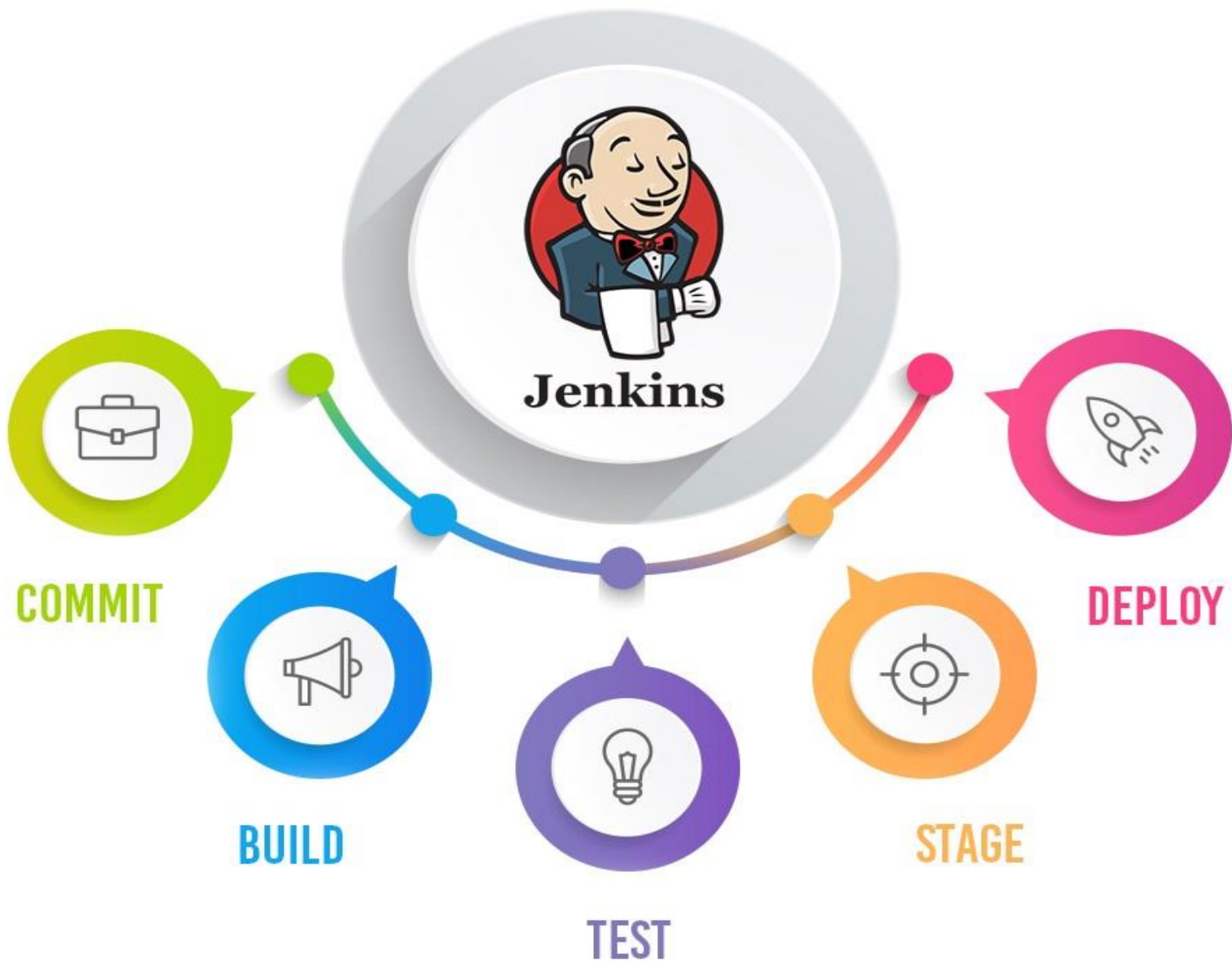




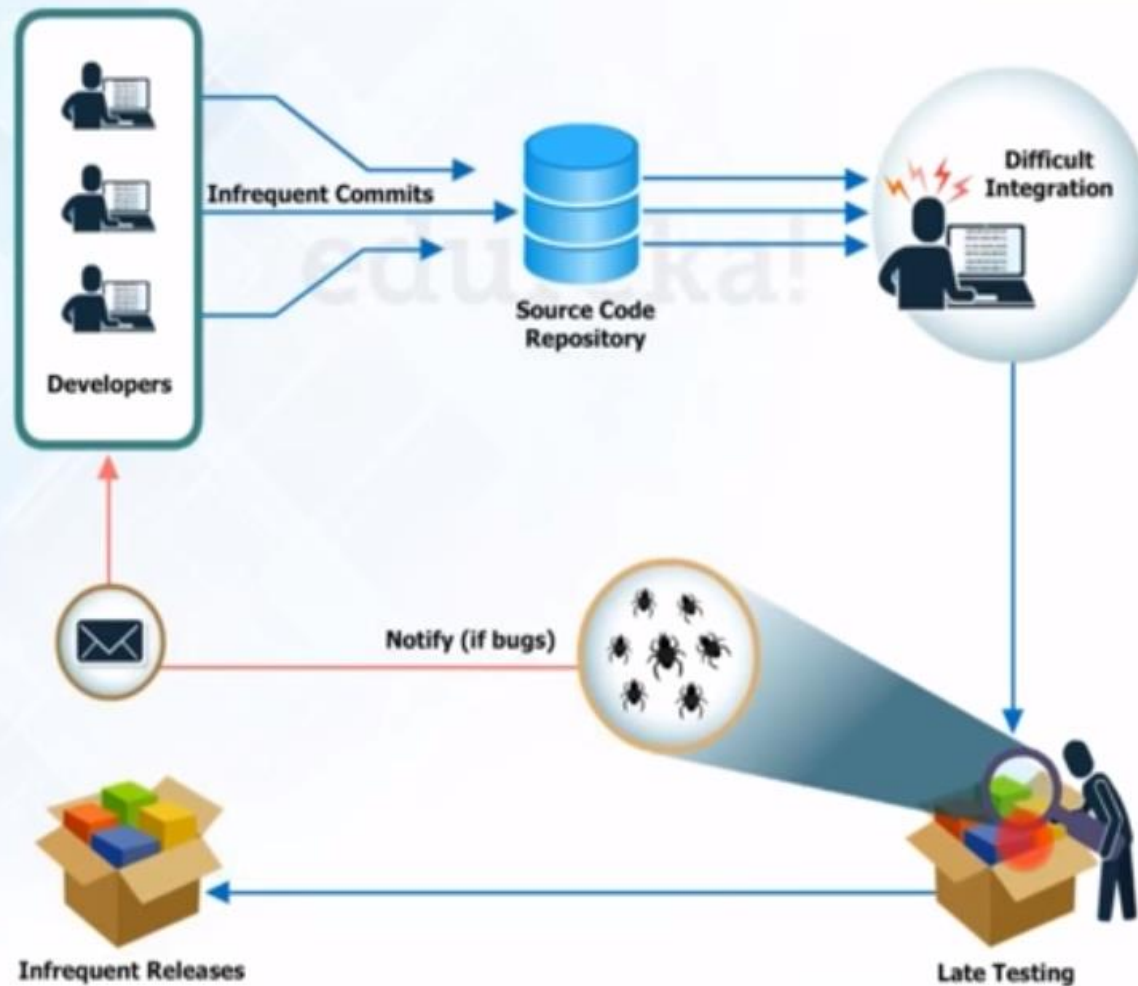
Jenkins



Jenkins

- Jenkins is an open source automation tool written in Java programming language that allows continuous integration.
- Jenkins **builds** and **tests** our software projects which continuously making it easier for developers to integrate changes to the project, and making it easier for users to obtain a fresh build.
- It also allows us to continuously **deliver** our software by integrating with a large number of testing and deployment technologies.
- Jenkins offers a straightforward way to set up a continuous integration or continuous delivery environment for almost any combination of languages and source code repositories using pipelines, as well as automating other routine development tasks.

Process Before Continuous Integration



Problems Before Continuous Integration

Developers have to wait till the complete software is developed for the test results.

