* **INTELLIQIT:**

Developers will upload their code in Git, Jenkins will download it [CONTINUIOUS DOWNLOAD]and triggered build process[CONTINUIOUS BUILD 🡪 Ant/Maven], after building we will get a setup file i.e an artifact, Jenkins will take these artifact and deploy[CONTINUIOUS DEPLOYMENT] it in Testing environment(QA server), Testers will create test scripts using selenium tool, Jenkins will pickup those test scripts and checks whether application working correctly or not[CONTINUIOUS TESTING], if testing passes then Jenkins will deploy the artifact into ProdServer[CONTINUIOUS DELIVERY] or incase if it fails then sends notification to developers to recheck the code

Day 1

===================================================================

Jenkins

===============

This is a tool for implementing CI-CD

* **Stages in CI-CD**

===========================

Stage 1 (Continuous Download)

-------------------------------------

Developers create some code and upload that code into the version controlling

system. The moment code is uplaoded Jenkins gets a notification and it will

download that code, this is called Continuous Download

Stage 2 (Continuous Build)

--------------------------------------

The code downloaded in the previous stage has to converted into an artifact

This artifact can come in the format of war, jar, ear, exe file etc. To convert the

code into an artifact jenkins takes the help of centain build tools like

ANT, Maven, MsBuild etc.

Stage 3 (Continuous Deployment)

------------------------------------------

The artifact created in the previous stage is now deployed into the testing

environment. This Testing environment can be running on some application

servers like tomcat, Jboss, Weblogic etc. Jenkins should deploy the artifact into

these application servers from where testers can start accessing it

Stage 4 (Continuous Testing)

-------------------------------------

Jenkins now executes the automation test scripts created by the testers

and check if the application is working according to the clients requirement

If it does not Jenkins will send email notifications to the concerned team

members and developers will fix the defects and upload the modified code

into the version controlling system. Jenkins will now start from stage 1

Stage 5 (Continuous Delivery)

---------------------------------------

If testing passes Jenkins will now take approvals from the delivery team and

deploy the artifact into the prod environment where the end user can start

accessing it.

Note: The first four stages are called CI (Congtinuous Integration)

The last stage is called as CD (Continuous Delivery)

* **Setup of 3 Ubuntu servers using vagrant**

===============================================

Vagrant

===================

1 Download and install Oracle virtual Box

https://www.virtualbox.org/wiki/Downloads

2 Download and install vagrant

https://www.vagrantup.com/downloads.html

3 To check if vagrant is installed

vagrant --version

4 Copy the vagrantfile into an empty folder

5 Open cmd prompt

cd path\_of\_folder\_where\_vagrantfile\_is\_copied

vagrant up

6 Open Oracle virtual box to access these VM's

Username and Password: vagrant

6 To destroy the VM's

vagrant destroy

===========================================================================

Day 2

===========================================================================

* **Setup of Jenkins environment for CI-CD**

============================================

1 Create 3 AWS ubuntu instances and name them

JenkinsServer, QAServer, ProdServer

2 Connect to JenkinsServer AWS instance using git bash

3 Update the apt repository

sudo apt-get update

4 Install jdk

sudo apt-get install -y openjdk-8-jdk

5 Install git and maven

sudo apt-get install -y git maven

6 Download jenkins.war

wget https://get.jenkins.io/war-stable/2.263.1/jenkins.war

7 To start Jenkins ----------we shall run this command every time when we want to start Jenkins

java -jar jenkins.war

java -jar jenkins.war --httpPort=9090 -------------------------------------run this command if you want to change port number

8 To access jenkins from browser

public\_ip\_of\_jenkinsserver:8080

9 Unlock jenkins by entering the password

10 Click on "Install suggested plugins"

11 Create First admin user--->Click on Continue--->Finish

-------------------------------------------------------------------------------

* **Setup of tomcat on QA and PRodServers**

-----------------------------------------

1 Connect to QAServer Aws instance using git bash

2 Update the apt repository

sudo apt-get update

3 Install tomcat9

sudo apt-get install -y tomcat9

4 Install tomcat9-admin -------- it contains all the dependencies that require for tomcat

sudo apt-get install -y tomcat9-admin

5 Edit the tomcat-users.xml file

sudo vim /etc/tomcat9/tomcat-users.xml

Delete the entire content of the file and add the below data

<tomcat-users>

<user username="intelliqit" password="intelliqit" roles="manager-script"/>

</tomcat-users>

These credentials we need to pass in Jenkins so that it can deploy artifact in it.

