

# Project 1

## Building a CI/CD Pipeline for a Retail Company

I would like to thank Edureka for the Devops Course, it was a great learning experience.

I have chosen project1.

### Business Challenge/Requirement:

ABC Technologies is a leading online retail store, and it has recently acquired a large retail 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

ABC 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, ABC 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.

ABC 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 the GitHub link shared in resources to your local machine. Build the code using Maven commands.

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

1. Create a build 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 jobs created in step 1
3. Set up a master-slave node to distribute the tasks in the pipeline

**Task 3:** Write a Dockerfile. 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.

**Task 4:** Integrate the Docker host with Ansible. Write an Ansible playbook to create an image and create a container. Integrate Ansible with Jenkins. Deploy Ansible-playbook. CI/CD job to build code on ansible and deploy it on docker container

1. Deploy Artifacts on Kubernetes
2. Write pod, service, and deployment manifest file
3. Integrate Kubernetes with Ansible
4. Ansible playbook to create deployment and service

**Task 5:** Using Prometheus, monitor the resources like CPU utilisation: 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.

**Below are the step by step process that I followed to complete each task :-**

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

### Mvn Clean Install Screenshot

```
Downloaded from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-archiver/3.6.0/plexus-archiver-3.6.0.jar (191 kB at 7.8 kB/s)
[INFO] Packaging webapp
[INFO] Assembling webapp [ABCTechnologies] in [C:\Users\praty\project1\target\ABCTechnologies-1.0]
[INFO] Processing war project
[INFO] Copying webapp resources [C:\Users\praty\project1\src\main\webapp]
[INFO] Webapp assembled in [348 msecs]
[INFO] Building war: C:\Users\praty\project1\target\ABCTechnologies-1.0.war
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:report (jacoco-site) @ ABCTechnologies ---
[INFO] Loading execution data file C:\Users\praty\project1\target\jacoco.exec
[INFO] Analyzed bundle 'RetailModule' with 2 classes
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 40.729 s
[INFO] Finished at: 2023-02-12T02:20:37+05:30
[INFO]
C:\Users\praty\project1>mvn clean install
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.abc:ABCTechnologies >-----
[INFO] Building RetailModule 1.0
[INFO] -----[ war ]-----
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-clean-plugin/2.5/maven-clean-plugin-2.5.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-clean-plugin/2.5/maven-clean-plugin-2.5.jar (3.9 kB at 1.8 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/22/maven-plugins-22.pom (13 kB at 19 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-clean-plugin/2.5/maven-clean-plugin-2.5.jar (25 kB at 32 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-install-plugin/2.4/maven-install-plugin-2.4.pom (6.4 kB at 9.7 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-install-plugin/2.4/maven-install-plugin-2.4.jar (27 kB at 39 kB/s)
[INFO] --- maven-clean-plugin:2.5:clean (default-clean) @ ABCTechnologies ---
```

### Mvn Test job screenshot

```

Downloaded from central: https://repo.maven.apache.org/maven2/com/google/collections/google-collections/1.0/google-collections-1.0.jar (640 kB at 148 kB/s)
[INFO] Changes detected - recompiling the module!
[INFO] Compiling 3 source files to C:\Users\praty\project\target\classes
[INFO] -----[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 01:21 min
[INFO] Finished at: 2023-02-12T02:19:12+05:30
[INFO] -----

C:\Users\praty\project>mvn test
[INFO] Scanning for projects...
[INFO] -----< com.abc:ABCtechnologies >-----
[INFO] Building RetailModule 1.0
[INFO] -----[ war ]-----
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-surefire-plugin/2.12.4/maven-surefire-plugin-2.12.4.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-surefire-plugin/2.12.4/maven-surefire-plugin-2.12.4.pom (10 kB at 5.2 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire/2.12.4/surefire-2.12.4.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire/2.12.4/surefire-2.12.4.pom (14 kB at 20 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-surefire-plugin/2.12.4/maven-surefire-plugin-2.12.4.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-surefire-plugin/2.12.4/maven-surefire-plugin-2.12.4.jar (30 kB at 43 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/junit/junit/4.4/junit-4.4.jar
Downloaded from central: https://repo.maven.apache.org/maven2/junit/junit/4.4/junit-4.4.jar (161 kB at 154 kB/s)
[INFO] --- jacoco-maven-plugin:0.8.6:prepare-agent (jacoco-initialize) @ ABCtechnologies ---
[INFO] argLine set to -javaagent:C:\Users\praty\\.m2\repository\org\jacoco\org.jacoco.agent\0.8.6\org.jacoco.agent-0.8.6-runtime.jar-destfile=C:\Users\praty\project\target\jacoco.exec
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ ABCtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory C:\Users\praty\project\src\main\resources

```

## Mvn Package screeshsot

```

-----
T E S T S
-----
Running com.abc.dataAccessObject.ProductImpTest
Tests run: 4, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.063 sec

Results :

Tests run: 4, Failures: 0, Errors: 0, Skipped: 0

[INFO] -----[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 22.628 s
[INFO] Finished at: 2023-02-12T02:19:46+05:30
[INFO] -----

C:\Users\praty\project>mvn package
[INFO] Scanning for projects...
[INFO] -----< com.abc:ABCtechnologies >-----
[INFO] Building RetailModule 1.0
[INFO] -----[ war ]-----
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.2.2/maven-war-plugin-3.2.2.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.2.2/maven-war-plugin-3.2.2.pom (9.7 kB at 4.9 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.2.2/maven-war-plugin-3.2.2.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-war-plugin/3.2.2/maven-war-plugin-3.2.2.jar (91 kB at 97 kB/s)
[INFO] --- jacoco-maven-plugin:0.8.6:prepare-agent (jacoco-initialize) @ ABCtechnologies ---
[INFO] argLine set to -javaagent:C:\Users\praty\\.m2\repository\org\jacoco\org.jacoco.agent\0.8.6\org.jacoco.agent-0.8.6-runtime.jar=destfile=C:\Users\praty\project\target\jacoco.exec
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ ABCtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory C:\Users\praty\project\src\main\resources
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ ABCtechnologies ---
[INFO] Nothing to compile - all classes are up to date
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ ABCtechnologies ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory C:\Users\praty\project\src\test\resources
[INFO]

```

## Mvn output War screenshot

```
[INFO] Installing C:\Users\praty\project1\pom.xml to C:\Users\praty\.m2\repository\com\abc\ABCtechnologies\1.0\ABCtechnologies-1.0.pom
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 19.013 s
[INFO] Finished at: 2023-02-12T02:21:07+05:30
[INFO] -----
```

```
C:\Users\praty\project1>dir
Volume in drive C is Windows
Volume Serial Number is A782-4F00
```

```
Directory of C:\Users\praty\project1
```

```
12-02-2023  02:20    <DIR>        .
12-02-2023  02:17    <DIR>        ..
12-02-2023  02:17             2,083 pom.xml
12-02-2023  02:17             794 pom.xml.bak
12-02-2023  02:17             42 README.md
12-02-2023  02:17    <DIR>        src
12-02-2023  02:21    <DIR>        target
                3 File(s)          2,919 bytes
                4 Dir(s)  74,097,020,928 bytes free
```

```
C:\Users\praty\project1>cd target
```

```
C:\Users\praty\project1\target>dir
Volume in drive C is Windows
Volume Serial Number is A782-4F00
```

```
Directory of C:\Users\praty\project1\target
```

```
12-02-2023  02:21    <DIR>        .
12-02-2023  02:20    <DIR>        ..
12-02-2023  02:21    <DIR>        ABCtechnologies-1.0
12-02-2023  02:21             7,132,831 ABCtechnologies-1.0.war
12-02-2023  02:20    <DIR>        classes
12-02-2023  02:20    <DIR>        generated-sources
12-02-2023  02:20    <DIR>        generated-test-sources
12-02-2023  02:21             4,295 jacoco.exec
12-02-2023  02:21    <DIR>        maven-archiver
12-02-2023  02:20    <DIR>        maven-status
12-02-2023  02:21    <DIR>        site
12-02-2023  02:21    <DIR>        surefire-reports
12-02-2023  02:21    <DIR>        test-classes
                2 File(s)          7,137,126 bytes
               11 Dir(s)  74,097,020,928 bytes free
```

## Git Clone Screenshot

```

C:\Users\praty>git clone https://github.com/vermakeshav1994/project1.git
Cloning into 'project1'...
remote: Enumerating objects: 24, done.
remote: Counting objects: 100% (24/24), done.
remote: Compressing objects: 100% (15/15), done.
remote: Total 24 (delta 0), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (24/24), 3.88 KiB | 39.00 KiB/s, done.

C:\Users\praty>cd project1

C:\Users\praty\project1>ls -lrth
'ls' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\praty\project1>dir
Volume in drive C is Windows
Volume Serial Number is A782-4F00

Directory of C:\Users\praty\project1

12-02-2023  02:17    <DIR>          .
12-02-2023  02:17    <DIR>          ..
12-02-2023  02:17                2,083 pom.xml
12-02-2023  02:17                794 pom.xml.bak
12-02-2023  02:17                42 README.md
12-02-2023  02:17    <DIR>          src
                3 File(s)                2,919 bytes
                3 Dir(s)  74,137,915,392 bytes free

```

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

1. Create a build 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 jobs created in step 1
3. Set up a master-slave node to distribute the tasks in the pipeline

**Approach I have followed :-**

- Jenkins has been installed in master server already so i have created the 3 jobs for compile,test,package in jenkins and created pipeline with these 3 jobs and set up the agent machine(slave machine) and shared the load to agent as well.

- 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.

