Task 5: Using Prometheus monitor the resources like CPU utilization: Total Usage, Usage per core, usage breakdown, Memory, Network on the instance by providing the end points in local host. Install node exporter and add URL to target in Prometheus

Let's start…

Task 1: Clone the project from the GitHub link shared in resources to your local machine. Build the code using Maven commands.

Approach i have followed:

The primary goal of this project is to build a robust CI/CD pipeline that automates the building, testing, and deployment of the XYZ Technologies web application. This pipeline will use Jenkins, Ansible, Docker, and Kubernetes to achieve a streamlined and efficient software delivery process.Repositoryhttps://github.com/IgorDems/XYZ_Technologies.git

- And executed the below tasks of maven in VM(**Virtual Box instance, Ubuntu VM, host:** vmlt)my local environment.

igor@k8s-control:~$ cd XYZ_Technologies/

1.igor@k8s-control:~/XYZ_Technologies$ mvn compile // Compiles source code of the project

```
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.xyz:XYZtechnologies >-----------------------
[INFO] Building adminModule 1.0
[INFO] --------------------------------[ war ]---------------------------------
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argLine set to -javaagent:/home/igor/.m2/repository/org/jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-runtime.jar=destfile=/home/igor/XYZ_Technologies/target/jacoco.exec
[INFO]
```

[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ XYZtechnologies ---
[INFO] Changes detected - recompiling the module!
[INFO] Compiling 3 source files to /home/igor/XYZ_Technologies/target/classes
[INFO] --
[INFO] BUILD SUCCESS
[INFO] --
[INFO] Total time: 0.853 s
[INFO] Finished at: 2025-06-25T21:13:31-05:00
[INFO] --
2. igor@k8s-control:~/XYZ_Technologies$ mvn test   //Runs tests for the project.
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.xyz:XYZtechnologies >-----------------------
[INFO] Building adminModule 1.0
[INFO] --------------------------------[war]---------------------------------
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argLine set to -javaagent:/home/igor/.m2/repository/org/jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-runtime.jar=destfile=/home/igor/XYZ_Technologies/target/jacoco.exec
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ XYZtechnologies ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/test/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ XYZtechnologies ---
[INFO] Changes detected - recompiling the module!
[INFO] Compiling 1 source file to /home/igor/XYZ_Technologies/target/test-classes
[INFO]
[INFO] --- maven-surefire-plugin:2.12.4:test (default-test) @ XYZtechnologies ---
[INFO] Surefire report directory: /home/igor/XYZ_Technologies/target/surefire-reports

---
 T E S T S

Running com.xyz.dataAccessObject.AdminDataImpTest
Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.02 sec

Results :

```
Tests run: 1, Failures: 0, Errors: 0, Skipped: 0

[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.100 s
[INFO] Finished at: 2025-06-25T21:17:30-05:00
[INFO] ------------------------------------------------------------------------
```

3. igor@k8s-control:~/XYZ_Technologies$ mvn package
//Creates WAR file for the project to convert it into a distributable format

```
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.xyz:XYZtechnologies >-----------------------
[INFO] Building adminModule 1.0
[INFO] --------------------------------[ war ]---------------------------------
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argLine set to -javaagent:/home/igor/.m2/repository/org/jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-runtime.jar=destfile=/home/igor/XYZ_Technologies/target/jacoco.exec
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ XYZtechnologies ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/test/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ XYZtechnologies ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-surefire-plugin:2.12.4:test (default-test) @ XYZtechnologies ---
[INFO] Surefire report directory: /home/igor/XYZ_Technologies/target/surefire-reports

-------------------------------------------------------
 T E S T S
-------------------------------------------------------
Running com.xyz.dataAccessObject.AdminDataImpTest
Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.019 sec

Results :

Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
```

[INFO]
[INFO] --- maven-war-plugin:3.2.2:war (default-war) @ XYZtechnologies ---
[INFO] Packaging webapp
[INFO] Assembling webapp [XYZtechnologies] in [/home/igor/XYZ_Technologies/target/XYZtechnologies-1.0]
[INFO] Processing war project
[INFO] Copying webapp resources [/home/igor/XYZ_Technologies/src/main/webapp]
[INFO] Webapp assembled in [33 msecs]
[INFO] Building war: /home/igor/XYZ_Technologies/target/XYZtechnologies-1.0.war
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:report (jacoco-site) @ XYZtechnologies ---
[INFO] Loading execution data file /home/igor/XYZ_Technologies/target/jacoco.exec
[INFO] Analyzed bundle 'adminModule' with 2 classes
[INFO] --
[INFO] BUILD SUCCESS
[INFO] --
[INFO] Total time: 1.195 s
[INFO] Finished at: 2025-06-25T21:19:41-05:00
[INFO]

4. igor@k8s-control:~/XYZ_Technologies$ mvn clean install //Using the **clean** command, which will delete all previously compiled Java .class files and resources (like .properties) in the project. build will start from a clean slate.
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.xyz:XYZtechnologies >-----------------------
[INFO] Building adminModule 1.0
[INFO] --------------------------------[war]---------------------------------
[INFO]
[INFO] --- maven-clean-plugin:2.5:clean (default-clean) @ XYZtechnologies ---
[INFO] Deleting /home/igor/XYZ_Technologies/target
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argLine set to -javaagent:/home/igor/.m2/repository/org/jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-runtime.jar=destfile=/home/igor/XYZ_Technologies/target/jacoco.exec
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ XYZtechnologies ---
[INFO] Changes detected - recompiling the module!
[INFO] Compiling 3 source files to /home/igor/XYZ_Technologies/target/classes
[INFO]
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/test/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ XYZtechnologies ---
[INFO] Changes detected - recompiling the module!

```
[INFO] Compiling 1 source file to /home/igor/XYZ_Technologies/target/test-classes
[INFO]
[INFO] --- maven-surefire-plugin:2.12.4:test (default-test) @ XYZtechnologies ---
[INFO] Surefire report directory: /home/igor/XYZ_Technologies/target/surefire-reports

-------------------------------------------------------
 T E S T S
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Running com.xyz.dataAccessObject.AdminDataImpTest
Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.02 sec

Results :

Tests run: 1, Failures: 0, Errors: 0, Skipped: 0

[INFO]
[INFO] --- maven-war-plugin:3.2.2:war (default-war) @ XYZtechnologies ---
[INFO] Packaging webapp
[INFO] Assembling webapp [XYZtechnologies] in [/home/igor/XYZ_Technologies/target/XYZtechnologies-1.0]
[INFO] Processing war project
[INFO] Copying webapp resources [/home/igor/XYZ_Technologies/src/main/webapp]
[INFO] Webapp assembled in [33 msecs]
[INFO] Building war: /home/igor/XYZ_Technologies/target/XYZtechnologies-1.0.war
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:report (jacoco-site) @ XYZtechnologies ---
[INFO] Loading execution data file /home/igor/XYZ_Technologies/target/jacoco.exec
[INFO] Analyzed bundle 'adminModule' with 2 classes
[INFO]
[INFO] --- maven-install-plugin:2.4:install (default-install) @ XYZtechnologies ---
[INFO] Installing /home/igor/XYZ_Technologies/target/XYZtechnologies-1.0.war to /home/igor/.m2/repository/com/xyz/
XYZtechnologies/1.0/XYZtechnologies-1.0.war
[INFO] Installing /home/igor/XYZ_Technologies/pom.xml to
/home/igor/.m2/repository/com/xyz/XYZtechnologies/1.0/XYZtechnologies-1.0.pom
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.615 s
[INFO] Finished at: 2025-06-25T21:22:20-05:00
[INFO] ------------------------------------------------------------------------
```

- **Install** will then compile, test & package my Java project and even install/copy my built .war file into Maven repository.
- Below are the snapshots of actions:

Compile task :

```
igor@k8s-control:~/XYZ_Technologies$ mvn compile
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.xyz:XYZtechnologies >-----------------------
[INFO] Building adminModule 1.0
[INFO] --------------------------------[ war ]---------------------------------
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argLine set to -javaagent:/home/igor/.m2/repository/org/jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-run
time.jar=destfile=/home/igor/XYZ_Technologies/target/jacoco.exec
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ XYZtechnologies ---
[INFO] Changes detected - recompiling the module!
[INFO] Compiling 3 source files to /home/igor/XYZ_Technologies/target/classes
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  0.853 s
[INFO] Finished at: 2025-06-25T21:13:31-05:00
[INFO] ------------------------------------------------------------------------
```

Test task:

```
igor@k8s-control:~/XYZ_Technologies$ mvn test
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.xyz:XYZtechnologies >-----------------------
[INFO] Building adminModule 1.0
[INFO] --------------------------------[ war ]---------------------------------
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argLine set to -javaagent:/home/igor/.m2/repository/org/jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-run
time.jar=destfile=/home/igor/XYZ_Technologies/target/jacoco.exec
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ XYZtechnologies ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/test/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ XYZtechnologies ---
[INFO] Changes detected - recompiling the module!
[INFO] Compiling 1 source file to /home/igor/XYZ_Technologies/target/test-classes
[INFO]
[INFO] --- maven-surefire-plugin:2.12.4:test (default-test) @ XYZtechnologies ---
[INFO] Surefire report directory: /home/igor/XYZ_Technologies/target/surefire-reports

-------------------------------------------------------
 T E S T S
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Running com.xyz.dataAccessObject.AdminDataImpTest
Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.02 sec

Results :

Tests run: 1, Failures: 0, Errors: 0, Skipped: 0

[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.100 s
[INFO] Finished at: 2025-06-25T21:17:30-05:00
[INFO] ------------------------------------------------------------------------
```

Package task running in local:

```
igor@k8s-control:~/XYZ_Technologies$ mvn package
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.xyz:XYZtechnologies >-----------------------
[INFO] Building adminModule 1.0
[INFO] --------------------------------[ war ]---------------------------------
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argLine set to -javaagent:/home/igor/.m2/repository/org/jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-run
time.jar=destfile=/home/igor/XYZ_Technologies/target/jacoco.exec
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ XYZtechnologies ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/test/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ XYZtechnologies ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-surefire-plugin:2.12.4:test (default-test) @ XYZtechnologies ---
[INFO] Surefire report directory: /home/igor/XYZ_Technologies/target/surefire-reports

-------------------------------------------------------
 T E S T S
-------------------------------------------------------
Running com.xyz.dataAccessObject.AdminDataImpTest
Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.019 sec

Results :

Tests run: 1, Failures: 0, Errors: 0, Skipped: 0

[INFO]
[INFO] --- maven-war-plugin:3.2.2:war (default-war) @ XYZtechnologies ---
[INFO] Packaging webapp
[INFO] Assembling webapp [XYZtechnologies] in [/home/igor/XYZ_Technologies/target/XYZtechnologies-1.0]
[INFO] Processing war project
[INFO] Copying webapp resources [/home/igor/XYZ_Technologies/src/main/webapp]
[INFO] Webapp assembled in [33 msecs]
[INFO] Building war: /home/igor/XYZ_Technologies/target/XYZtechnologies-1.0.war
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:report (jacoco-site) @ XYZtechnologies ---
[INFO] Loading execution data file /home/igor/XYZ_Technologies/target/jacoco.exec
[INFO] Analyzed bundle 'adminModule' with 2 classes
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.195 s
[INFO] Finished at: 2025-06-25T21:19:41-05:00
```

mvn clean install

```
igor@k8s-control:~/XYZ_Technologies$ mvn clean install
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.xyz:XYZtechnologies >-----------------------
[INFO] Building adminModule 1.0
[INFO] --------------------------------[ war ]---------------------------------
[INFO]
[INFO] --- maven-clean-plugin:2.5:clean (default-clean) @ XYZtechnologies ---
[INFO] Deleting /home/igor/XYZ_Technologies/target
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argLine set to -javaagent:/home/igor/.m2/repository/org/jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-run
time.jar=destfile=/home/igor/XYZ_Technologies/target/jacoco.exec
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ XYZtechnologies ---
[INFO] Changes detected - recompiling the module!
[INFO] Compiling 3 source files to /home/igor/XYZ_Technologies/target/classes
[INFO]
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ XYZtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/igor/XYZ_Technologies/src/test/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ XYZtechnologies ---
[INFO] Changes detected - recompiling the module!
[INFO] Compiling 1 source file to /home/igor/XYZ_Technologies/target/test-classes
[INFO]
[INFO] --- maven-surefire-plugin:2.12.4:test (default-test) @ XYZtechnologies ---
[INFO] Surefire report directory: /home/igor/XYZ_Technologies/target/surefire-reports

-------------------------------------------------------
 T E S T S
-------------------------------------------------------
Running com.xyz.dataAccessObject.AdminDataImpTest
Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.02 sec

Results :

Tests run: 1, Failures: 0, Errors: 0, Skipped: 0

[INFO]
[INFO] --- maven-war-plugin:3.2.2:war (default-war) @ XYZtechnologies ---
[INFO] Packaging webapp
[INFO] Assembling webapp [XYZtechnologies] in [/home/igor/XYZ_Technologies/target/XYZtechnologies-1.0]
[INFO] Processing war project
[INFO] Copying webapp resources [/home/igor/XYZ_Technologies/src/main/webapp]
[INFO] Webapp assembled in [33 msecs]
[INFO] Building war: /home/igor/XYZ_Technologies/target/XYZtechnologies-1.0.war
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:report (jacoco-site) @ XYZtechnologies ---
[INFO] Loading execution data file /home/igor/XYZ_Technologies/target/jacoco.exec
[INFO] Analyzed bundle 'adminModule' with 2 classes
[INFO]
[INFO] --- maven-install-plugin:2.4:install (default-install) @ XYZtechnologies ---
[INFO] Installing /home/igor/XYZ_Technologies/target/XYZtechnologies-1.0.war to /home/igor/.m2/repository/com/xyz/XYZte
chnologies/1.0/XYZtechnologies-1.0.war
[INFO] Installing /home/igor/XYZ_Technologies/pom.xml to /home/igor/.m2/repository/com/xyz/XYZtechnologies/1.0/XYZtechn
ologies-1.0.pom
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.615 s
[INFO] Finished at: 2025-06-25T21:22:20-05:00
[INFO] ------------------------------------------------------------------------
```

History and target folder after the maven tasks completed

```
1994  cd XYZ_Technologies/
1995  mvn compile
1996  mvn test
1997  mvn package
1998  mvn clean install
1999  history
igor@k8s-control:~/XYZ_Technologies$
```

Classes folder contains compilation data and package task created .war executable file to deploy.

```
igor@k8s-control:~/XYZ_Technologies$ ls -l target
total 7012
drwxrwxr-x 3 igor igor    4096 Jun 25 21:22 classes
drwxrwxr-x 3 igor igor    4096 Jun 25 21:22 generated-sources
drwxrwxr-x 3 igor igor    4096 Jun 25 21:22 generated-test-sources
-rw-rw-r-- 1 igor igor    4288 Jun 25 21:22 jacoco.exec
drwxrwxr-x 2 igor igor    4096 Jun 25 21:22 maven-archiver
drwxrwxr-x 3 igor igor    4096 Jun 25 21:22 maven-status
drwxrwxr-x 3 igor igor    4096 Jun 25 21:22 site
drwxrwxr-x 2 igor igor    4096 Jun 25 21:22 surefire-reports
drwxrwxr-x 3 igor igor    4096 Jun 25 21:22 test-classes
drwxrwxr-x 4 igor igor    4096 Jun 25 21:22 XYZtechnologies-1.0
-rw-rw-r-- 1 igor igor 7132904 Jun 25 21:22 XYZtechnologies-1.0.war
```

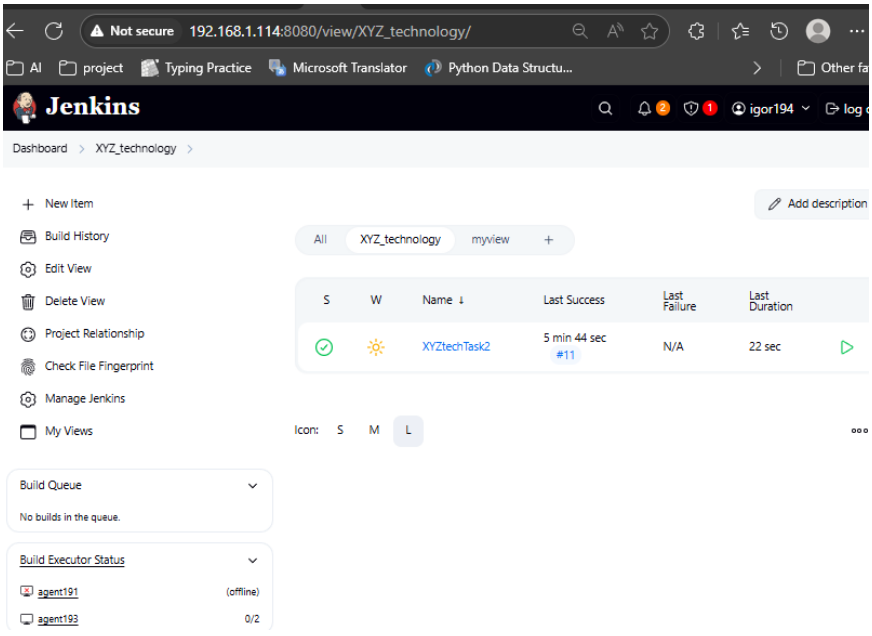
References: https://www.marcobehler.com/guides/mvn-clean-install-a-short-guide-to-maven
https://www.geeksforgeeks.org/maven-lifecycle-and-basic-maven-commands/#:~:text=mvn% 20compile%3A%20Compiles%20source%20code,it%20into%20a%20distributable%20format

Task 2: Set up the Git repository and push the source code. Then, log in to Jenkins.

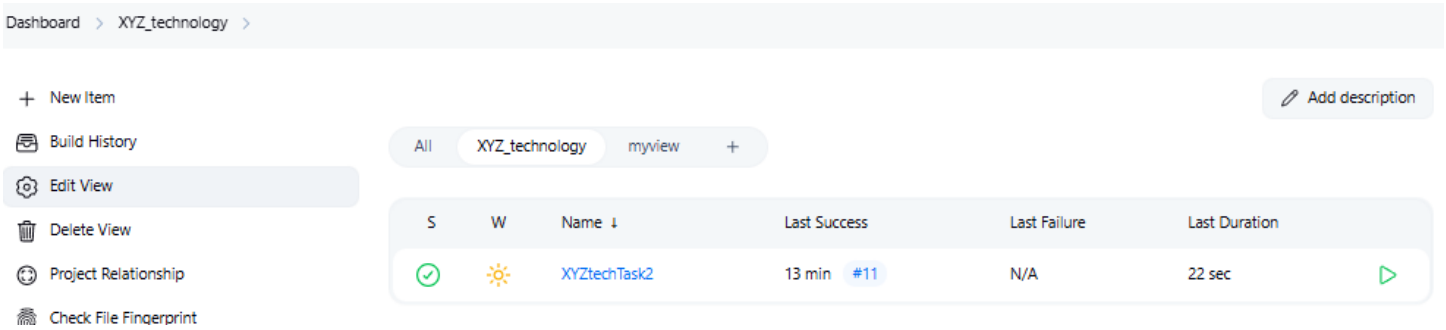
1. Create a build pipeline(Declarative pipeline) containing a job for each
    - One for compiling source code
    - Second for testing source code
    - Third for packing the code
2. Execute the CI/CD pipeline to execute the job created in step 1
3. Set up a master-slave node the tasks in the node pipeline

Approach i have followed:

- Jenkins has been installed in master server already IP: 192.168.1.114



I have created the job:



for compile, test, package in jenkins and created Declarative pipeline by Jenkinsfile located at:
https://github.com/IgorDems/XYZ_Technologies/tree/main/tasktwo
with these and set up the agent " label 'agent193' " IP: 192.168.1.115 machine(slave machine) and shared the load to agent
To start agent193:
java -jar /var/jenkins-agent/agent.jar -url http://192.168.1.115:8080/ -secret cbe949df3af3ec0c992286d18250984da77a2a71c8f2fb172c08629f34608b4c -name agent193 -workDir "/var/jenkins-agent"

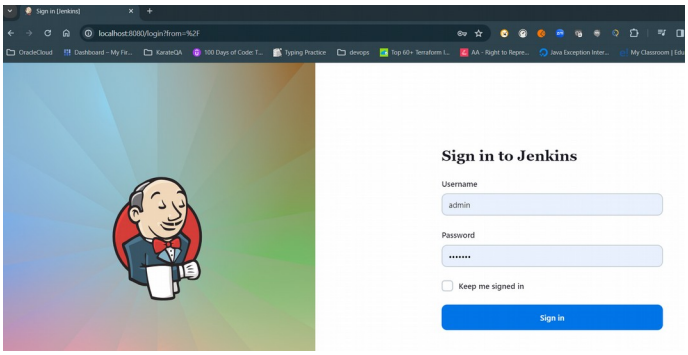
- As a given project is based on java i have used maven to build the code and Jenkins is a build automation server that helps to automate these things so i have set up the java, maven paths of master in global tool configuration in jenkins and set up the jenkins goals and left git path as default.

```
igor@k8s-2:~$ mvn -version
Apache Maven 3.6.3
Maven home: /usr/share/maven
Java version: 21.0.2, vendor: Oracle Corporation, runtime: /usr/lib/jvm/jdk-21-oracle-x64
Default locale: en_US, platform encoding: UTF-8
OS name: "linux", version: "6.5.0-35-generic", arch: "amd64", family: "unix"
igor@k8s-2:~$ java --version
java 21.0.2 2024-01-16 LTS
Java(TM) SE Runtime Environment (build 21.0.2+13-LTS-58)
Java HotSpot(TM) 64-Bit Server VM (build 21.0.2+13-LTS-58, mixed mode, sharing)
```

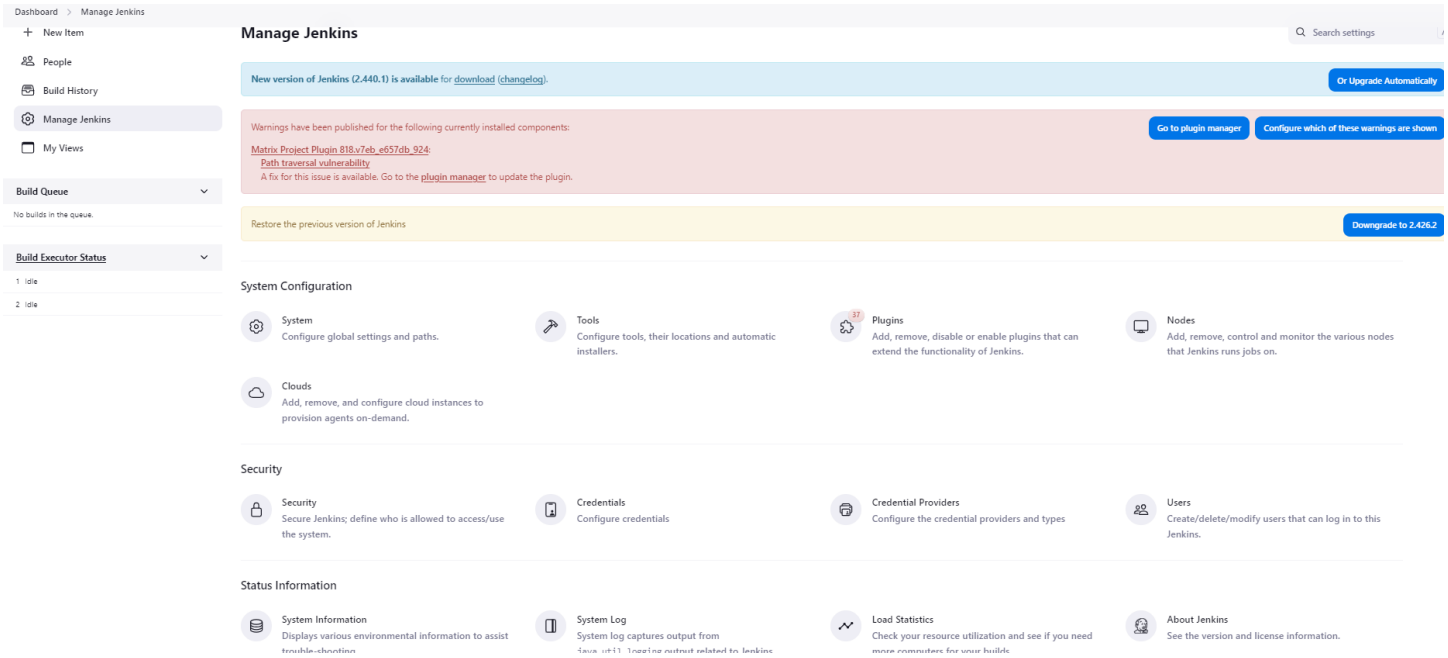
- Tools location :
    /usr/share/maven
    /usr/lib/jvm/jdk-21-oracle-x64
- Goals:
    compile
    test
    Package

Please find the screenshots of the above task-2:

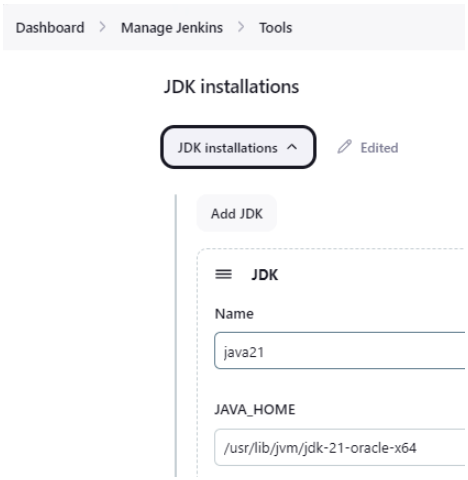
Jenkins login:

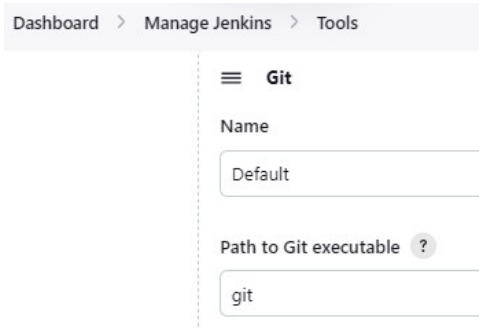


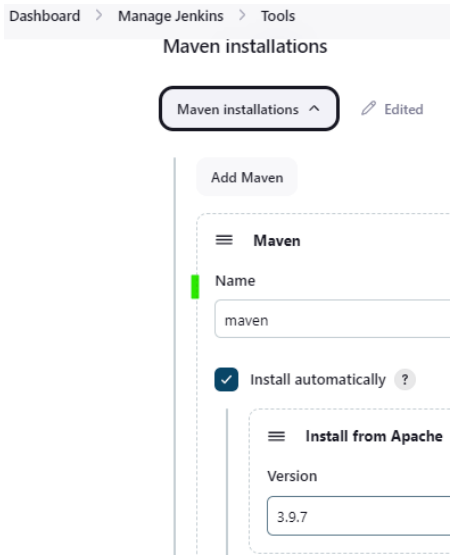
Global tool configuration:

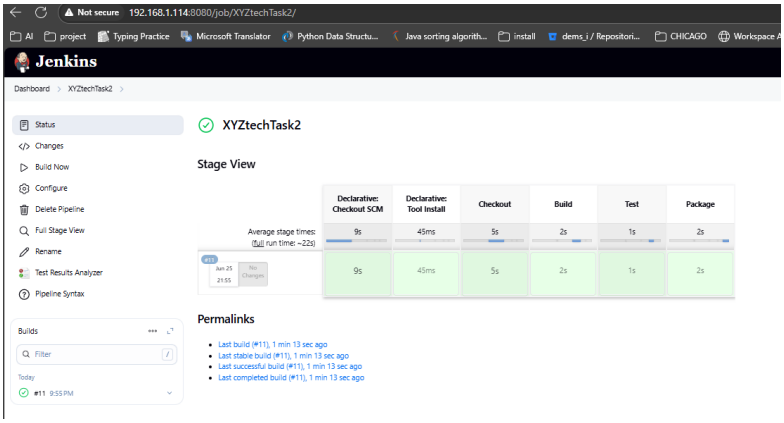


Tool location configuration JDK, GIT, MVN :