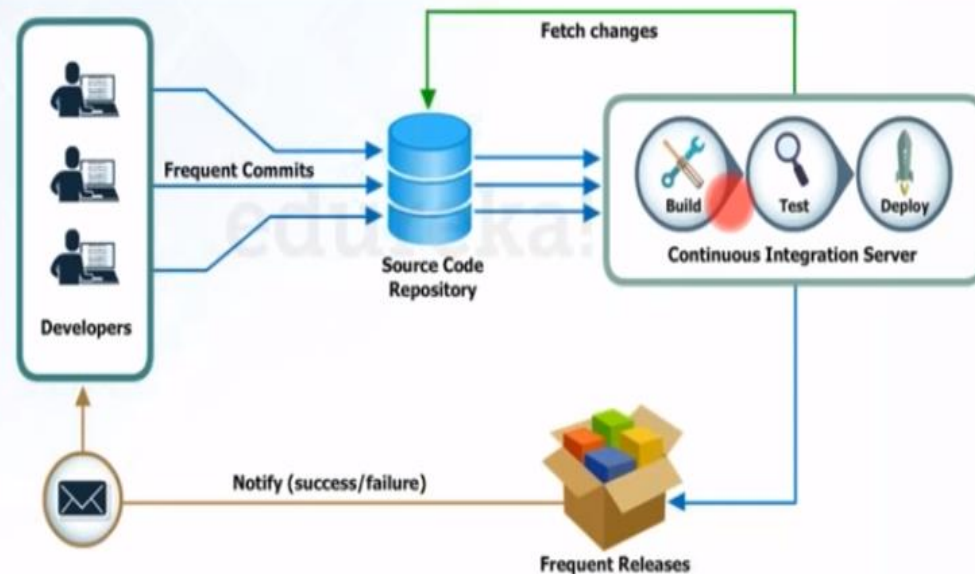


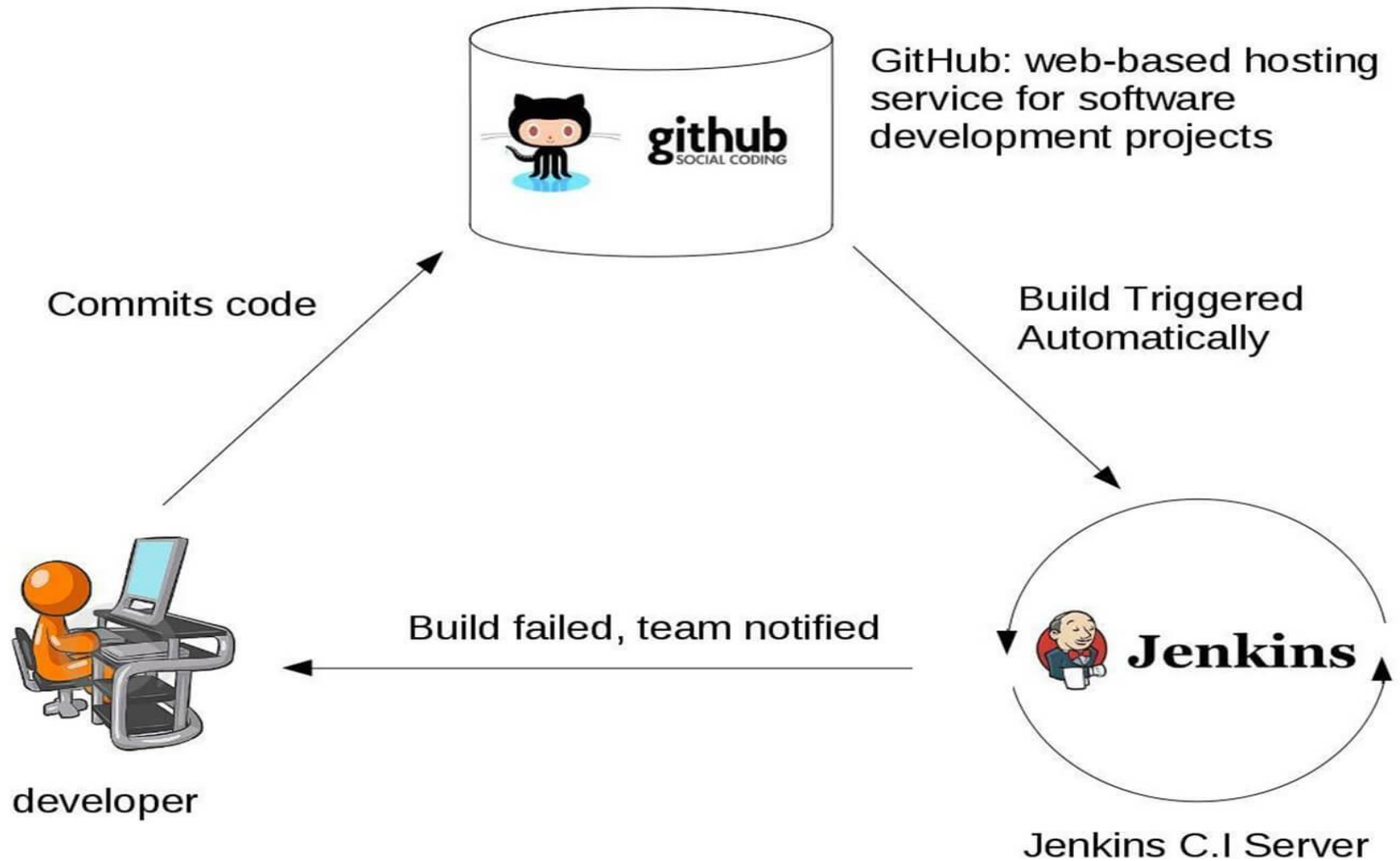
If the test fails then locating and fixing bugs is very difficult. Developers have to check the entire source code of the software.