- Tools location :

**/opt/maven**

**/usr/lib/jvm/java-8-oracle**

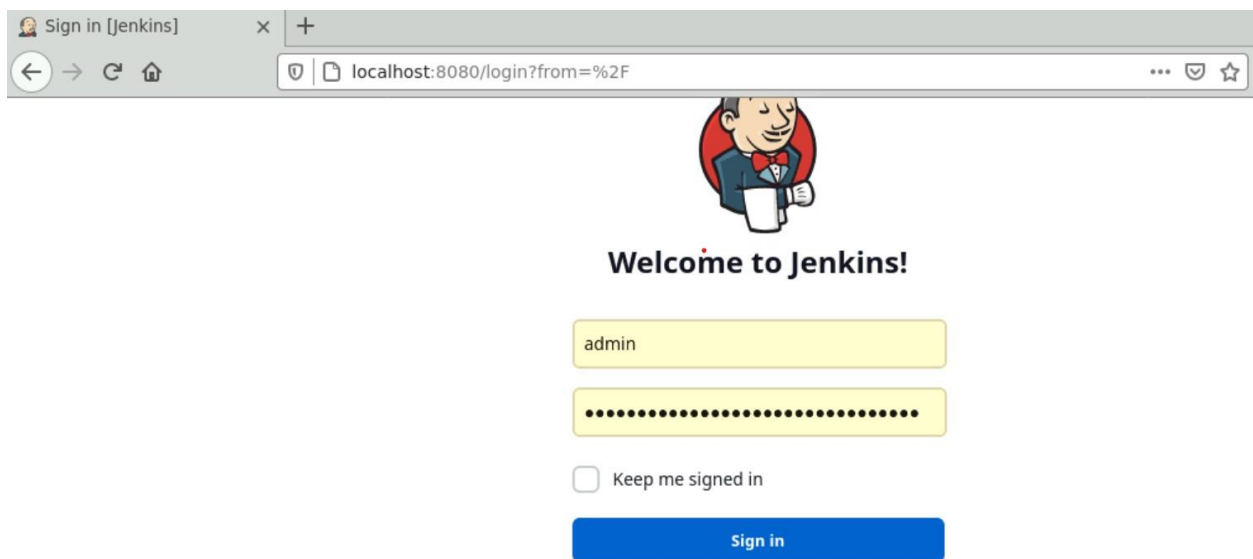
- Goals:      Compile

                Test

                Package


**Screenshots of the above task :-**

**Jenkins Login:**



Sign in [Jenkins] x +

localhost:8080/login?from=%2F



**Welcome to Jenkins!**

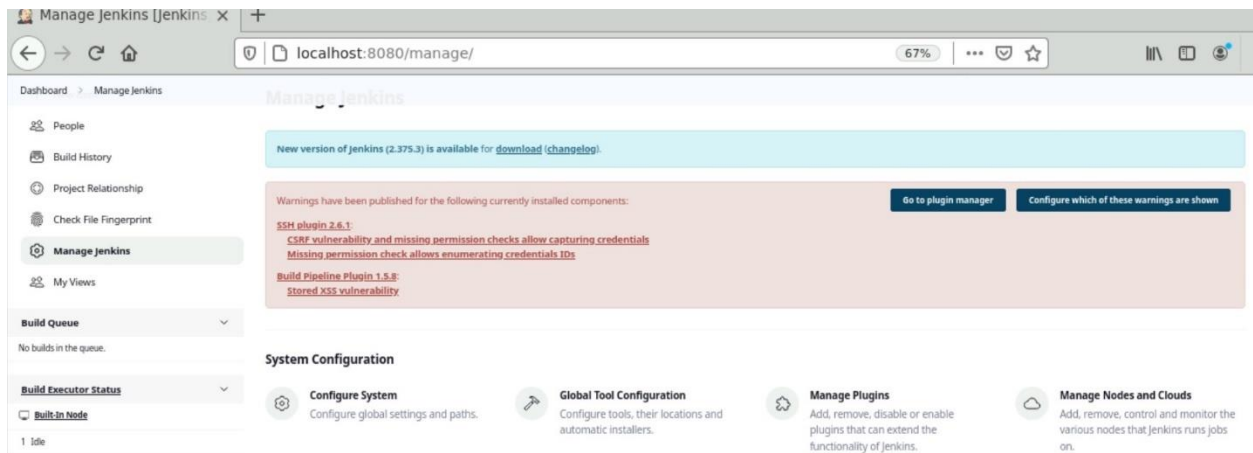
admin

.....

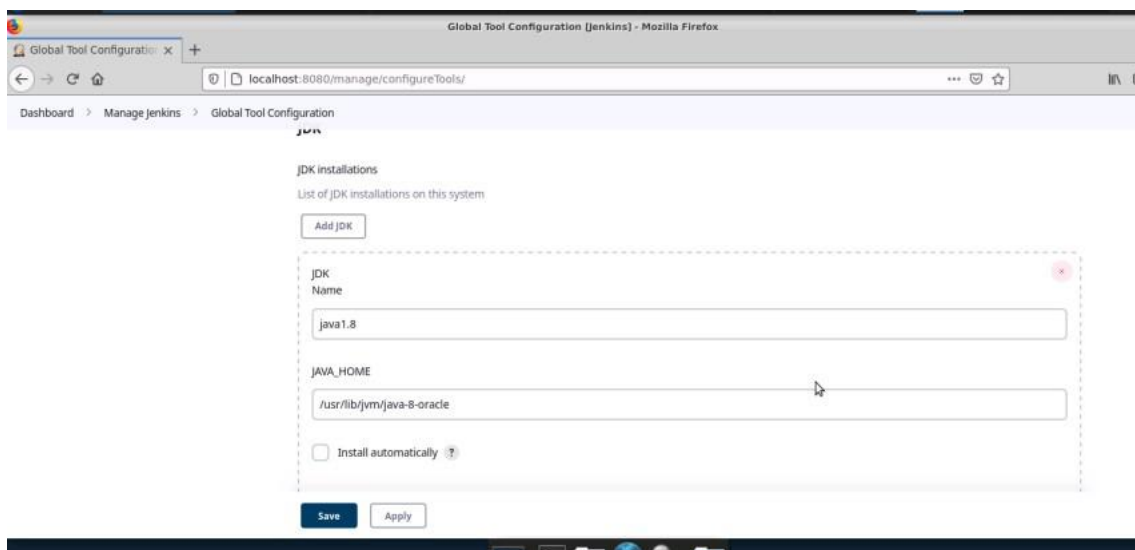
☐ Keep me signed in

Sign in

## Global Tool Configuration:

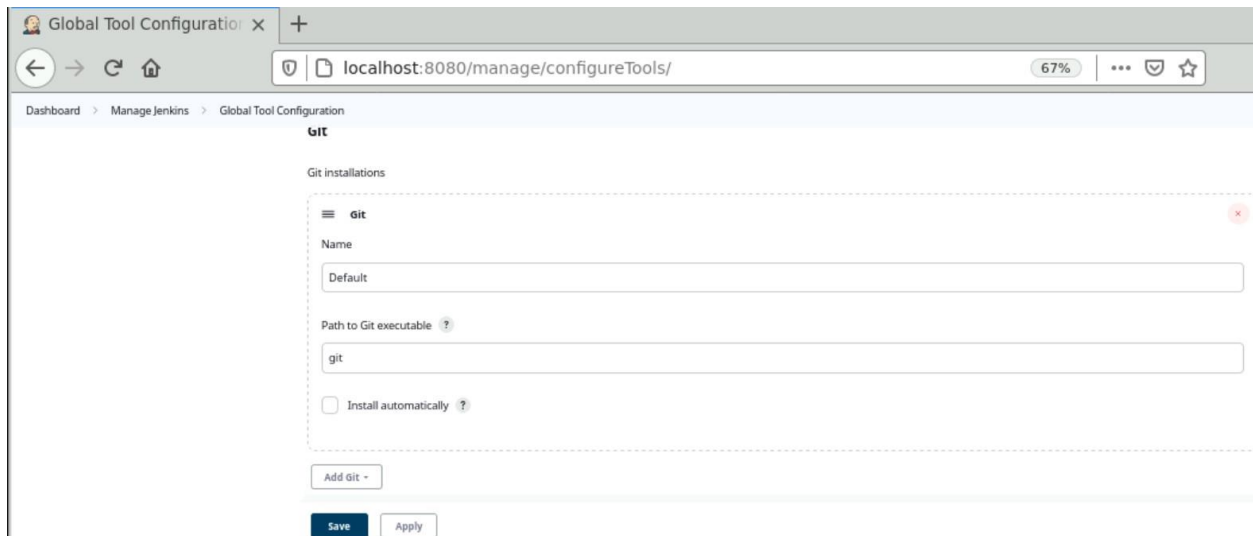


## Configuration for Java:

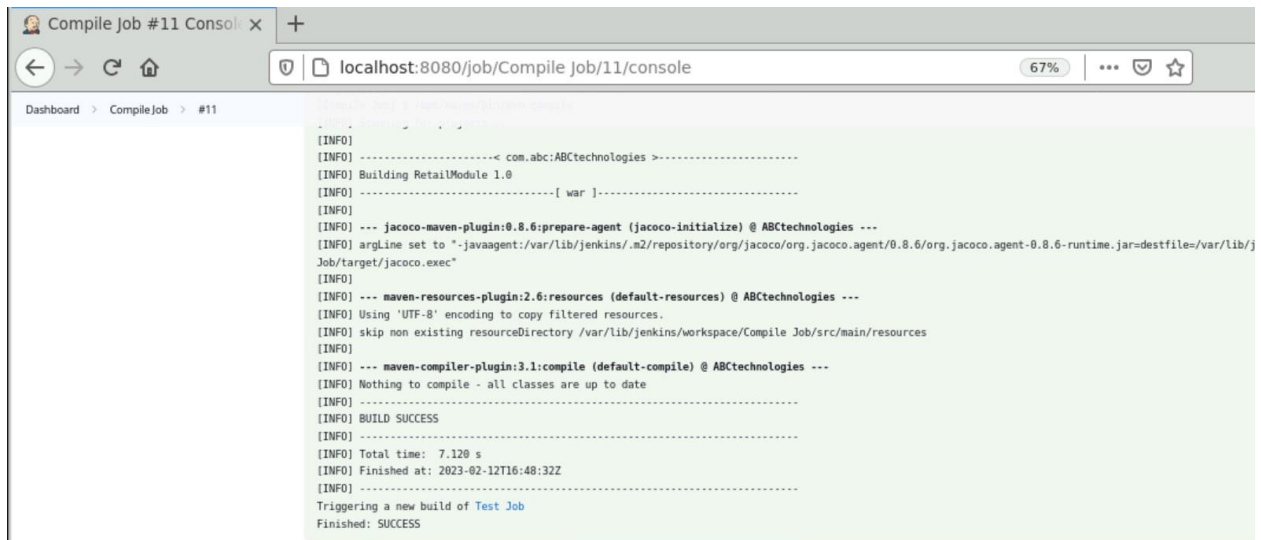


## Configuration for Git:





## Compile job result in Jenkins



## Test Job result in Jenkins :

```
Test Job #13 Console [je] x +
localhost:8080/job/Test Job/13/console
67%

Dashboard > TestJob > #13

[INFO] --- maven-surefire-plugin:2.12.4:test (default-test) @ ABCtechnologies ---
[INFO] Surefire report directory: /home/edureka/workspace/Test Job/target/surefire-reports

-----
T E S T S
-----

Running com.abc.dataAccessObject.ProductImpTest
Tests run: 4, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.117 sec

Results :

Tests run: 4, Failures: 0, Errors: 0, Skipped: 0

[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 3.557 s
[INFO] Finished at: 2023-02-12T16:50:30Z
[INFO] -----
Triggering a new build of Package Job
Finished: SUCCESS
```