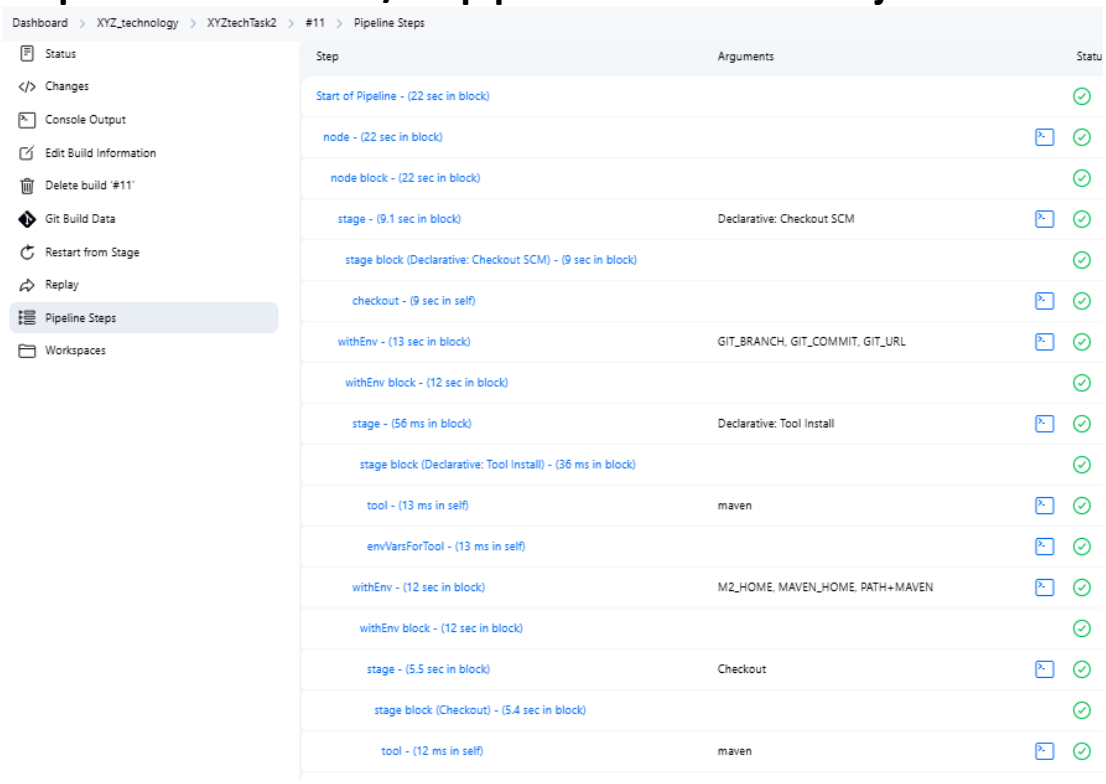


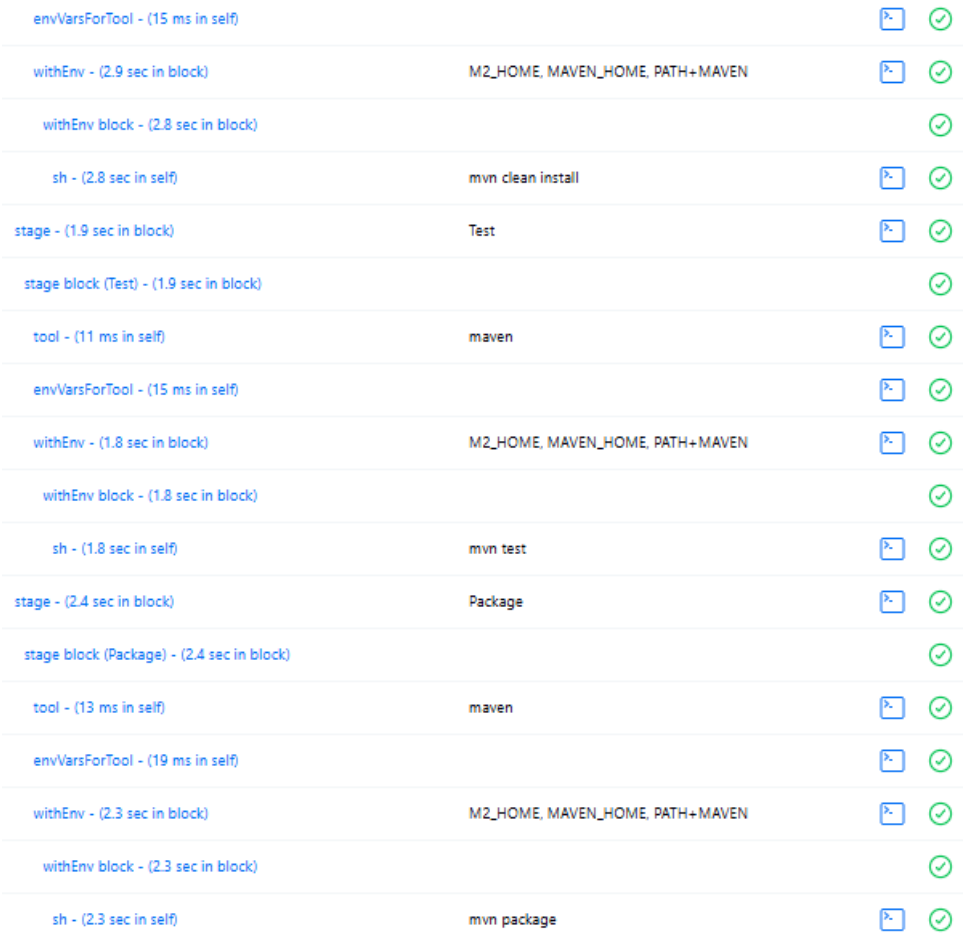


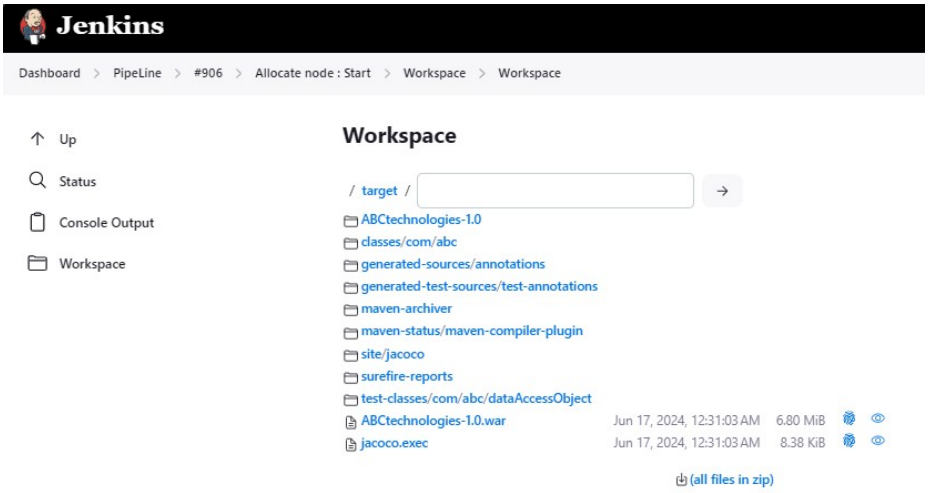




Step 2: Execute the CI/CD pipeline to execute the jobs created in step 1

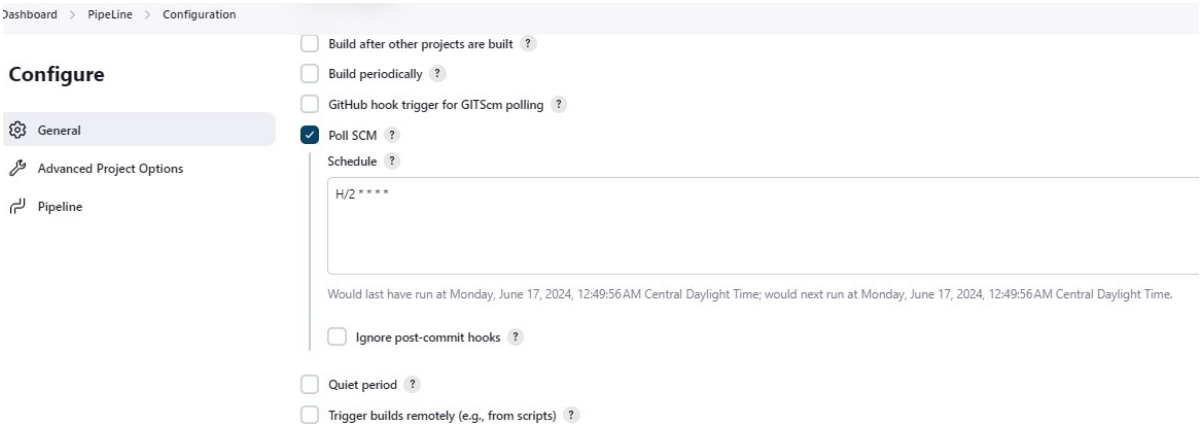






And I have configured the git polling as a cron job for a compile job that triggers for every 2 minutes for github code so that if whatever change happens then it will trigger and perform the given task.

Poll SCM settings using cronjob in compile job:



Git polling Log that it has triggered automatically after i modified the Readme file.

Git Polling Log

```
Started on Jun 17, 2024, 12:53:00 AM
Using strategy: Default
[poll] Last Built Revision: Revision 2301b2e7ac6699b7f08e938f9f12ac8bf445feff (refs/remotes/origin/firstask)
The recommended git tool is: git
No credentials specified
 > git --version # timeout=10
 > git --version # 'git version 2.34.1'
 > git ls-remote -h -- https://github.com/IgorDems/ABC_Technologies.git # timeout=10
Found 7 remote heads on https://github.com/IgorDems/ABC_Technologies.git
[poll] Latest remote head revision on refs/heads/firstask is: 2301b2e7ac6699b7f08e938f9f12ac8bf445feff - already built by 906
Using strategy: Default
[poll] Last Built Revision: Revision 2301b2e7ac6699b7f08e938f9f12ac8bf445feff (refs/remotes/origin/firstask)
The recommended git tool is: git
No credentials specified
 > git --version # timeout=10
 > git --version # 'git version 2.34.1'
 > git ls-remote -h -- https://github.com/IgorDems/ABC_Technologies.git # timeout=10
Found 7 remote heads on https://github.com/IgorDems/ABC_Technologies.git
[poll] Latest remote head revision on refs/heads/master is: 2301b2e7ac6699b7f08e938f9f12ac8bf445feff - already built by 906
Done. Took 1.5 sec
No changes
```

Step 3: Set up a master-slave node to distribute the tasks in the pipeline

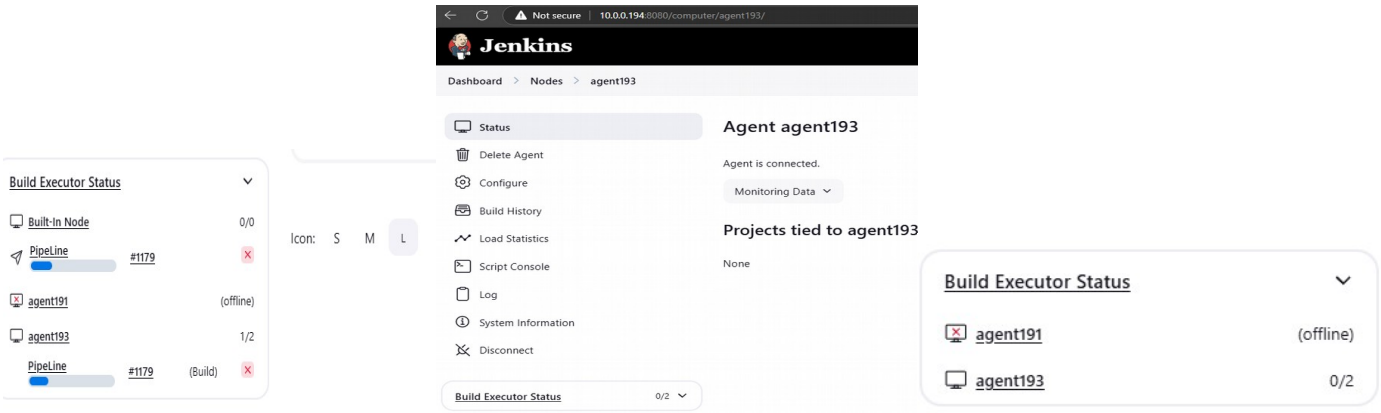
The agent configurations:

- I have created a user jenkins on second linux machine so that i can run the jenkins jobs in slave machine as well.

Agent commands that i run in agent machine:

To start agent193 we have to establish a connection slave to master :
java -jar /var/jenkins-agent/agent.jar -url http://192.168.1.114:8080/ -secret cbe949df3af3ec0c992286d18250984da77a2a71c8f2fb172c08629f34608b4c -name agent193 -workDir "/var/jenkins-agent"

Job running in agent193 machine(example):



Agent193 location setup, structure configuration:

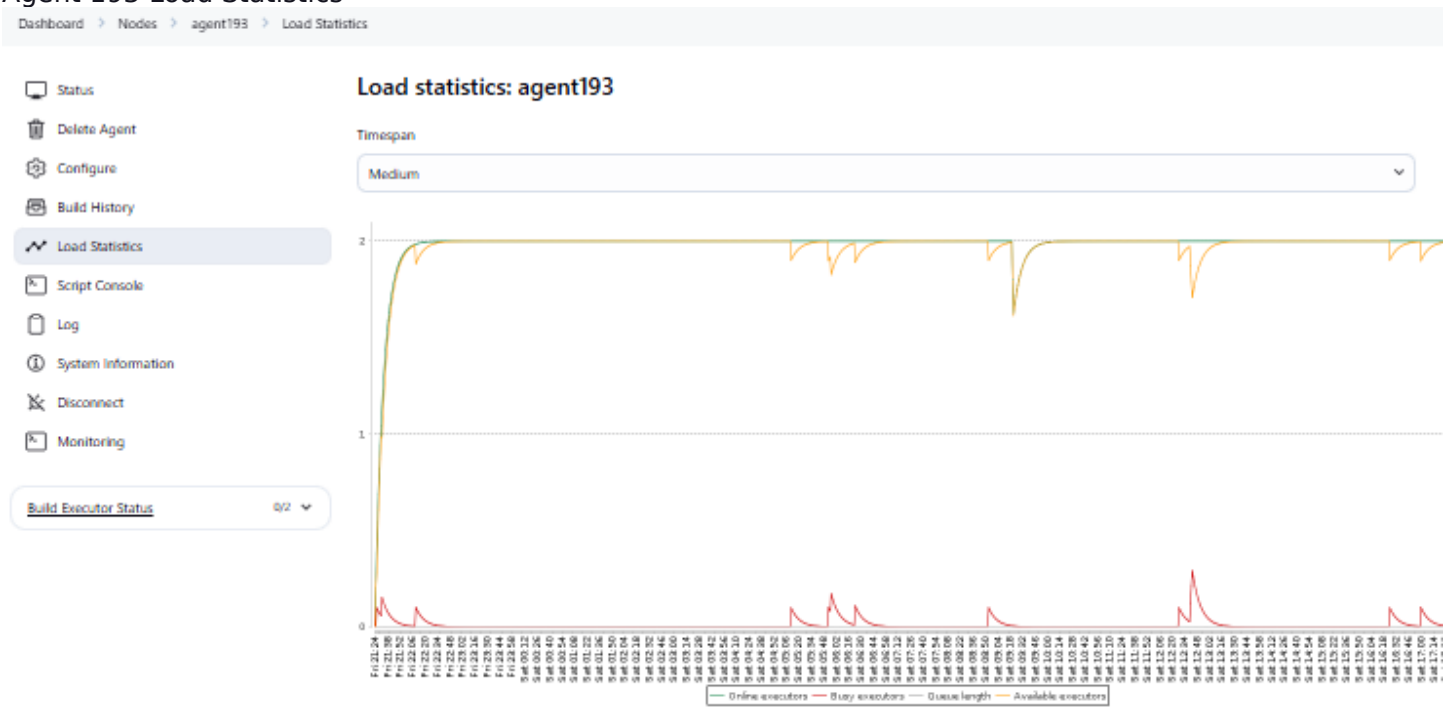
Making a compile job to run on `'agent193'` machine only I have added the Agent into Jenkinsfile :

```
pipeline {
  agent {label 'agent193' }
  tools {
    maven 'maven'
  }
  stages {
    stage('Checkout') {
      steps {
        checkout([
          $class: 'GitSCM',
          branches: [[name: '*/main']],
          userRemoteConfigs: [[
            url: 'https://github.com/IgorDems/XYZ_Technologies.git',
            credentialsId: 'GITHUB'
          ]]
        ])
      }
    }
    stage('Build') {
      steps {
        sh 'mvn clean install'
      }
    }
    stage('Test') {
      steps {
        sh 'mvn test'
      }
    }
    stage('Package') {
      steps {
        sh 'mvn package'
      }
    }
  }
}
```

```
igor@k8s-control:/var/jenkins-agent$ ls -l
total 1404
-rwxrwxrwx  1 igor igor 1369595 May  2  2024 agent.jar
drwxrwxr-x  3 igor igor    4096 May  1  2024 caches
-rw-rw-r--  1 igor igor    1289 May 10  2024 kubernetes-ca.crt
-rw-rw-r--  1 igor igor    8260 Nov 20  2024 maven35-agent.jar
-rw-rw-r--  1 igor igor   24138 Nov 20  2024 maven35-interceptor.jar
-rw-rw-r--  1 igor igor    8021 Nov 20  2024 maven3-interceptor-commons.jar
drwxrwxr-x  4 igor igor    4096 Apr 30  2024 remoting
drwxrwxr-x  3 igor igor    4096 Nov 19  2024 tools
drwxrwxr-x 11 igor igor    4096 Jun 25 21:55 workspace
```

These environment variables streamline the pipeline configuration by centralizing common settings and paths. They enhance maintainability and portability of the Jenkins Pipeline, ensuring consistent builds and deployments.

Agent 193 Load Statistics



Making a compile job to run in agent01 machine only.

```
=====The part of Jenkinsfile=====
pipeline {
    agent {
        label 'agent193'
    }
================================
```

```
Started by user igor194
Obtained tasktwo/Jenkinsfile from git https://github.com/IgorDems/XYZ_Technologies.git
[Pipeline] Start of Pipeline
[Pipeline] node
Running on agent193 in /var/jenkins-agent/workspace/XYZtechTask2
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Declarative: Checkout SCM)
[Pipeline] checkout
The recommended git tool is: git
using credential GITHUB
Fetching changes from the remote Git repository
 > git rev-parse --resolve-git-dir /var/jenkins-agent/workspace/XYZtechTask2/.git # timeout=10
 > git config remote.origin.url https://github.com/IgorDems/XYZ_Technologies.git # timeout=10
Fetching upstream changes from https://github.com/IgorDems/XYZ_Technologies.git
 > git --version # timeout=10
 > git --version # 'git version 2.34.1'
using GIT_ASKPASS to set credentials GITHUB
```

```
 > git fetch --tags --force --progress -- https://github.com/IgorDems/XYZ_Technologies.git +refs/heads/*:refs/remotes/origin/* # timeout=10
Checking out Revision 9546c3d1668699f324b9553aee88d93d93d2210a (refs/remotes/origin/main)
Commit message: "Update Jenkinsfile"
 > git rev-parse refs/remotes/origin/main^{commit} # timeout=10
 > git config core.sparsecheckout # timeout=10
 > git checkout -f 9546c3d1668699f324b9553aee88d93d93d2210a # timeout=10
 > git rev-list --no-walk 7c1e40410d87e3a8f7c6300d79959dd96037730f # timeout=10
[Pipeline] }
[Pipeline] // stage
[Pipeline] withEnv
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Declarative: Tool Install)
[Pipeline] tool
[Pipeline] envVarsForTool
[Pipeline] }
[Pipeline] // stage
[Pipeline] withEnv
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Checkout)
[Pipeline] tool
[Pipeline] envVarsForTool
[Pipeline] withEnv
[Pipeline] {
[Pipeline] checkout
The recommended git tool is: git
using credential GITHUB
Fetching changes from the remote Git repository
 > git rev-parse --resolve-git-dir /var/jenkins-agent/workspace/XYZtechTask2/.git # timeout=10
 > git config remote.origin.url https://github.com/IgorDems/XYZ_Technologies.git # timeout=10
Fetching upstream changes from https://github.com/IgorDems/XYZ_Technologies.git
 > git --version # timeout=10
 > git --version # 'git version 2.34.1'
using GIT_ASKPASS to set credentials GITHUB
 > git fetch --tags --force --progress -- https://github.com/IgorDems/XYZ_Technologies.git +refs/heads/*:refs/remotes/origin/* # timeout=10
Checking out Revision 9546c3d1668699f324b9553aee88d93d93d2210a (refs/remotes/origin/main)
Commit message: "Update Jenkinsfile"
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Build)
[Pipeline] tool
[Pipeline] envVarsForTool
[Pipeline] withEnv
 > git rev-parse refs/remotes/origin/main^{commit} # timeout=10
 > git config core.sparsecheckout # timeout=10
 > git checkout -f 9546c3d1668699f324b9553aee88d93d93d2210a # timeout=10
[Pipeline] {
[Pipeline] sh
+ mvn clean install
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.xyz:XYZtechnologies >-----------------------
[INFO] Building adminModule 1.0
[INFO]   from pom.xml
[INFO] --------------------------------[ war ]---------------------------------
[INFO]
[INFO] --- clean:3.2.0:clean (default-clean) @ XYZtechnologies ---
[INFO] Deleting /var/jenkins-agent/workspace/XYZtechTask2/target
[INFO]
[INFO] --- jacoco:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argLine set to -javaagent:/home/igor/.m2/repository/org/jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-runtime.jar=destfile=/var/jenkins-agent/
workspace/XYZtechTask2/target/jacoco.exec
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ XYZtechnologies ---
```

```
[INFO] skip non existing resourceDirectory /var/jenkins-agent/workspace/XYZtechTask2/src/main/resources
[INFO]
[INFO] --- compiler:3.13.0:compile (default-compile) @ XYZtechnologies ---
[INFO] Recompiling the module because of changed source code.
[INFO] Compiling 3 source files with javac [debug target 1.8] to target/classes
[WARNING] bootstrap class path not set in conjunction with -source 8
[WARNING] source value 8 is obsolete and will be removed in a future release
[WARNING] target value 8 is obsolete and will be removed in a future release
[WARNING] To suppress warnings about obsolete options, use -Xlint:-options.
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ XYZtechnologies ---
[INFO] skip non existing resourceDirectory /var/jenkins-agent/workspace/XYZtechTask2/src/test/resources
[INFO]
[INFO] --- compiler:3.13.0:testCompile (default-testCompile) @ XYZtechnologies ---
[INFO] Recompiling the module because of changed dependency.
[INFO] Compiling 1 source file with javac [debug target 1.8] to target/test-classes
[WARNING] bootstrap class path not set in conjunction with -source 8
[WARNING] source value 8 is obsolete and will be removed in a future release
[WARNING] target value 8 is obsolete and will be removed in a future release
[WARNING] To suppress warnings about obsolete options, use -Xlint:-options.
[INFO]
[INFO] --- surefire:3.2.5:test (default-test) @ XYZtechnologies ---
[INFO] Using auto detected provider org.apache.maven.surefire.junit4.JUnit4Provider
[INFO]
[INFO] -------------------------------------------------------
[INFO]  T E S T S
[INFO] -------------------------------------------------------
[INFO] Running com.xyz.dataAccessObject.AdminDataImpTest
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.026 s -- in com.xyz.dataAccessObject.AdminDataImpTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] --- war:3.2.2:war (default-war) @ XYZtechnologies ---
[INFO] Packaging webapp
[INFO] Assembling webapp [XYZtechnologies] in [/var/jenkins-agent/workspace/XYZtechTask2/target/XYZtechnologies-1.0]
[INFO] Processing war project
[INFO] Copying webapp resources [/var/jenkins-agent/workspace/XYZtechTask2/src/main/webapp]
[INFO] Webapp assembled in [33 msecs]
[INFO] Building war: /var/jenkins-agent/workspace/XYZtechTask2/target/XYZtechnologies-1.0.war
[INFO]
[INFO] --- jacoco:0.8.6:report (jacoco-site) @ XYZtechnologies ---
[INFO] Loading execution data file /var/jenkins-agent/workspace/XYZtechTask2/target/jacoco.exec
[INFO] Analyzed bundle 'adminModule' with 2 classes
[INFO]
[INFO] --- install:3.1.1:install (default-install) @ XYZtechnologies ---
[INFO] Installing /var/jenkins-agent/workspace/XYZtechTask2/pom.xml to /home/igor/.m2/repository/com/xyz/XYZtechnologies/1.0/XYZtechnologies-1.0.pom
[INFO] Installing /var/jenkins-agent/workspace/XYZtechTask2/target/XYZtechnologies-1.0.war to
/home/igor/.m2/repository/com/xyz/XYZtechnologies/1.0/XYZtechnologies-1.0.war
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.849 s
[INFO] Finished at: 2025-06-25T22:59:08-05:00
[INFO] ------------------------------------------------------------------------
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Test)
[Pipeline] tool
[Pipeline] envVarsForTool
[Pipeline] withEnv
[Pipeline] {
[Pipeline] sh
```

```
+ mvn test
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.xyz:XYZtechnologies >-----------------------
[INFO] Building adminModule 1.0
[INFO]   from pom.xml
[INFO] --------------------------------[ war ]---------------------------------
[INFO]
[INFO] --- jacoco:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argLine set to -javaagent:/home/igor/.m2/repository/org/jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-runtime.jar=destfile=/var/jenkins-agent/
workspace/XYZtechTask2/target/jacoco.exec
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ XYZtechnologies ---
[INFO] skip non existing resourceDirectory /var/jenkins-agent/workspace/XYZtechTask2/src/main/resources
[INFO]
[INFO] --- compiler:3.13.0:compile (default-compile) @ XYZtechnologies ---
[INFO] Nothing to compile - all classes are up to date.
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ XYZtechnologies ---
[INFO] skip non existing resourceDirectory /var/jenkins-agent/workspace/XYZtechTask2/src/test/resources
[INFO]
[INFO] --- compiler:3.13.0:testCompile (default-testCompile) @ XYZtechnologies ---
[INFO] Nothing to compile - all classes are up to date.
[INFO]
[INFO] --- surefire:3.2.5:test (default-test) @ XYZtechnologies ---
[INFO] Using auto detected provider org.apache.maven.surefire.junit4.JUnit4Provider
[INFO]
[INFO] -------------------------------------------------------
[INFO]  T E S T S
[INFO] -------------------------------------------------------
[INFO] Running com.xyz.dataAccessObject.AdminDataImpTest
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.026 s -- in com.xyz.dataAccessObject.AdminDataImpTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.054 s
[INFO] Finished at: 2025-06-25T22:59:11-05:00
[INFO] ------------------------------------------------------------------------
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Package)
[Pipeline] tool
[Pipeline] envVarsForTool
[Pipeline] withEnv
[Pipeline] {
[Pipeline] sh
+ mvn package
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.xyz:XYZtechnologies >-----------------------
[INFO] Building adminModule 1.0
[INFO]   from pom.xml
[INFO] --------------------------------[ war ]---------------------------------
[INFO]
[INFO] --- jacoco:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argLine set to -javaagent:/home/igor/.m2/repository/org/jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-runtime.jar=destfile=/var/jenkins-agent/
workspace/XYZtechTask2/target/jacoco.exec
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ XYZtechnologies ---
[INFO] skip non existing resourceDirectory /var/jenkins-agent/workspace/XYZtechTask2/src/main/resources
```

```
[INFO]
[INFO] --- compiler:3.13.0:compile (default-compile) @ XYZtechnologies ---
[INFO] Nothing to compile - all classes are up to date.
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ XYZtechnologies ---
[INFO] skip non existing resourceDirectory /var/jenkins-agent/workspace/XYZtechTask2/src/test/resources
[INFO]
[INFO] --- compiler:3.13.0:testCompile (default-testCompile) @ XYZtechnologies ---
[INFO] Nothing to compile - all classes are up to date.
[INFO]
[INFO] --- surefire:3.2.5:test (default-test) @ XYZtechnologies ---
[INFO] Using auto detected provider org.apache.maven.surefire.junit4.JUnit4Provider
[INFO]
[INFO] -------------------------------------------------------
[INFO]  T E S T S
[INFO] -------------------------------------------------------
[INFO] Running com.xyz.dataAccessObject.AdminDataImpTest
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.024 s -- in com.xyz.dataAccessObject.AdminDataImpTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] --- war:3.2.2:war (default-war) @ XYZtechnologies ---
[INFO] Packaging webapp
[INFO] Assembling webapp [XYZtechnologies] in [/var/jenkins-agent/workspace/XYZtechTask2/target/XYZtechnologies-1.0]
[INFO] Processing war project
[INFO] Copying webapp resources [/var/jenkins-agent/workspace/XYZtechTask2/src/main/webapp]
[INFO] Webapp assembled in [31 msecs]
[INFO] Building war: /var/jenkins-agent/workspace/XYZtechTask2/target/XYZtechnologies-1.0.war
[INFO]
[INFO] --- jacoco:0.8.6:report (jacoco-site) @ XYZtechnologies ---
[INFO] Loading execution data file /var/jenkins-agent/workspace/XYZtechTask2/target/jacoco.exec
[INFO] Analyzed bundle 'adminModule' with 2 classes
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.466 s
[INFO] Finished at: 2025-06-25T22:59:13-05:00
[INFO] ------------------------------------------------------------------------
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

Note: I have modified the compile job again for the next set of tasks.

References:

https://www.jenkins.io/blog/2022/06/28/require-java-11/
https://www.jenkins.io/doc/administration/requirements/upgrade-java-guidelines/#:~:text=If%20you're%20upgrading%20your,screen%20of%20your%20Jenkins%20instance.
https://stackoverflow.com/questions/69495517/unable-to-install-jenkins-on-ubuntu-20-04
https://stackoverflow.com/questions/14119983/java-home-and-path-are-set-but-java-versionstill-shows-the-old-one

Task 3: Write a Docket file. Create an Image and container on the Docker host. Integrate docker host with Jenkins. Create CI/CD job on Jenkins to build and deploy on a container.

1. Enhance the package job created in step 1 of task 2 to create a docker image.
2. In the Docker image, add code to move the war file to the Tomcat server and build the image

Approach i have followed:

- I have installed Jenkins on Ubuntu virtual server 192.168.1.114 and Docker on Ubuntu virtual server 192.168.1.115

igor@k8s-control:~/XYZ_Technologies$ docker --version
Docker version 27.3.1, build ce12230

in master machine and slave machine 192.168.1.114:

igor@k8s-2:~$ docker --version
Docker version 27.3.1, build ce12230.

Ansible server in 192.168.1.115 :

igor@k8s-control:/var/jenkins-agent$ ansible --version
ansible [core 2.17.6]
config file = /etc/ansible/ansible.cfg
configured module search path = ['/home/igor/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
ansible python module location = /home/igor/.local/lib/python3.10/site-packages/ansible
ansible collection location = /home/igor/.ansible/collections:/usr/share/ansible/collections
executable location = /home/igor/.local/bin/ansible
python version = 3.10.12 (main, Sep 11 2024, 15:47:36) [GCC 11.4.0] (/usr/bin/python3)
jinja version = 3.0.3
libyaml = True

- Now using earlier Jenkins package job with more enhancement with docker integration and doing two things here

i) Deploying .war file generated from package job into the tomcat server

ii) And creating the docker build and docker container with above .war file generated from package command and uploading the docker image to the docker hub and running this docker image as container.

Step1: Deploying .war file generated from package job into the tomcat server

Step 2: Creating the docker build and docker container with above .war file generated from package command and uploading the docker image to the docker hub and running this docker image as container.

Dockerfile