Here there is a file servers.xml in which you can change your port number

6 Restart tomcat9

sudo service tomcat9 restart

7 To access tomcat from the level of browser

public\_ip\_qaserver:8080

Repeat the above 7 steps on ProdServer AWS instance

=============================================================================

Day 3

=============================================================================

**Stage 1 (Continuous Download)**

=======================================

1 Open the dashboard of jenkins

2 Click on New item---->Enter some item name "Development"

3 Select Free Style Project---->OK

4 Go to Source code Management

5 Select Git

6 Enter the github url where developers have uploaded the code

https://github.com/intelliqittrainings/maven.git

7 Click on Apply--->Save

8 Go to the dashboard of Jenkins

9 Go to the Development job and click on Build icon

This job will download all the code uploaded by the developers

into the remote git server

**Stage 2 (Continuous Build)**

===============================================

1 Open the dashboard of Jenkins

2 Go to the Development job---->Click on configure

3 Go to Build section

4 Click on Add Build step

5 Click on Invoke top level maven targets

6 Enter maven goal: package--------------------its 5th stage of maven life-cycle

7 Click on Apply--->Save

8 Go to the dashboard of Jenkins

9 Go to Development job---->Click on Build icon

This job will convert the java code into an artifact

This artifact comes in the format of a war file

**Stage 3 (Continuous Deployment)**

====================================================

1 Open the dashboard of Jenkins

2 Click on Manage Jenkins

3 Click on Manage Plugins

4 Go to Available section

5 Search for "Deploy to Container" plugin

6 Click on Install without restart

7 Go to the dashboard of Jenkins

8 Go to the Development job---->Click on Configure

9 Go to Post Build actions

10 Click on Add Post Build actions

11 Click on Deploy war/ear to container

war/ear files: \*\*/\*.war

Context path: testapp

Click on Add container

Select tomcat9

Enter username and password of tomcat

tomcat url: private\_ip\_of\_qaserver:8080

here what we have done is asking Jenkins to check all subfolders sub-sub folders in current directory and find .war files and deploy them to a Tomcat server. Tester can access it by name ‘testapp’ in browser e.g public\_ip\_of\_testing\_server:8080/testapp