## Package Job result in Jenkins:

```
Package Job #12 Console [je] x +
localhost:8080/job/Package Job/12/console
67%

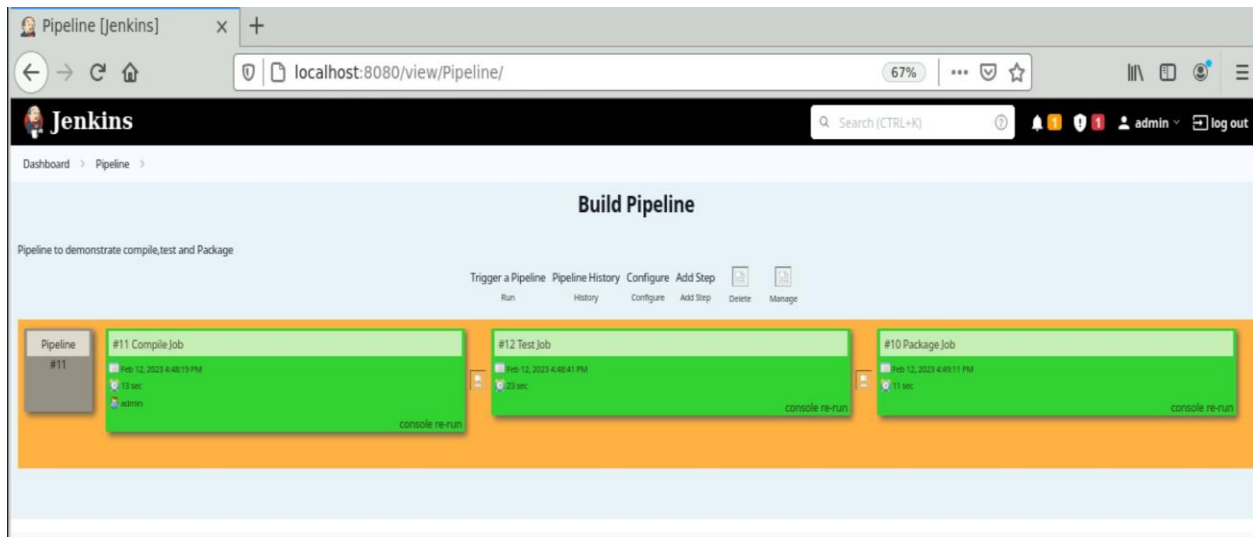
Dashboard > PackageJob > #12

Tests run: 4, Failures: 0, Errors: 0, Skipped: 0

[INFO] --- maven-war-plugin:3.2.2:war (default-war) @ ABCtechnologies ---
[INFO] Packaging webapp
[INFO] Assembling webapp [ABCtechnologies] in [/var/lib/jenkins/workspace/Package Job/target/ABCtechnologies-1.0]
[INFO] Processing war project
[INFO] Copying webapp resources [/var/lib/jenkins/workspace/Package Job/src/main/webapp]
[INFO] Webapp assembled in [142 msecs]
[INFO] Building war: /var/lib/jenkins/workspace/Package Job/target/ABCtechnologies-1.0.war
[INFO] --- jacoco-maven-plugin:0.8.6:report (jacoco-site) @ ABCtechnologies ---
[INFO] Loading execution data file /var/lib/jenkins/workspace/Package Job/target/jacoco.exec
[INFO] Analyzed bundle 'RetailModule' with 2 classes
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 5.512 s
[INFO] Finished at: 2023-02-12T16:52:38Z
[INFO] -----
Finished: SUCCESS
```

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

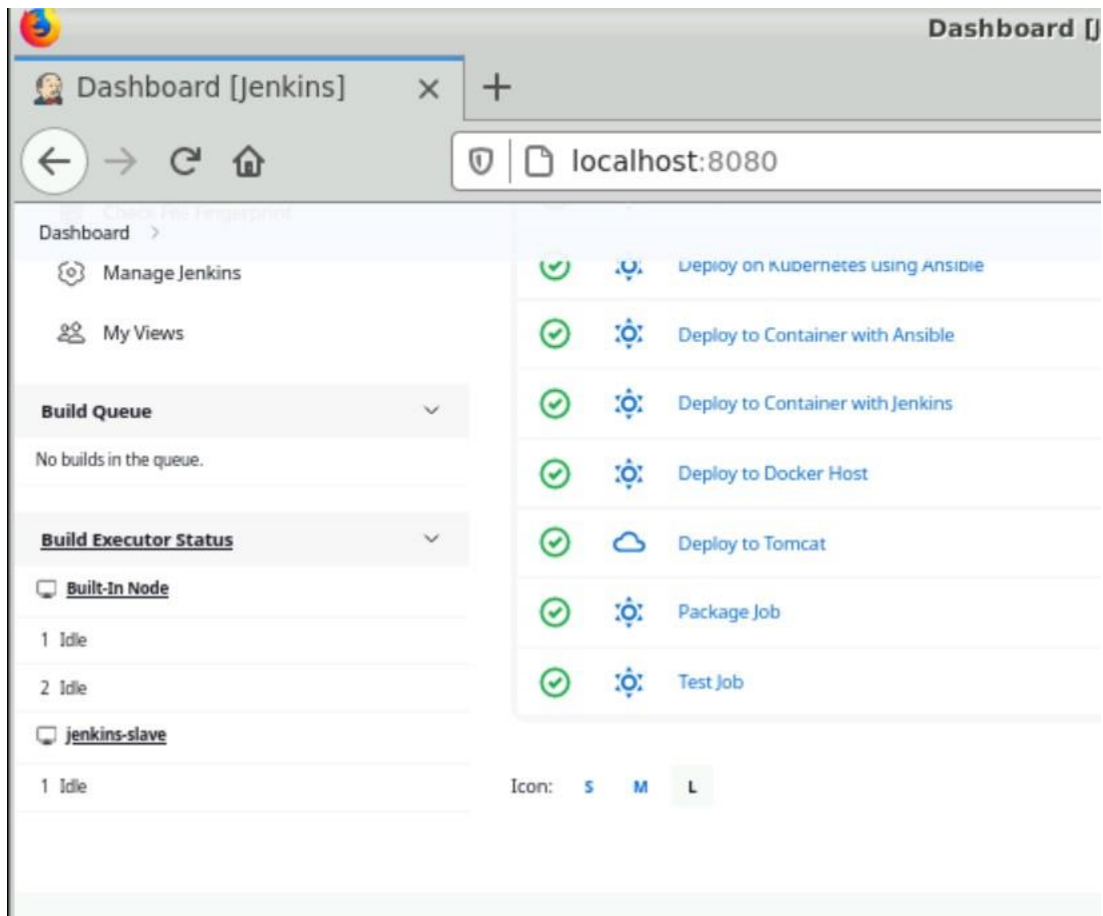
## PipeLine Screenshot



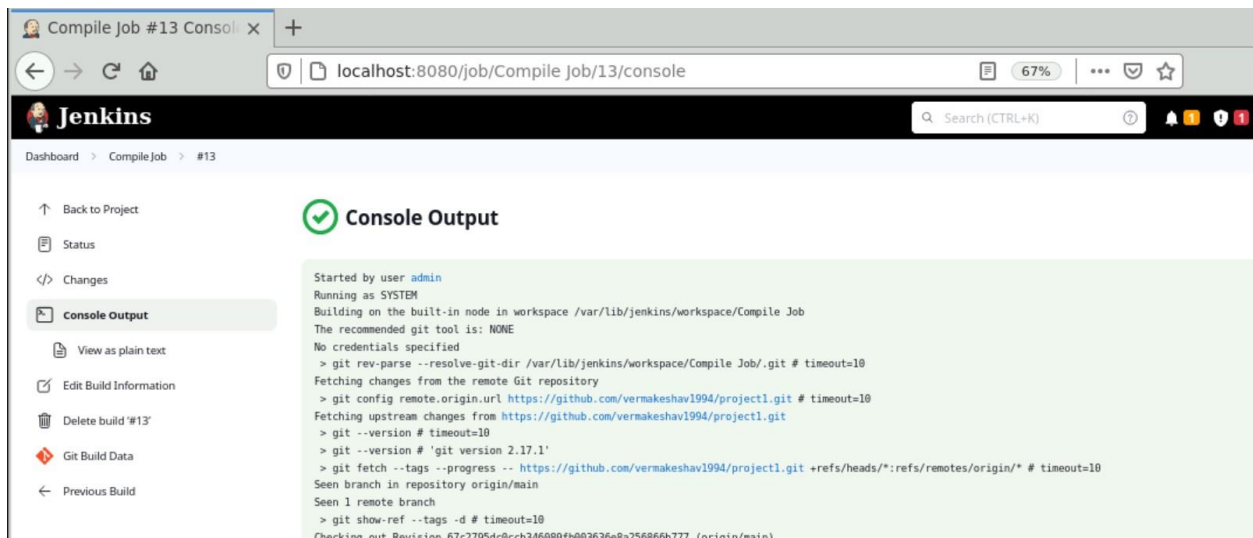
### Step 3: Set up a master-slave node to distribute the tasks in the pipeline

Here, My Compile job will be running on Master Node. Master Node is the default Node so, I didn't change the name and it is showing as Built-In node.