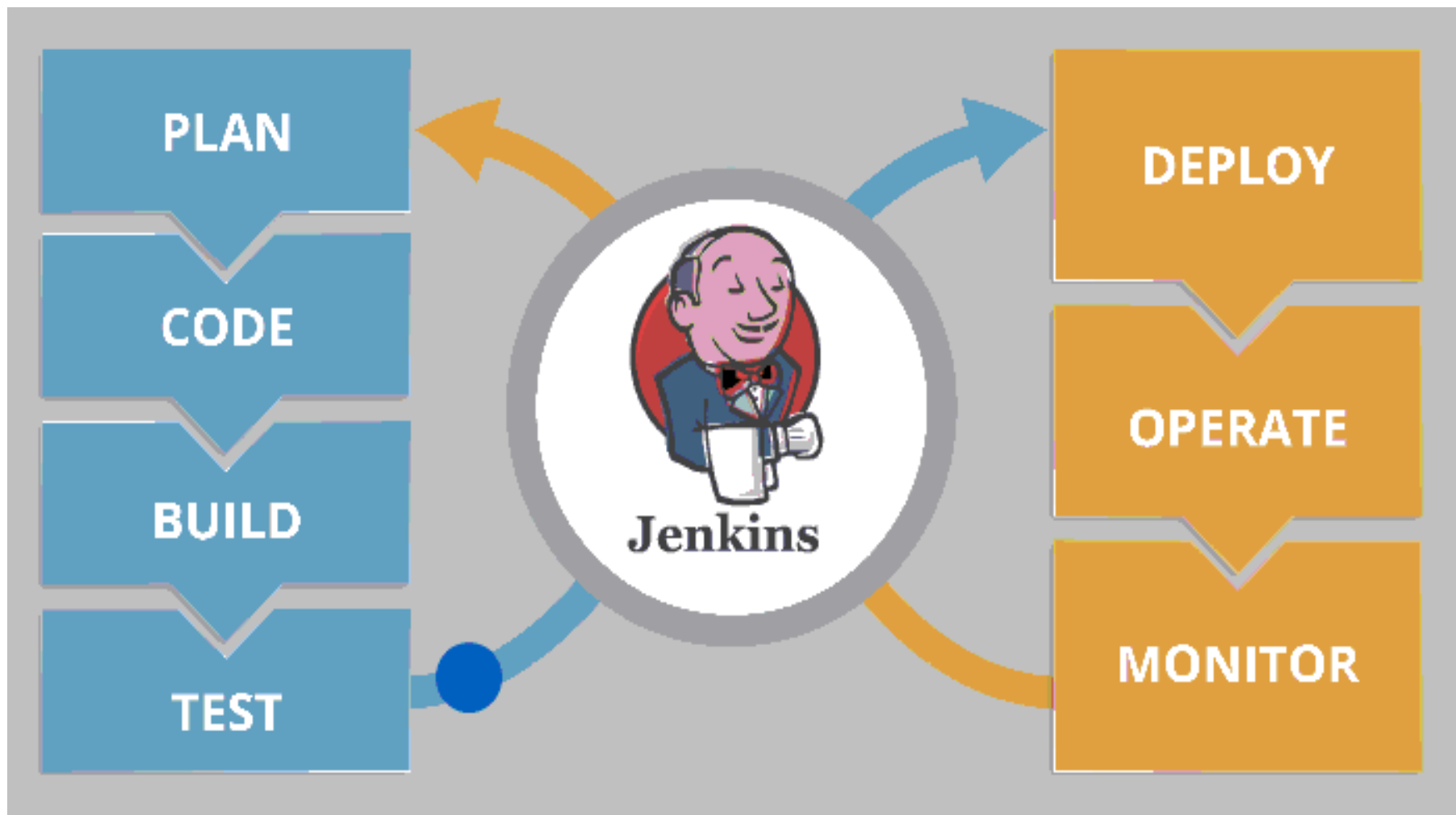


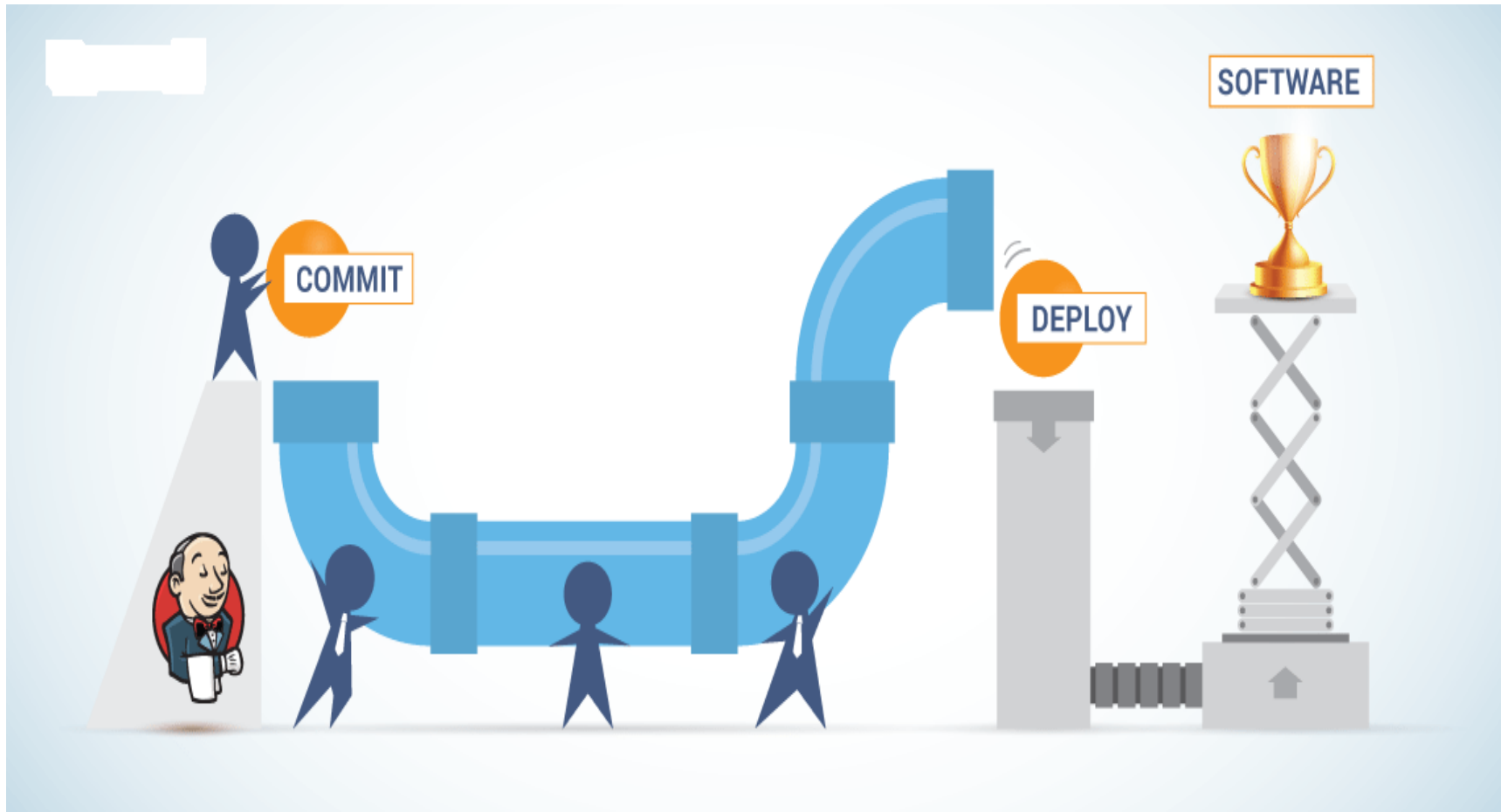
Continuous Integration To The Rescue

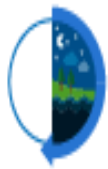
- ☐ Since after every commit to the source code an auto build is triggered and then it is automatically deployed on the test server
- ☐ If the test results shows that there is a bug in the code then the developers only have to check the last commit made to the source code
- ☐ This also increases the frequency of new software releases
- ☐ The concerned teams are always provided with the relevant feedback