12 Apply---->save

13 Go to the dashbord of Jenkins

14 Go to the Development job---->Click on Build icon

This job will deploy the artfact into the qaserver

15 To access the application from the browser

public\_ip\_of\_qaserver:8080/testapp

========================================================================

Day 4

========================================================================

**Stage 4 (Continuous Testing)**

======================================

1 Open the dashboard of Jenkins

2 Create a new job and name it "Testing"

3 Select Free Style Project--->OK

4 Slelect Git--->Enter the github url where teters have uplaoded the code

https://github.com/intelliqittrainings/FunctionalTesting.git

5 Go to Build section

6 Click on Add Build step

7 Click on Execute shell

java -jar path/testing.jar

8 Apply--->Save

9 Go to the dashboard of jenkins

10 Go to the testing job--->Click on Build icon

This job will download the selenium test scripts and execute them

Linking the Development job with the Testing job

========================================================

The Development job has to be linked with the testing job so that all

the stages of CI-CD can happen in a flow. This is called as upstream/downstream

config in jenkins

1 Go to the dashboard of jenkins

2 Go to the development job

3 Click on Configure

4 Go to Post build actions

5 Click on Add post build action

6 Click on Build other projects

7 Enter project name as "Testing"

8 Apply--->Save

===============================================================================

Copying artifacts from Development job and Testing job

===========================================================

1 Open the dashboard of Jenkins

2 Click on Manage Jenkins--->Manage Plugins

3 Go to Available section

4 Search for "Copy Artifact" plugin

5 Click on Install without restart

6 Go to the dashboard of Jenkins

7 Go to the Development job--->Click on configure

8 Go to Post Build actions

9 Click on Add Post Build actions

10 Click on Archive the artifacts

File to archive: \*\*\\*.war

11 Apply--->Save

12 Go to the dashboard of Jenkins

13 Go to the Testing job---->Click on Configure

14 Go to Build section

15 Click on Add Build step

16 Click on Copy artifacts from other projects

17 enter project name as Development

18 Save

**Stage 5 (Continuous Delivery)**

===============================

1 Open the dashboard of Jenkins

2 Go to the Testing job

3 Click on Configure

4 Go to Post Build actions

5 Click on Add post build action

6 Click on Deploy war/ear to container

7 war/ear files: \*\*/\*.war

Context path: prodapp

Click on Add container

Select tomcat9

Enter username and password of tomcat9

Tomcat url: private\_ip\_of\_prodserver:8080

8 Apply--->Save

==================================================================

Day 5

==================================================================

====================================================================

* **User Administration in Jenkins**

===========================================

**Creating users in Jenkins**

===========================

1 Open the dashboard of jenkins

2 click on manage jenkins

3 click on manage users

4 click on create users

5 enter user credentials

**Creating roles and assigning**

==============================

1 Open the dashboard of jenkins

2 click on manage jenkins

3 click on manage plugins

4 click on role based authorization strategy plugin

5 install it

6 go to dashboard-->manage jenkins

7 click on configure global security

8 check enable security checkbox

9 go to authorization section-->click on role based strategy radio button

10 apply-->save

11 go to dashboard of jenkins

12 click on manage jenkins

13 click on manage and assign roles

14 click on manage roles

15 go to global roles and create a role "employee"

16 for this employee in overall give read access

and in view section give all access

17 go to item roles-->Give the role as developer

and patter as Dev.\* (ie developer role can access

only those jobs whose name start with Dev)

18 similarly create another role as tester and assign the pattern as "Test.\*"

19 give all permissions to developers and tester

20 apply--save

21 click on assign roles

22 go to global roles and add user1 and user2

23 check user1 and user2 as employees

24 go to item roles

25 add user1 and user2

26 check user1 as developer and user2 as tester

27 apply-->save

If we login into jenkins as user1 we can access only the development

related jobs and user2 can access only the testing related jobs

========================================================================

* **Alternate ways of Setup of Jenkins**

=========================================

**Setups of jenkins as a direct installation**

-------------------------------------------------

1 Update the apt repository

sudo apt-get update

2 Install java

sudo apt-get install -y openjdk-8-jdk

3 Add the jenkins repository keys to the apt repository

wget -q -O - https://pkg.jenkins.io/debian-stable/jenkins.io.key | sudo apt-key add -

4 Add the debain package address to jenkins.list file

sudo sh -c 'echo deb https://pkg.jenkins.io/debian-stable binary/ > /etc/apt/sources.list.d/jenkins.list'

5 Update the apt repository

sudo apt-get update

6 Install jenkins

sudo apt-get install -y jenkins

============================================================================

Setup of Jenkins using tomcat

---------------------------------

1 Update apt repository

sudo apt-get update

2 Install tomcat9

sudo apt-get install -y tomcat9

3 Install tomcat9-admin

sudo apt-get install -y tomcat9-admin

4 Download the jenkins.war file

wget https://get.jenkins.io/war-stable/2.249.2/jenkins.war

5 Give wite permssion on tomcat9 folder to others

sudo chmod o+w -R /var/lib/tomcat9

6 Copy the jenkins.war into the tomcat9 webapps folder

cp jenkins.war /var/lib/tomcat9/webapps

7 To access tomcat from browser

public\_ip:8080

To access jenkins running on tomcat

public\_ip:8080/jenkins

==========================================================================

Day 6

==========================================================================

* **Master Slave Architecture of Jenkins**

============================================

This is used distribute the work load to additional linux

servers called as slaves. This is used when we want to run multiple

jobs on jenkins parallelly.