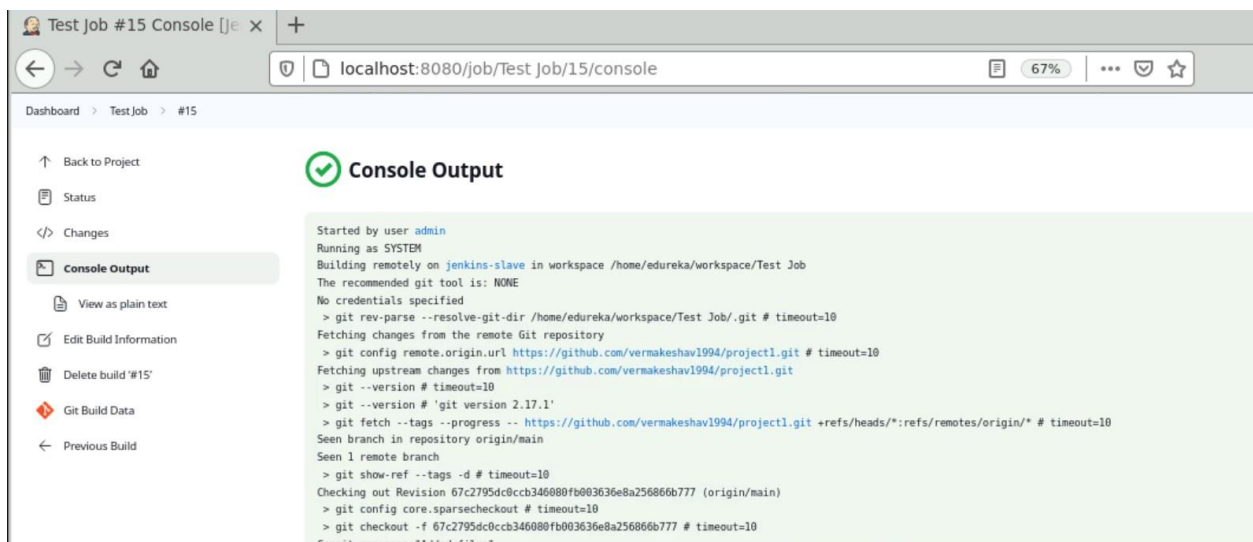
Test Job will be running on Slave Node and then again Package Job will be running on Master Node.



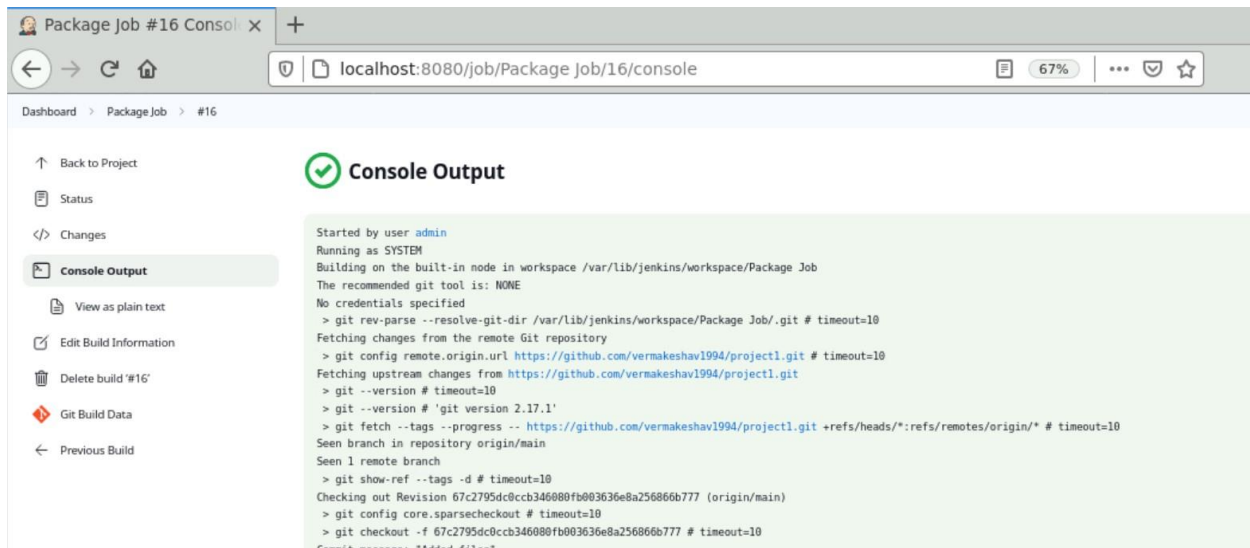
**Screenshot of Compile Job running on Master :**



**Screenshot of Test Job running on Slave :**



**Screenshot of Package job running on Master :**



**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.

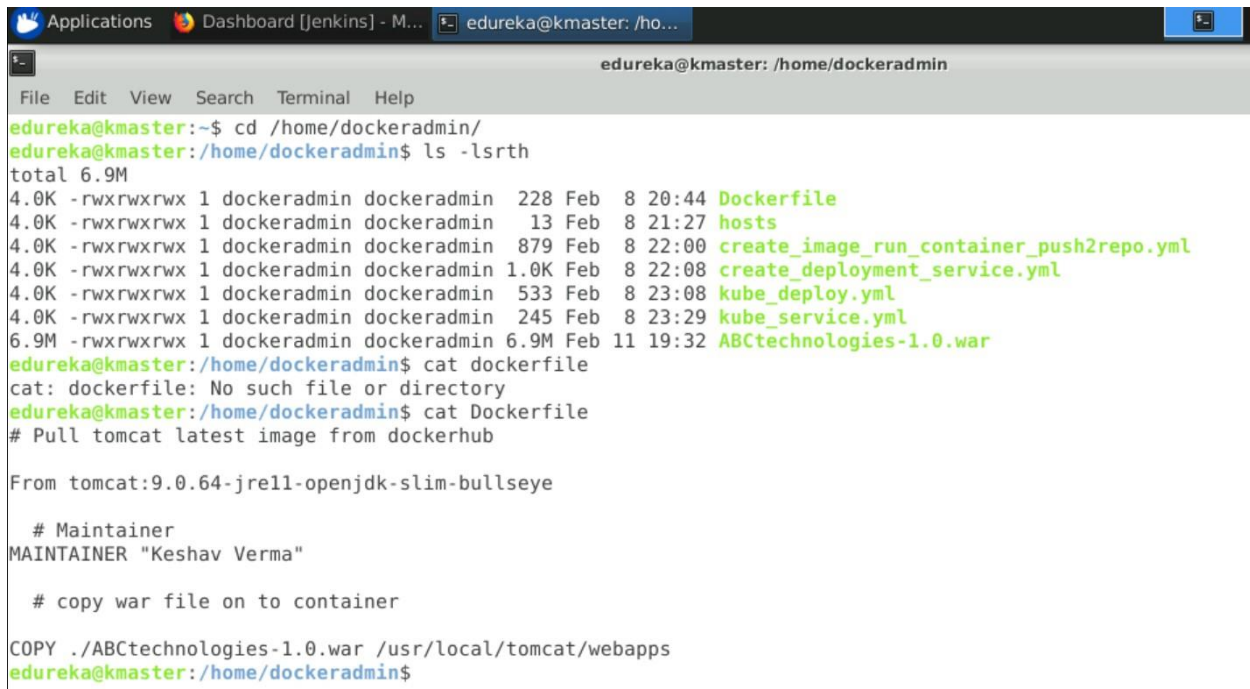
1. Enhance the package job created in step 1 of task 2 to create a docker image.
2. In the Docker image, add code to move the war file to the Tomcat server and build the image.

### Approach i have followed: -

Jenkins and Docker are already installed in master machine and slave machine. - 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.

### Screenshot of Docker File



The screenshot shows a terminal window with a menu bar (File, Edit, View, Search, Terminal, Help) and a title bar (edureka@kmaster: /home/dockeradmin). The user runs `ls -lsrth` in the `/home/dockeradmin` directory, listing files including `Dockerfile`, `hosts`, `create_image_run_container_push2repo.yml`, `create_deployment_service.yml`, `kube_deploy.yml`, `kube_service.yml`, and `ABCtechnologies-1.0.war`. Then, the user runs `cat Dockerfile`, displaying the following content:

```
cat: Dockerfile: No such file or directory
edureka@kmaster:/home/dockeradmin$ cat Dockerfile
# Pull tomcat latest image from dockerhub

From tomcat:9.0.64-jre11-openjdk-slim-bullseye

# Maintainer
MAINTAINER "Keshav Verma"

# copy war file on to container

COPY ./ABCtechnologies-1.0.war /usr/local/tomcat/webapps
edureka@kmaster:/home/dockeradmin$
```

## Screenshot of Code to move War file to Tomcat Server

```
edureka@kmaster:/home/dockeradmin$ cat Dockerfile
# Pull tomcat latest image from dockerhub

From tomcat:9.0.64-jre11-openjdk-slim-bullseye

# Maintainer
MAINTAINER "Keshav Verma"

# copy war file on to container

COPY ./ABCtechnologies-1.0.war /usr/local/tomcat/webapps
edureka@kmaster:/home/dockeradmin$
```

## Screenshot of Deploying to Container with Jenkins Job Configuration :-

Deploy to Container with Jenkins

localhost:8080/job/Deploy to Container with Jenkins/configure

67%

Dashboard > Deploy to Container with Jenkins >

Configuration

General

Source Code Management

Build Triggers

Build Environment

Pre Steps

Build

Post Steps

Build Settings

Post-build Actions

General

Description

Deploy to Container using Jenkins

[Plain text] Preview

☐ Discard old builds ?

☐ GitHub project

☐ This project is parameterized ?

☐ Execute concurrent builds if necessary ?

Save

Apply

Enabled

Deploy to Container with Jenkins

localhost:8080/job/Deploy to Container with Jenkins/configure

67%

Dashboard > Deploy to Container with Jenkins >

Configuration

General

Source Code Management

Build Triggers

Build Environment

Pre Steps

Build

Post Steps

Build Settings

Post-build Actions

Git

Repositories

Repository URL ?

https://github.com/vermakeshav1994/project1.git

Credentials ?

- none -

+ Add

Advanced...

Add Repository

Save

Apply



Deploy to Container with Jenkins Config [Jenkins] - Mozilla Firefox

Deploy to Container with Jenkins

localhost:8080/job/Deploy to Container with Jenkins/configure 67%

Dashboard > Deploy to Container with Jenkins >

### Configuration

- General
- Source Code Management
- Build Triggers
- Build Environment
- Pre Steps
- Build**
- Post Steps
- Build Settings
- Post-build Actions

#### Build

Root POM ?

pom.xml

Goals and options ?

clean install package

Advanced...

#### Post Steps

☒ Run only if build succeeds

Save Apply

Deploy to Container with Jenkins Config [Jenkins] - Mozilla Firefox

Deploy to Container with Jenkins

localhost:8080/job/Deploy to Container with Jenkins/configure 67%

Dashboard > Deploy to Container with Jenkins >

### Configuration

- General
- Source Code Management
- Build Triggers
- Build Environment
- Pre Steps
- Build
- Post Steps
- Build Settings
- Post-build Actions**

#### SSH Publishers

SSH Server Name ?

dockerhost

Advanced...