```
# Use a minimal Ubuntu base image
FROM ubuntu:24.04
# Avoid interactive prompts during package installation
ENV DEBIAN_FRONTEND=noninteractive
# Set environment variables for Java and Tomcat
ENV JAVA_HOME=/usr/lib/jvm/java-17-openjdk-amd64
ENV CATALINA_HOME=/opt/tomcat
ENV PATH=$CATALINA_HOME/bin:$PATH
# Create tomcat directory
RUN mkdir -p /opt/tomcat
# Install required packages and download stable Tomcat 9 manually
RUN apt-get update && \
```

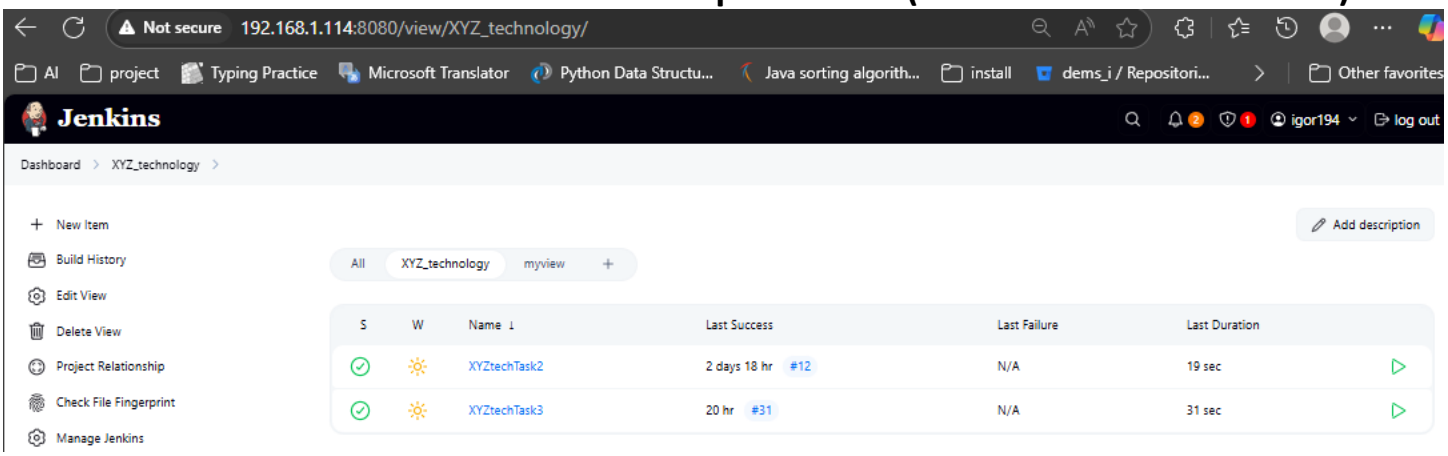
```
    apt-get install -y wget curl openjdk-17-jdk && \
    wget https://downloads.apache.org/tomcat/tomcat-9/v9.0.106/bin/apache-tomcat-
9.0.106.tar.gz && \
    tar -xzf apache-tomcat-9.0.106.tar.gz -C /opt/tomcat --strip-components=1 && \
    rm apache-tomcat-9.0.106.tar.gz && \
    chmod +x /opt/tomcat/bin/*.sh
# Copy your WAR application to the Tomcat webapps directory
COPY **/XYZtechnologies-1.0.war /opt/tomcat/webapps/
# Expose Tomcat default port
EXPOSE 8080
# Start Tomcat when the container launches
CMD ["/opt/tomcat/bin/catalina.sh", "run"]
```

- As part of building docker images and uploading to dockerhub and running in the docker container.

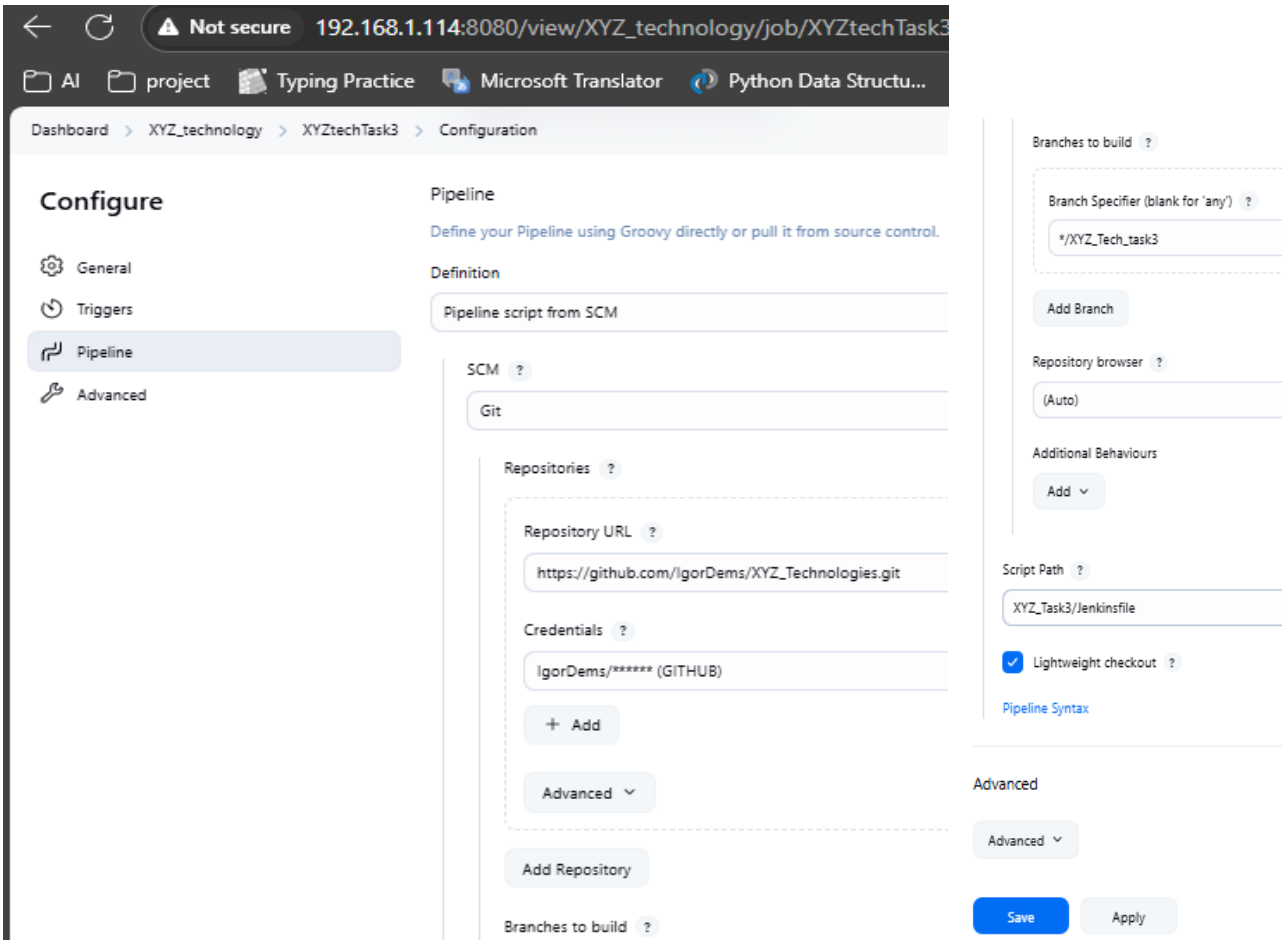
I tried to build the docker image manually in local and it got successful as part of that i have created a Dockerfile and added the plugins "cloudbees docker build and publish", “docker pipeline”, “docker plugin”,”docker build step”.

After installation of plugins you should be able to see the build/publish docker image in the build section of jenkins job and one more option "docker build and publish" , if you see that your plugin is installed successfully.
For telling jenkins to prepare docker image we need to build the DockerFile , now we need to give instructions to jenkins but it will read this Dockerfile in the home directory so i have placed this file in home directory and after build i have pushed the docker image to the docker hub for that i need to give my docker hub credentials to jenkins so for giving credentials i have configured the job in the build section "Docker build and publish" and validated in local and docker hub after build the job.

Below are the screenshots of the above steps of Task 3(Jenkins Job XYZtechTask3)



Git repo settings:



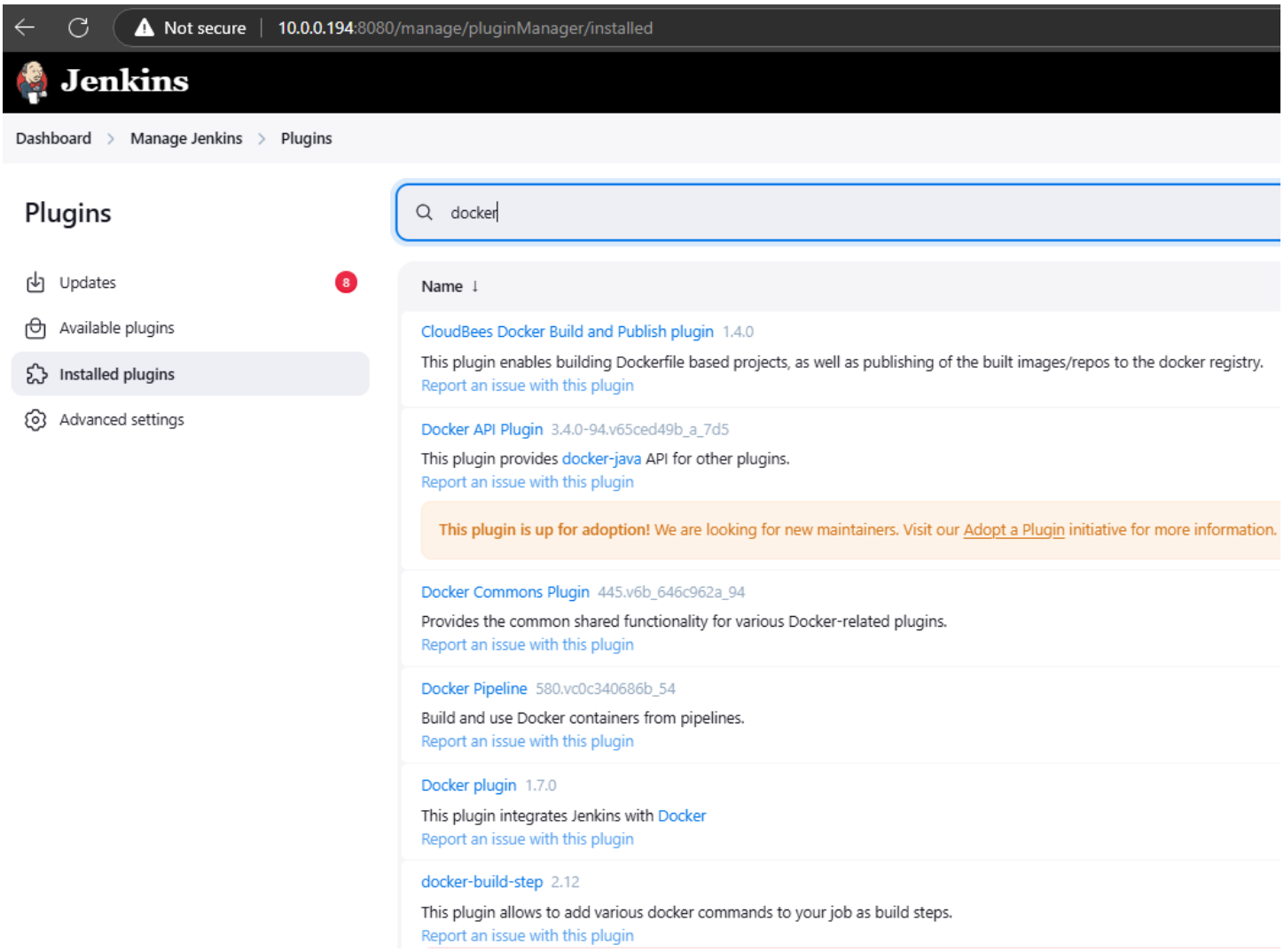
Git Branch 'XYZ_Tech_task3' will be merged to 'main' containing Jenkinsfile within folder 'XYZ_Task3' version with Maven targets , Goal and pushing the image to dockerhub starting the docker container

```
pipeline {
  agent {
    label 'agent193'
  }
  environment {
    DOCKER_REGISTRY = 'docker.io'
    DOCKER_IMAGE = "xyztechnologies"
    DOCKER_HUB = "demsdocker"
    APP_PORT = "8080"
    HOST_PORT = "8081"
    TOMCAT_APP_PATH = "XYZtechnologies-1.0"
  }
  stages {
    stage('Checkout') {
      steps {
        checkout scm
      }
    }
    stage('Build') {
      tools {
        maven 'maven'
      }
      steps {
```

```
            sh 'mvn clean install -Dmaven.test.skip=true'
        }
        post {
            success {
                archiveArtifacts artifacts: '**/target/*.war', fingerprint: true
            }
        }
    }
    stage('Build Docker Image') {
        steps {
            sh "docker build -t ${DOCKER_IMAGE} ."
        }
    }
    stage('Push Docker Image') {
        steps {
            withCredentials([usernamePassword(credentialsId: 'dockerhub_credentials', usernameVariable: 'DOCKER_USERNAME',
passwordVariable: 'DOCKER_PASSWORD')]) {
                sh "docker login -u $DOCKER_USERNAME -p $DOCKER_PASSWORD"
                sh "docker tag ${DOCKER_IMAGE} ${DOCKER_HUB}/${DOCKER_IMAGE}"
                sh "docker push ${DOCKER_HUB}/${DOCKER_IMAGE}"
            }
            echo "Successfully built and uploaded to DockerHub"
        }
    }
    stage('Run Docker container locally') {
        steps {
            sh 'ansible-playbook XYZ_Task3/ansible/ansibleDocCont.yml --connection=local'
            echo "Successfully pulled from DockerHub and started container locally"
        }
    }
    stage('Post-deploy: Check App Deployment in Tomcat') {
        steps {
            script {
                echo "Waiting for Tomcat to start..."
                sleep 10
                echo "Checking deployed app in Tomcat..."
                sh '''
                    status_code=$(curl -o /dev/null -s -w "%{http_code}" http://localhost:${HOST_PORT}/${TOMCAT_APP_PATH}/)
                    if [ "$status_code" != "200" ]; then
                        echo "❌ Application not available at http://localhost:${HOST_PORT}/${TOMCAT_APP_PATH}/"
                        exit 1
                    else
                        echo "☑ Application successfully deployed to Tomcat at http://localhost:${HOST_PORT}/${TOMCAT_APP_PATH}/"
                    fi
                '''
            }
        }
    }
}}
```

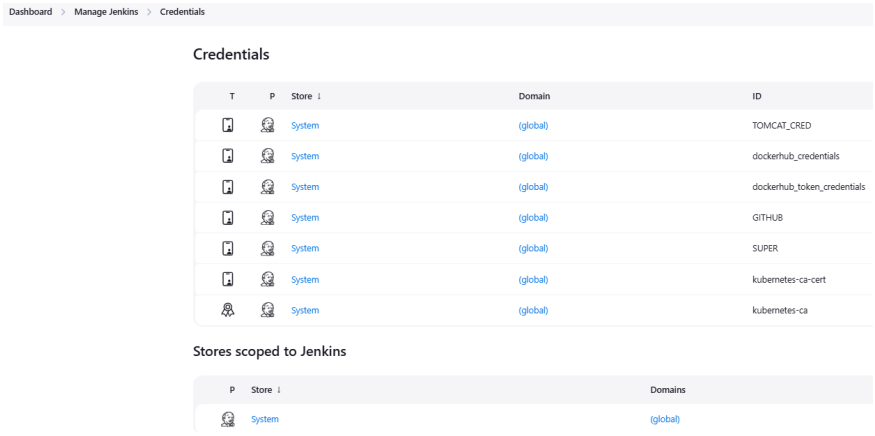
To add a PostBuild Action that checks that the .war application is successfully deployed to the container and Tomcat 9 is running, I added into Jenkins pipeline:
'Post-deploy: Check App Deployment in Tomcat'

Docker plugins installed from manage plugins

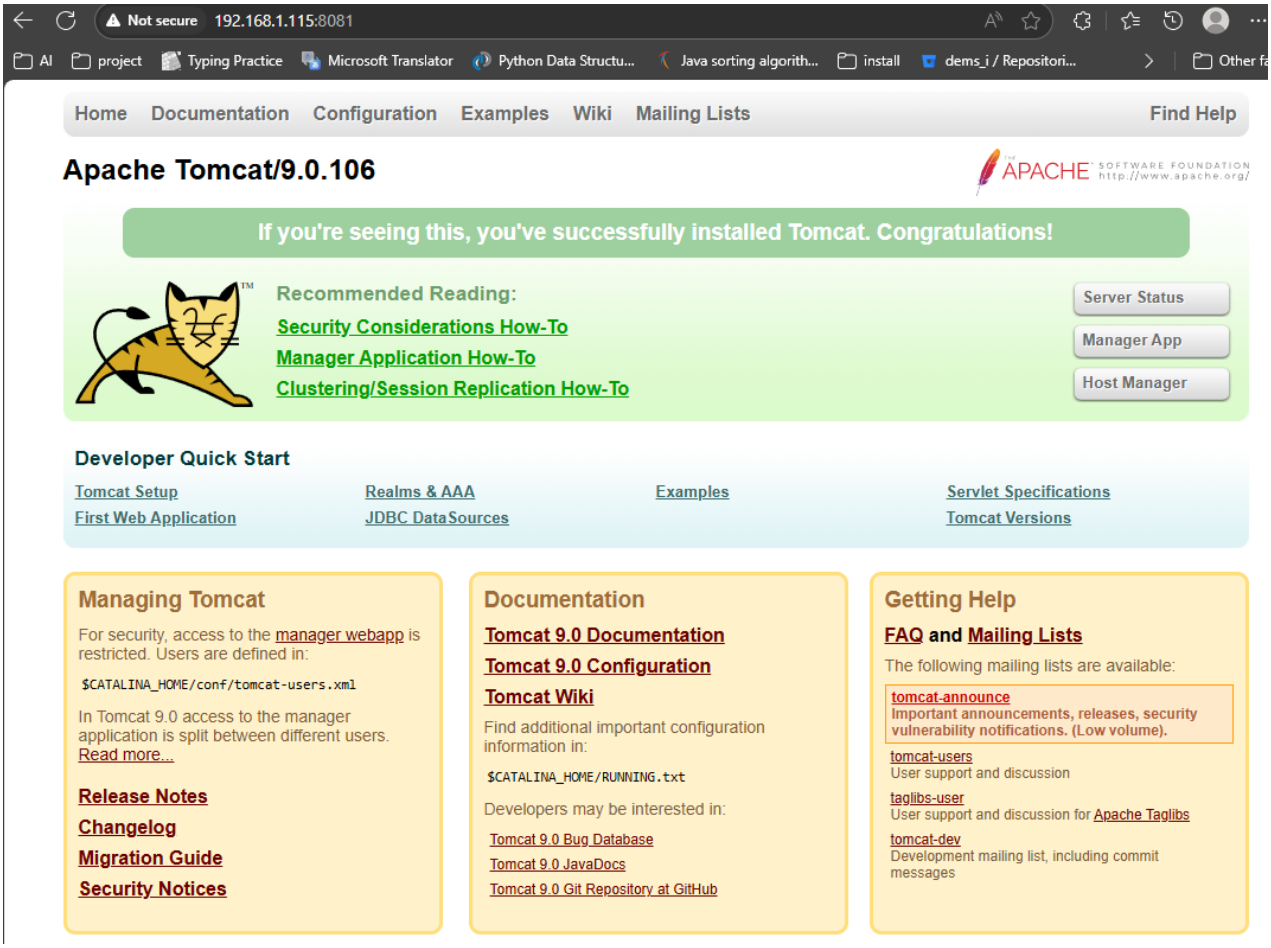


Jenkins Credentials/Secret Files/Certificates ID & Name:

At the bottom the list of the Credentials/Secret Files/Certificates IDs & Names I have used like a Jenkinsfile variables.



Tomcat validation (newest version)

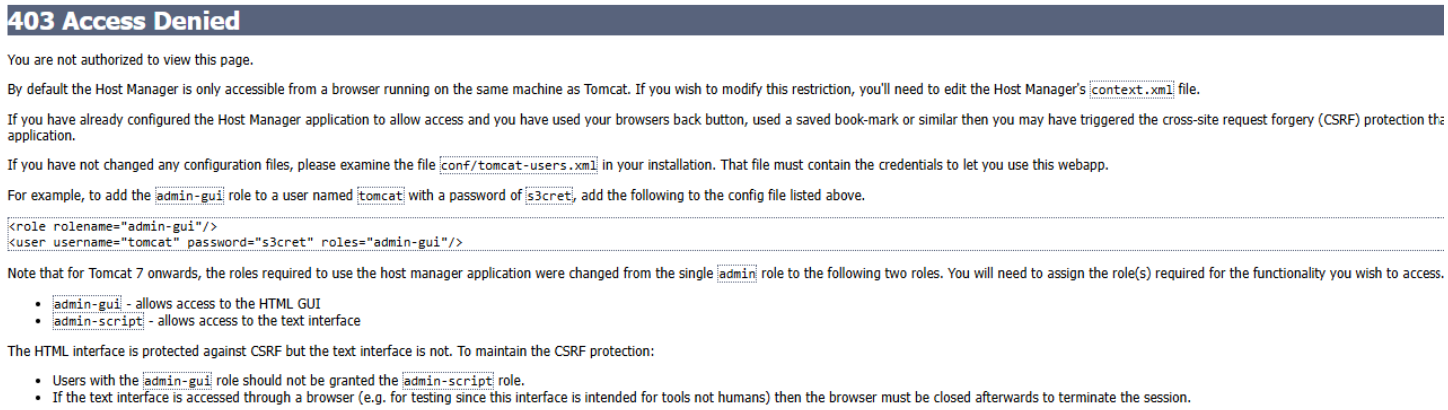


Tomcat login.

I need to fix access issues:

- Tomcat Server Status: http://192.168.1.115:8081/manager/status
- Manager UI: http://192.168.1.115:8081/manager/html
- Host Manager: http://192.168.1.115:8081/host-manager/html

Issue:



Solution:

Dockerfile: New version with Configure Tomcat users and roles

```
# Use a minimal Ubuntu base image
FROM ubuntu:24.04
# Avoid interactive prompts during package installation
ENV DEBIAN_FRONTEND=noninteractive
```

```
# Set environment variables for Java and Tomcat
ENV JAVA_HOME=/usr/lib/jvm/java-17-openjdk-amd64
ENV CATALINA_HOME=/opt/tomcat
ENV PATH=$CATALINA_HOME/bin:$PATH
# Create tomcat directory
RUN mkdir -p /opt/tomcat
# Install required packages and download stable Tomcat 9 manually
RUN apt-get update && \
   apt-get install -y wget curl openjdk-17-jdk && \
   wget https://downloads.apache.org/tomcat/tomcat-9/v9.0.106/bin/apache-tomcat-9.0.106.tar.gz && \
   tar -xzf apache-tomcat-9.0.106.tar.gz -C /opt/tomcat --strip-components=1 && \
   rm apache-tomcat-9.0.106.tar.gz && \
   chmod +x /opt/tomcat/bin/*.sh
# Set environment variables
ENV CATALINA_HOME=/opt/tomcat
ENV PATH=$CATALINA_HOME/bin:$PATH
# Configure Tomcat users and roles
RUN echo '<?xml version="1.0" encoding="UTF-8"?>\n\
<tomcat-users xmlns="http://tomcat.apache.org/xml"\n\
           xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"\n\
           xsi:schemaLocation="http://tomcat.apache.org/xml tomcat-users.xsd"\n\
           version="1.0">\n\
   <role rolename="manager-gui"/>\n\
   <role rolename="manager-script"/>\n\
   <role rolename="manager-jmx"/>\n\
   <role rolename="manager-status"/>\n\
   <role rolename="admin-gui"/>\n\
   <user username="admin" password="admin_password" roles="manager-gui,manager-script,manager-jmx,manager-status,admin-gui"/>\n\
</tomcat-users>' > /opt/tomcat/conf/tomcat-users.xml
# Create and configure context.xml files for manager and host-manager
RUN echo '<?xml version="1.0" encoding="UTF-8"?>\n\
<Context antiResourceLocking="false" privileged="true" >\n\
  <Valve className="org.apache.catalina.valves.RemoteAddrValve" allow="^.*$" />\n\
</Context>' > /opt/tomcat/webapps/manager/META-INF/context.xml && \
   echo '<?xml version="1.0" encoding="UTF-8"?>\n\
<Context antiResourceLocking="false" privileged="true" >\n\
  <Valve className="org.apache.catalina.valves.RemoteAddrValve" allow="^.*$" />\n\
</Context>' > /opt/tomcat/webapps/host-manager/META-INF/context.xml
# Ensure the directories exist for manager and host-manager
RUN mkdir -p /opt/tomcat/webapps/manager/META-INF \
   /opt/tomcat/webapps/host-manager/META-INF
COPY **/XYZtechnologies-1.0.war /opt/tomcat/webapps/
EXPOSE 8080
# Start Apache Tomcat
CMD ["/opt/tomcat/bin/catalina.sh", "run"]
```

Server Status

Manager

List Applications	HTML Manager Help	Manager Help	Complete Server Status

Server Information

Tomcat Version	JVM Version	JVM Vendor	OS Name	OS Version	OS Architecture	Hostname	IP Address
Apache Tomcat/9.0.106	17.0.15+6-Ubuntu-0ubuntu124.04	Ubuntu	Linux	6.8.0-60-generic	amd64	6498ba1f1bac	172.17.0.2

JVM

Free Memory: 124.74 MiB Total Memory: 184.00 MiB Max Memory: 2868.00 MiB

Memory Pool	Type	Initial	Total	Maximum	Used
G1 Eden Space	Heap memory	14.00 MiB	108.00 MiB	-0.00 MiB	46.00 MiB
G1 Old Gen	Heap memory	166.00 MiB	70.00 MiB	2868.00 MiB	5.81 MiB (0%)
G1 Survivor Space	Heap memory	0.00 MiB	6.00 MiB	-0.00 MiB	5.43 MiB
CodeHeap 'non-nmethods'	Non-heap memory	2.43 MiB	2.43 MiB	5.56 MiB	1.16 MiB (21%)
CodeHeap 'non-profiled nmethods'	Non-heap memory	2.43 MiB	2.43 MiB	117.21 MiB	1.66 MiB (1%)
CodeHeap 'profiled nmethods'	Non-heap memory	2.43 MiB	6.68 MiB	117.21 MiB	6.63 MiB (5%)
Compressed Class Space	Non-heap memory	0.00 MiB	1.81 MiB	1024.00 MiB	1.68 MiB (0%)
Metaspace	Non-heap memory	0.00 MiB	16.43 MiB	-0.00 MiB	16.15 MiB

"http-nio-8080"

Max threads: 200 Current thread count: 10 Current threads busy: 1 Keep alive sockets count: 0
Max processing time: 22 ms Processing time: 0.031 s Request count: 2 Error count: 0 Bytes received: 0.00 MiB Bytes sent: 0.02 MiB

Stage	Time	Bytes Sent	Bytes Recv	Client (Forwarded)	Client (Actual)	VHost	Request
S	6 ms	0 KiB	0 KiB	192.168.1.123	192.168.1.123	192.168.1.115	GET /manager/status HTTP/1.1

Tomcat Web Application Manager

Message:	OK

Manager

List Applications	HTML Manager Help	Manager Help	

Applications

Path	Version	Display Name	Running	Sessions	Commands
/	*None specified*	Welcome to Tomcat	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/XYZtechnologies-1.0	*None specified*	Archetype Created Web Application	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/docs	*None specified*	Tomcat Documentation	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/examples	*None specified*	Servlet and JSP Examples	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/host-manager	*None specified*	Tomcat Host Manager Application	true	1	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/manager	*None specified*	Tomcat Manager Application	true	1	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes

Not secure 192.168.1.115:8081/host-manager/html

AI | project | Typing Practice | Microsoft Translator | Python Data Structu... | Java sorting algorith... | install | dems_i / Repositori... | CHICAGO | Workspace Accesso... | PUBG Developer Po... | Other favorites

Tomcat Virtual Host Manager

Message:	OK

Host Manager

List Virtual Hosts	HTML Host Manager Help	Host Manager Help	Server Status

Host name

Host name	Host aliases	Commands
localhost		Host Manager installed - commands disabled

Add Virtual Host

Host

Name:
Aliases:
App base:
AutoDeploy
DeployOnStartup
DeployXML
UnpackWARs
Manager App
CopyXML
Add

Persist configuration

All Save current configuration (including virtual hosts) to server.xml and per web application context.xml files

Server Information

Tomcat Version	JVM Version	JVM Vendor	OS Name	OS Version	OS Architecture
Apache Tomcat/9.0.106	17.0.15+6-Ubuntu-0ubuntu124.04	Ubuntu	Linux	6.8.0-60-generic	amd64

Tomcat manager UI that shows all the .war deployed files. We can deploy from here as well.

Run the Docker container by Ansible ansibleDocCont.yml