Setup

============

1 Create a new AWS ubuntu20 instance

2 Install the same version of java as present in the master

sudo apt-get update

sudo apt-get install -y openjdk-8-jdk

3 Setup passwordless SSH between Master and slave

a) Connect to slave and set password to default user i.e ubuntu

sudo passwd ubuntu

b) Edit the ssh config file

sudo vim /etc/ssh/sshd\_config

Search for "PasswordAuthentication" and change it from no to yes

sudo nano /etc/ssh/sshd\_config

ctrl w --------------to search

search for PasswordAuthentication

make changes

ctrl x ----------------to save file

y -----------------to yes

c) Restart ssh

sudo service ssh restart

d) Connect to Master using git bash

e) Generate the ssh keys

sudo su jenkins

ssh-keygen

f) Copy the ssh keys

ssh-copy-id ubuntu@private\_ip\_of\_slave

This will copy the content of the public keys to a file called

"authorised\_keys" on the slave machine

===========================================================================

Connect to slave using git bash

4 Download the slave.jar file

wget <http://private_ip_of_jenkinsserver:8080/jnlpJars/slave.jar> 🡨 can we use same command to copy files from other server

wget <http://172.31.33.159:8080/jnlpJars/slave.jar>

5 Give execute permissions to the slave.jar

chmod u+x slave.jar

6 Create an empty folder that will be the workspace of jenkins

mkdir workspace

7 Open the dashboard of Jenkins

8 Click on Manage Jenkins--->Click on Manage Nodes and Clouds

9 Click on New node---->Enter some node name as Slave1

10 Select Permanent Agent--->OK

12 Enter remote root directory as /home/ubuntu/workspace

12.1 usage : choose 2nd option

13 Labels: myslave (This label is associated with a job in jenkins

and then that job will run on that slave)

14 Go to Launch Method and select "Launch agent via execution of command on master"

Launch command 🡪 ssh ubuntu@private\_ip\_of\_slave java -jar slave.jar

with this command as we run it from master machine 🡪 we execute ‘java-jar slave.jar’ command on slave machine from master machine without actually connecting to slave machine

15 Click on Save

16 Go to the dashboard of Jenkins

17 Go to the job that we want to run on slave---->Click on Configure

18 Go to General section

19 Check restrict where this project can be run

20 Enter slave label as myslave

Day 7

============================================================================

=========================================================================

Pipeline as Code

======================

Implementing all the stages of CI-CD from the level of a Grrovy script

file is called as Pipeline as Code. This groovy script files is called

as Jenkinsfile and generally it is uploaded into the remote git server

along with the application code. From the remote git server this Jenkinsfile

will trigger all the stages of CI-CD

Advantages

====================

1 Since the stages of CI-CD are implemented from the level of code

it can perform version controlling on it i.e it gives the team members

ability to edit and review the code and yet maintain multiple versions

of jenkinsfile

2 Jenkinsfile can withstand planned and unplanned restarts of the Jenkins

master

3 It can perform all stages of CI-CD with minimum number of plugins as

a result of which it give better performance than the free style projects

4 It can handle all the real time challenges like if conditions,

error handling etc

Pipeline can be implemented in 2 ways

1 Scripted Pipeline

2 Declarative Pipeline

Syntax of Scripted Pipeline

=================================

node('master')

{

stage('Stage name in CI-CD')

{

Groovy script code for implementing this stage

}

}

Syntax of Declarative Pipeline

====================================

pipeline

{

agent any

stages

{

stage('Stage name in CI-CD')

{

steps

{

Groovy script for implementing this stage

}

}

}

}