#### Transfers

Transfer Set

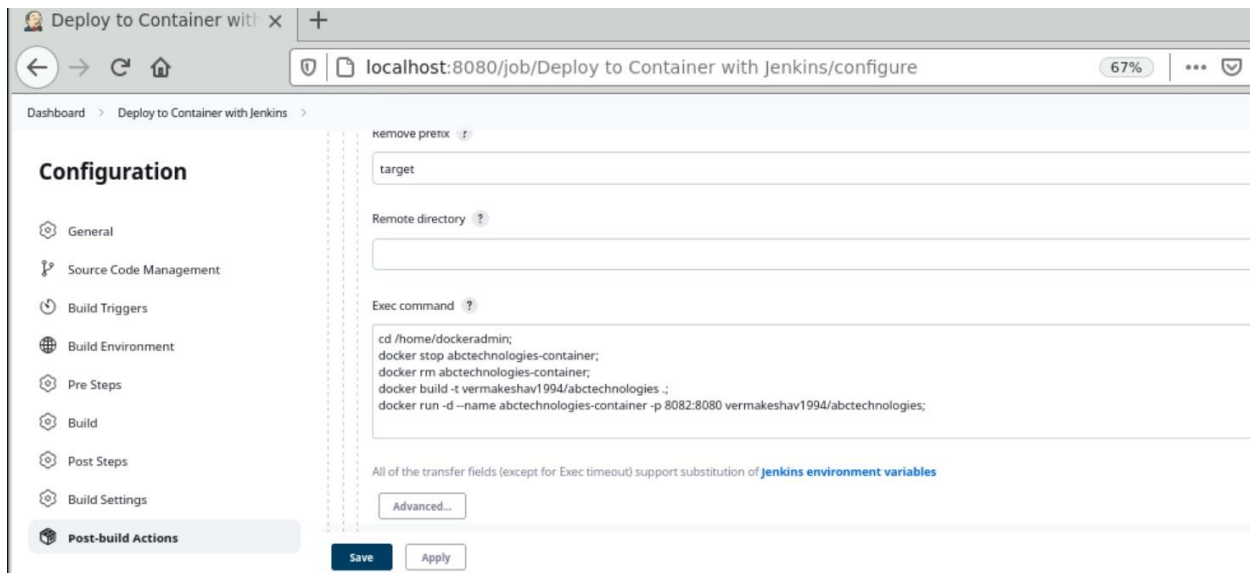
Source files ?

\*/\*.war

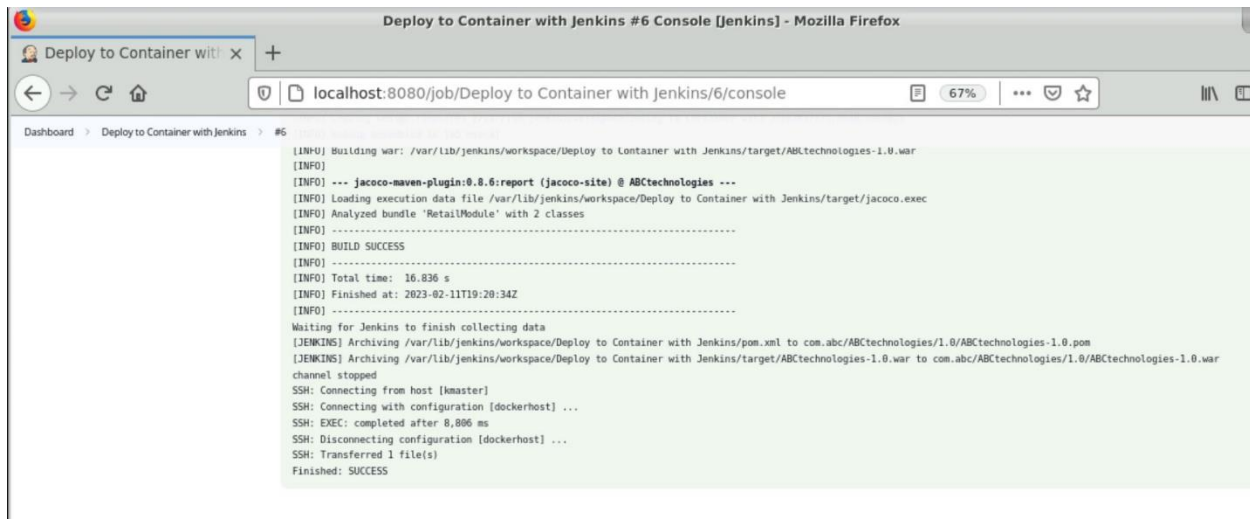
Remove prefix ?

target

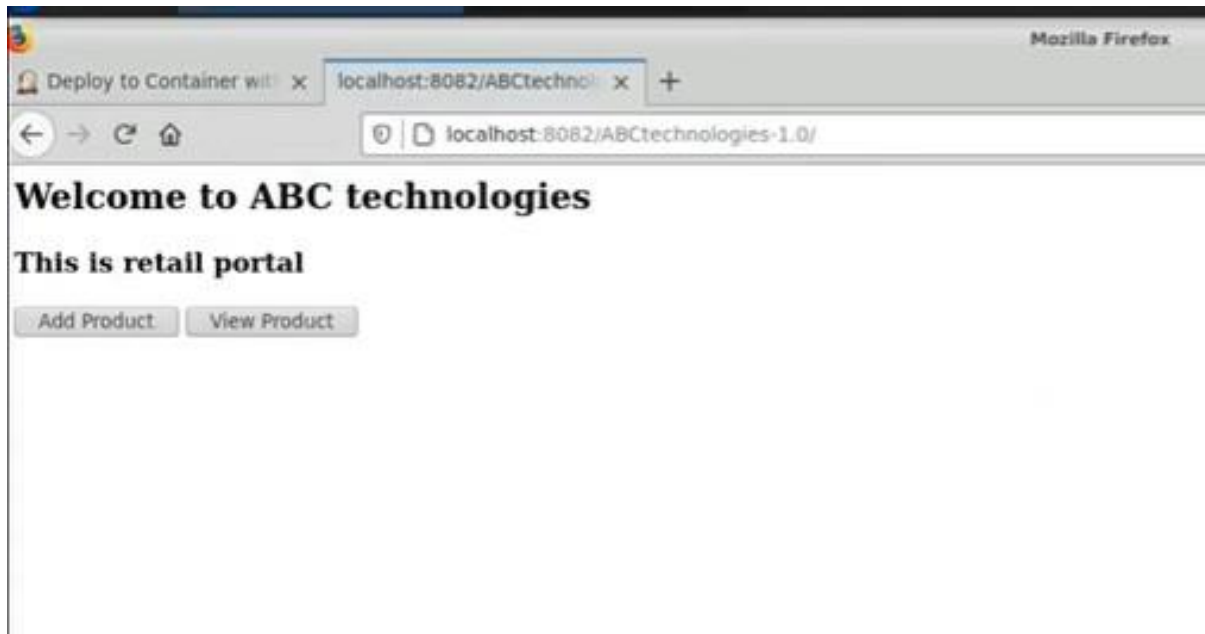
Save Apply



## Deploy to Container with Jenkins Job console Output :



## Deploy to container with Jenkins result



**Task 4:** Integrate the Docker host with Ansible. Write an Ansible playbook to create an image and create a container. Integrate Ansible with Jenkins. Deploy Ansible-playbook. CI/CD job to build code on ansible and deploy it on docker container

1. Deploy Artifacts on Kubernetes
2. Write pod, service, and deployment manifest file
3. Integrate Kubernetes with Ansible
4. Ansible playbook to create deployment and service

**Screenshot of Deploying to Container with Ansible Job Configuration :-**

Deploy to Container with Ansible

localhost:8080/job/Deploy to Container with Ansible/configure

67%

Dashboard > Deploy to Container with Ansible > General

### Configuration

General

Source Code Management

Build Triggers

Build Environment

Pre Steps

Build

Post Steps

Build Settings

Post-build Actions

Description

Deploy to Container using Ansible

[Plain text] [Preview](#)

☐ Discard old builds ?

☐ GitHub project

☐ This project is parameterized ?

☐ Execute concurrent builds if necessary ?

☐ Restrict where this project can be run ?

Advanced

Save

Apply

Deploy to Container with Ansible

localhost:8080/job/Deploy to Container with Ansible/configure

67%

Dashboard > Deploy to Container with Ansible > Source

### Configuration

General

Source Code Management

Build Triggers

Build Environment

Pre Steps

Build

Post Steps

Build Settings

Post-build Actions

Git ?

Repositories ?

Repository URL ?

https://github.com/vermakeshav1994/project1.git

Credentials ?

- none -

+ Add

Advanced...

Add Repository

Save

Apply

Deploy to Container with Ansible

localhost:8080/job/Deploy to Container with Ansible/configure

67%

Dashboard > Deploy to Container with Ansible >

Configuration

General

Source Code Management

Build Triggers

Build Environment

Pre Steps

Build

Post Steps

Build Settings

Post-build Actions

Post-build Actions

Send build artifacts over SSH

SSH Publishers

SSH Server Name

dockerhost

Advanced...

Transfers

Transfer Set

Source files

\*/\*.war

Save

Apply

Deploy to Container with Ansible

localhost:8080/job/Deploy to Container with Ansible/configure

Dashboard > Deploy to Container with Ansible >

Configuration

General

Source Code Management

Build Triggers

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Pre Steps

Build

Post Steps

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Post-build Actions

Build

Root POM

pom.xml

Goals and options

clean install package

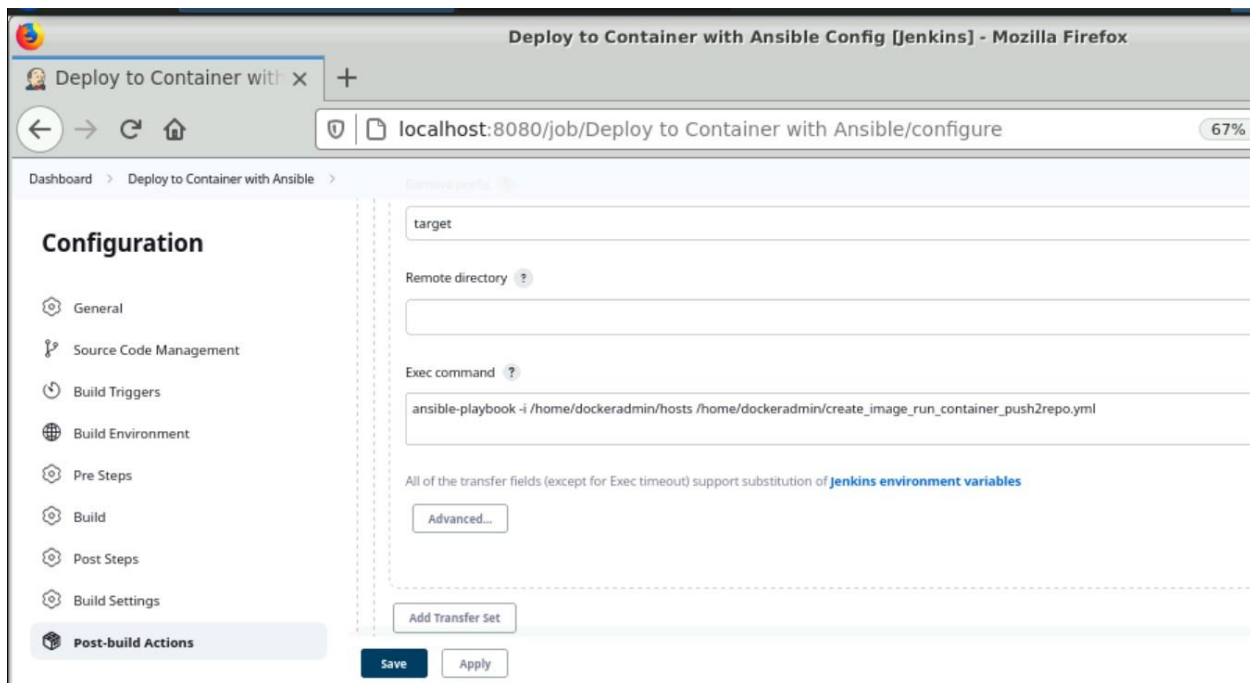
Advanced...