```
- - -
```

```yaml
- hosts: localhost
  become: yes
  vars:
    docker_username: "demsdocker" # Replace with your Docker Hub username
    app_name: "xyztechnologies"
  tasks:
    - name: Pull latest image from Docker Hub
      community.docker.docker_image:
        name: "{{ docker_username }}/{{ app_name }}:latest"
        source: pull
        state: present

    - name: Stop and remove any existing container
      community.docker.docker_container:
        name: "{{ app_name }}-container"
        state: absent

    - name: Run Docker container from the pulled image
      community.docker.docker_container:
        name: "{{ app_name }}-container"
        image: "{{ docker_username }}/{{ app_name }}:latest"
        state: started
        ports:
          - "8081:8080" # Mapping to 8081 to avoid conflicts
```

Package build success

```
[INFO] --- install:3.1.1:install (default-install) @ XYZtechnologies ---
[INFO] Installing /var/jenkins-agent/workspace/XYZtechTask3/pom.xml to /home/igor/.m2/repository/com/xyz/XYZtechnologies/1.0/XYZtechnologies-1.0.pom
[INFO] Installing /var/jenkins-agent/workspace/XYZtechTask3/target/XYZtechnologies-1.0.war to /home/igor/.m2/repository/com/xyz/XYZtechnologies/1.0/XYZtechnologies-1.0.war
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.321 s
[INFO] Finished at: 2025-06-28T19:18:12-05:00
```

Docker hub push success message

```
Login Succeeded
[Pipeline] sh
+ docker tag abctechnologies demsdocker/abctechnologies
[Pipeline] sh
+ docker push demsdocker/abctechnologies
Using default tag: latest
The push refers to repository [docker.io/demsdocker/abctechnologies]
be0cdb29ed65: Preparing
ce902b553a42: Preparing
fb8a93c8f7fa: Preparing
2573e0d81582: Preparing
fb8a93c8f7fa: Layer already exists
2573e0d81582: Layer already exists
ce902b553a42: Layer already exists
be0cdb29ed65: Pushed
latest: digest: sha256:cbf068c6295ec6b98e679b0b48c4578dfece5066d90a65c20f8518f461b23217 size: 1160
[Pipeline] echo
Successfully built and uploaded to DockerHub
```

Tomcat configuration and deployment successful

```
Successfully pulled from DockerHub and started container locally
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Post-deploy: Check App Deployment in Tomcat)
[Pipeline] script
[Pipeline] {
[Pipeline] echo
Waiting for Tomcat to start...
[Pipeline] sleep
Sleeping for 10 sec
[Pipeline] echo
Checking deployed app in Tomcat...
[Pipeline] sh
+ curl -o /dev/null -s -w %{http_code} http://localhost:8081/XYZtechnologies-1.0/
+ status_code=200
+ [ 200 != 200 ]
+ echo ✅ Application successfully deployed to Tomcat at http://localhost:8081/XYZtechnologies-1.0/
✅ Application successfully deployed to Tomcat at http://localhost:8081/XYZtechnologies-1.0/
```

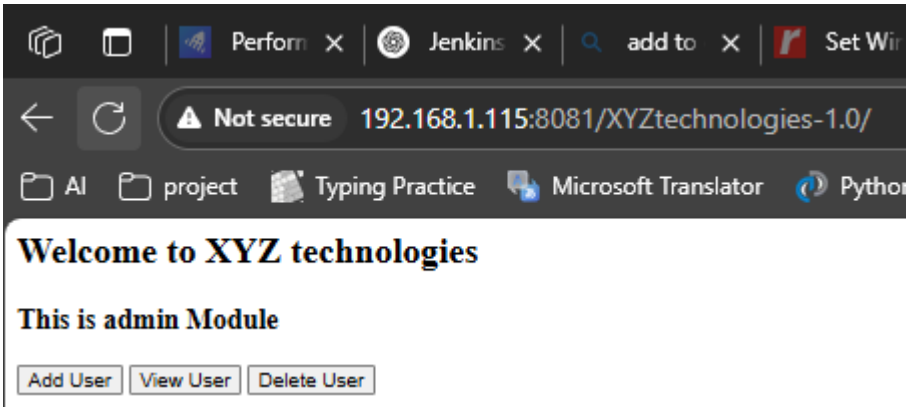
Validating in terminal for docker images

```
igor@k8s-control:~$ docker images
REPOSITORY                      TAG       IMAGE ID       CREATED          SIZE
xyztechnologies                 latest    8574dd153536   39 minutes ago   899MB
demsdocker/xyztechnologies      latest    8574dd153536   39 minutes ago   899MB
```

Validating container is running or not

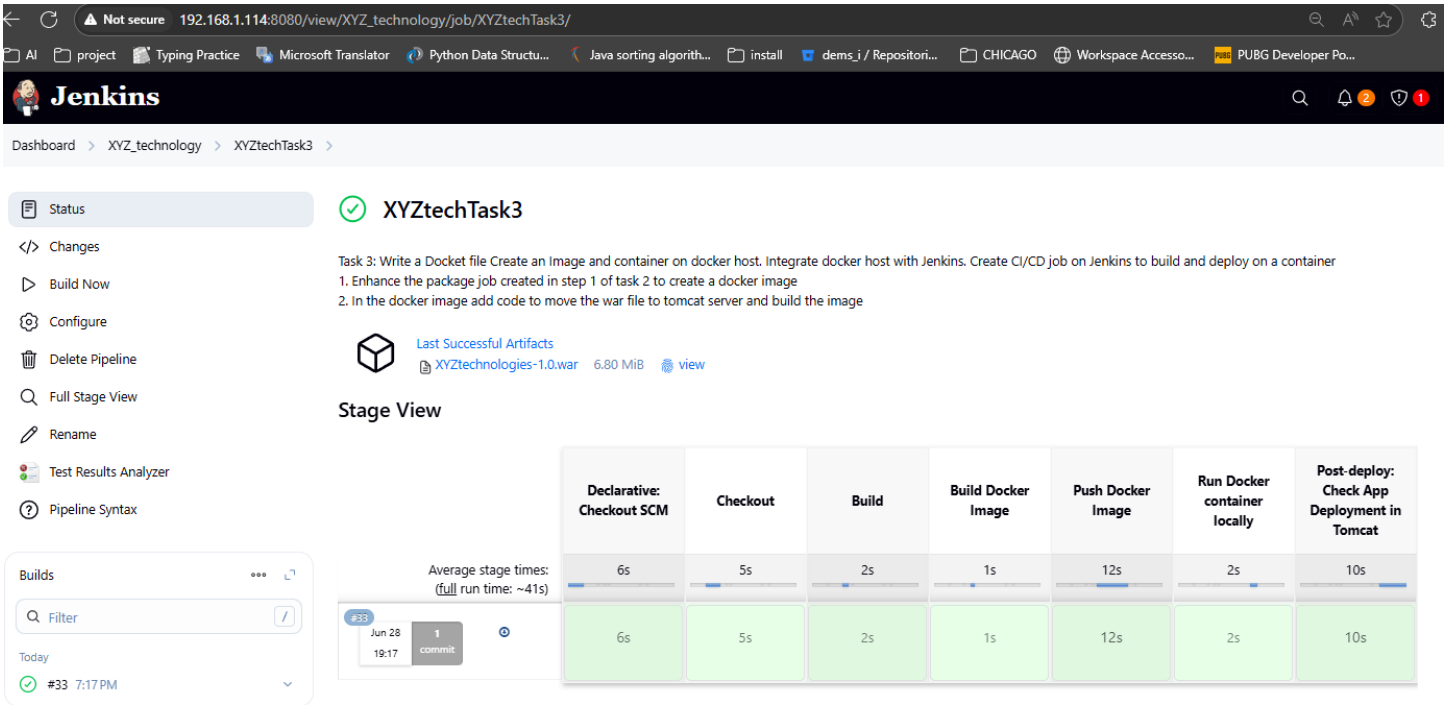
```
igor@k8s-control:~$ docker ps
CONTAINER ID   IMAGE                              COMMAND                  CREATED          STATUS          PORTS
               NAMES
bf5f8e8d6813   demsdocker/xyztechnologies:latest   "/opt/tomcat/bin/cat…"   28 minutes ago   Up 28 minutes   0.0.0.0:80
81->8080/tcp   xyztechnologies-container
igor@k8s-control:~$
```

Docker container validation in browser



Creating declarative pipeline

For this particular example I have utilized branch *dockerpushpull*:
https://github.com/IgorDems/XYZ_Technologies/tree/main/XYZ_Task3/Jenkinsfile



Console Output

```
Started by user igor194
Obtained XYZ_Task3/Jenkinsfile from git https://github.com/IgorDems/XYZ_Technologies.git
[Pipeline] Start of Pipeline
[Pipeline] node
Running on agent193 in /var/jenkins-agent/workspace/XYZtechTask3
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Declarative: Checkout SCM)
[Pipeline] checkout
The recommended git tool is: git
using credential GITHUB
Fetching changes from the remote Git repository
 > git rev-parse --resolve-git-dir /var/jenkins-agent/workspace/XYZtechTask3/.git # timeout=10
 > git config remote.origin.url https://github.com/IgorDems/XYZ_Technologies.git # timeout=10
Fetching upstream changes from https://github.com/IgorDems/XYZ_Technologies.git
 > git --version # timeout=10
 > git --version # 'git version 2.34.1'
using GIT_ASKPASS to set credentials GITHUB
 > git fetch --tags --force --progress -- https://github.com/IgorDems/XYZ_Technologies.git +refs/heads/*:refs/remotes/origin/* # timeout=10
Checking out Revision 1c901de199a7da8079e7da7bd01072d9fa308191 (refs/remotes/origin/XYZ_Tech_task3)
Commit message: "PostBuild + Task4"
 > git rev-parse refs/remotes/origin/XYZ_Tech_task3^{commit} # timeout=10
 > git config core.sparsecheckout # timeout=10
 > git checkout -f 1c901de199a7da8079e7da7bd01072d9fa308191 # timeout=10
 > git rev-list --no-walk 9972298ae076306d3444002c37551102e53d95a5 # timeout=10
[Pipeline] }
[Pipeline] // stage
[Pipeline] withEnv
[Pipeline] {
[Pipeline] withEnv
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Checkout)
[Pipeline] checkout
The recommended git tool is: git
using credential GITHUB
Fetching changes from the remote Git repository
 > git rev-parse --resolve-git-dir /var/jenkins-agent/workspace/XYZtechTask3/.git # timeout=10
 > git config remote.origin.url https://github.com/IgorDems/XYZ_Technologies.git # timeout=10
```

```
Fetching upstream changes from https://github.com/IgorDems/XYZ_Technologies.git
 > git --version # timeout=10
 > git --version # 'git version 2.34.1'
using GIT_ASKPASS to set credentials GITHUB
 > git fetch --tags --force --progress -- https://github.com/IgorDems/XYZ_Technologies.git +refs/heads/*:refs/remotes/origin/* # timeout=10
Checking out Revision 1c901de199a7da8079e7da7bd01072d9fa308191 (refs/remotes/origin/XYZ_Tech_task3)
Commit message: "PostBuild + Task4"
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Build)
[Pipeline] tool
[Pipeline] envVarsForTool
[Pipeline] withEnv
[Pipeline] {
[Pipeline] sh
+ mvn clean install -Dmaven.test.skip=true
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------------< com.xyz:XYZtechnologies >-----------------------
[INFO] Building adminModule 1.0
[INFO]   from pom.xml
[INFO] --------------------------------[ war ]---------------------------------
 > git rev-parse refs/remotes/origin/XYZ_Tech_task3^{commit} # timeout=10
 > git config core.sparsecheckout # timeout=10
 > git checkout -f 1c901de199a7da8079e7da7bd01072d9fa308191 # timeout=10
[INFO]
[INFO] --- clean:3.2.0:clean (default-clean) @ XYZtechnologies ---
[INFO] Deleting /var/jenkins-agent/workspace/XYZtechTask3/target
[INFO]
[INFO] --- jacoco:0.8.6:prepare-agent (jacoco-initialize) @ XYZtechnologies ---
[INFO] argLine set to -javaagent:/home/igor/.m2/repository/org/jacoco/org.jacoco.agent/0.8.6/org.jacoco.agent-0.8.6-runtime.jar=destfile=/
var/jenkins-agent/workspace/XYZtechTask3/target/jacoco.exec
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ XYZtechnologies ---
[INFO] skip non existing resourceDirectory /var/jenkins-agent/workspace/XYZtechTask3/src/main/resources
[INFO]
[INFO] --- compiler:3.13.0:compile (default-compile) @ XYZtechnologies ---
[INFO] Recompiling the module because of changed source code.
[INFO] Compiling 3 source files with javac [debug target 1.8] to target/classes
[WARNING] bootstrap class path not set in conjunction with -source 8
[WARNING] source value 8 is obsolete and will be removed in a future release
[WARNING] target value 8 is obsolete and will be removed in a future release
[WARNING] To suppress warnings about obsolete options, use -Xlint:-options.
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ XYZtechnologies ---
[INFO] Not copying test resources
[INFO]
[INFO] --- compiler:3.13.0:testCompile (default-testCompile) @ XYZtechnologies ---
[INFO] Not compiling test sources
[INFO]
[INFO] --- surefire:3.2.5:test (default-test) @ XYZtechnologies ---
[INFO] Tests are skipped.
[INFO]
[INFO] --- war:3.2.2:war (default-war) @ XYZtechnologies ---
[INFO] Packaging webapp
[INFO] Assembling webapp [XYZtechnologies] in [/var/jenkins-agent/workspace/XYZtechTask3/target/XYZtechnologies-1.0]
[INFO] Processing war project
[INFO] Copying webapp resources [/var/jenkins-agent/workspace/XYZtechTask3/src/main/webapp]
[INFO] Webapp assembled in [33 msecs]
[INFO] Building war: /var/jenkins-agent/workspace/XYZtechTask3/target/XYZtechnologies-1.0.war
[INFO]
[INFO] --- jacoco:0.8.6:report (jacoco-site) @ XYZtechnologies ---
[INFO] Skipping JaCoCo execution due to missing execution data file.
[INFO]
[INFO] --- install:3.1.1:install (default-install) @ XYZtechnologies ---
```

[INFO] Installing /var/jenkins-agent/workspace/XYZtechTask3/pom.xml to
/home/igor/.m2/repository/com/xyz/XYZtechnologies/1.0/XYZtechnologies-1.0.pom
[INFO] Installing /var/jenkins-agent/workspace/XYZtechTask3/target/XYZtechnologies-1.0.war to
/home/igor/.m2/repository/com/xyz/XYZtechnologies/1.0/XYZtechnologies-1.0.war
[INFO] --
[INFO] BUILD SUCCESS
[INFO] --
[INFO] Total time: 1.321 s
[INFO] Finished at: 2025-06-28T19:18:12-05:00
[INFO] --
Post stage
[Pipeline] archiveArtifacts
Archiving artifacts
Recording fingerprints
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Build Docker Image)
[Pipeline] sh
+ docker build -t xyztechnologies .
#0 building with "default" instance using docker driver

#1 [internal] load build definition from Dockerfile
#1 transferring dockerfile: 3.24kB done
#1 DONE 0.0s

#2 [internal] load metadata for docker.io/library/ubuntu:24.04
#2 ...

#3 [auth] library/ubuntu:pull token for registry-1.docker.io
#3 DONE 0.0s

#2 [internal] load metadata for docker.io/library/ubuntu:24.04
#2 DONE 0.9s

#4 [internal] load .dockerignore
#4 transferring context: 2B done
#4 DONE 0.0s

#5 [1/7] FROM docker.io/library/ubuntu:24.04@sha256:b59d21599a2b151e23eea5f6602f4af4d7d31c4e236d22bf0b62b86d2e386b8f
#5 DONE 0.0s

#6 [internal] load build context
#6 transferring context: 7.13MB 0.0s done
#6 DONE 0.0s

#7 [5/7] RUN echo '<?xml version="1.0" encoding="UTF-8"?>\n<Context antiResourceLocking="false" privileged="true" >\n <Valve
className="org.apache.catalina.valves.RemoteAddrValve" allow="^.*$" />\n</Context>' >
/opt/tomcat/webapps/manager/META-INF/context.xml &&   echo '<?xml version="1.0" encoding="UTF-8"?>\n<Context
antiResourceLocking="false" privileged="true" >\n <Valve className="org.apache.catalina.valves.RemoteAddrValve" allow="^.*$"
/>\n</Context>' > /opt/tomcat/webapps/host-manager/META-INF/context.xml
#7 CACHED

#8 [2/7] RUN mkdir -p /opt/tomcat
#8 CACHED

#9 [4/7] RUN echo '<?xml version="1.0" encoding="UTF-8"?>\n<tomcat-users xmlns="http://tomcat.apache.org/xml"\n
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"\n   xsi:schemaLocation="http://tomcat.apache.org/xml tomcat-users.xsd"\n
version="1.0">\n   <role rolename="manager-gui"/>\n   <role rolename="manager-script"/>\n   <role rolename="manager-jmx"/>\n
<role rolename="manager-status"/>\n   <role rolename="admin-gui"/>\n   <user username="admin" password="admin_password"
roles="manager-gui,manager-script,manager-jmx,manager-status,admin-gui"/>\n</tomcat-users>' > /opt/tomcat/conf/tomcat-users.xml
#9 CACHED

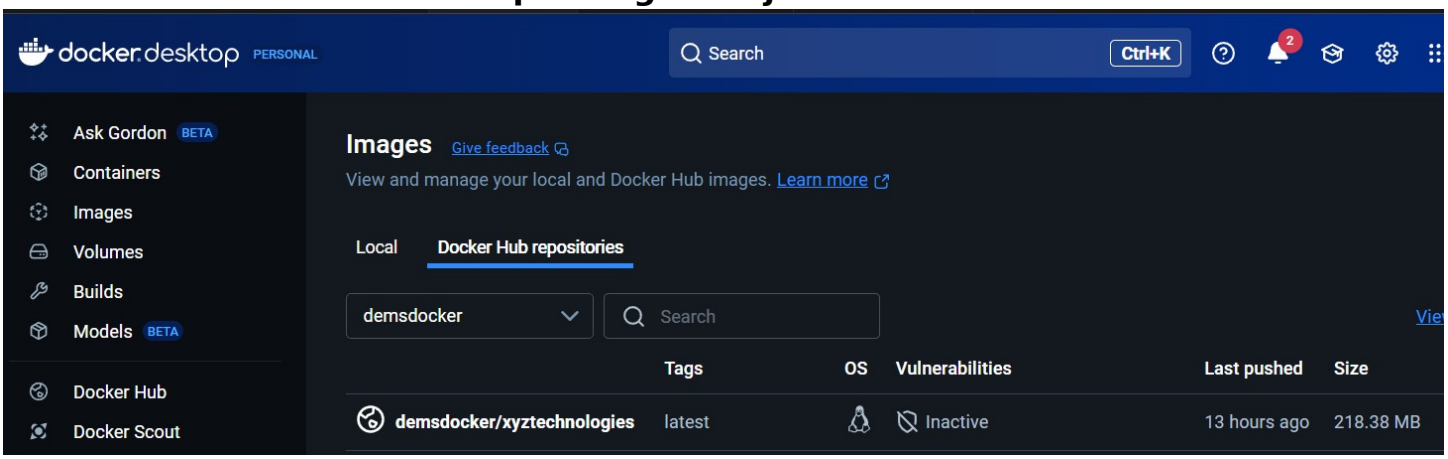
```
#10 [3/7] RUN apt-get update &&     apt-get install -y wget curl openjdk-17-jdk &&     wget
https://downloads.apache.org/tomcat/tomcat-9/v9.0.106/bin/apache-tomcat-9.0.106.tar.gz &&     tar -xzf apache-tomcat-9.0.106.tar.gz -C
/opt/tomcat --strip-components=1 &&     rm apache-tomcat-9.0.106.tar.gz &&     chmod +x /opt/tomcat/bin/*.sh
#10 CACHED

#11 [6/7] RUN mkdir -p /opt/tomcat/webapps/manager/META-INF     /opt/tomcat/webapps/host-manager/META-INF
#11 CACHED

#12 [7/7] COPY **/XYZtechnologies-1.0.war /opt/tomcat/webapps/
#12 DONE 0.0s

#13 exporting to image
#13 exporting layers 0.0s done
#13 writing image sha256:8574dd15353627ed799366034aa806268801393f566b791f840fa2e3f47f44e9 done
#13 naming to docker.io/library/xyztechnologies done
#13 DONE 0.0s
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Push Docker Image)
[Pipeline] withCredentials
Masking supported pattern matches of $DOCKER_PASSWORD
[Pipeline] {
[Pipeline] sh
Warning: A secret was passed to "sh" using Groovy String interpolation, which is insecure.
                         Affected argument(s) used the following variable(s): [DOCKER_PASSWORD]
                         See https://jenkins.io/redirect/groovy-string-interpolation for details.
+ docker login -u demsdocker -p ****
WARNING! Using --password via the CLI is insecure. Use --password-stdin.
Login Succeeded
[Pipeline] sh
+ docker tag xyztechnologies demsdocker/xyztechnologies
[Pipeline] sh
+ docker push demsdocker/xyztechnologies
Using default tag: latest
The push refers to repository [docker.io/demsdocker/xyztechnologies]
b7c9bf221ef9: Preparing
5f70bf18a086: Preparing
b6005ad57008: Preparing
f35c61dbf6e1: Preparing
44f3ac27abac: Preparing
7c0fced359ed: Preparing
a8346d259389: Preparing
a8346d259389: Waiting
7c0fced359ed: Waiting
f35c61dbf6e1: Layer already exists
b6005ad57008: Layer already exists
5f70bf18a086: Layer already exists
44f3ac27abac: Layer already exists
a8346d259389: Layer already exists
7c0fced359ed: Layer already exists
b7c9bf221ef9: Pushed
latest: digest: sha256:ff9a00edf5513d38463a34d075c667641fdc286c74eab31d27d91eecc33711a5 size: 1780
[Pipeline] }
[Pipeline] // withCredentials
[Pipeline] echo
Successfully built and uploaded to DockerHub
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Run Docker container locally)
[Pipeline] sh
+ ansible-playbook XYZ_Task3/ansible/ansibleDocCont.yml --connection=local

PLAY [localhost] ***************************************************************

TASK [Gathering Facts] *********************************************************
```

```
[WARNING]: Platform linux on host localhost is using the discovered Python
interpreter at /usr/bin/python3.10, but future installation of another Python
interpreter could change the meaning of that path. See
https://docs.ansible.com/ansible-
core/2.17/reference_appendices/interpreter_discovery.html for more information.
ok: [localhost]

TASK [Pull latest image from Docker Hub] ***************************************
ok: [localhost]

TASK [Stop and remove any existing container] **********************************
changed: [localhost]

TASK [Run Docker container from the pulled image] ******************************
changed: [localhost]

PLAY RECAP *********************************************************************
localhost                  : ok=4    changed=2    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

[Pipeline] echo
Successfully pulled from DockerHub and started container locally
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Post-deploy: Check App Deployment in Tomcat)
[Pipeline] script
[Pipeline] {
[Pipeline] echo
Waiting for Tomcat to start...
[Pipeline] sleep
Sleeping for 10 sec
[Pipeline] echo
Checking deployed app in Tomcat...
[Pipeline] sh
+ curl -o /dev/null -s -w %{http_code} http://localhost:8081/XYZtechnologies-1.0/
+ status_code=200
+ [ 200 != 200 ]
+ echo ☑ Application successfully deployed to Tomcat at http://localhost:8081/XYZtechnologies-1.0/
☑ Application successfully deployed to Tomcat at http://localhost:8081/XYZtechnologies-1.0/
[Pipeline] }
[Pipeline] // script
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

ansible-playbook started to run Tomcat(Docker pull and container running success message)

```
+ ansible-playbook XYZ_Task3/ansible/ansibleDocCont.yml --connection=local

PLAY [localhost] ***********************************************************

TASK [Gathering Facts] *****************************************************
[WARNING]: Platform linux on host localhost is using the discovered Python
interpreter at /usr/bin/python3.10, but future installation of another Python
interpreter could change the meaning of that path. See
https://docs.ansible.com/ansible-
core/2.17/reference_appendices/interpreter_discovery.html for more information.
ok: [localhost]

TASK [Pull latest image from Docker Hub] ***********************************
ok: [localhost]

TASK [Stop and remove any existing container] ******************************
changed: [localhost]

TASK [Run Docker container from the pulled image] **************************
changed: [localhost]

PLAY RECAP *****************************************************************
localhost                  : ok=4    changed=2    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

[Pipeline] echo
Successfully pulled from DockerHub and started container locally
```

Docker-hub validation after pushing from jenkins:



Jenkins Credential ID Manager containing token(*secret text*) **Credential ID for Docker:** dockerhub_token_credentials**, and (***login&password)* **Credential ID for Docker:** dockerhub_credentials

References i have followed:

https://plugins.jenkins.io/role-strategy/

https://stackoverflow.com/questions/37603621/jenkins-sudo-no-tty-present-and-no-askpassprogram-
specified-with-nopasswd
https://dlcdn.apache.org/tomcat/tomcat-9/
https://phoenixnap.com/kb/how-to-configure-docker-in-jenkins
https://www.tutorialspoint.com/docker/docker_continuous_integration.htm
https://www.provartesting.com/documentation/devops/continuous-integration/docker/settingup-continuous-integration-with-jenkins-for-docker/
https://www.youtube.com/watch?v=mszE-OCI2V4&list=PLVz2XdJiJQxwS0BZUHX34ocLTJtRGSQzN&index=4
https://www.digitalocean.com/community/questions/how-to-fix-docker-got-permission-denied-while-trying-to-connect-to-the-docker-daemon-socket
https://stackoverflow.com/questions/50798720/jenkins-throwing-error-jenkins-model-invalidbuildsdir-item-rootdir-builds-d
https://linuxize.com/post/how-to-list-groups-in-linux/
https://stackoverflow.com/questions/17733671/how-can-i-tell-what-user-jenkins-is-running-as
https://stackoverflow.com/questions/55156958/jenkins-fail-to-deploy-war-to-tomcat-container-second-time

Task 4: Integrate Docker Host with Ansible. Write Ansible Playbook to Create Image and Create Container. Integrate Ansible with Jenkins. Deploy Ansible Playbook. CI/CD job to build code on Ansible and deploy it on Docker Container.