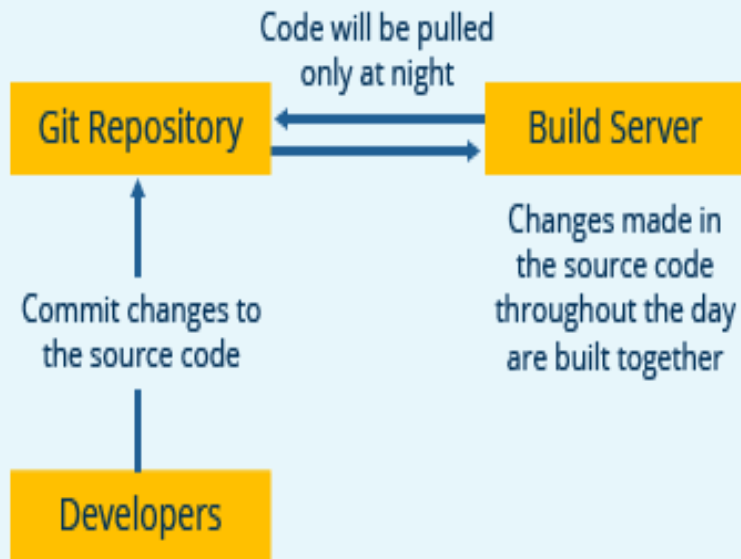




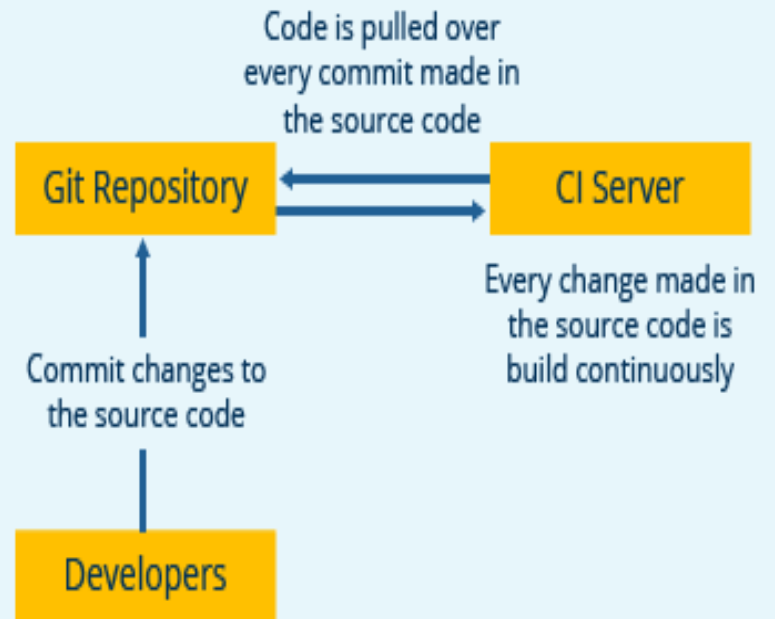




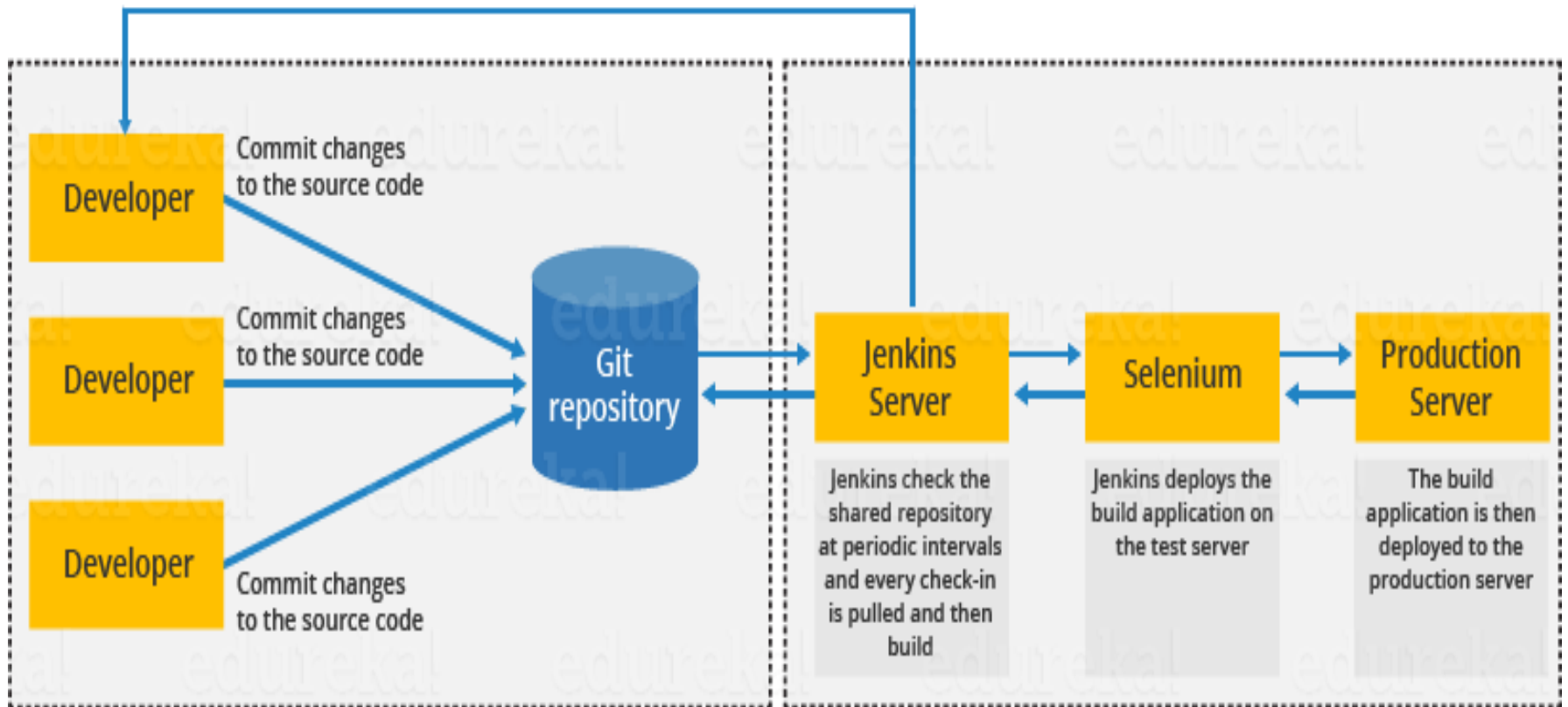
Nightly build



Continuous Integration



Build and test results are
fed back to the developers



Before Jenkins	After Jenkins
Once all Developers had completed <u>their</u> assigned coding tasks, they used to commit their code all at same time. Later, Build is tested and deployed	The code is built and test as soon as Developer commits code. Jenkin will build and test code many times during the day
Code commit built, and test cycle was very infrequent, and a single build was done after many days.	If the build is successful, then Jenkins will deploy the source into the test server and notifies the deployment team.
Since the code was built all at once, some developers would need to wait until other developers finish coding to check their build	The code is built immediately after any of the Developer commits
It is not an easy task to isolate, detect, and fix errors for multiple commits.	Since the code is built after each commit of a single developer, it's easy to detect whose code caused the built to fail
Code build and test process are entirely manual, so there are a lot of chances for failure.	Automated build and test process saving timing and reducing defects.
The code is deployed once all the errors are fixed and tested	The code is deployed after every successful build and test
Development Cycle is slow	The development cycle is fast. New features are more readily available to users. Increases profits

What is CI/CD?

- Continuous integration (CI) is a DevOps practice in which team members regularly commit their code changes to the version control repository, after which automated builds and tests are run.
- Continuous delivery (CD) is a series of practices where code changes are automatically built, tested and deployed to production.