Post Steps

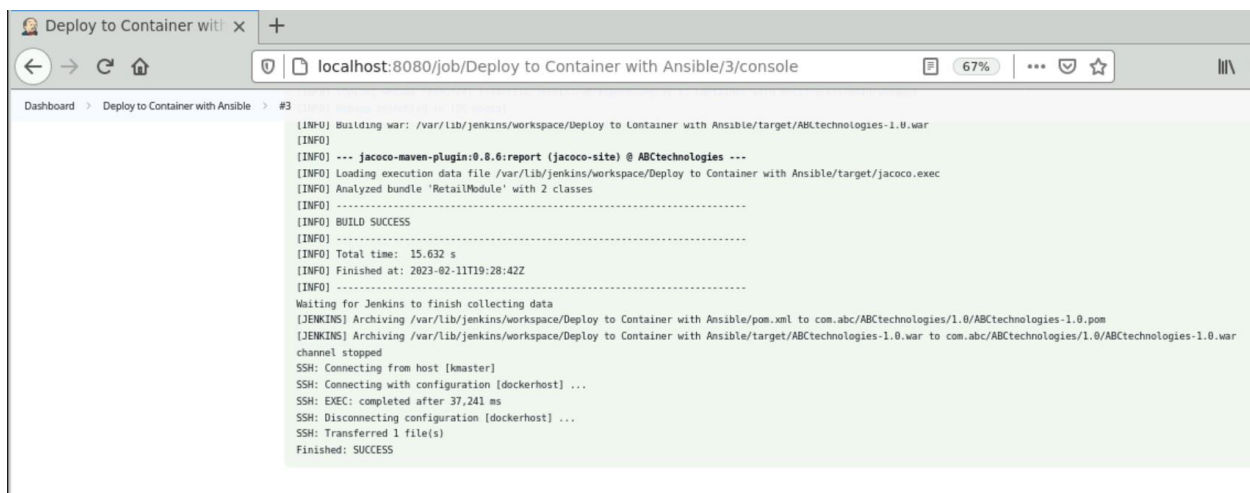
Run only if build succeeds

Save

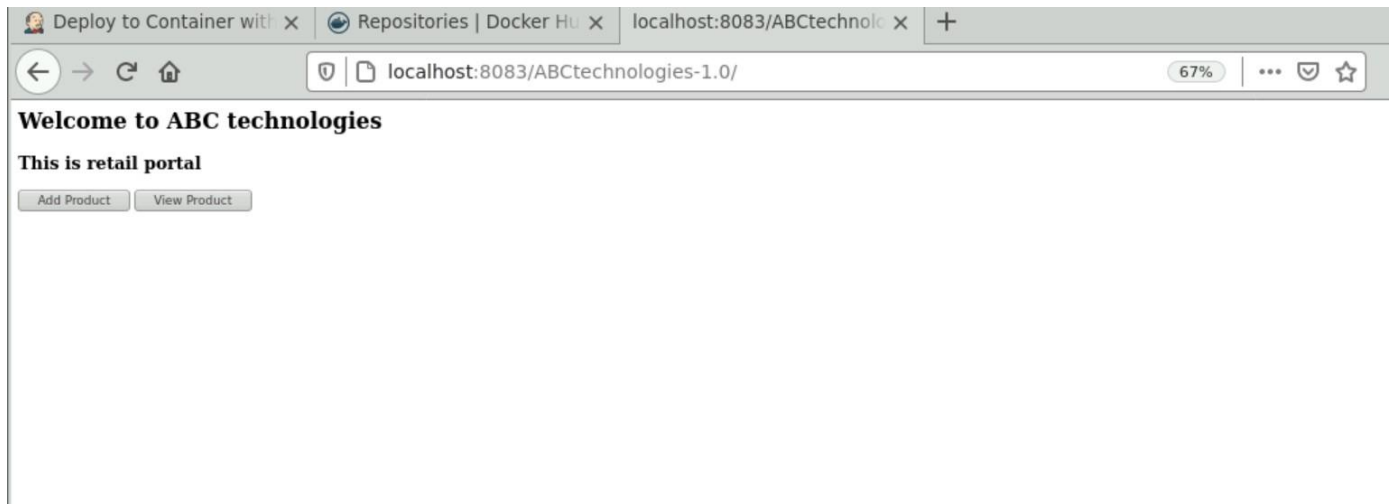
Apply



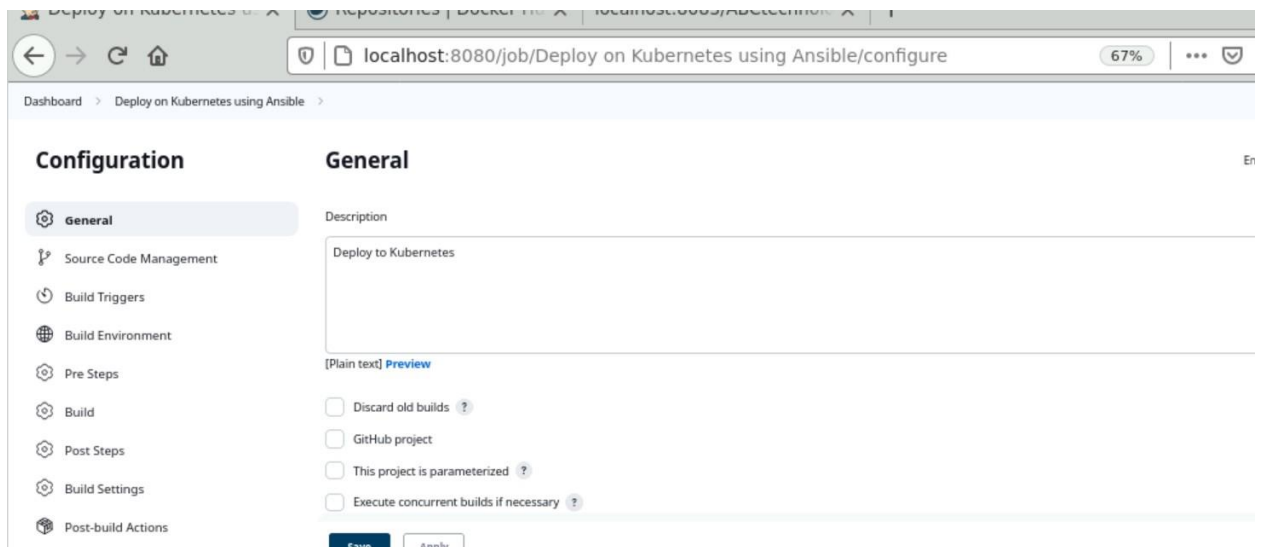
## Deploy to Container with Ansible Job console Output :



## Deploy to Container with ansible final output :-



## Screenshot of Deploying to Kubernetes with Ansible Job Configuration



Deploy on Kubernetes using Ansible | Repositories | Docker Hub | localhost:8083/ABCtechnology | +

localhost:8080/job/Deploy on Kubernetes using Ansible/configure 67%

Dashboard > Deploy on Kubernetes using Ansible > More

### Configuration

- General
- Source Code Management**
- Build Triggers
- Build Environment
- Pre Steps
- Build
- Post Steps
- Build Settings
- Post-build Actions

**Git**

Repositories

Repository URL

https://github.com/vermakeshav1994/project1.git

Credentials

- none -

+ Add

Advanced...

Add Repository

Save Apply

Deploy on Kubernetes using Ansible | Repositories | Docker Hub | localhost:8083/ABCtechnology | +

localhost:8080/job/Deploy on Kubernetes using Ansible/configure 67%

Dashboard > Deploy on Kubernetes using Ansible > More

### Configuration

- General
- Source Code Management
- Build Triggers
- Build Environment
- Pre Steps
- Build
- Post Steps
- Build Settings
- Post-build Actions**

Remote directory

Exec command

ansible-playbook -i /home/dockeradmin/hosts /home/dockeradmin/create\_deployment\_service.yml

All of the transfer fields (except for Exec timeout) support substitution of [Jenkins environment variables](#)

Advanced...