Environment, tools and K8s cluster

```
# Hold versions
sudo apt-mark hold kubelet kubeadm kubectl
# Disable Swap
sudo swapoff -a
sudo sed -i '/ swap / s/^/#/' /etc/fstab
```

- ✓ Docker&Ansible installed

```
igor@k8s-control:~$ ansible --version
ansible [core 2.17.6]
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/igor/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /home/igor/.local/lib/python3.10/site-packages/ansible
  ansible collection location = /home/igor/.ansible/collections:/usr/share/ansible/collections
  executable location = /home/igor/.local/bin/ansible
  python version = 3.10.12 (main, May 27 2025, 17:12:29) [GCC 11.4.0] (/usr/bin/python3)
  jinja version = 3.0.3
  libyaml = True
igor@k8s-control:~$ docker --version
Docker version 28.2.2, build e6534b4
```

- ✓ K8s Master Node initialization:

igor@k8s-control:~$ sudo kubeadm init --apiserver-advertise-address=192.168.1.115 --pod-network-cidr=192.168.0.0/16
The successful performance finally informed about:
Then you can join any number of worker nodes by running the following on each as root:
kubeadm join 192.168.1.115:6443 --token 78vdoe.lb28dlsdu2ozpdju \
--discovery-token-ca-cert-hash sha256:d58cffc4ddfb5959bd1804e00cd4071419673e369bd803be480797a8444bc468

- ✓ K8s Worker Node was joining to the cluster.
- ✓ K8s Master Node configuration:

igor@k8s-control:~$ mkdir -p $HOME/.kube
sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
sudo chown $(id -u):$(id -g) $HOME/.kube/config
igor@k8s-control:~$ kubectl get nodes
NAME STATUS ROLES AGE VERSION
k8s-2 Ready <none> 8m45s v1.29.15
k8s-control Ready control-plane 12m v1.29.15

- ✓ **MetalLB installation:**

kubectl apply -f https://raw.githubusercontent.com/metallb/metallb/v0.13.10/config/manifests/metallb-native.yaml

- ✓ **MetalLB configuration:**
  https://github.com/IgorDems/XYZ_Technologies/tree/main/k8s/metallb-config.yaml

igor@k8s-control:~$ sudo nano metallb-config.yaml
igor@k8s-control:~$ kubectl apply -f metallb-config.yaml
configmap/metal-lb-config created

metallb-config.yaml **content**:

```
apiVersion: metallb.io/v1beta1
kind: IPAddressPool
metadata:
  name: my-ip-pool
  namespace: metallb-system
spec:
  addresses:
  - 192.168.1.240-192.168.1.250  # Pick a free range from your LAN
---
apiVersion: metallb.io/v1beta1
kind: L2Advertisement
metadata:
  name: l2-advert
  namespace: metallb-system
spec: {}
```

Virtual Environment VM193, VM194 (Hyper-V):
- K8s Master Node: 192.168.1.115, 4 CPU, 32 GB RAM (Ubuntu), VM193

igor@k8s-control:~$ kubectl version
Client Version: v1.29.4
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
Server Version: v1.29.4
- K8s Worker Node: : 192.168.1.114, 2 CPU, 16 GB RAM (Ubuntu), VM194
Node joined:
igor@k8s-2:~$ sudo kubeadm join --token owcscb.sbcfivj68p25onws : 192.168.1.115:6443 --discovery-token-ca-cert-hash sha256:43bb5c0a68c4661777d713dfd1d579af0681d54d72553a1d7b60aeec4845e4e4

Ansible version:
igor@k8s-2:~$ ansible --version
ansible 2.10.8
config file = /etc/ansible/ansible.cfg
configured module search path = ['/home/igor/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
ansible python module location = /usr/lib/python3/dist-packages/ansible
executable location = /usr/bin/ansible
python version = 3.10.12 (main, Feb 4 2025, 14:57:36) [GCC 11.4.0]

So i have installed the ansible plugin in jenkins to run the playbook with provided ansible-playbook and inventory file paths to run the ansible-playbook.
The ansible playbook created with docker module to build the image and then start the build container with provided .war file path in Dockerfile. and i have used two docker modules 'community.docker.docker_image' and 'community.docker.docker_container' to build the image and run the container.
The ansible-playbook path: project_required_file_v2/ansible.yml in github

repo= https://github.com/IgorDems/XYZ_Technologies/tree/main/k8s

[master]
192.168.1.115 ansible_user=ubuntu ansible_ssh_private_key_file=~/.ssh/id_rsa
[worker]
192.168.1.114 ansible_user=ubuntu ansible_ssh_private_key_file=~/.ssh/id_rsa
[all:vars]
ansible_python_interpreter=/usr/bin/python3

Approach

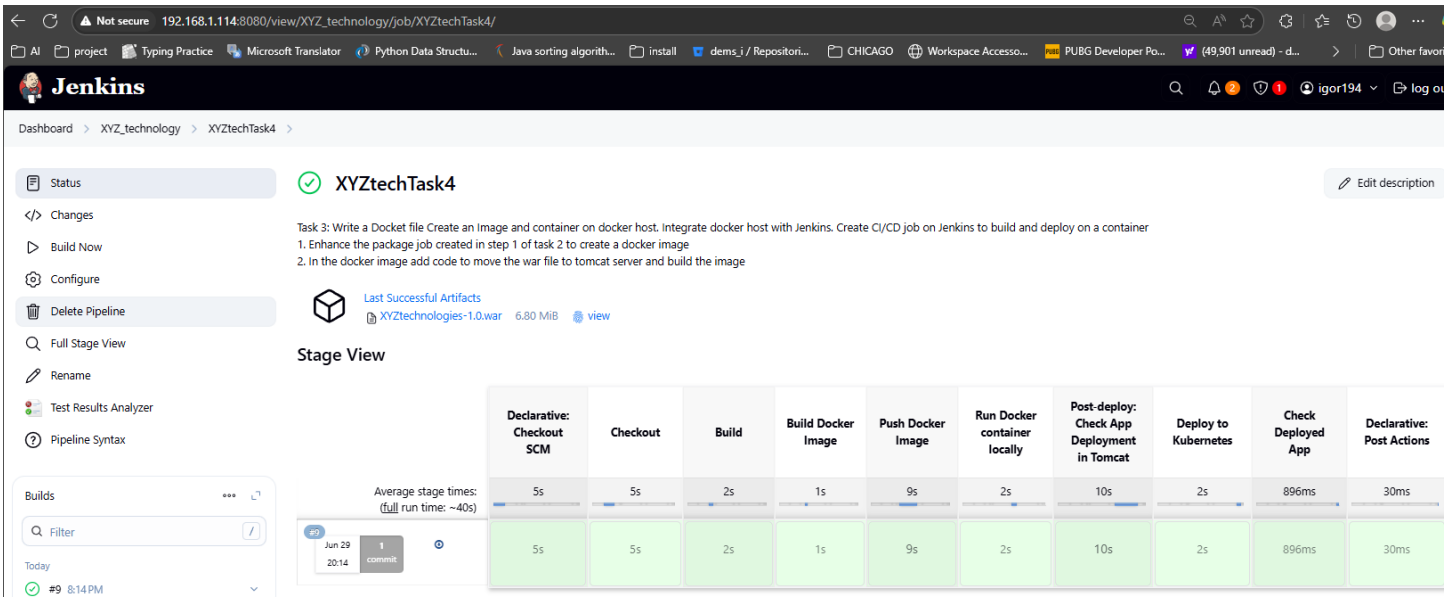
Task 4 focuses on leveraging Ansible to manage Docker images and containers, and integrating this process into Jenkins CI/CD pipeline. The core idea is to automate the pulling of a Docker image from Docker Hub and running it as a container on a target host (which is `localhost` in this case, representing the Jenkins agent itself or a Docker host accessible from it).

The task involves:

1. **Ansible Playbook Creation:** Writing an Ansible playbook (`ansibleDocCont.yml`) to define the steps for Docker image pull and container creation.
2. **Jenkins Integration:** Calling this Ansible playbook from within the Jenkinsfile as part of the CI/CD pipeline. This ensures that after the Docker image is built and pushed to Docker Hub, Jenkins can trigger Ansible to pull and run that image.
3. **Kubernetes Deployment (Sub-tasks a, b, c):** This part involves deploying the application to a Kubernetes cluster using manifests and potentially Ansible for orchestration.

File Descriptions

- **`ansibleDocCont.yml`**: This Ansible playbook is designed to pull the latest `demsdocker/xyztechnologies` Docker image from Docker Hub, stop and remove any existing container named `xyztechnologies-container`, and then run a new container from the pulled image. It maps port `8080` inside the container to port `8081` on the host.
- **`deployment.yml`**: This Kubernetes manifest defines a Deployment for `xyztechnologies` application. It specifies that two replicas of Docker image (`demsdocker/xyztechnologies:latest`) should be running in the `xyz-tech` namespace, exposed on container port `8080`.
- **`service.yml`**: This Kubernetes manifest defines a Service for the `xyztechnologies` application. It exposes the pods created by the deployment on port `80` externally as a `NodePort` service, mapping to `8080` on the pods. This allows external access to application within the Kubernetes cluster.
- **`namespace.yml`**: This simple Kubernetes manifest defines a Namespace named `xyz-tech`. Namespaces provide a way to divide cluster resources between multiple users or teams.
- **`rbac.yml`**: This Kubernetes manifest defines ServiceAccounts, ClusterRoles, and ClusterRoleBindings primarily for MetalLB, which is likely used for load balancing services in Kubernetes cluster. It also includes a ServiceAccount for `xyz-tech-sa` within the `xyz-tech` namespace, which could be used for application's service account within Kubernetes.
- **`Jenkinsfile`**: This file defines CI/CD pipeline in Jenkins. For Task 4, the relevant stages are:
  - **`Run Docker container locally`**: This stage executes the `ansibleDocCont.yml` playbook locally to pull the Docker image from Docker Hub and run it as a container.
  - **`Post-deploy: Check App Deployment in Tomcat`**: This stage verifies if the application deployed via Ansible on the Docker container is accessible, by making a `curl` request.
  - **`Deploy to Kubernetes`**: This stage applies the Kubernetes manifests (`namespace.yml`, `rbac.yml`, `deployment.yml`, `service.yml`) to deploy application to a Kubernetes cluster. It uses a `withKubeConfig` block, indicating that Jenkins is configured to connect to Kubernetes cluster using a `certificate_file` credential.
  - **`Check Deployed App`**: This stage runs `kubectl` commands to inspect the status, description, and logs of the deployed pods in the Kubernetes cluster.



Part 1: Integrate Docker Host with Ansible (Ansible Playbook)

Step 1.1: Create ansibleDocCont.yml

This playbook pulls the Docker image from Docker Hub and runs it as a container.

- **Location:** `XYZ_Task3/ansible/ansibleDocCont.yml` (as referenced in Jenkinsfile)

```
---
- hosts: localhost
  become: yes
  vars:
    docker_username: "demsdocker" # Replace with  Docker Hub username
    app_name: "xyztechnologies"
  tasks:
    - name: Pull latest image from Docker Hub
      community.docker.docker_image:
        name: "{{ docker_username }}/{{ app_name }}:latest"
        source: pull
        state: present

    - name: Stop and remove any existing container
      community.docker.docker_container:
        name: "{{ app_name }}-container"
        state: absent

    - name: Run Docker container from the pulled image
      community.docker.docker_container:
        name: "{{ app_name }}-container"
        image: "{{ docker_username }}/{{ app_name }}:latest"
        state: started
        ports:
          - "8081:8080" # Mapping to 8081 to avoid conflicts
```

- **Evidence:**
  - **Screenshot:** Show the content of `ansibleDocCont.yml` in IDE/editor.
  - **CLI Command Result:**
    - Manual playbook execution:

      Bash
      ```
      ansible-playbook XYZ_Task3/ansible/ansibleDocCont.yml --
      connection=local
      ```

      Output from Jenkins Log:
      ```
      + ansible-playbook XYZ_Task3/ansible/ansibleDocCont.yml --
      connection=local

      PLAY [localhost]
      ***************************************************************

      TASK [Gathering Facts]
      *********************************************************
      [WARNING]: Platform linux on host localhost is using the discovered
      Python
      interpreter at /usr/bin/python3.10, but future installation of
      another Python
      interpreter could change the meaning of that path.
      Seehttps://docs.ansible.com/ansible-
      core/2.17/reference_appendices/interpreter_discovery.html for more
      information.
      ok: [localhost]

      TASK [Pull latest image from Docker Hub]
      ************************************
      ok: [localhost]
      ```

```
TASK [Stop and remove any existing container]
*********************************
changed: [localhost]

TASK [Run Docker container from the pulled image]
*****************************
changed: [localhost]

PLAY RECAP
*********************************************************************
*
localhost                  : ok=4    changed=2    unreachable=0
failed=0    skipped=0    rescued=0    ignored=0
```

Part 2: Integrate Ansible with Jenkins

Step 2.1: Update Jenkinsfile to Call Ansible Playbook

Modify the Jenkinsfile to include a stage that executes the Ansible playbook.

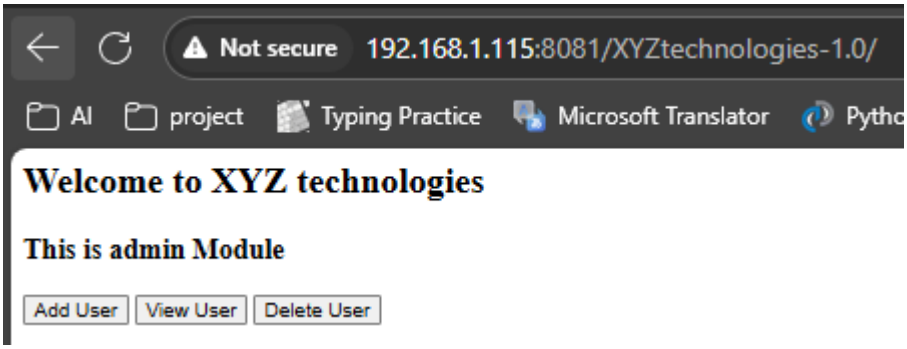
- **Location:** `Jenkinsfile` https://github.com/IgorDems/XYZ_Technologies/tree/main/XYZ_Task4
- **Changes in `Jenkinsfile`:**
  Ensure the `Run Docker container locally` stage is present and correctly calls the playbook.

```groovy
stage('Run Docker container locally') {
    steps {
        sh 'ansible-playbook XYZ_Task3/ansible/ansibleDocCont.yml --
connection=local'
        echo "Successfully pulled from DockerHub and started container
locally"
    }
}
```

Ensure the `Post-deploy: Check App Deployment in Tomcat` stage is present to verify the locally run container.

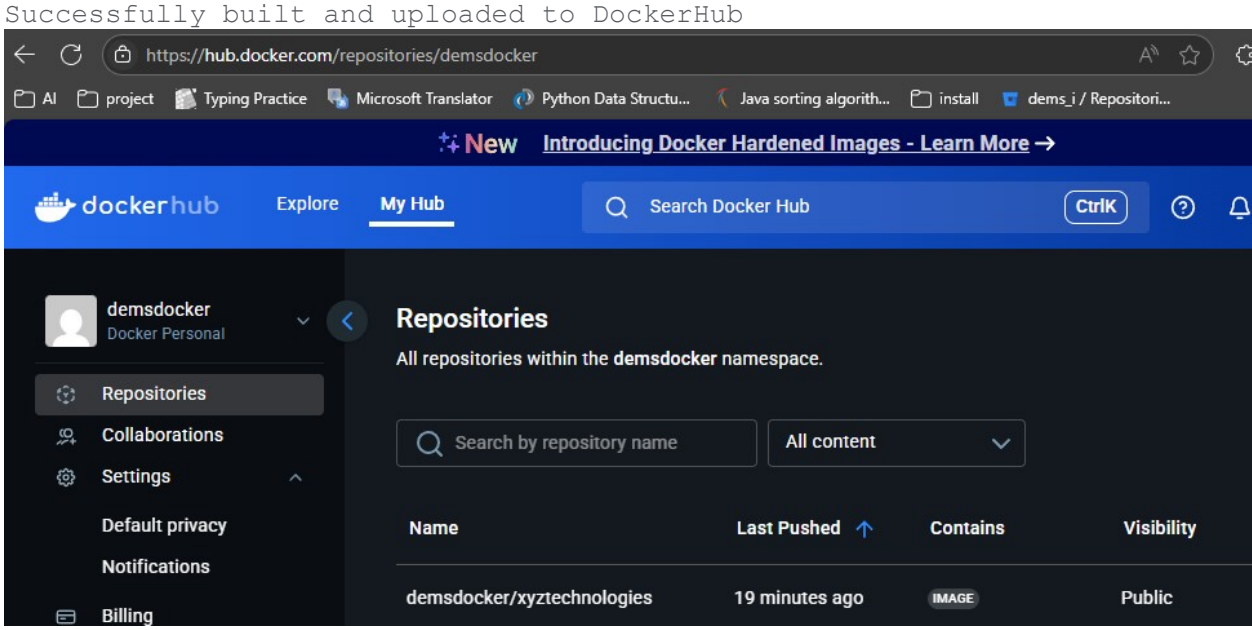
```
stage('Post-deploy: Check App Deployment in Tomcat') {
    steps {
        script {
            echo "Waiting for Tomcat to start..."
            sleep 10
            echo "Checking deployed app in Tomcat..."
            sh '''
                status_code=$(curl -o /dev/null -s -w "%{http_code}" http://localhost:${HOST_PORT}/$
{TOMCAT_APP_PATH}/)
                if [ "$status_code" != "200" ]; then
                    echo "❌ Application not available at http://localhost:${HOST_PORT}/$
{TOMCAT_APP_PATH}/"
                    exit 1
                else
                    echo "☑ Application successfully deployed to Tomcat at http://localhost:${HOST_PORT}/
${TOMCAT_APP_PATH}/"
                fi
            '''
        }
    }
}
```

- The `Run Docker container locally` and `Post-deploy: Check App Deployment in Tomcat` stages in `Jenkinsfile`.



- Jenkins Pipeline build log showing the successful execution of the `Run Docker container locally` stage and `Post-deploy: Check App Deployment in Tomcat` stage.
  - **Build Stage Success:**
  - `[INFO] ------------------------------------------------------------------------`
  - `[INFO] BUILD SUCCESS`
  - `[INFO] ------------------------------------------------------------------------`
  - `[INFO] Total time:  1.322 s`
  - `[INFO] Finished at: 2025-06-29T20:15:10-05:00`
  - `[INFO] ------------------------------------------------------------------------`
  - `Post stage`
  - `[Pipeline] archiveArtifacts`
  - `Archiving artifacts`
  - `Recording fingerprints`
  - **Build Docker Image Success:**
  - `#13 exporting to image`
  - `#13 exporting layers 0.0s done`
  - `#13 writing image sha256:02bf58dde17a01c7826b42a73fce5aa92f3e48b903f6b57b5b03742877153f7e done`
  - `#13 naming to docker.io/library/xyztechnologies done`
  - `#13 DONE 0.0s`
  - **Push Docker Image Success:**
  - `+ docker login -u demsdocker -p ****`
  - `WARNING! Using --password via the CLI is insecure. Use --password-stdin.`
  - `Login Succeeded`
  - `...`
  - `+ docker push demsdocker/xyztechnologies`
  - `Using default tag: latest`
  - `The push refers to repository [docker.io/demsdocker/xyztechnologies]`
  - `...`
  - `3dba382f1106: Pushed`
  - `latest: digest: sha256:233196e5f1a7731fe0c9285f2a8873a538b69958953f946ef8fd77368de2fdb4 size: 1780`
  - `[Pipeline] echo`

- Successfully built and uploaded to DockerHub



- **Run Docker Container Locally Success:**
- PLAY RECAP
  ****
  *
- localhost : ok=4 changed=2 unreachable=0
  failed=0 skipped=0 rescued=0 ignored=0
- [Pipeline] echo
- Successfully pulled from DockerHub and started container locally
- **Post-deploy Check App Deployment Success:**
- [Pipeline] echo
- Waiting for Tomcat to start...
- [Pipeline] sleep
- Sleeping for 10 sec
- [Pipeline] echo
- Checking deployed app in Tomcat...
- [Pipeline] sh
- + curl -o /dev/null -s -w %{http_code}
  http://localhost:8081/XYZtechnologies-1.0/
- + status_code=200
- + [200 != 200]
- + echo ☑ Application successfully deployed to Tomcat at
  http://localhost:8081/XYZtechnologies-1.0/
- ☑ Application successfully deployed to Tomcat at
  http://localhost:8081/XYZtechnologies-1.0/

Part 3: Deploy Artifacts on Kubernetes

Step 3.1: Create Kubernetes Manifests

These YAML files define application's deployment and service within a Kubernetes cluster.

- **`namespace.yml` Content:**

```yaml
apiVersion: v1
kind: Namespace
metadata:
  name: xyz-tech
```

- `rbac.yml` **Content:** (Note: This file primarily contains MetalLB RBAC, but also includes a service account for `xyz-tech-sa`.)

```
# ... (existing MetalLB RBAC content) ...
apiVersion: v1
kind: ServiceAccount
metadata:
  name: xyz-tech-sa
  namespace: xyz-tech
```

- `deployment.yml` **Content:**

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: xyztechnologies-deployment
  namespace: xyz-tech
  labels:
    app: xyztechnologies
spec:
  replicas: 2
  selector:
    matchLabels:
      app: xyztechnologies
  template:
    metadata:
      labels:
        app: xyztechnologies
    spec:
      containers:
        - name: xyztechnologies
          image: demsdocker/xyztechnologies:latest
          imagePullPolicy: Always
          ports:
            - containerPort: 8080
```

- `service.yml` **Content:**

YAML

```
apiVersion: v1
kind: Service
metadata:
  name: xyztechnologies-service
  namespace: xyz-tech
spec:
  type: LoadBalancer
  selector:
    app: xyztechnologies
  ports:
    - port: 80
      targetPort: 8080
      protocol: TCP
```

- **Evidence:**
  - The content of `namespace.yml`, `rbac.yml`, `deployment.yml`, and `service.yml` in GITHUB https://github.com/IgorDems/XYZ_Technologies/tree/main/XYZ_Task4/k8s

Step 3.2: Update Jenkinsfile for Kubernetes Deployment

Add the Deploy to Kubernetes stage and Check Deployed App stage to Jenkinsfile.

- **Location:** `Jenkinsfile`
- **Changes in `Jenkinsfile`:**
  - Ensure the `Deploy to Kubernetes` stage is present and applies the manifests.

    Groovy
    ```
        stage('Deploy to Kubernetes') {
            steps {
                withKubeConfig([credentialsId: 'certificate_file']) { // Ensure 'certificate_file' is  valid Kubeconfig credential in Jenkins
                    sh 'kubectl get nodes'
                    sh 'kubectl create namespace xyz-tech --dry-run=client -o yaml | kubectl apply -f -'
                    sh 'kubectl create namespace metallb-system --dry-run=client -o yaml | kubectl apply -f -'
                    sh 'kubectl apply -f XYZ_Task4/k8s/rbac.yml'
                    sh 'kubectl apply -f XYZ_Task4/k8s/deployment.yml'
                    sh 'kubectl apply -f XYZ_Task4/k8s/service.yml'
                    sh 'kubectl rollout status deployment/xyztechnologies-deployment -n xyz-tech --timeout=900s'
                }
            }
        }
    ```

  - Ensure the `Check Deployed App` stage is present to verify the Kubernetes deployment.

    Groovy
    ```
        stage('Check Deployed App') {
            steps {
                withKubeConfig([credentialsId: 'certificate_file']) {
                    sh 'kubectl get pods -n xyz-tech'
                    sh 'kubectl describe pods -n xyz-tech -l app=xyztechnologies'
                    sh 'kubectl logs -n xyz-tech -l app=xyztechnologies --all-containers --tail=100'
                }
            }
        }
    ```

  - The `Deploy to Kubernetes` and `Check Deployed App` stages in `Jenkinsfile`.
  - Jenkins Pipeline build log showing the successful execution of the `Deploy to Kubernetes` stage.
    - **`kubectl get nodes` output:**
    - `+ kubectl get nodes`
    - `NAME          STATUS   ROLES           AGE   VERSION`
    - `k8s-2         Ready    <none>          8d    v1.29.15`
    - `k8s-control   Ready    control-plane   8d    v1.29.15`
    - **Namespace creation and application of manifests:**
    - `+ kubectl create namespace xyz-tech --dry-run=client -o yaml`
    - `+ kubectl apply -f -`
    - `namespace/xyz-tech configured`
    - `+ kubectl create namespace metallb-system --dry-run=client -o yaml`
    - `+ kubectl apply -f -`
    - `namespace/metallb-system configured`
    - `+ kubectl apply -f XYZ_Task4/k8s/rbac.yml`

- serviceaccount/metallb-controller unchanged
- serviceaccount/metallb-speaker unchanged
- clusterrole.rbac.authorization.k8s.io/metallb-controller unchanged
- clusterrolebinding.rbac.authorization.k8s.io/metallb-controller unchanged
- clusterrole.rbac.authorization.k8s.io/metallb-speaker unchanged
- clusterrolebinding.rbac.authorization.k8s.io/metallb-speaker unchanged
- serviceaccount/xyz-tech-sa unchanged
- + kubectl apply -f XYZ_Task4/k8s/deployment.yml
- deployment.apps/xyztechnologies-deployment unchanged
- + kubectl apply -f XYZ_Task4/k8s/service.yml
- service/xyztechnologies-service unchanged
- **Deployment Rollout Status:**
- + kubectl rollout status deployment/xyztechnologies-deployment -n xyz-tech --timeout=900s
- deployment "xyztechnologies-deployment" successfully rolled out

- Jenkins Pipeline build log showing the successful execution of the `Check Deployed App` stage.
  - **`kubectl get pods` output:**
  - + kubectl get pods -n xyz-tech
  - NAME READY STATUS RESTARTS AGE
  - xyztechnologies-deployment-76c6bb857b-75btc 1/1 Running 0 3h10m
  - xyztechnologies-deployment-76c6bb857b-l4htf 1/1 Running 0 3h10m
  - **`kubectl describe pods` output (partial for brevity, showing one pod):**
  - + kubectl describe pods -n xyz-tech -l app=xyztechnologies
  - Name: xyztechnologies-deployment-76c6bb857b-75btc
  - Namespace: xyz-tech
  - Priority: 0
  - Service Account: default
  - Node: k8s-2/192.168.1.114
  - Start Time: Sun, 29 Jun 2025 17:04:48 -0500
  - Labels: app=xyztechnologies
  - pod-template-hash=76c6bb857b
  - Annotations: <none>
  - Status: Running
  - IP: 10.244.1.9
  - IPs:
  - IP: 10.244.1.9
  - Controlled By: ReplicaSet/xyztechnologies-deployment-76c6bb857b
  - Containers:
  - xyztechnologies:
  - Container ID: containerd://bdaaaa828d7f0454d5e28df92a2b15fe5f4c120e1ef0e3a9a7a87e6e9a0782ff
  - Image: demsdocker/xyztechnologies:latest
  - Image ID: docker.io/demsdocker/xyztechnologies@sha256:164368e325ef78428dd2f9bf7555308e441221d709afc82444e3e4ff9da6493e
  - Port: 8080/TCP
  - Host Port: 0/TCP
  - State: Running
  - Started: Sun, 29 Jun 2025 17:05:47 -0500
  - Ready: True
  - Restart Count: 0

```
    Environment:    <none>
    Mounts:
      /var/run/secrets/kubernetes.io/serviceaccount from kube-api-access-6zmsn (ro)
Conditions:
  Type                        Status
  PodReadyToStartContainers   True
  Initialized                 True
  Ready                       True
  ContainersReady             True
  PodScheduled                True
Volumes:
  kube-api-access-6zmsn:
    Type:                     Projected (a volume that contains injected data from multiple sources)
    TokenExpirationSeconds:  3607
    ConfigMapName:           kube-root-ca.crt
    ConfigMapOptional:       <nil>
    DownwardAPI:             true
QoS Class:                   BestEffort
Node-Selectors:              <none>
Tolerations:                 node.kubernetes.io/not-ready:NoExecute op=Exists for 300s
                             node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:                      <none>
```

`kubectl logs` output (partial for brevity):

```
+ kubectl logs -n xyz-tech -l app=xyztechnologies --all-containers --tail=100
NOTE: Picked up JDK_JAVA_OPTIONS: --add-opens=java.base/java.lang=ALL-UNNAMED --add-opens=java.base/java.lang.invoke=ALL-UNNAMED --add-opens=java.base/java.lang.reflect=ALL-UNNAMED --add-opens=java.base/java.io=ALL-UNNAMED --add-opens=java.base/java.util=ALL-UNNAMED --add-opens=java.base/java.util.concurrent=ALL-UNNAMED --add-opens=java.rmi/sun.rmi.transport=ALL-UNNAMED
29-Jun-2025 22:05:48.866 INFO [main] org.apache.catalina.startup.VersionLoggerListener.log Server version name:   Apache Tomcat/9.0.106
...
29-Jun-2025 22:05:50.348 INFO [main] org.apache.catalina.startup.HostConfig.deployWAR Deployment of web application archive [/opt/tomcat/webapps/XYZtechnologies-1.0.war] has finished in [706] ms
...
29-Jun-2025 22:05:50.516 INFO [main] org.apache.catalina.startup.Catalina.start Server startup in [990] milliseconds
```

Step 3.3: Verify Kubernetes Deployment

After the Jenkins pipeline runs, manually verify the deployment on the Kubernetes cluster.

- **CLI Commands:**
  `kubectl get namespaces # Verify xyz-tech and metallb-system namespaces exist`

```
igor@k8s-control:~$ kubectl get namespaces
NAME              STATUS   AGE
abc-tech          Active   8d
default           Active   8d
kube-flannel      Active   8d
kube-node-lease   Active   8d
kube-public       Active   8d
kube-system       Active   8d
metallb-system    Active   8d
xyz-tech          Active   3h59m
```

```
kubectl get deployments -n xyz-tech # Check xyztechnologies-deployment
```

```
igor@k8s-control:~$ kubectl get deployments -n xyz-tech
NAME                        READY   UP-TO-DATE   AVAILABLE   AGE
xyztechnologies-deployment  2/2     2            2           3h53m
```

```
kubectl get pods -n xyz-tech # Check the pods created by the deployment
```

```
igor@k8s-control:~$ kubectl get pods -n xyz-tech
NAME                                         READY   STATUS    RESTARTS   AGE
xyztechnologies-deployment-76c6bb857b-75btc  1/1     Running   0          3h54m
xyztechnologies-deployment-76c6bb857b-l4htf  1/1     Running   0          3h54m
```

```
kubectl get services -n xyz-tech # Check xyztechnologies-service and its
LoadBalancer
```

```
igor@k8s-control:~$ kubectl get services -n xyz-tech
NAME                    TYPE           CLUSTER-IP       EXTERNAL-IP     PORT(S)        AGE
xyztechnologies-service LoadBalancer   10.108.115.215   192.168.1.241   80:31347/TCP   4h34m
```

```
# To access the application: find the LoadBalancer  and a cluster node IP
# curl http://10.108.115.215:80/XYZtechnologies-1.0/
```

```
igor@k8s-control:~$ curl http://10.108.115.215:80/XYZtechnologies-1.0/
<html>
<body>
<h2>Welcome to XYZ technologies</h2>
  <h3>This is admin Module</h3>
  <button name="Add User" value="Add User" type="button" onclick="addUser()">Add User</button>
<script>
function addUser(){
alert("You will be navigated to Add module");
}
</script>
    <button name="View User" value="View User" type="button" onclick="viewUser()">View User</button>
<script>
function viewUser(){
alert("You will be navigated to view module");
}
  </script>
    <button name="Delete User" value="Delete User" type="button" onclick="deleteUser()">Delete User</button>
<script>
function deleteUser(){
alert("You will be navigated to delete module");
}
</script>
</body>
</html>
```

- Output of `kubectl get deployments -n xyz-tech` showing `xyztechnologies-deployment` as ready.