Agile vs Waterfall vs DevOps

Waterfall



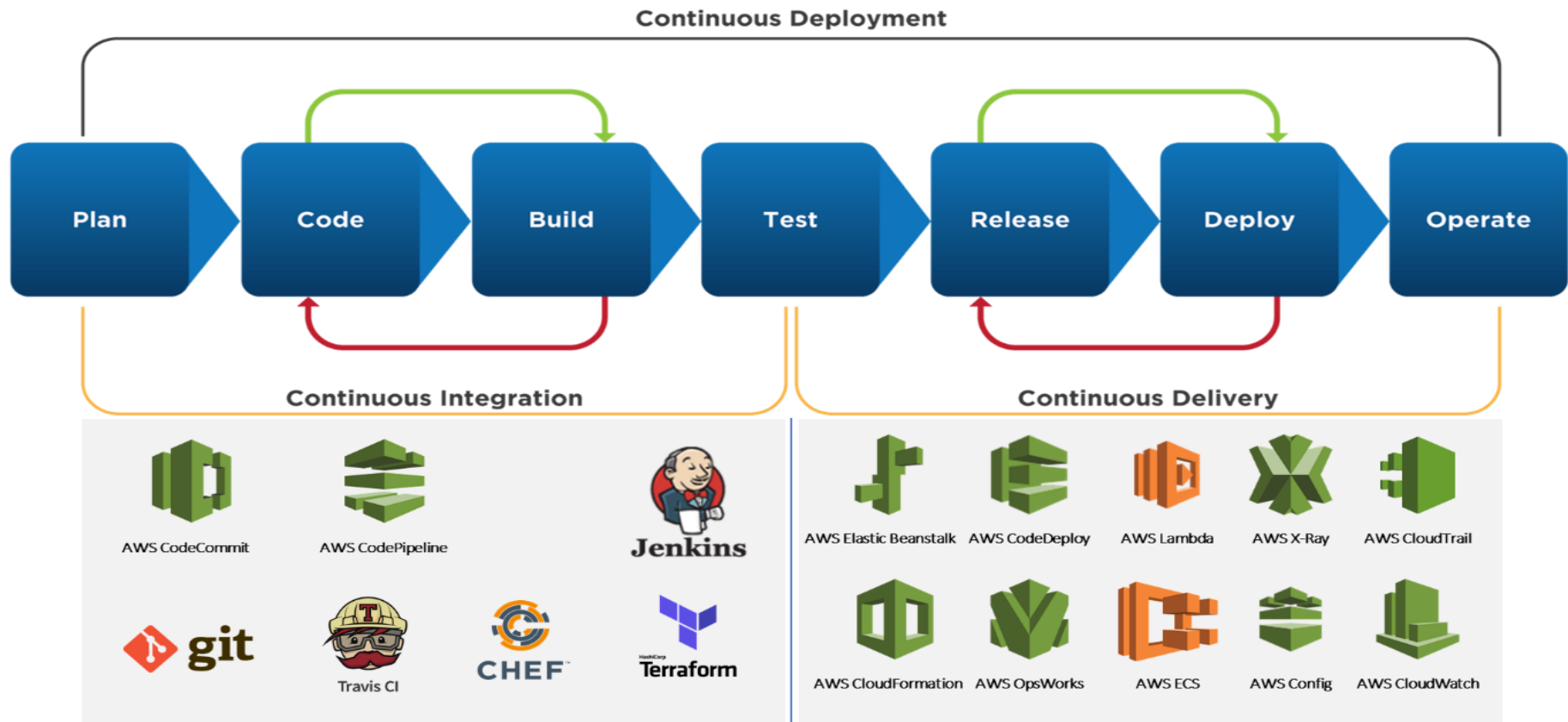
Agile



Agile with Continuous Deploy



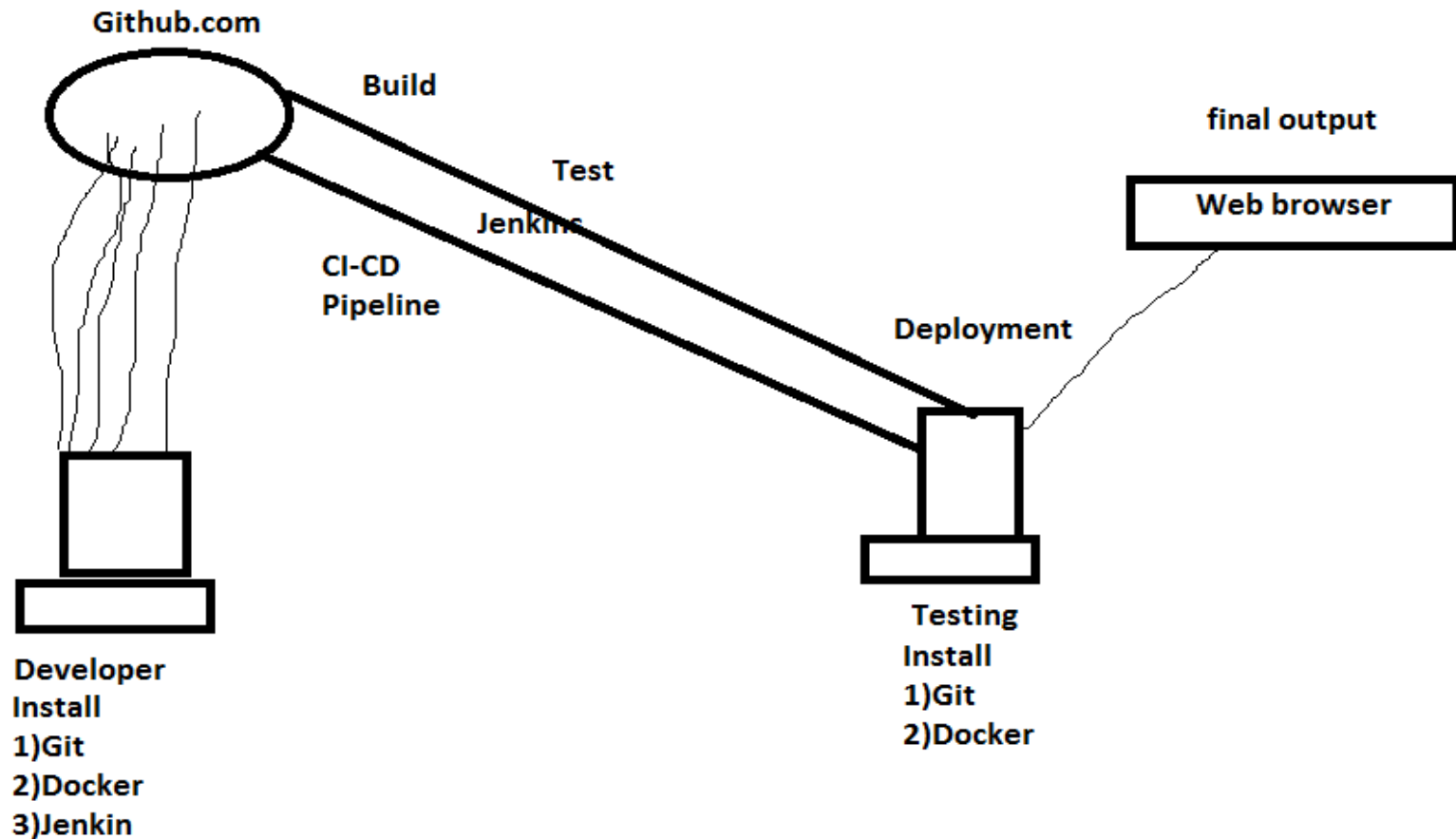
Continuous Deploy requires DevOps



Advantages of Jenkins

- It is an open source tool.
- It is free of cost.
- It does not require additional installations or components. Means it is easy to install.
- Easily configurable.
- It supports 1000 or more plugins to ease your work. If a plugin does not exist, you can write the script for it and share with community.
- It is built in java and hence it is portable.
- It is platform independent. It is available for all platforms and different operating systems. Like OS X, Windows or Linux.
- Jenkins also supports cloud based architecture so that we can deploy Jenkins in cloud based platforms.

Lab



Lab : Step Involved

Steps

- 0) Req: 2 System(Developer, Testing)
- 1) Install jenkins
- 2) Jenkins setup(web console)
- 3) Global security
- 4) Adding Slave1(node1)
- 5) Mapping node(agent.jar file)
- 6) Install git in both system
- 7) Create a job to map github to slave1
- 8) Create files in dev -push to github -jenkins-build now-check in slave1
- 9) Install docker in both system
- 10) Deploy image into slave
- 11) Configure auto trigger(webhook)
- 12) CI-CD pipelining
- 13) Do CI CD pipelining with 3 System(Dev, test, Prod)

Lab: Steps 0 and Step 1

Steps 0) Launch 2 Instance in AWScloud– Named as Developer and testing – Use security group port as all traffic.

Connect both Instances using Mobaxterm

Steps 1) Install Jenkins in Developer system

1) Jenkins is a Java application, so the first step is to install Java.

```
# yum install java-1.8.0-openjdk-devel
```

2) The next step is to enable the Jenkins repository.

```
# curl --silent --location http://pkg.jenkins-ci.org/redhat-stable/jenkins.repo | sudo tee  
/etc/yum.repos.d/jenkins.repo
```

```
# nano /etc/yum.repos.d/jenkins.repo
```

```
gpgcheck=0
```

3) Once the repository is enabled, install the latest stable version of Jenkins

```
# yum install jenkins -y
```

4) After the installation process is completed, start the Jenkins service

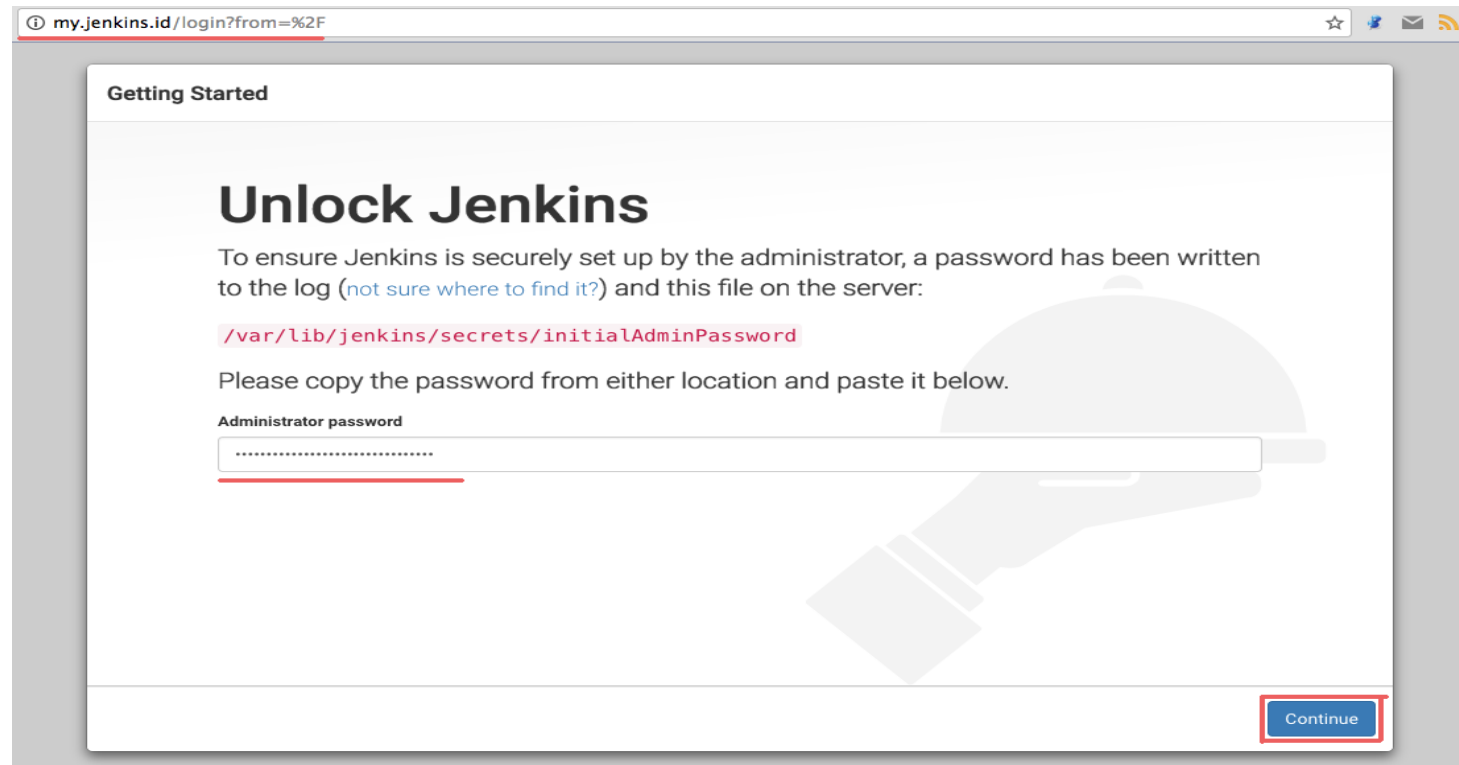
```
# systemctl start jenkins
```

```
# systemctl enable jenkins
```