Add Transfer Set

Save Apply



## Deploy to Kubernetes using Ansible Console Output :-

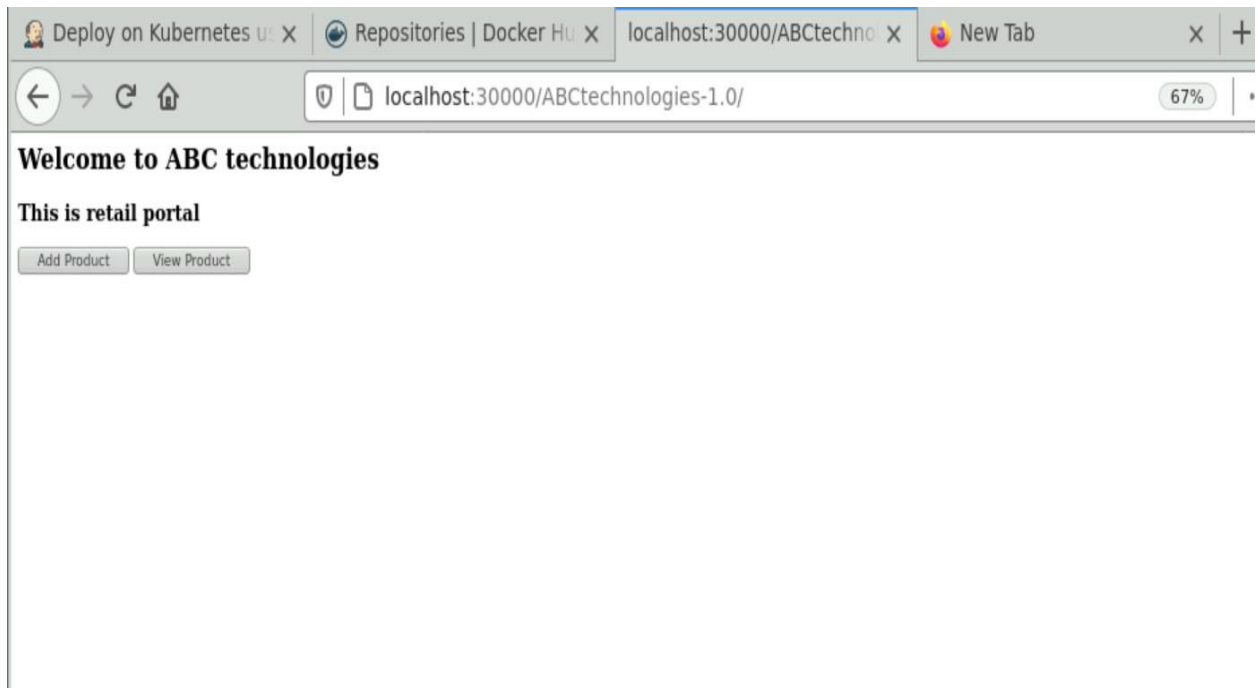
The screenshot shows the Jenkins web interface for a job named 'Deploy on Kubernetes using Ansible'. The left sidebar contains navigation links: 'Back to Project', 'Status', 'Changes', 'Console Output' (selected), 'View as plain text', 'Edit Build Information', 'Delete build '#4'', 'Git Build Data', 'Test Result', 'Redeploy Artifacts', and 'See Fingerprints'. The main area displays the 'Console Output' with a green checkmark icon. The output text is as follows:

```
Started by user admin
Running as SYSTEM
Building on the built-in node in workspace /var/lib/jenkins/workspace/Deploy on Kubernetes using Ansible
The recommended git tool is: NONE
No credentials specified
> git rev-parse --resolve-git-dir /var/lib/jenkins/workspace/Deploy on Kubernetes using Ansible/.git # timeout=10
Fetching changes from the remote Git repository
> git config remote.origin.url https://github.com/vermakeshav1994/project1.git # timeout=10
Fetching upstream changes from https://github.com/vermakeshav1994/project1.git
> git --version # timeout=10
> git --version # 'git version 2.17.1'
> git fetch --tags --progress -- https://github.com/vermakeshav1994/project1.git +refs/heads/*:refs/remotes/origin/* # timeout=10
Seen branch in repository origin/main
Seen 1 remote branch
> git show-ref --tags -d # timeout=10
Checking out Revision 67c2795dc0ccb346080fb083636e8a256866b777 (origin/main)
> git config core.sparsecheckout # timeout=10
```

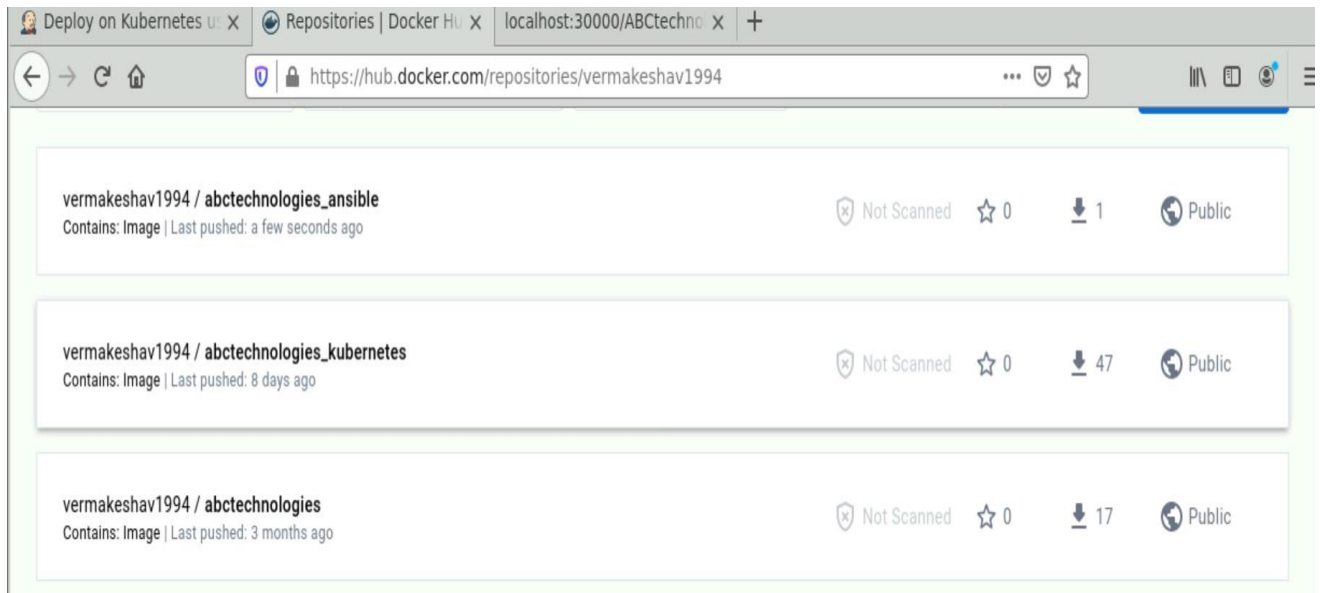
The screenshot shows the continuation of the Jenkins 'Console Output'. The output text is as follows:

```
[INFO] Copying webapp resources [/var/lib/jenkins/workspace/Deploy on Kubernetes using Ansible/src/main/webapp]
[INFO] Webapp assembled in [87 msecs]
[INFO] Building war: /var/lib/jenkins/workspace/Deploy on Kubernetes using Ansible/target/ABCtechnologies-1.0.war
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.6:report (jacoco-site) @ ABCtechnologies ---
[INFO] Loading execution data file /var/lib/jenkins/workspace/Deploy on Kubernetes using Ansible/target/jacoco.exec
[INFO] Analyzed bundle 'RetailModule' with 2 classes
[INFO] .....
[INFO] BUILD SUCCESS
[INFO] .....
[INFO] Total time: 12.033 s
[INFO] Finished at: 2023-02-20T07:43:43Z
[INFO] .....
Waiting for Jenkins to finish collecting data
[JENKINS] Archiving /var/lib/jenkins/workspace/Deploy on Kubernetes using Ansible/pom.xml to com.abc/ABCtechnologies/1.0/ABCtechnologies-1.0.p
[JENKINS] Archiving /var/lib/jenkins/workspace/Deploy on Kubernetes using Ansible/target/ABCtechnologies-1.0.war to com.abc/ABCtechnologies/1.0/ABCtechnologies-1.0.war
channel stopped
SSH: Connecting from host [kmaster]
SSH: Connecting with configuration [dockerhost] ...
SSH: EXEC: completed after 30,024 ms
SSH: Disconnecting configuration [dockerhost] ...
SSH: Transferred 1 file(s)
Finished: SUCCESS
```

## Deploy to Kubernetes using Ansible final Output :-



## Docker hub repositories ---



## Run Container to push to repositories yml file

```
edureka@kmaster:/home/dockeradmin$ cat  
create_image_run_container_push2repo.yml
```

---

- hosts: all

become: true

tasks:

- name: Stopping running container

command: docker stop abctechnologies\_ansible-container

- name: Removing Container

command: docker rm abctechnologies\_ansible-container

- name: Building Docker Image

command: docker build -t abctechnologies\_ansible .

- name: Creating Docker container

command: docker run -d --name abctechnologies\_ansible-container -p 8083:8080 abctechnologies\_ansible

- name: Login to Docker Hub

docker\_login:

username: vermakeshav1994

password: Keshav@12345

email: vermakeshav1994@gmail.com

- name: Create tag to push image on docker hub

```
command: docker tag abctechologies_ansible:latest  
vermakeshav1994/abctechologies_ansible:latest
```

- name: Push Docker Image to docker hub

```
command: docker push vermakeshav19
```

### **Kube Service Yml file**

```
edureka@kmaster:/home/dockeradmin$ cat kube_service.yml
```

```
apiVersion: v1
```

```
kind: Service
```

```
metadata:
```

```
  name: edureka-service
```

```
  labels:
```

```
    app: edureka-devops-project
```

```
spec:
```

```
  selector:
```

```
    app: edureka-devops-project
```

```
  type: NodePort
```

```
  ports:
```

```
    - port: 8080
```

```
      targetPort: 8080
```

```
      nodePort: 30000
```

```
edureka@kmaster:/home/dockeradmin$
```

## Kube\_Deploy yml File

```
edureka@kmaster:~$ cd /home/dockeradmin
```

```
edureka@kmaster:/home/dockeradmin$ ls -lrth
```

```
total 6.9M
```

```
-rwxrwxrwx 1 dockeradmin dockeradmin 228 Feb  8 20:44 Dockerfile
```

```
-rwxrwxrwx 1 dockeradmin dockeradmin  13 Feb  8 21:27 hosts
```

```
-rwxrwxrwx 1 dockeradmin dockeradmin 879 Feb  8 22:00  
create_image_run_container_push2repo.yml
```

```
-rwxrwxrwx 1 dockeradmin dockeradmin 1.0K Feb  8 22:08  
create_deployment_service.yml
```

```
-rwxrwxrwx 1 dockeradmin dockeradmin 533 Feb  8 23:08 kube_deploy.yml
```

```
-rwxrwxrwx 1 dockeradmin dockeradmin 245 Feb  8 23:29 kube_service.yml
```

```
-rwxrwxrwx 1 dockeradmin dockeradmin 6.9M Feb 20 07:43 ABCtechnologies-  
1.0.war
```

```
edureka@kmaster:/home/dockeradmin$ cat kube_deploy.yml
```

```
apiVersion: apps/v1
```

```
kind: Deployment
```

```
metadata:
```

```
  name: edureka-deployment
```

```
spec:
```

```
  replicas: 2
```

selector:

matchLabels:

app: edureka-devops-project

template:

metadata:

labels:

app: edureka-devops-project

spec:

containers:

- name: edureka-devops-project

image: vermakeshav1994/abctechnologies\_kubernetes

imagePullPolicy: Always

ports:

- containerPort: 8080

strategy:

type: RollingUpdate

rollingUpdate:

maxSurge: 1

maxUnavailable: 1

edureka@kmaster:/home/dockeradmin\$

**Task 5:** Using Prometheus, monitor the resources like CPU utilisation: 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.