```
igor@k8s-control:~$ kubectl get deployments -n xyz-tech
NAME                        READY   UP-TO-DATE   AVAILABLE   AGE
xyztechnologies-deployment  2/2     2            2           4h5m
```

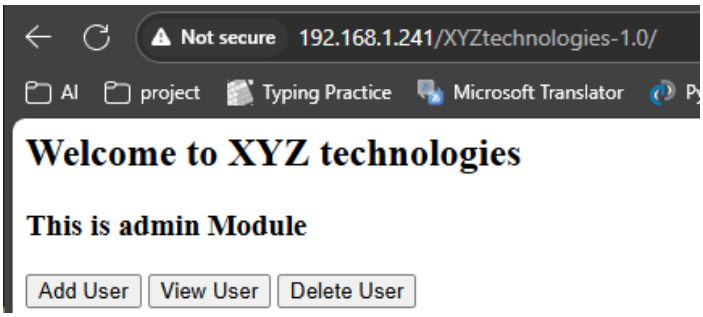
- Output of `kubectl get pods -n xyz-tech` showing application pods running.

```
igor@k8s-control:~$ kubectl get pods -n xyz-tech
NAME                                          READY   STATUS    RESTARTS   AGE
xyztechnologies-deployment-76c6bb857b-75btc   1/1     Running   0          4h6m
xyztechnologies-deployment-76c6bb857b-l4htf   1/1     Running   0          4h6m
```

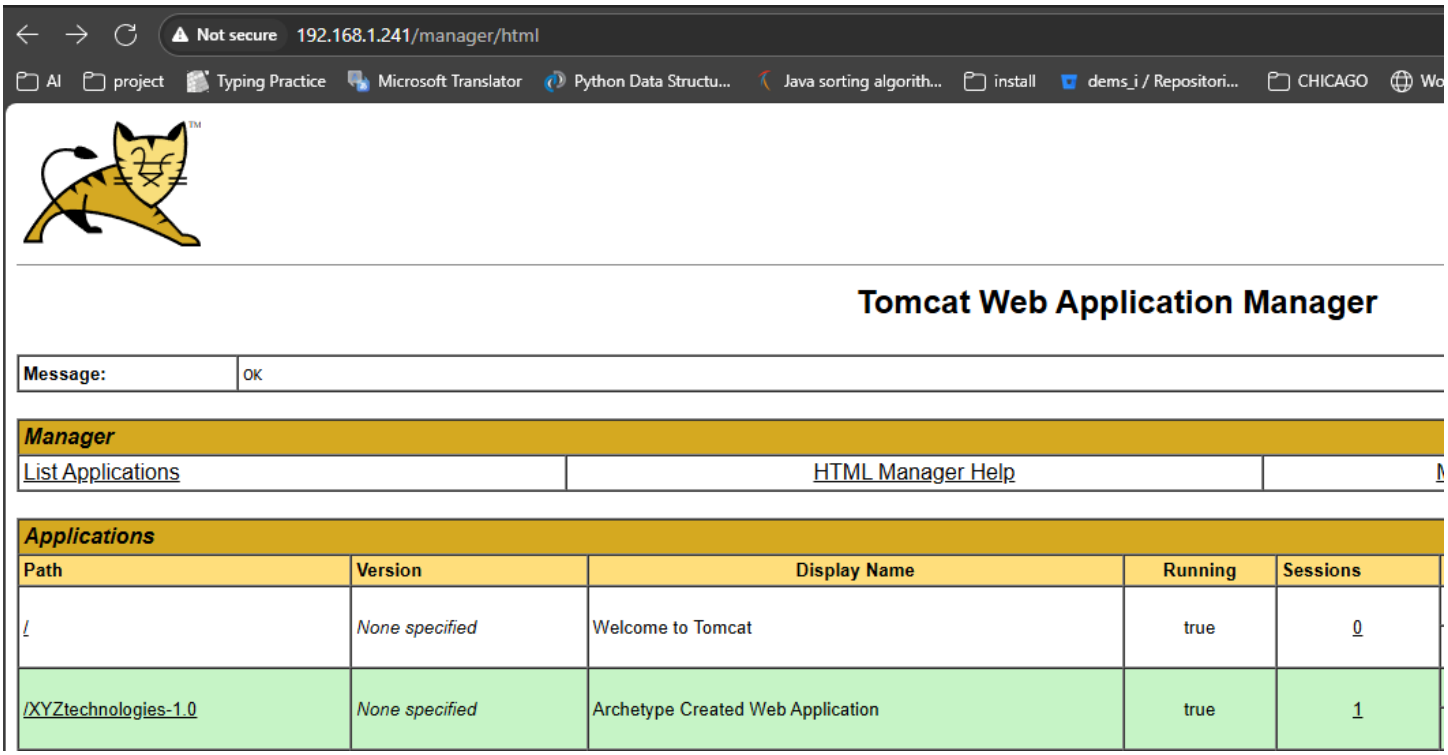
- Output of `kubectl get services -n xyz-tech` showing the `LoadBalancer` for `xyztechnologies-service`.

```
igor@k8s-control:~$ kubectl get services -n xyz-tech
NAME                    TYPE           CLUSTER-IP      EXTERNAL-IP     PORT(S)        AGE
xyztechnologies-service   LoadBalancer   10.108.115.215   192.168.1.241   80:31347/TCP   4h34m
```

A web browser screenshot showing `xyztechnologies` application accessible via the Kubernetes service's `LoadBalancer` (e.g., `http://192.168.1.241:80/XYZtechnologies-1.0/`).



Ensure TomCat access :



Task 5: Using Prometheus, monitor the resources like CPU utilization: Total Usage, Usage per core, usage breakdown, memory, and network on the instance by providing the endpoints on the local host. Install the node exporter and add the URL to the target in

Prometheus. Using this data, log in to Grafana and create a dashboard to show the metrics

Prometheus & Grafana installed:

```
igor@k8s-control:~$ prometheus --version
prometheus, version 2.30.0 (branch: HEAD, revision: 37468d88dce85ac507f3fb7864c7d1c078e3e27d)
  build user:       root@e913c65aa170
  build date:       20210914-09:49:24
  go version:       go1.17.1
  platform:         linux/amd64
igor@k8s-control:~$ grafana-server -v
Version 12.0.2 (commit: 5bda17e7c1cb313eb96266f2fdda73a6b35c3977, branch: HEAD)
igor@k8s-control:~$
```

Installation node_exporter on Both Nodes

Run this **on master (`192.168.1.115`) and worker (`192.168.1.114`)**:

Download Node Exporter

```
cd /tmp
wget https://github.com/prometheus/node_exporter/releases/download/v1.8.1/node_exporter-1.8.1.linux-amd64.tar.gz
tar xvfz node_exporter-1.8.1.linux-amd64.tar.gz
sudo cp node_exporter-1.8.1.linux-amd64/node_exporter /usr/local/bin/
```

Create a systemd service

```
sudo useradd -rs /bin/false node_exporter

cat <<EOF | sudo tee /etc/systemd/system/node_exporter.service
[Unit]
Description=Prometheus Node Exporter
After=network.target

[Service]
User=node_exporter
ExecStart=/usr/local/bin/node_exporter

[Install]
WantedBy=default.target
EOF
```

Start and enable service

```
sudo systemctl daemon-reexec
sudo systemctl daemon-reload
sudo systemctl enable node_exporter
sudo systemctl start node_exporter
```

Verify it's running for both of servers:

curl http://localhost:9100/metrics

```
igor@k8s-control:/tmp$ curl http://localhost:9100/metrics
# HELP go_gc_duration_seconds A summary of the pause duration of garbage collection cycles.
# TYPE go_gc_duration_seconds summary
go_gc_duration_seconds{quantile="0"} 9.201e-06
go_gc_duration_seconds{quantile="0.25"} 1.6401e-05
go_gc_duration_seconds{quantile="0.5"} 1.7101e-05
go_gc_duration_seconds{quantile="0.75"} 1.8601e-05
go_gc_duration_seconds{quantile="1"} 2.7902e-05
```

go_gc_duration_seconds_sum 0.000155309
go_gc_duration_seconds_count 9

igor@k8s-2:/tmp$ curl http://localhost:9100/metrics
 # HELP go_gc_duration_seconds A summary of the pause duration of garbage collection cycles.
 # TYPE go_gc_duration_seconds summary
go_gc_duration_seconds{quantile="0"} 0
go_gc_duration_seconds{quantile="0.25"} 0
go_gc_duration_seconds{quantile="0.5"} 0
go_gc_duration_seconds{quantile="0.75"} 0
go_gc_duration_seconds{quantile="1"} 0
go_gc_duration_seconds_sum 0
go_gc_duration_seconds_count 0

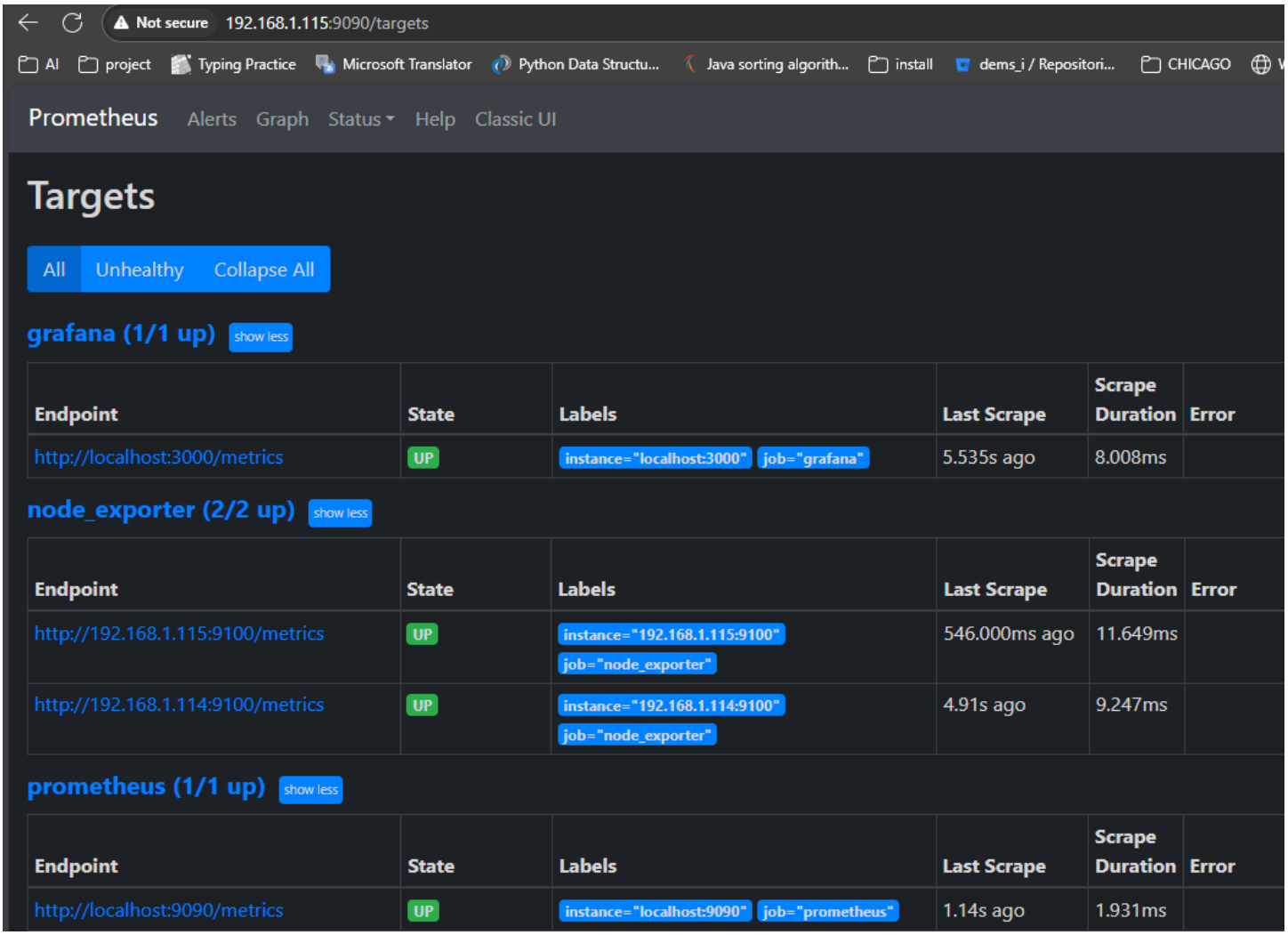
Update /etc/prometheus/prometheus.yml on master

Replace the node_exporter section with this:

```
  - job_name: 'node_exporter'
    scrape_interval: 5s
    static_configs:
      - targets: ['192.168.1.115:9100', '192.168.1.114:9100']
```

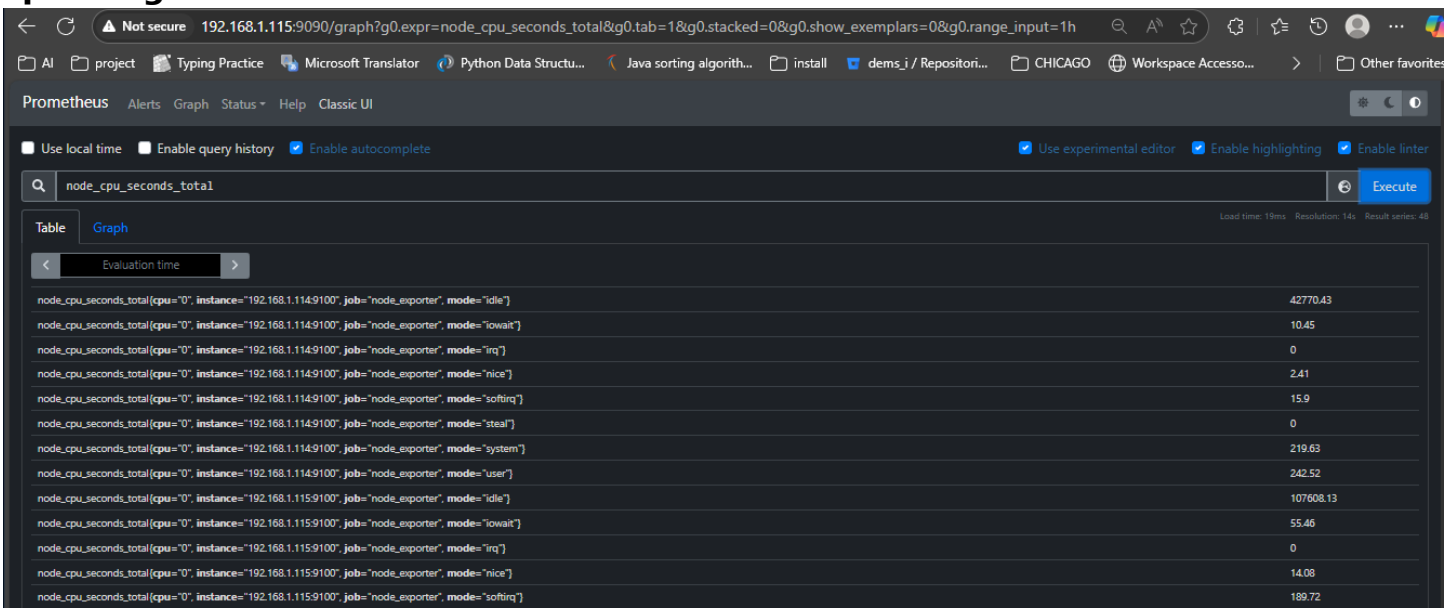
Then **restart Prometheus** on master:
sudo systemctl restart Prometheus

Verify Prometheus sees both node_exporters: → Go to http://192.168.1.115:9090/targets

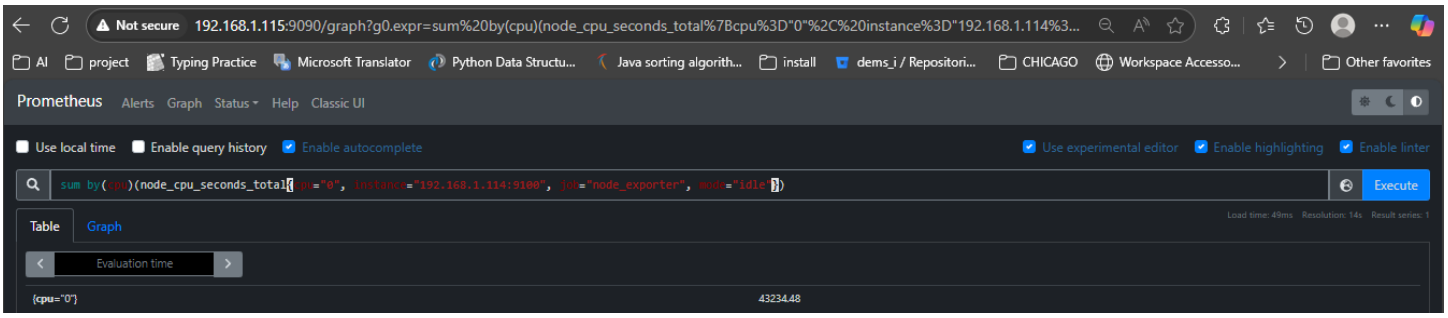


CPU monitoring

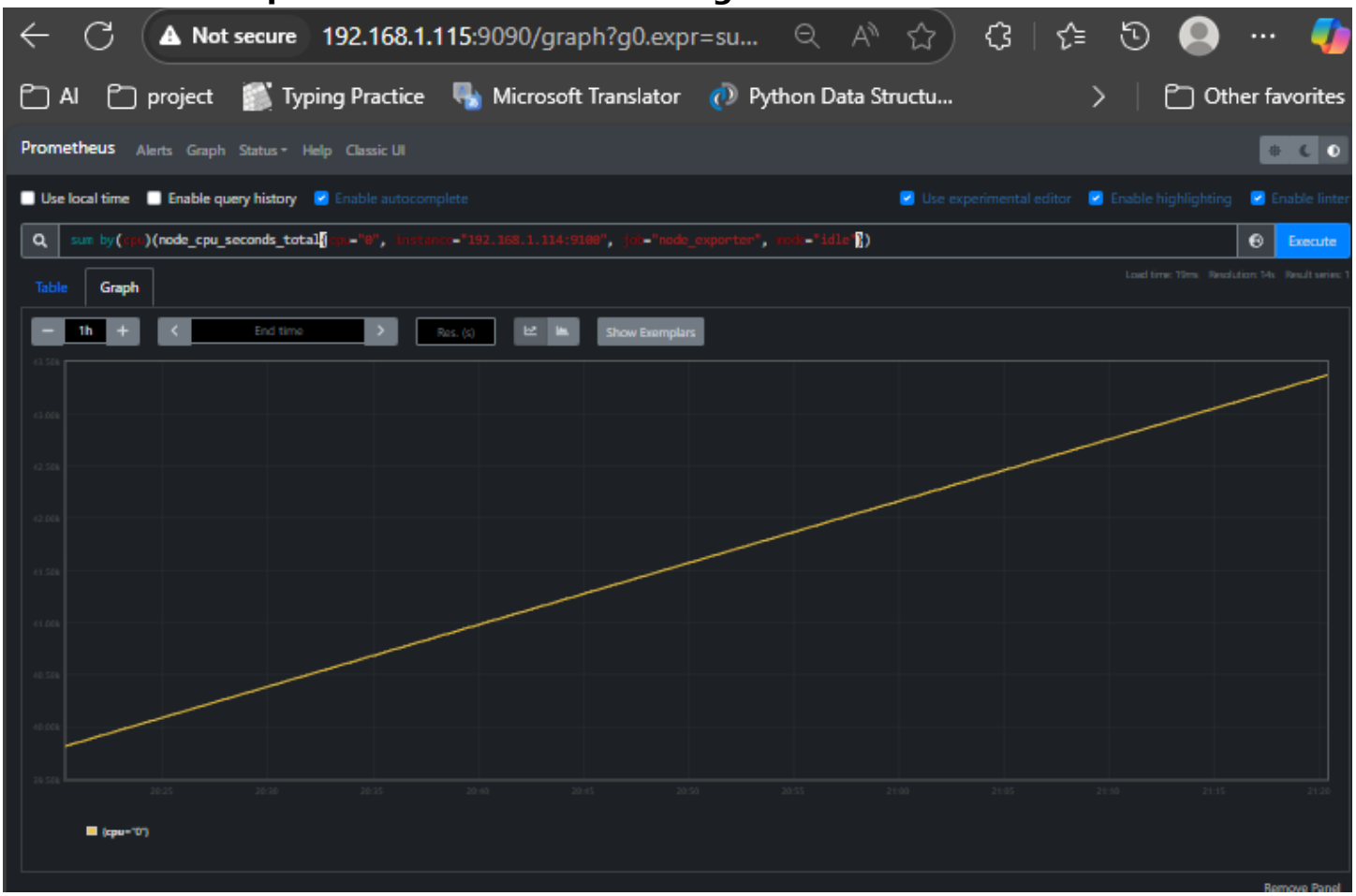
cpu usage breakdown for node



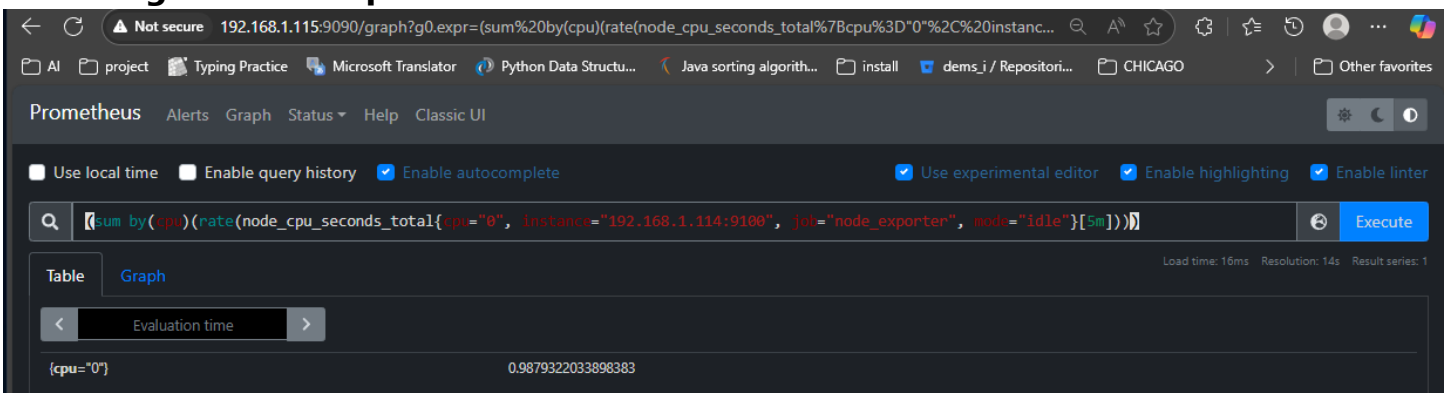
total count of cpu usage in seconds from starting



Total count of cpu in seconds from starting

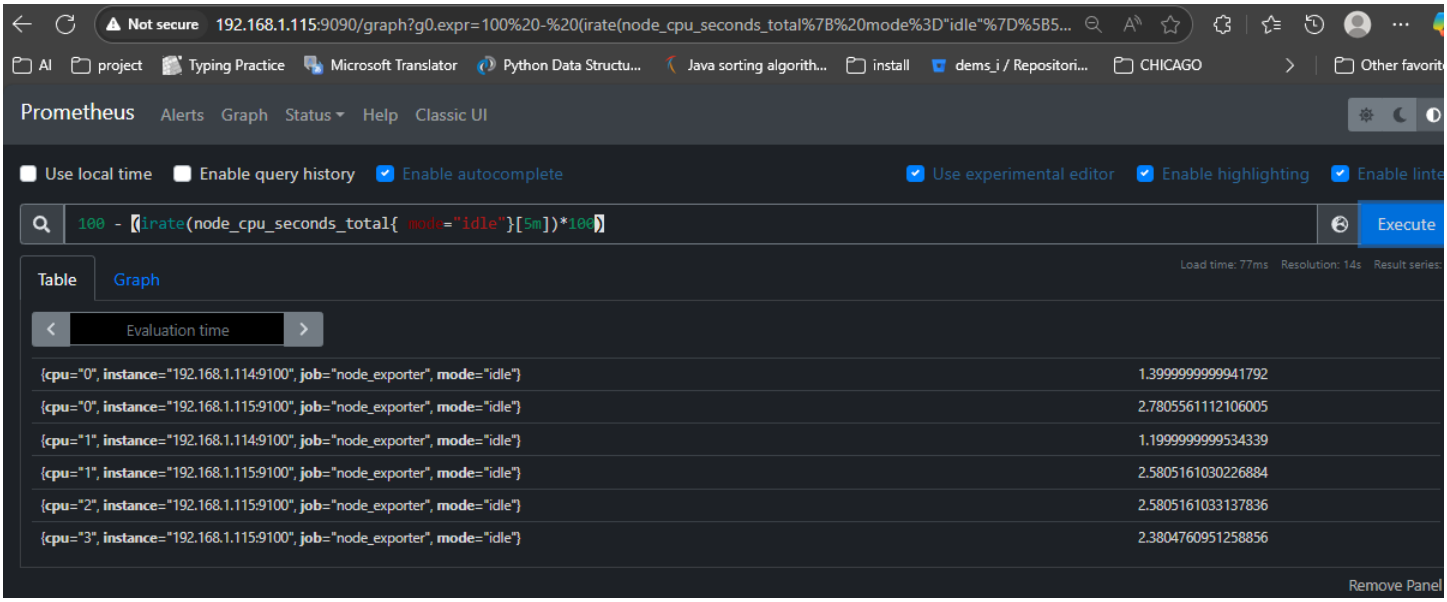


Rate of growth for cpu in last 5 minutes

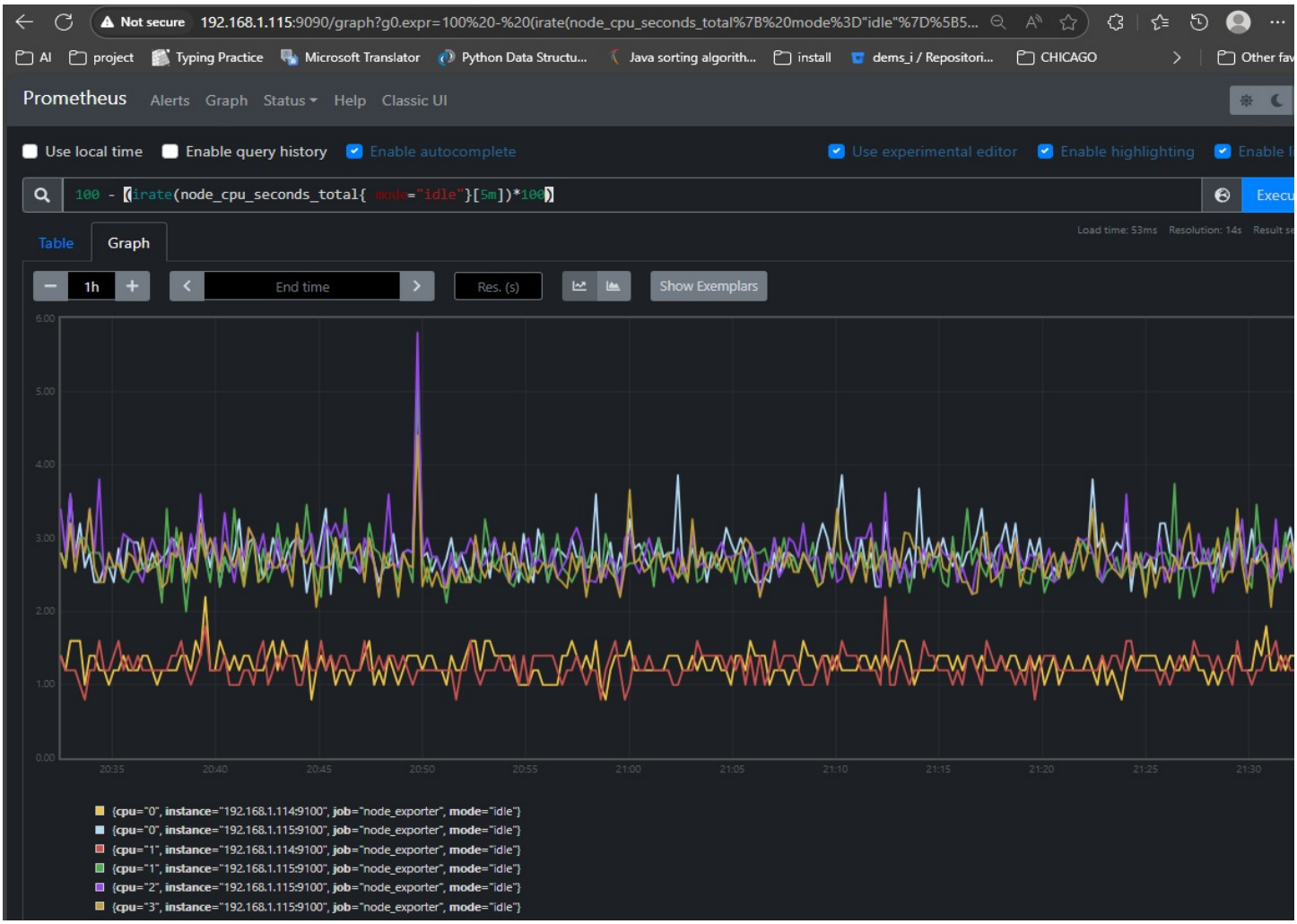


Rate of growth for cpu in 5 minutes graph

CPU Utilization



CPU Utilization graph



Some of the commands i have used for CPU monitoring

🔢 1. Overall CPU Idle Time (per mode)