Lab: Step 2

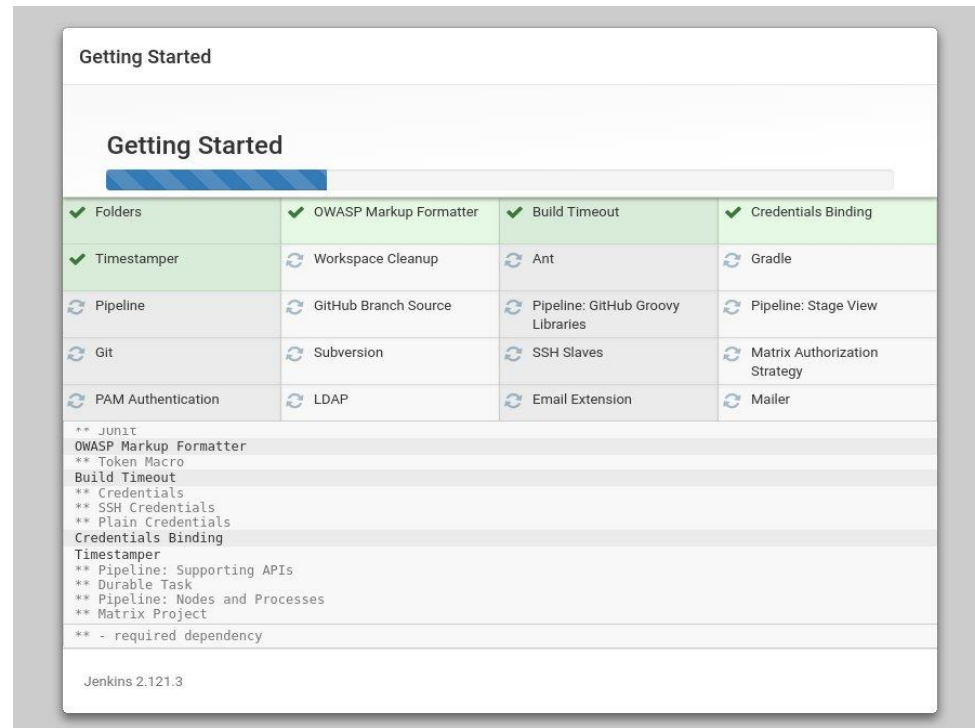
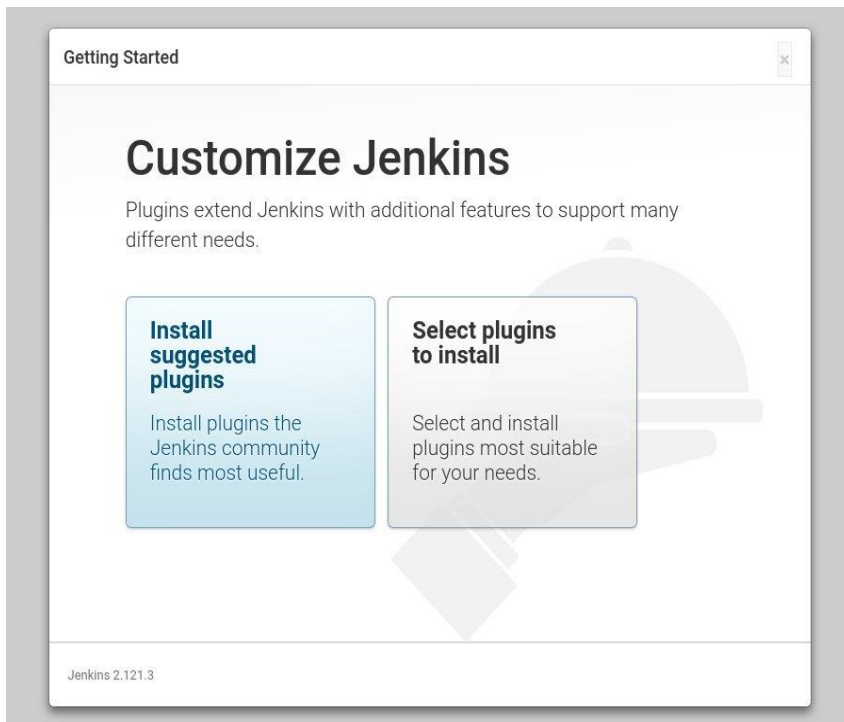
Steps 2) Jenkins setup(web console) : To set up your new Jenkins installation, open your browser and type your domain or IP address followed by port 8080:

- http://your_ip_or_domain:8080
- Use the following command to print the password on your terminal:
- `# cat /var/lib/jenkins/secrets/initialAdminPassword`
- Copy the password from your terminal, paste it into the Administrator password field and click Continue.



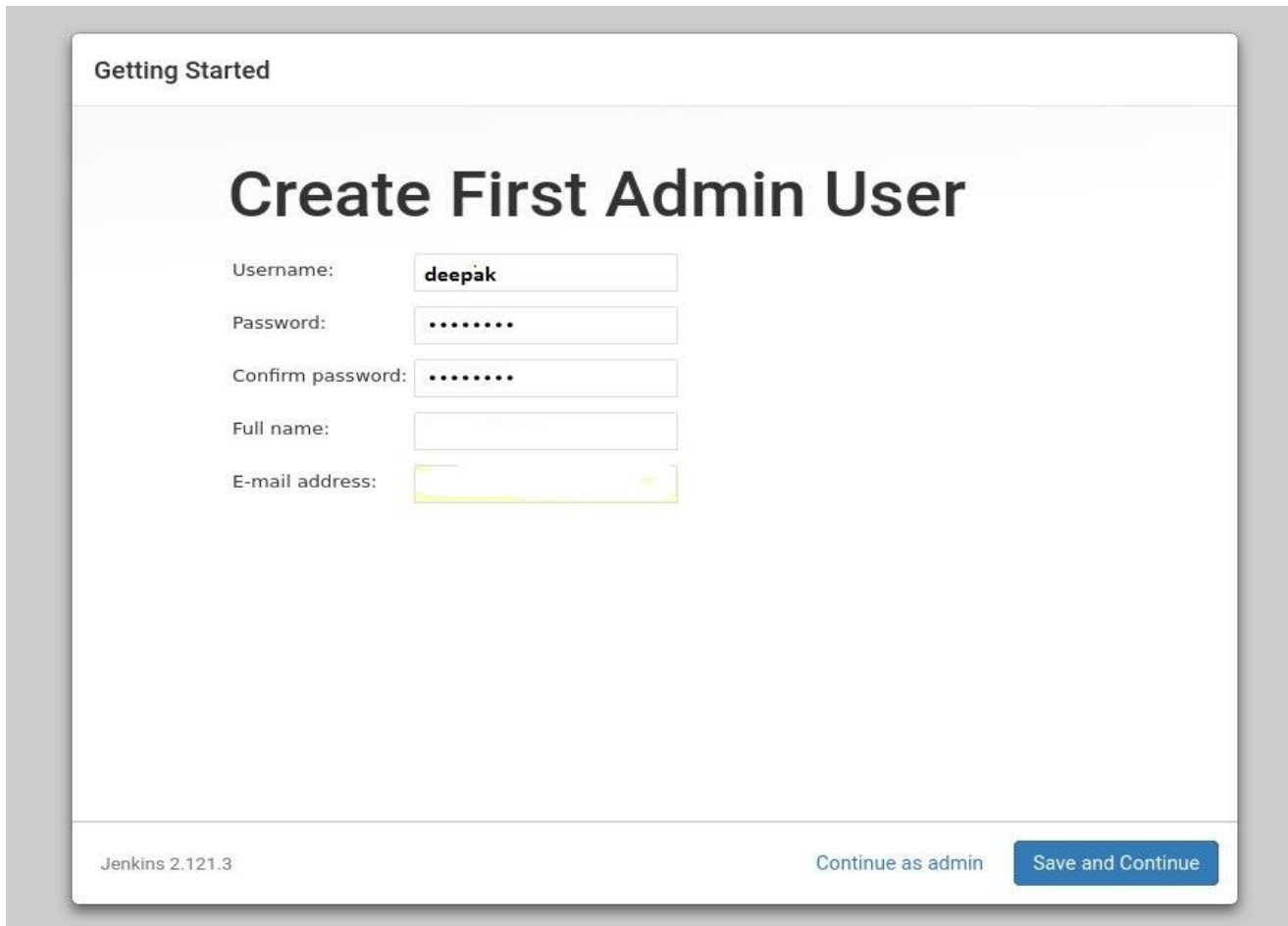
Lab: Step 2

On the next screen, you will be asked whether you want to install the suggested plugins or to select specific plugins. Click on the Install suggested plugins box, and the installation process will start immediately.