First of all we need to have prometheus,Grafana but edureka lab already installed these tools. So I had installed the node-exporter in master node to monitor the metrics of a node and added the target url in the prometheus.yml file so that prometheus will start to monitor

And I have monitored and captured the CPU,memory and network of the target node. And I have created a dashboard by selecting the prometheus app from Grafana and then created a Panel for visualizing the metrics in Grafana

After installing node\_exporter I have added the below job in the prometheus.yml file to get the metrics from the target.

-----

**- job\_name: 'node\_exporter\_Metrics'**

**scrape\_interval: 5s**

**static\_configs:**

**- targets: ['localhost:9100']**

-----

**/opt/prometheus-2.27/prometheus.yml**

**# my global config**

**global:**

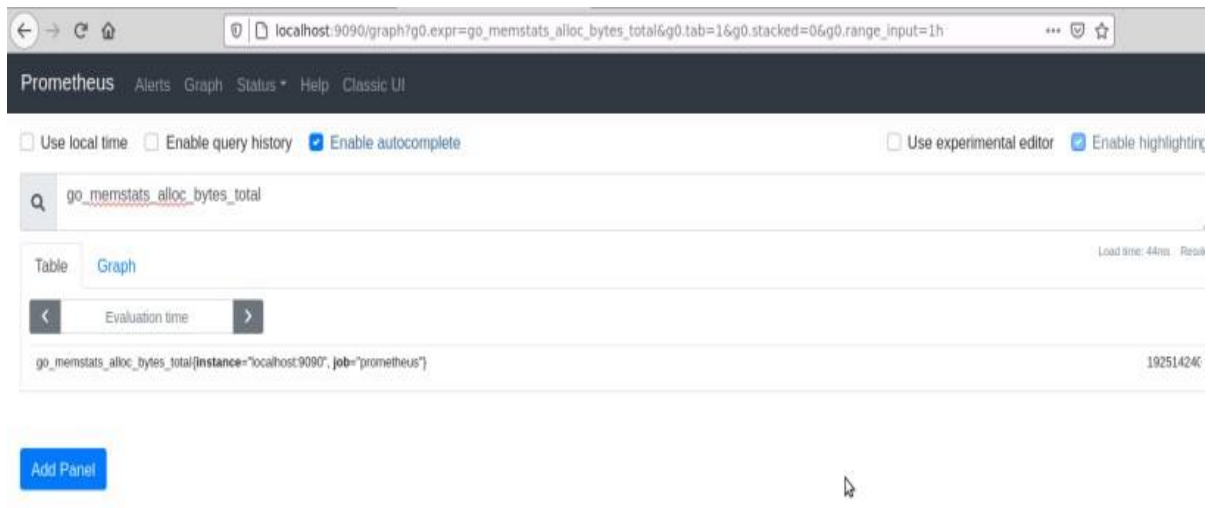
**scrape\_interval: 15s # Set the scrape interval to every 15 seconds. Default is every 1 minute.**

**evaluation\_interval: 15s # Evaluate rules every 15 seconds. The default is every 1 minute.**

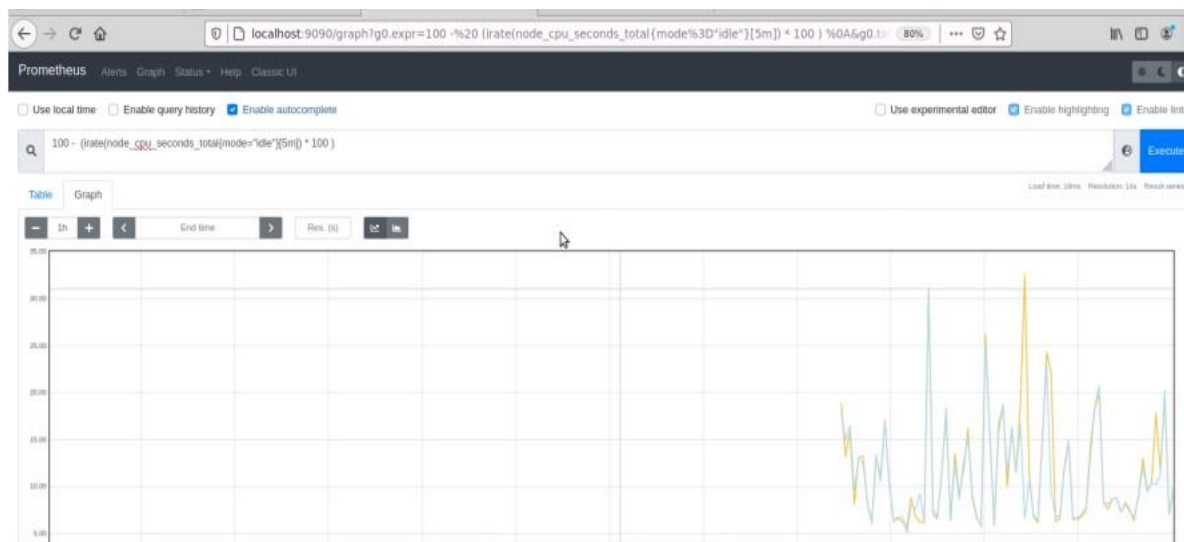
**#scrape\_timeout is set to the global default (10s).**



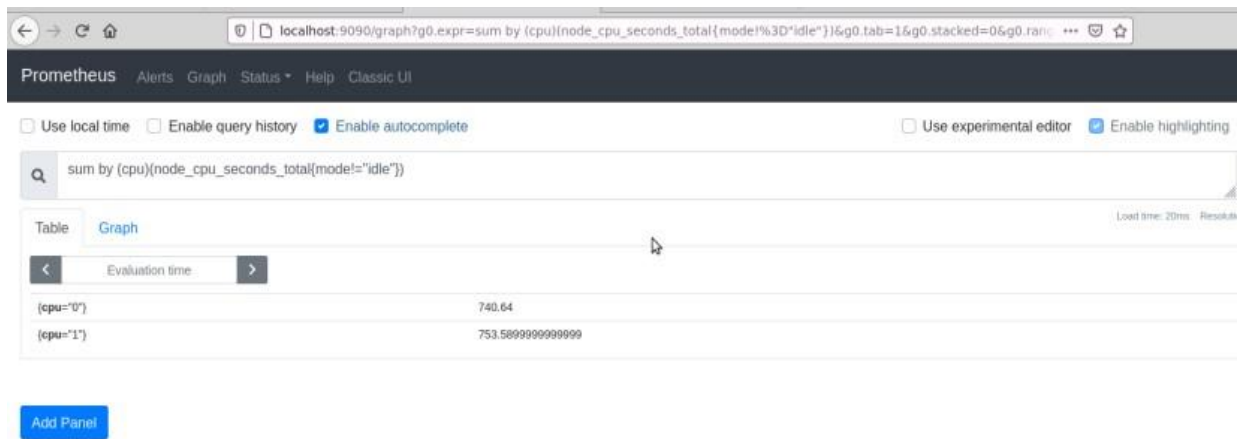
## Prometheus self Monitoring Screenshot :-



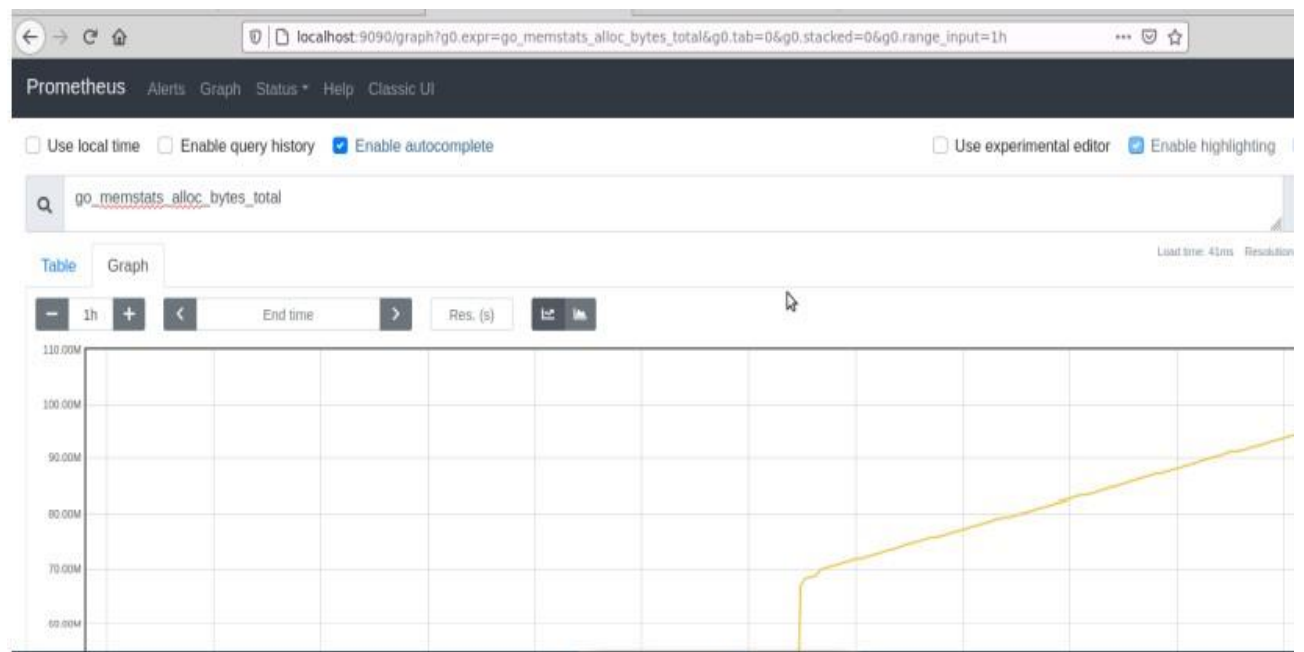
## CPU utilization graph :-



## CPU Usage screenshots –



## Graph Visualization metrics in Prometheus



## Rate of Growth of CPU and Total count of CPU from starting