```
sum by (cpu)(node_cpu_seconds_total{mode="idle"})
```

Explanation:
This shows the total idle CPU time **per CPU core**. Useful as a base metric to understand unused CPU.

📊 2. Overall CPU Utilization (%)

```
( sum by (cpu) (rate(node_cpu_seconds_total{mode!="idle"}[5m])) ) * 100
```

Explanation:

- `rate(...[5m])`: calculates per-second rate over 5 minutes
- `mode!="idle"`: selects **active** CPU modes (user, system, etc.)
- `sum by (cpu)`: aggregates over all cores
- `* 100`: converts to percentage

🟢 CPU Utilization % = 100% - idle time

🧠 3. CPU Utilization by Instance (localhost)

```
100 - (avg by(instance) (irate(node_cpu_seconds_total{mode="idle",
instance="localhost:9100"}[5m])) * 100)
```

Explanation:

- `irate(...)`: instant rate for higher resolution
- Filters only `idle` time on `localhost`
- `avg by(instance)`: averages across all CPU cores for the instance

➡️ Gives **total CPU usage percentage** for the `localhost` node.

🕒 4. Compare CPU Usage to 24h Ago

```
100 - (avg by(instance) (irate(node_cpu_seconds_total{mode="idle",
instance="localhost:9100"}[5m] offset 24h)) * 100)
```

Explanation:
Same as above, but with:

- `offset 24h`: shifts data to **24 hours ago**

📌 Useful for **comparing usage trends** over time.

🧮 5. CPU Utilization per Core

```
(1 - rate(node_cpu_seconds_total{job="node-exporter", mode="idle",
instance="localhost:9100"}[10m]))
/
ignoring(cpu)
group_left
count without (cpu) (node_cpu_seconds_total{job="node-exporter", mode="idle"})
```

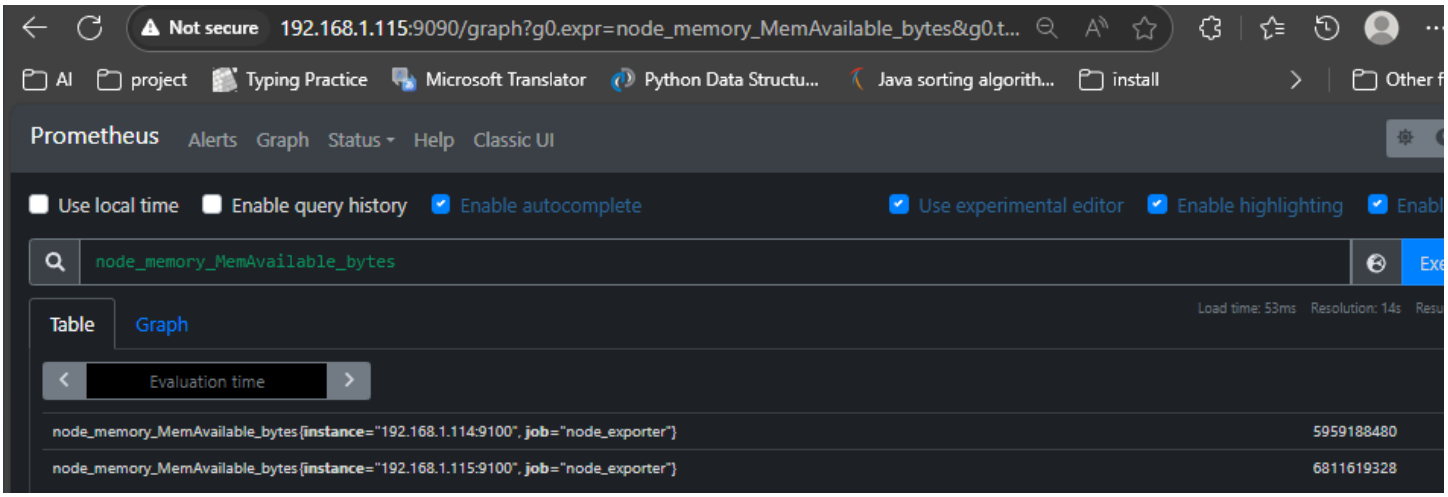
Explanation:

- `rate(...)`: CPU idle time rate per core
- `1 - rate(...)`: converts idle to **used** CPU
- `group_left`: joins metrics ignoring the `cpu` label
- `count without (cpu)`: gives number of cores

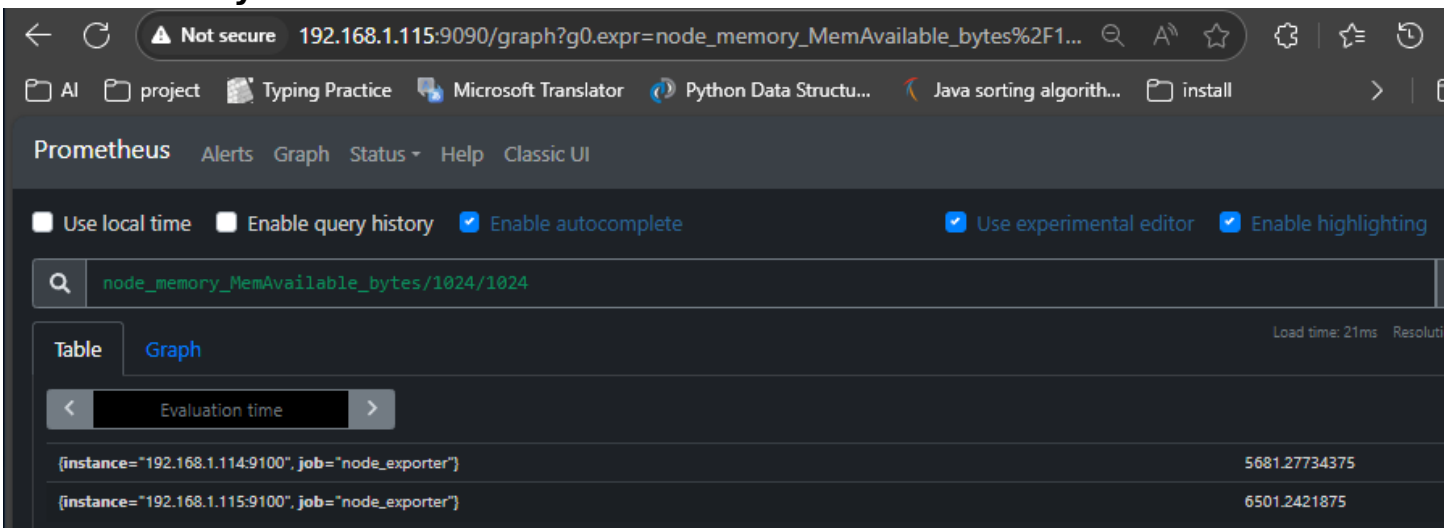
➡️ This gives **CPU usage per core as a ratio**, useful for spotting hotspots.

Memory monitoring

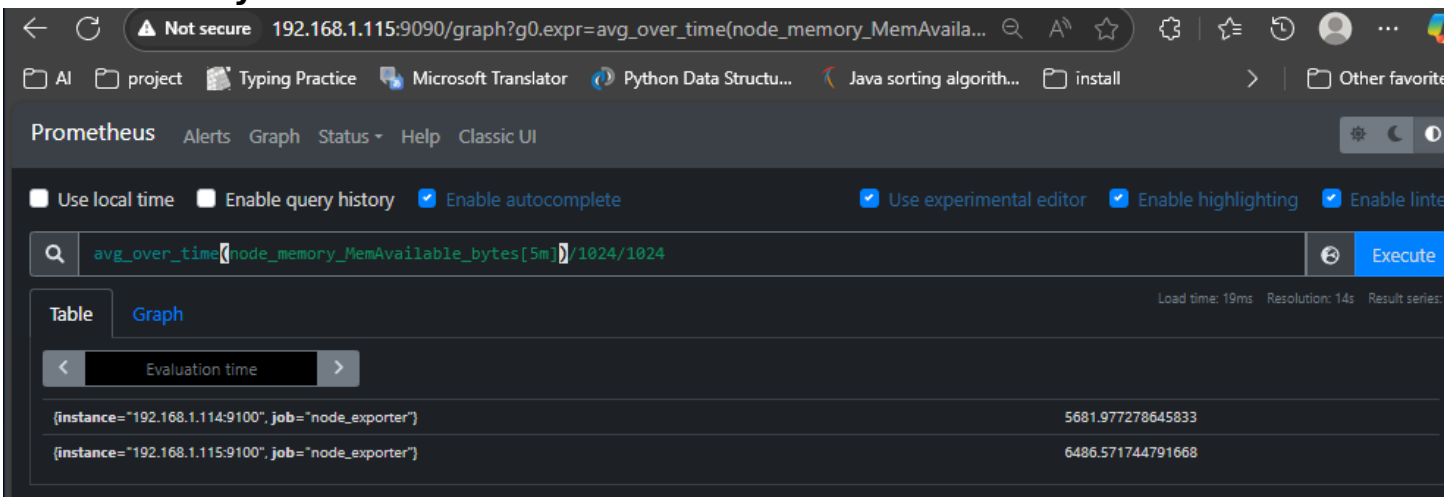
Node memory available in bytes:



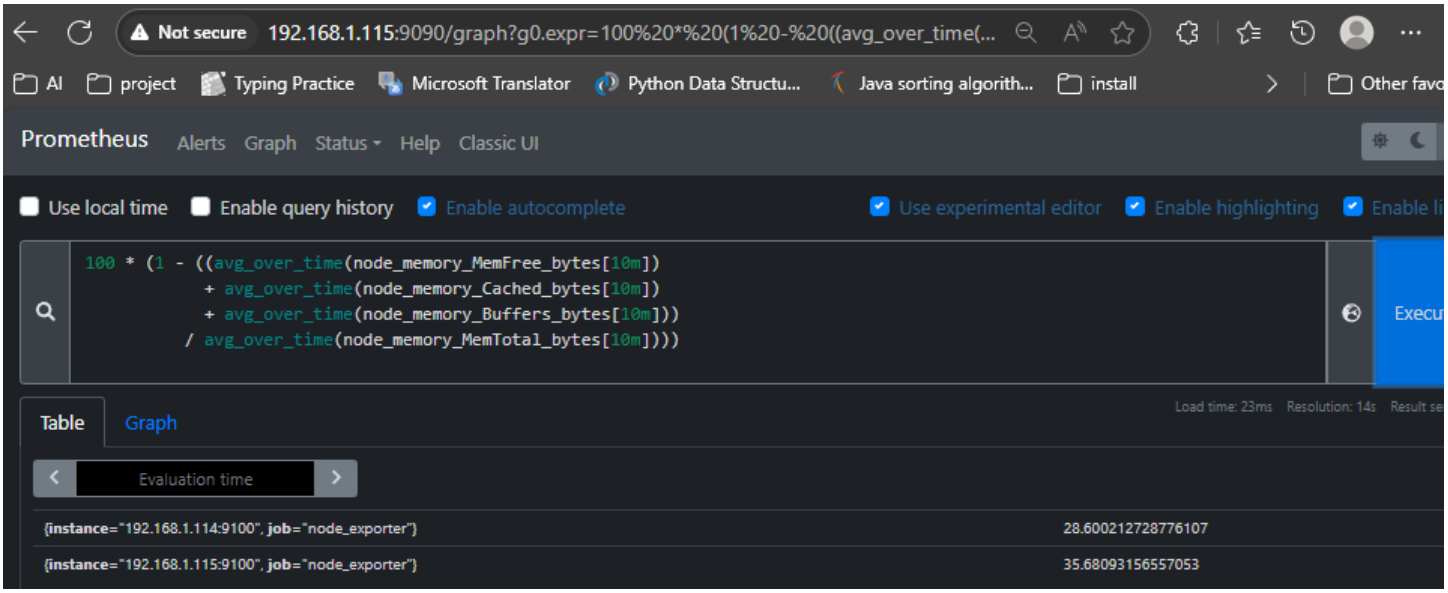
Node memory available in MB



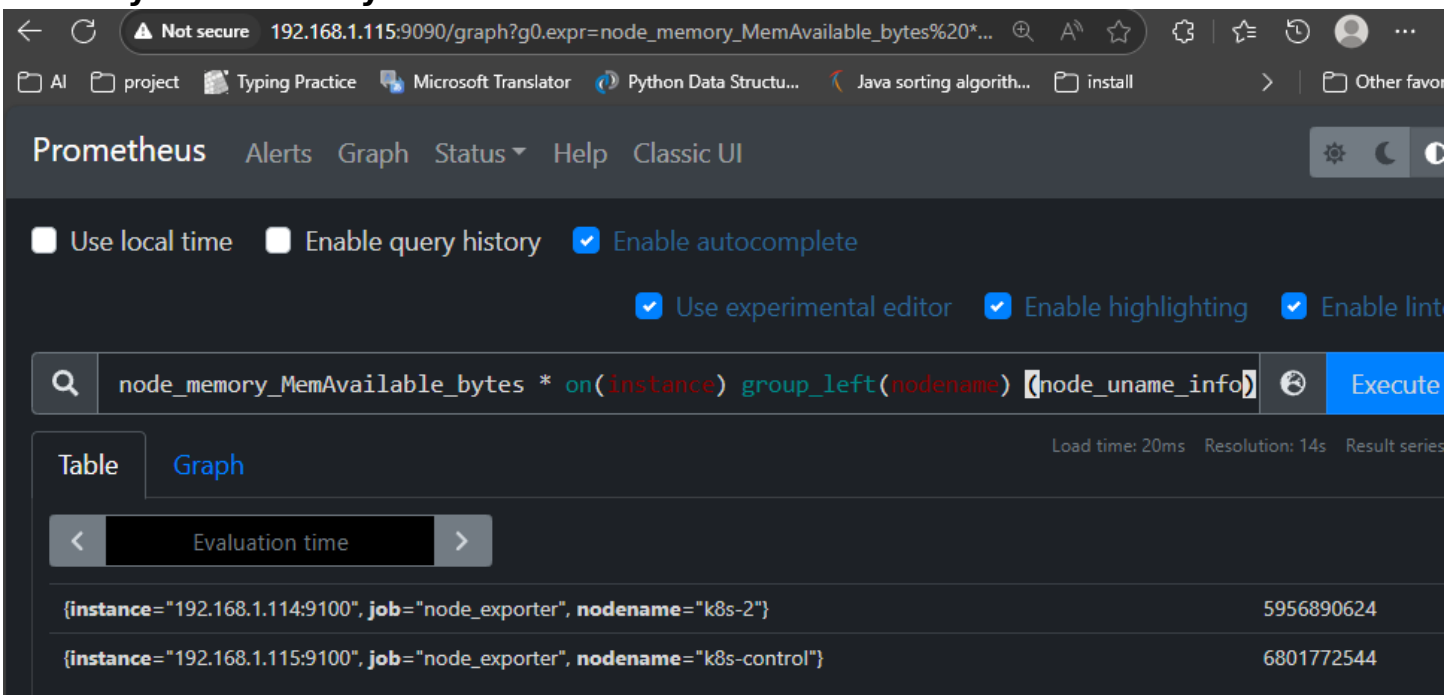
Node memory available in MB for last 5min



memory usage in percentage

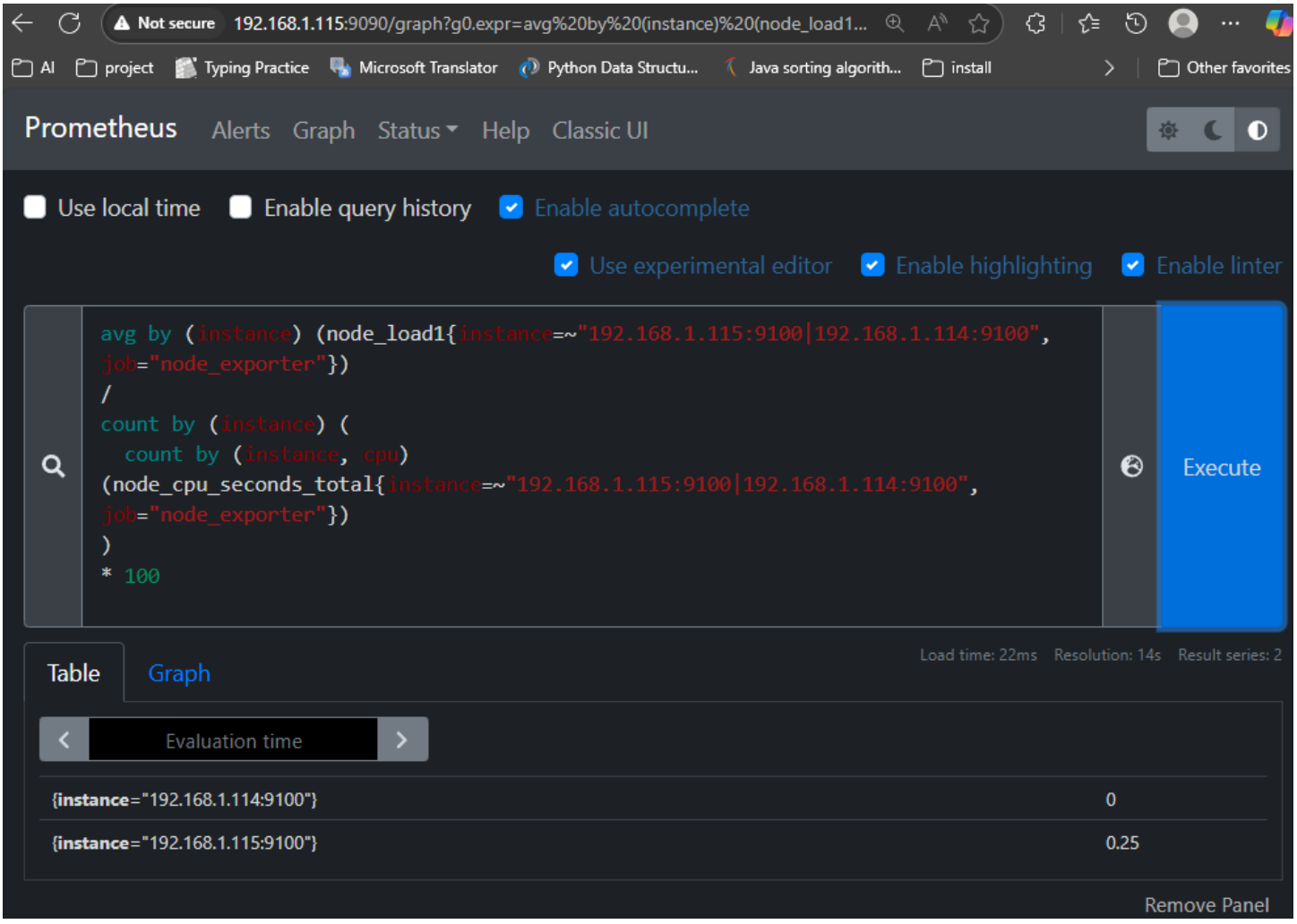


Memory Available by Node

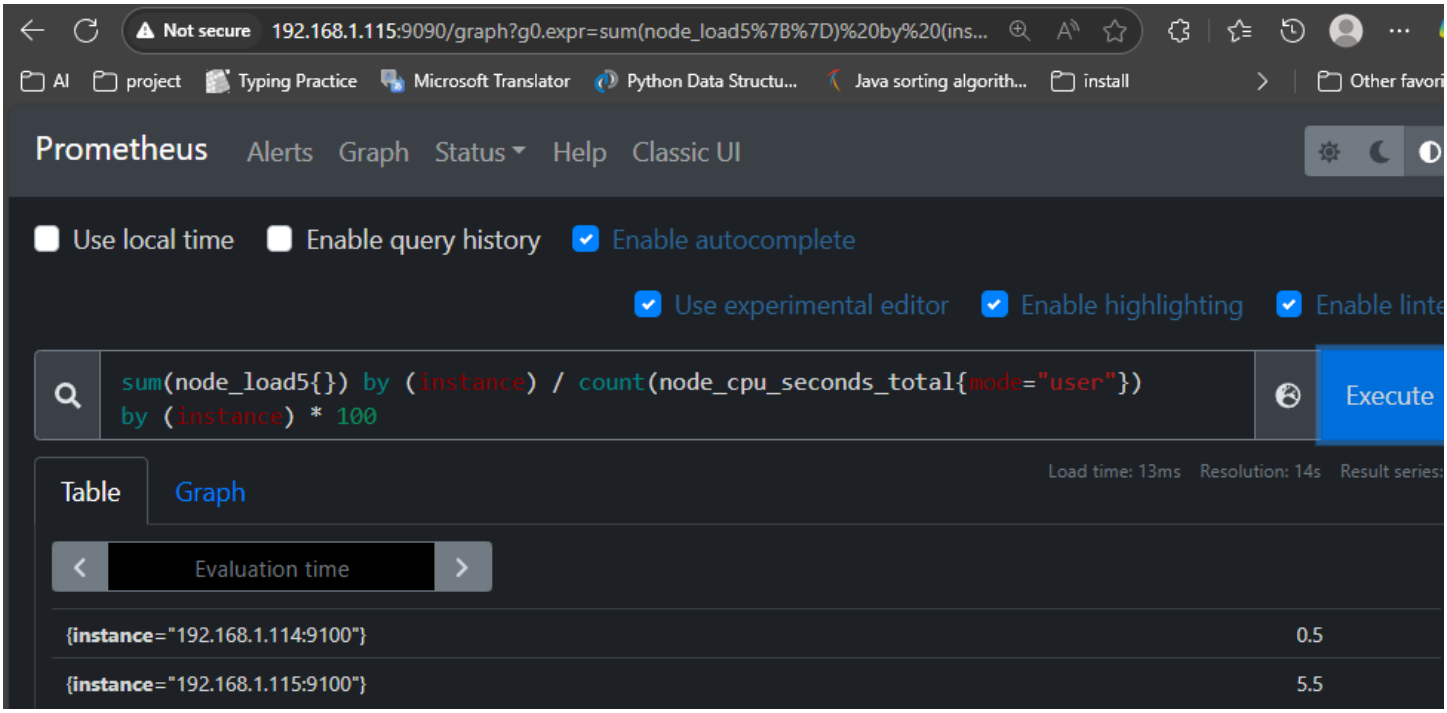


Network monitoring

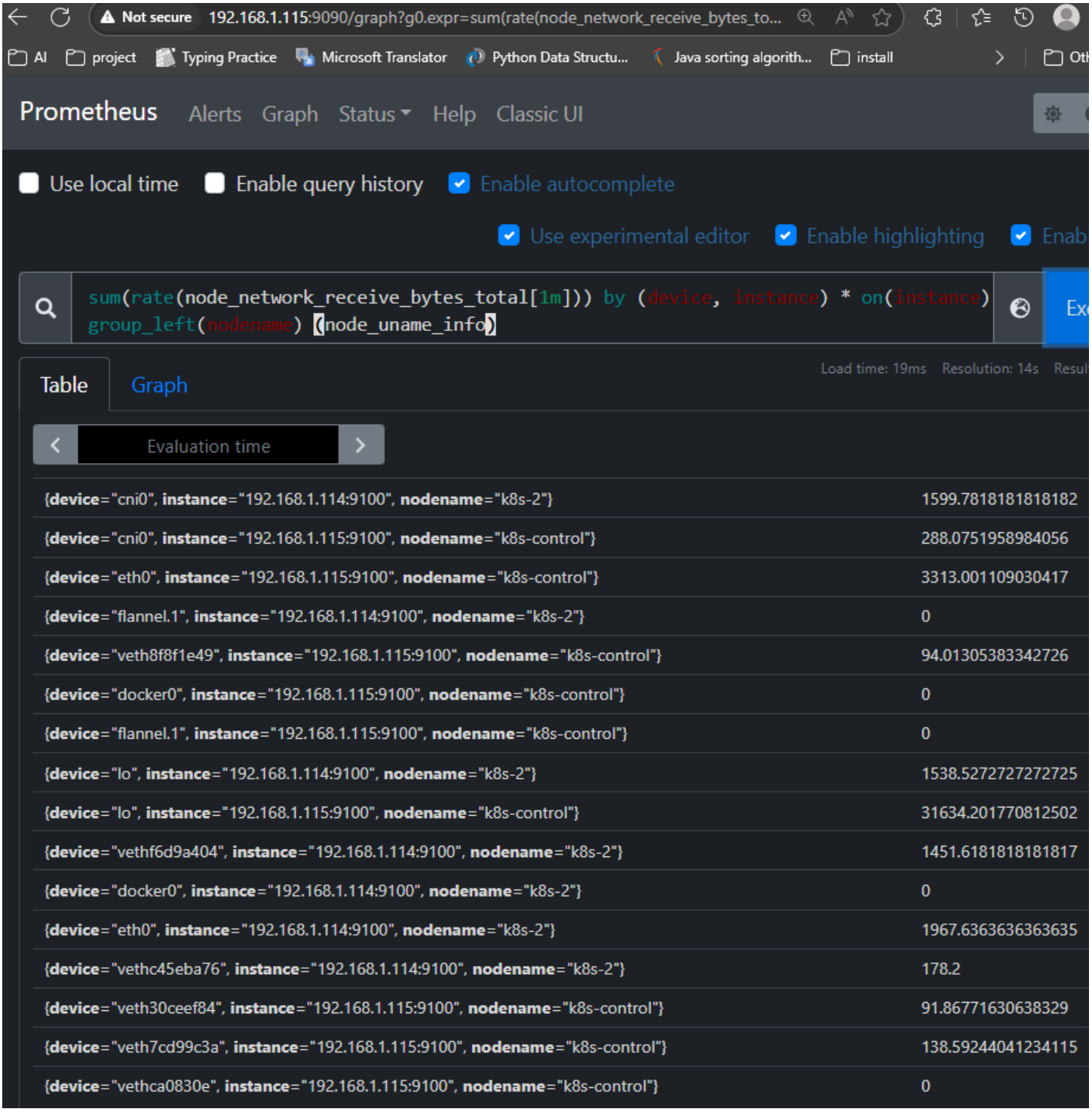
Load average in percentage separately for each of nodes:



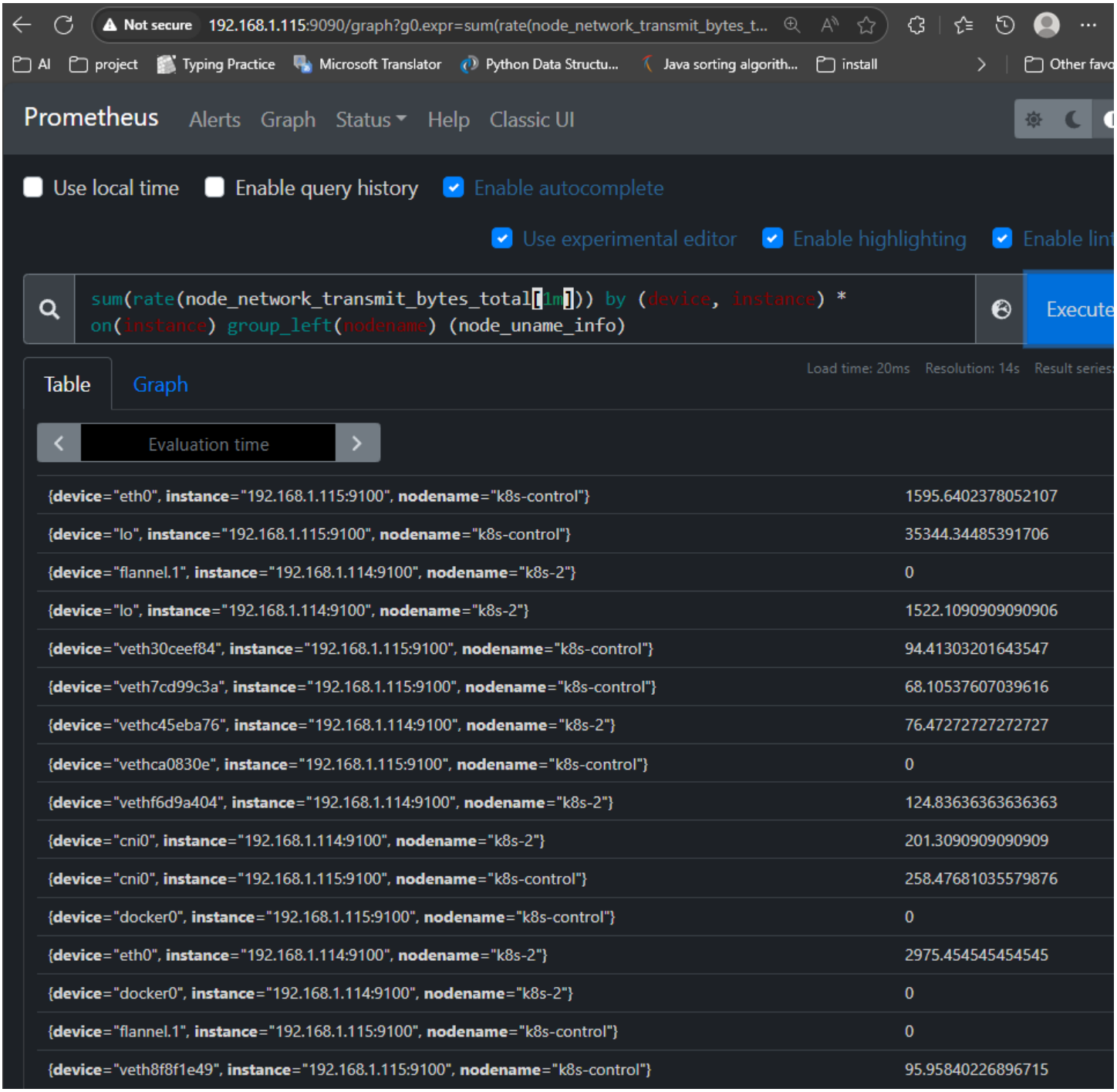
Load Average per Instance:



Network inbound traffic per Node:

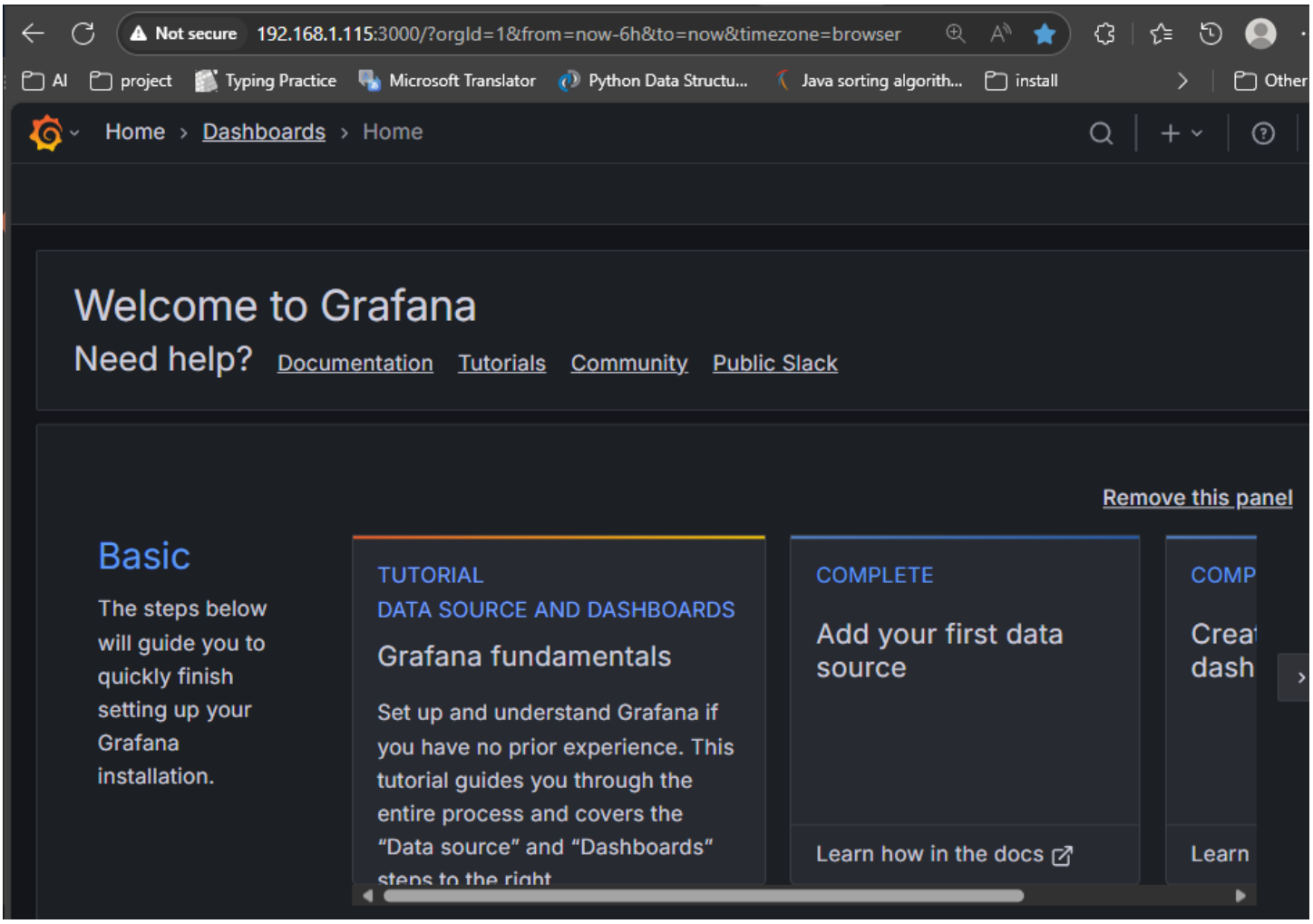


Network outbound traffic per Node

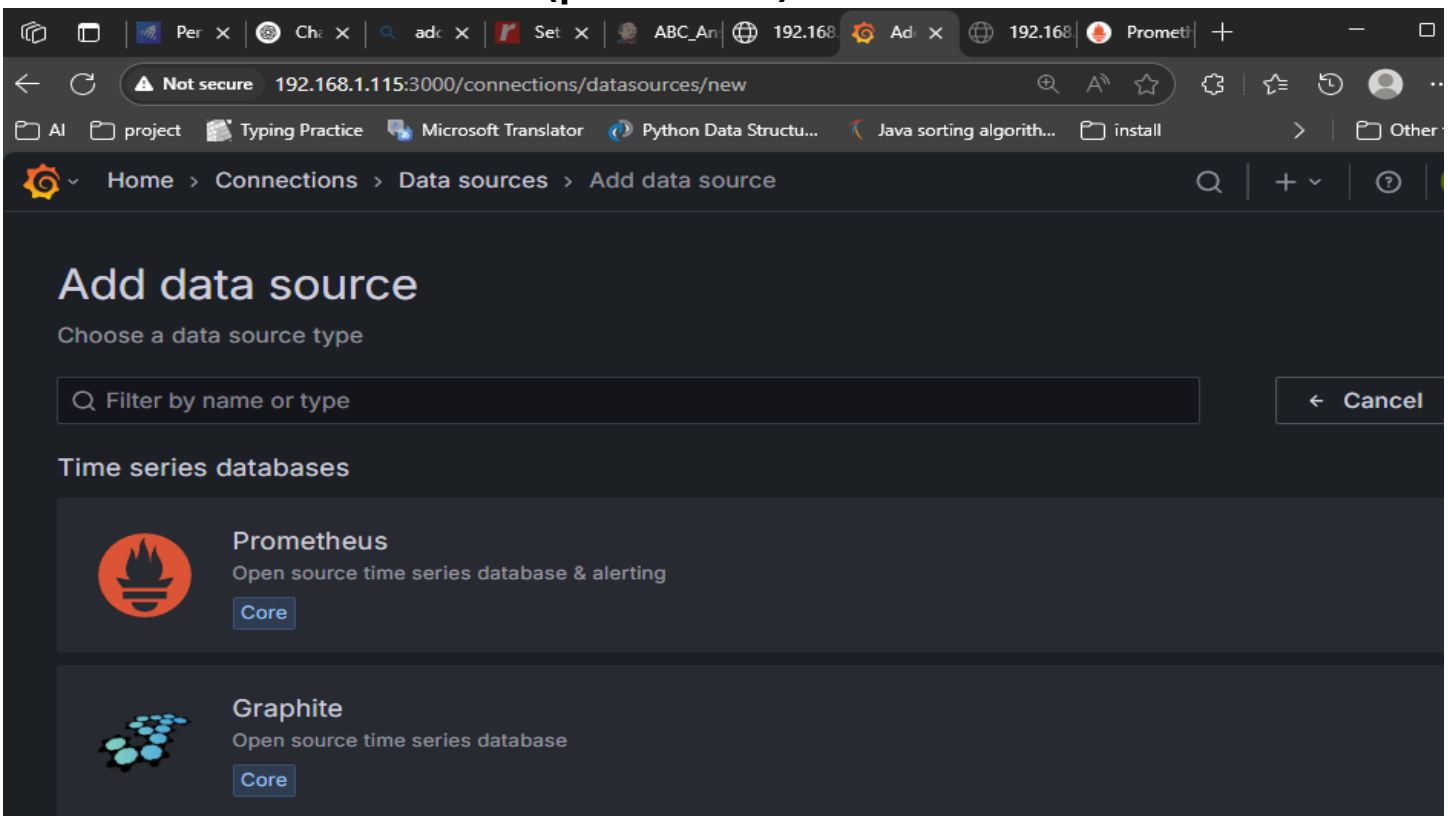


Grafana screenshots:

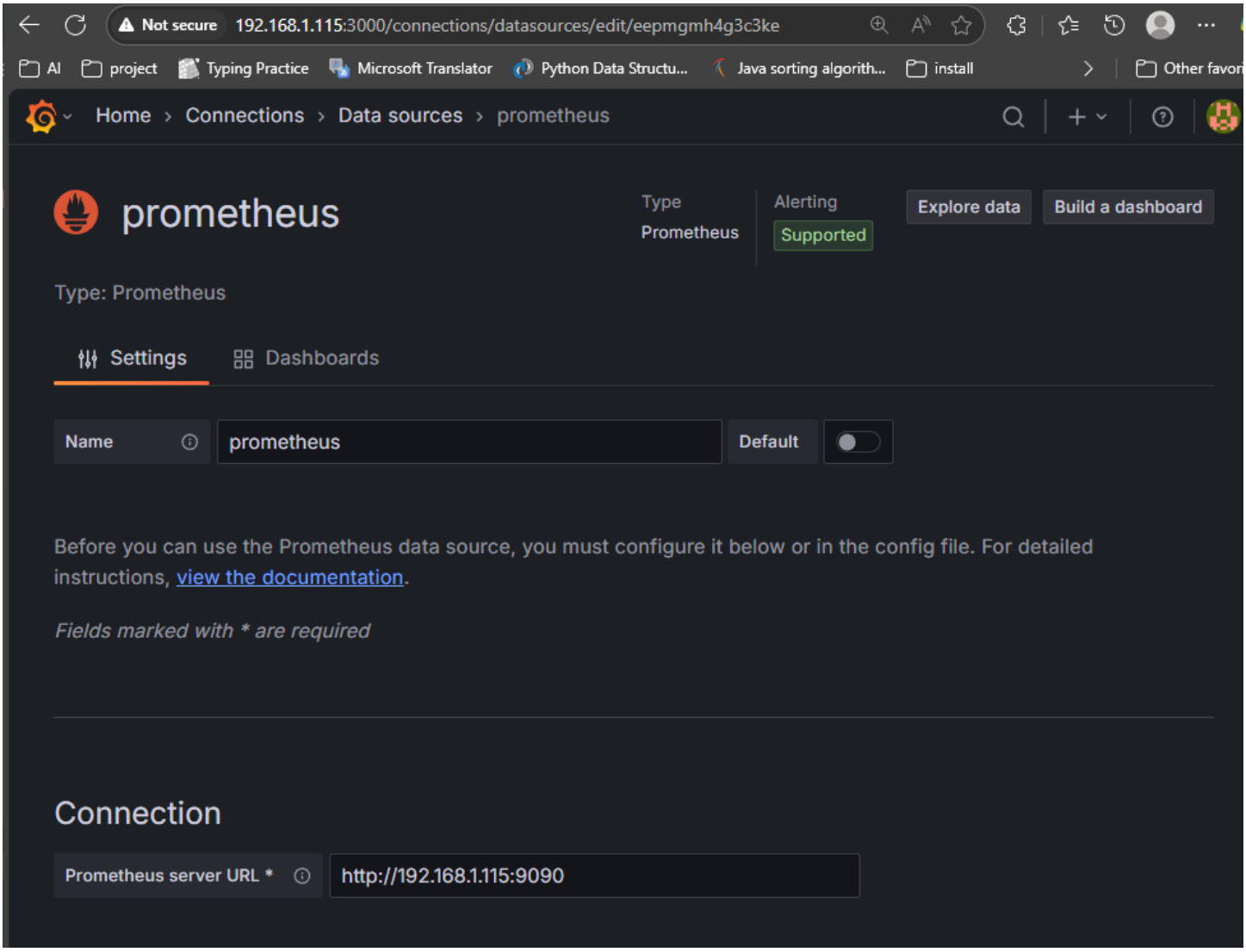
Grafana home page:



Grafana data source selection(prometheus):



Setting up the prometheus target:



Provision Prometheus Data Source in Grafana

Create file `/etc/grafana/provisioning/datasources/prometheus.yaml`:

```
apiVersion: 1
datasources:
  - name: Prometheus
    type: prometheus
    access: proxy
    url: http://localhost:9090
    isDefault: true
    editable: true
```

Then restart Grafana:

```
sudo systemctl restart grafana-server
```

Import Dashboard in Grafana from official portal [Node Exporter Full by Instance ID | Grafana Labs]

https://grafana.com/grafana/dashboards/10204-server-health/

AI | project | Typing Practice | Microsoft Translator | Python Data Structu... | Java sorting algorith... | install | dems_i / Repositori... | CHICAGO | Workspace Accesso... | Other

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← All dashboards

Node Exporter Full by Instance ID

This is a modification of dashboard #1860 that uses the instance id as the identifier.

The Node Exporter Full by Instance ID dashboard uses the prometheus data source to create a Grafana dashboard with the graph and singlestat panels.

Revisions

Revision	Description	Created	
2		2019-05-15T15:40:17	Download
1		2019-05-15T15:34:08	Download

Linux Server

Grafana Labs solution

Monitor Linux with Grafana. Easily monitor your Linux deployment with Grafana Cloud's out-of-the-box monitoring solution.

Learn more

Get this dashboard

1

Sign up for Grafana Cloud

Create free account

2

Import the dashboard template

Copy ID to clipboard

or

Download JSON

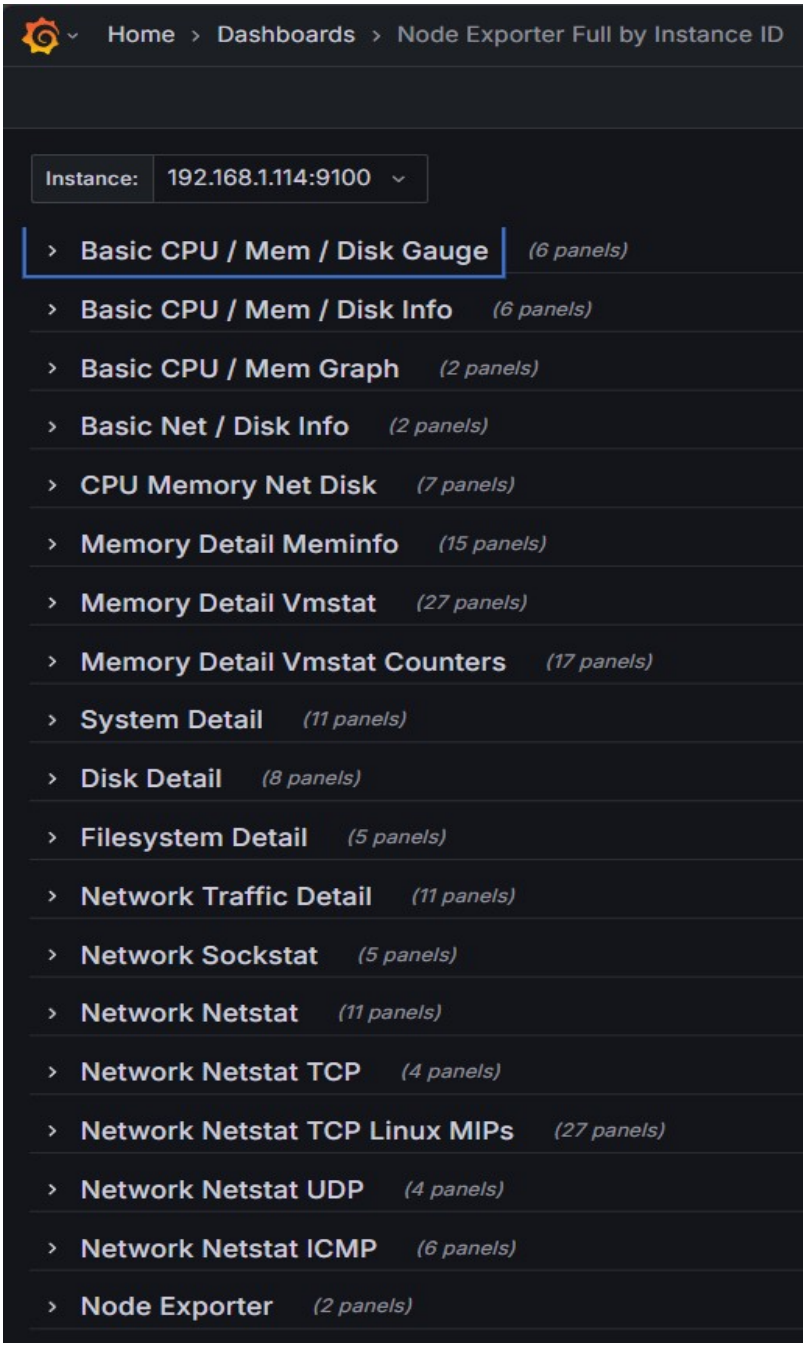
ID
10204

Datasource
Prometheus

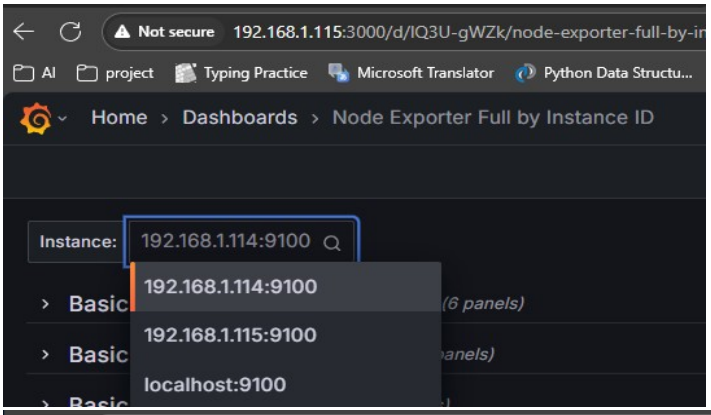
Dependencies
grafana 6.1.6 Graph (old)

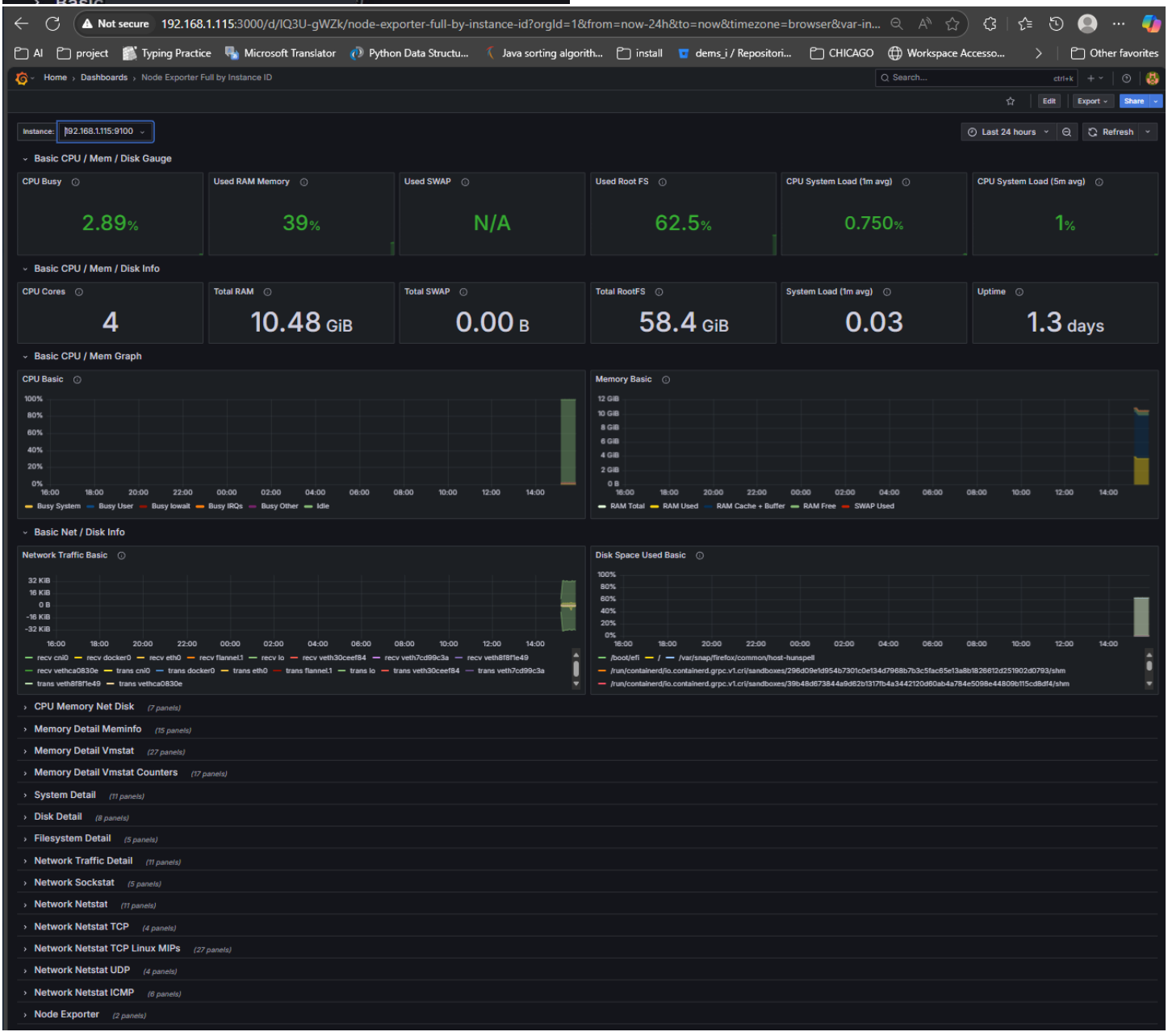
Singlestat

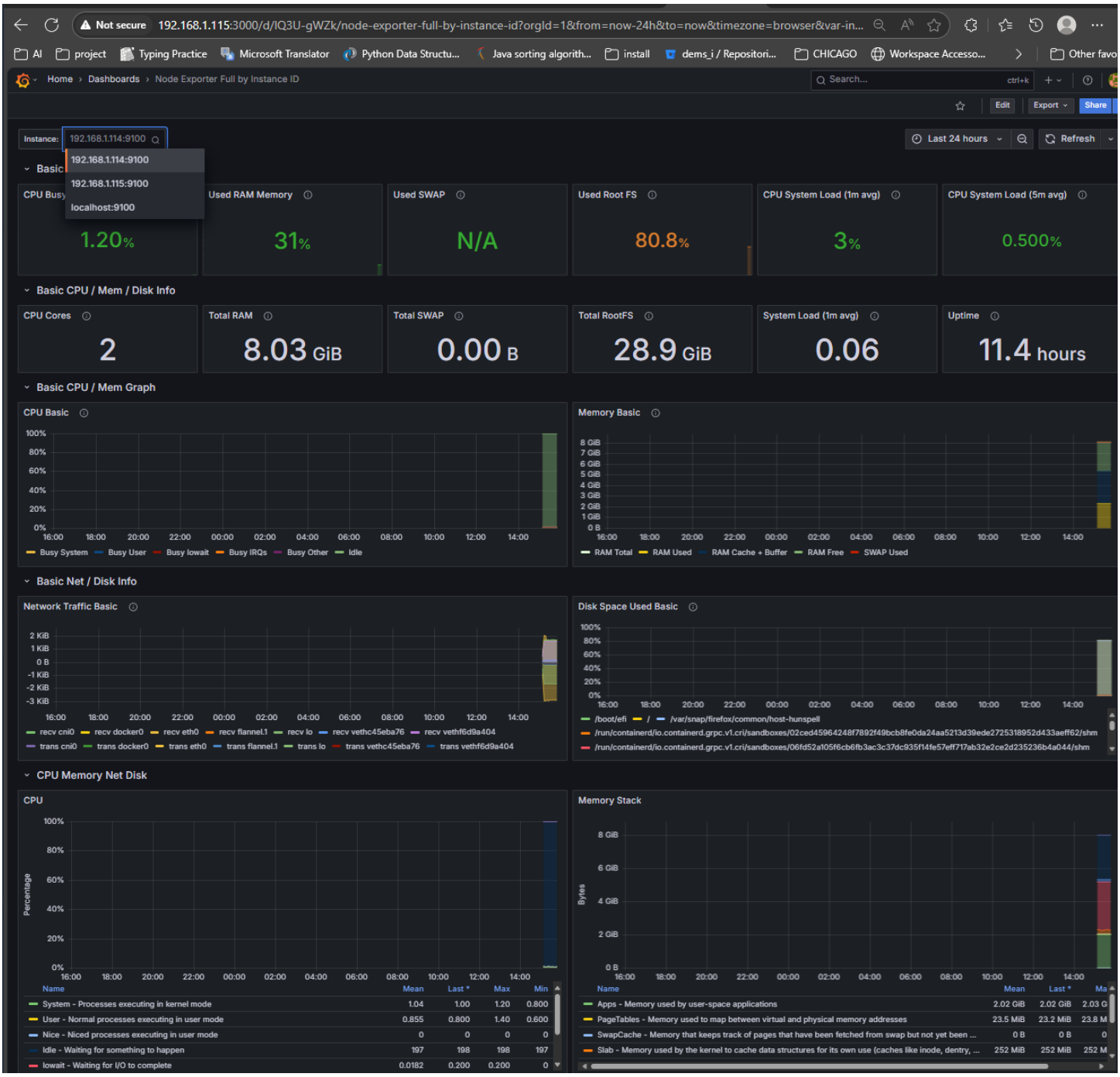
Different kinds of monitoring available



For the each of nodes


Not secure 192.168.1.115:3000/d/lQ3U-gWZk/node-exporter-full-by-in
AI
project
Typing Practice
Microsoft Translator
Python Data Structu...
Home › Dashboards › Node Exporter Full by Instance ID
Instance:
192.168.1.114:9100
192.168.1.114:9100
192.168.1.115:9100
localhost:9100
Basic
(6 panels)
Basic


Not secure 192.168.1.115:3000/d/lQ3U-gWZk/node-exporter-full-by-instance-id?orgId=1&from=now-24h&to=now&timezone=browser&var-in...
AI
project
Typing Practice
Microsoft Translator
Python Data Structu...
Java sorting algorith...
install
dems_i / Repositori...
CHICAGO
Workspace Accesso...
Other favorites
Home › Dashboards › Node Exporter Full by Instance ID
Search...
Edit
Export
Share
Instance: 192.168.1.115:9100
Last 24 hours
Refresh
Basic CPU / Mem / Disk Gauge
CPU Busy
2.89%
Used RAM Memory
39%
Used SWAP
N/A
Used Root FS
62.5%
CPU System Load (1m avg)
0.750%
CPU System Load (5m avg)
1%
Basic CPU / Mem / Disk Info
CPU Cores
4
Total RAM
10.48 GiB
Total SWAP
0.00 B
Total RootFS
58.4 GiB
System Load (1m avg)
0.03
Uptime
1.3 days
Basic CPU / Mem Graph
CPU Basic
Busy System
Busy User
Busy Iowait
Busy IRQs
Busy Other
Idle
Memory Basic
RAM Total
RAM Used
RAM Cache + Buffer
RAM Free
SWAP Used
Basic Net / Disk Info
Network Traffic Basic
Disk Space Used Basic
CPU Memory Net Disk (7 panels)
Memory Detail Meminfo (15 panels)
Memory Detail Vmstat (27 panels)
Memory Detail Vmstat Counters (17 panels)
System Detail (11 panels)
Disk Detail (8 panels)
Filesystem Detail (5 panels)
Network Traffic Detail (11 panels)
Network Sockstat (5 panels)
Network Netstat (11 panels)
Network Netstat TCP (4 panels)
Network Netstat TCP Linux MIPs (27 panels)
Network Netstat UDP (4 panels)
Network Netstat ICMP (6 panels)
Node Exporter (2 panels)


Not secure 192.168.1.115:3000/d/lQ3U-gWZk/node-exporter-full-by-instance-id?orgId=1&from=now-24h&to=now&timezone=browser&var-in...
Home › Dashboards › Node Exporter Full by Instance ID
Search...
Edit
Export
Share
Instance:
192.168.1.114:9100
192.168.1.114:9100
192.168.1.115:9100
localhost:9100
Last 24 hours
Refresh
Basic
CPU Busy
1.20%
Used RAM Memory
31%
Used SWAP
N/A
Used Root FS
80.8%
CPU System Load (1m avg)
3%
CPU System Load (5m avg)
0.500%
Basic CPU / Mem / Disk Info
CPU Cores
2
Total RAM
8.03 GiB
Total SWAP
0.00 B
Total RootFS
28.9 GiB
System Load (1m avg)
0.06
Uptime
11.4 hours
Basic CPU / Mem Graph
CPU Basic
Busy System
Busy User
Busy Iowait
Busy IRQs
Busy Other
Idle
Memory Basic
RAM Total
RAM Used
RAM Cache + Buffer
RAM Free
SWAP Used
Basic Net / Disk Info
Network Traffic Basic
Disk Space Used Basic
CPU Memory Net Disk
CPU
Memory Stack
Name
Mean
Last *
Max
Min
System - Processes executing in kernel mode
User - Normal processes executing in user mode
Nice - Niced processes executing in user mode
Idle - Waiting for something to happen
Iowait - Waiting for I/O to complete
Apps - Memory used by user-space applications
PageTables - Memory used to map between virtual and physical memory addresses
SwapCache - Memory that keeps track of pages that have been fetched from swap but not yet been ...
Slab - Memory used by the kernel to cache data structures for its own use (caches like inode, dentry, ...

Thank you