Lab: Step 2

Once the installation is complete, you will be prompted to set up the first administrative user. Fill out all required information and click Save and Continue



The screenshot shows the Jenkins 'Getting Started' screen. At the top, it says 'Getting Started'. Below that is the heading 'Create First Admin User'. There are five input fields: 'Username:' with the value 'deepak', 'Password:' with masked characters '.....', 'Confirm password:' with masked characters '.....', 'Full name:', and 'E-mail address:'. At the bottom left, it says 'Jenkins 2.121.3'. At the bottom right, there are two buttons: 'Continue as admin' and 'Save and Continue'.

Getting Started

Create First Admin User

Username:

Password:

Confirm password:

Full name:

E-mail address:

Jenkins 2.121.3

[Continue as admin](#) [Save and Continue](#)

Lab: Step 2

On the next page, you will be asked to set the URL for the Jenkins instance. The URL field will be populated with an automatically generated URL.

Getting Started

Instance Configuration

Jenkins URL:

The Jenkins URL is used to provide the root URL for absolute links to various Jenkins resources. That means this value is required for proper operation of many Jenkins features including email notifications, PR status updates, and the BUILD_URL environment variable provided to build steps.

The proposed default value shown is **not saved yet** and is generated from the current request, if possible. The best practice is to set this value to the URL that users are expected to use. This will avoid confusion when sharing or viewing links.

Jenkins 2.121.3

[Not now](#) [Save and Finish](#)

Lab: Step 2



Getting Started

Jenkins is ready!

Your Jenkins setup is complete.

[Start using Jenkins](#)

Jenkins 2.121.3

 [New Item](#) [People](#) [Build History](#) [Manage Jenkins](#) [My Views](#) [Credentials](#) [New View](#) [add description](#)

Welcome to Jenkins!

Please **create new jobs** to get started.

Build Queue

No builds in the queue.

Build Executor Status

1 Idle

2 Idle

Lab: Step 3 Configure Global Security

Open Jenkins -- Manage Jenkins--configure global security -- select enabled Agents TCP port for JNLP agents : select Random

The screenshot shows the Jenkins web interface in a browser. The address bar indicates the URL is 35.154.223.246:8080/manage. The page title is "Manage Jenkins". The left sidebar contains navigation links: New Item, People, Build History, Manage Jenkins (selected), My Views, Lockable Resources, and New View. The main content area is titled "Manage Jenkins" and "System Configuration". It features several configuration options: "Configure System" (gear icon), "Global Tool Configuration" (wrench icon), "Manage Plugins" (puzzle piece icon), "Manage Nodes and Clouds" (server icon), "Configure Global Security" (lock icon), "Manage Credentials" (key icon), and "Configure Credential Providers" (key icon). The "Configure Global Security" option is highlighted with a tooltip that says "Configure Global Security". Below the "Security" section, there is a "Manage Users" option. On the left, there are two panels: "Build Queue" showing "No builds in the queue." and "Build Executor Status" showing two idle executors. The bottom of the screen shows a Windows taskbar with various application icons and a system clock indicating 10:40 PM on 7/13/2020.

Jenkins

Manage Jenkins

System Configuration

Configure System
Configure global settings and paths.

Global Tool Configuration
Configure tools, their locations and automatic installers.

Manage Plugins
Add, remove, disable or enable plugins that can extend the functionality of Jenkins.

Manage Nodes and Clouds
Add, remove, control and monitor the various nodes that Jenkins runs jobs on.

Security

Configure Global Security
Secure Jenkins; define who is allowed to access/use the system.

Manage Credentials
Configure credentials

Configure Credential Providers
Configure the credential providers and types

Manage Users

Build Queue
No builds in the queue.

Build Executor Status
1 Idle
2 Idle

35.154.223.246:8080/configureSecurity

10:40 PM
7/13/2020

Jenkins > Configure Global Security

☒ Logged-in users can do anything ?

☐ Allow anonymous read access ?

☐ Matrix-based security ?

☐ Project-based Matrix Authorization Strategy ?

Markup Formatter

Markup Formatter

Plain text ▼

Treats all input as plain text. HTML unsafe characters like < and & are escaped to their respective character entities.

Agents

TCP port for inbound agents ☐ Fixed : ☒ Random ☐ Disable ?

Agent protocols...

CSRF Protection

Crumb Issuer

Default Crumb Issuer ▼

☐ Enable proxy compatibility ?

Save

Apply

Lab: Step 4 –Adding slave1

- Manage Jenkins: manage nodes -- new node - node name: slave1, select permanent agent --ok
- Now description page open --- launch method --- launch agent via java web start
- Custom working path: /home/ec2-user/jenkins
- save

The screenshot displays the Jenkins web interface in a browser window. The address bar shows the URL `35.154.223.246:8080/manage`. The page title is "Jenkins". The main navigation bar includes a search bar, the user "admin1", and a "log out" button. The left sidebar contains links for "New Item", "People", "Build History", "Manage Jenkins" (selected), "My Views", "Lockable Resources", and "New View". Below the sidebar, there are sections for "Build Queue" (showing "No builds in the queue.") and "Build Executor Status" (showing two idle executors). The main content area is titled "Manage Jenkins" and "System Configuration". It features several configuration options: "Configure System" (gear icon), "Global Tool Configuration" (wrench icon), "Manage Plugins" (puzzle piece icon), "Manage Nodes and Clouds" (laptop icon), "Configure Global Security" (lock icon), "Manage Credentials" (key icon), "Configure Credential Providers" (key icon), and "Manage Users" (people icon). A tooltip "Manage Nodes and Clouds" is visible over the "Manage Nodes and Clouds" option. The bottom of the browser window shows the Windows taskbar with various application icons and the system clock indicating 10:42 PM on 7/13/2020.

Back to Dashboard

Manage Jenkins

New Node

Configure Clouds

Node Monitoring

Node name slave1

Permanent Agent

Adds a plain, permanent agent to Jenkins. This is called "permanent" because Jenkins doesn't provide higher level of integration with these agents, such as dynamic provisioning. Select this type if no other agent types apply — for example such as when you are adding a physical computer, virtual machines managed outside Jenkins, etc.

OK

Build Queue
No builds in the queue.

Build Executor Status
1 Idle
2 Idle

Jenkins > **Nodes** >

⚙️ Manage Jenkins

💻 New Node

☁️ Configure Clouds

⚙️ Node Monitoring

Build Queue

No builds in the queue.

Build Executor Status

1 Idle

2 Idle

Description

of executors1

Remote root directory

Remote directory is mandatory

Labels

UsageUse this node as much as possible

Launch methodLaunch agent by connecting it to the master

☐ Disable WorkDir

Custom WorkDir path/home/ec2-user/jenkins

Internal data directoryremoting

☐ Fail if workspace is missing

☐ Use WebSocket

Advanced...

AvailabilityKeep this agent online as much as possible

Node Properties

☐ Disable deferred wipeout on this node

☐ Environment variables

☐ Tool Locations

Save

Lab: Step 5 –Mapping Node(Slave 1)

a) Back to list --open slave1 -- download agent.jar file ---- send this agent.jar file to slave1 server using filezilla

b) Open slave1 in jenkins dashboard --copy the command line and run in slave1 server . Before that

```
# yum install java-1.8.0-openjdk-devel
```

The screenshot displays the Jenkins web interface. At the top, the navigation bar includes the Jenkins logo, a search bar, and the user 'admin1' with a 'log out' button. The main content area is titled 'Nodes' and contains a table of node details.

S	Name	Architecture	Clock Difference	Free Disk Space	Free Swap Space	Free Temp Space	Response Time
	master	Linux (amd64)	In sync	6.36 GB	0 B	6.36 GB	0ms
	slave1		N/A	N/A	N/A	N/A	N/A
Data obtained		8 min 13 sec	8 min 13 sec	8 min 13 sec	8 min 13 sec	8 min 13 sec	8 min 13 sec

Below the table is a 'Refresh status' button. To the left of the table, there is a sidebar with links: 'Back to Dashboard', 'Manage Jenkins', 'New Node', 'Configure Clouds', and 'Node Monitoring'. Below these links are two sections: 'Build Queue' (showing 'No builds in the queue.') and 'Build Executor Status' (showing 'master' with 2 idle executors and 'slave1' as 'offline').

The bottom status bar of the browser window shows the URL '35.154.223.246:8080/computer/slave1/', the page generation time 'Page generated: Jul 13, 2020 5:14:48 PM UTC', the REST API endpoint, and the Jenkins version 'Jenkins 2.235.1'.

📌 Back to List

🔍 Status

🗑️ Delete Agent

🔧 Configure

📋 Build History

📊 Load Statistics

📄 Log

[Build Executor Status](#)



Agent slave1

Mark this node temporarily offline

Connect agent to Jenkins one of these ways:

- 🔥 [Launch](#) Launch agent from browser
- Run from agent command line:

```
java -jar agent.jar -jnlpUrl http://35.154.223.246:8080/computer/slave1/slave-agent.jnlp -secret 316814d5b34e65a89daba04de8091f4f4e03eb5ac32441ce715d618cc0dbdabd -workDir "/home/ec2-user/jenkins"
```

Run from agent command line, with the secret stored in a file:

```
echo 316814d5b34e65a89daba04de8091f4f4e03eb5ac32441ce715d618cc0dbdabd > secret-file  
java -jar agent.jar -jnlpUrl http://35.154.223.246:8080/computer/slave1/slave-agent.jnlp -secret @secret-file -workDir "/home/ec2-user/jenkins"
```

Projects tied to slave1

None

35.154.223.246:8080/jnlpJars/agent.jar

Page generated:
Jul 13, 2020 5:16:07 PM UTC

REST API

Jenkins 2.235.1



This type of file can harm your computer.
Do you want to keep agent.jar anyway?

Keep

Discard

Show all



Lab: Step 5 – Mapping Node(Slave 1)-Check Status

Open Jenkins dashboard

master

slave1

All are connected now

The screenshot shows the Jenkins web interface. The top navigation bar includes the Jenkins logo, a search bar, and user information (admin1, log out). The main content area is titled 'Nodes' and displays a table of nodes. The table has columns for Name, Architecture, Clock Difference, Free Disk Space, Free Swap Space, Free Temp Space, and Response Time. Two nodes are listed: 'master' and 'slave1'. The 'master' node is in sync, while 'slave1' is not. The 'Free Swap Space' for 'master' is 0 B. The 'Build Queue' section shows no builds in the queue. The 'Build Executor Status' section shows the status of the nodes: 'master' has 2 idle executors, and 'slave1' has 1 idle executor. The bottom status bar shows the agent.jar file and a 'Show all' button.

S	Name ↓	Architecture	Clock Difference	Free Disk Space	Free Swap Space	Free Temp Space	Response Time
	master	Linux (amd64)	In sync	6.23 GB	0 B	6.23 GB	0ms
	slave1		N/A	N/A	N/A	N/A	N/A
Data obtained			7 min 4 sec	7 min 4 sec	7 min 4 sec	7 min 4 sec	7 min 4 sec

Build Queue: No builds in the queue.

Build Executor Status:

- master**
 - 1 Idle
 - 2 Idle
- slave1**
 - 1 Idle

agent.jar

Show all

Lab: Step 6 –install git in both system

Developer system

```
# yum install git-all -y
# git --version
# mkdir project1
# cd project1
# git init
# git remote add origin "https://github.com/depakkumarrrts/demo.git"
# git config --global user.name "deepak-kumar-rrts"
# git config --global user.email "deepak.amie.it@gmail.com"
# git config --list
```

In testing system

```
# yum install git-all -y
# git --version
```

Lab: Step 7 – Create job

Create job for slave1

1) In github.com --create one repository

2) Open Jenkins dashboard -- create new job --enter item name: test1 -- Freestyle project -- OK

Description page open








Select github repository -- project url: <https://github.com/deepak-kumar-rts/test1.git>

Source code management --- git -- repo -- <https://github.com/deepak-kumar-rts/test1.git>

Restrict where this project can be run

label expression: slave1

save

-  [New Item](#)
-  People New Item
-  Build History
-  Manage Jenkins
-  My Views
-  Lockable Resources
-  New View

 [add description](#)

Welcome to Jenkins!

Create a job to start building your software project.

Build Queue —


No builds in the queue.

Build Executor Status —

 **master**

- 1 Idle
- 2 Idle

35.154.223.246:8080/view/all/newJob


 agent.jar ^

Show all ✕

Enter an item name


test1

» Required field




Freestyle project

This is the central feature of Jenkins. Jenkins will build your project, combining any SCM with any build system, and this can be even used for something other than software build.



Pipeline

Orchestrates long-running activities that can span multiple build agents. Suitable for building pipelines (formerly known as workflows) and/or organizing complex activities that do not easily fit in free-style job type.



Multi-configuration project

Suitable for projects that need a large number of different configurations, such as testing on multiple environments, platform-specific builds, etc.

OK

General

Source Code Management

Build Triggers

Build Environment

Build

Post-build Actions

[\[Plain text\]](#) [Preview](#)

☐ Discard old builds

☒ GitHub project

Project url

https://github.com/deepak-kumar-rtS/july13.git/

Advanced...

☐ This build requires lockable resources

☐ This project is parameterized

☐ Throttle builds

☐ Disable this project

☐ Execute concurrent builds if necessary

☒ Restrict where this project can be run

Label Expression

slave1

[Label slave1](#) is serviced by 1 node. Permissions or other restrictions provided by plugins may prevent this job from running on those nodes.

Advanced...

Source Code Management

☐ None

☒ Git

Repositories

Repository URL

https://github.com/deepak-kumar-rtS/july13.git

Credentials

- none -

Add

Advanced...

Add Repository

Save

Apply

Lab: Step 8-Create file and push to github

```
# cat > test1.txt
```

```
# cat > test2.txt
```

```
# git add test1.txt test2.txt    ( add these two files)
```

or

```
# git add .                      ( add current directory)
```

```
# git commit -m " first commit adding test1.txt and test2.txt)
```

```
# git push origin master
```

Put github username and password

Go to github repository and check to confirm the upload

Go to jenkins – Open created Job – Build now

Now in testing PC -- open and check –

```
# ls /home/ec2-user/workspace/test1/
```


 [Back to Dashboard](#)

 [Status](#)

 [Changes](#)


 [Workspace](#)

 [Build Now](#)

 [Delete Project](#)

Build Now

 [Configure](#)

 [GitHub Hook Log](#)

 [GitHub](#)

 [Rename](#)



Build History

[trend](#) =

x



Project test1



[Workspace](#)



[Recent Changes](#)

Permalinks

- [Last build \(#10\), 19 min ago](#)
- [Last stable build \(#10\), 19 min ago](#)
- [Last successful build \(#10\), 19 min ago](#)
- [Last failed build \(#7\), 26 min ago](#)
- [Last unsuccessful build \(#7\), 26 min ago](#)
- [Last completed build \(#10\), 19 min ago](#)

Lab: Step 9, 10

Install docker in both system

```
# yum install docker
```

```
# systemctl start docker
```

```
# docker --version
```

Create image to deploy into slave – Do it in Developer system only

```
a) #vi dockerfile
```

```
FROM centos
```

```
RUN yum install httpd -y
```

```
ENTRYPOINT /usr/bin/httpd -D FOREGROUND
```

```
ENV deepak classes
```

```
# docker build . -t deepakkumarrrts/jenkin
```

```
# docker login
```

```
# docker push deepakkumarrrts/jenkin
```

```
# rm -f dockerfile
```

```
b) #vi dockerfile
```

```
FROM deepakkumarrrts/jenkin
```

```
ADD . /var/www/html
```

Lab: Step 10

c) nano index.html

```
<html>
```

```
<title> Welcome to Bangalore </title>
```

```
<body background="images-dir/1.jpg">
```

```
</body>
```

```
</html>
```

d) mkdir images-dir : and keep some pics

Or

nano index.html

```
<html>
```

```
<h1> Welcome to India - Unity in diversity </h1>
```

```
</html>
```

Lab: Step 10

```
# git add .
```

```
# git commit -m "adding files"
```

```
#git push origin master
```

Now go to github and confirm the upload

Configure deployment in Jenkins

Open Jenkins –open job(test1) – configure –

Build -- execute shell--

command

```
sudo docker rm -f $(sudo docker ps -a -q)      ---- this is optional ( put it from  
2nd times onwards)
```



```
sudo docker build /home/ec2-user/workspace/test1 -t newcentos
```

```
sudo docker run -it -p 82:80 -d newcentos
```

SAVE

[General](#)[Source Code Management](#)[Build Triggers](#)**Build Environment**[Build](#)[Post-build Actions](#)

Build Environment

- ☐ Delete workspace before build starts
- ☐ Use secret text(s) or file(s) 
- ☐ Abort the build if it's stuck
- ☐ Add timestamps to the Console Output
- ☐ Inspect build log for published Gradle build scans
- ☐ With Ant 

Build

Execute shell

Command

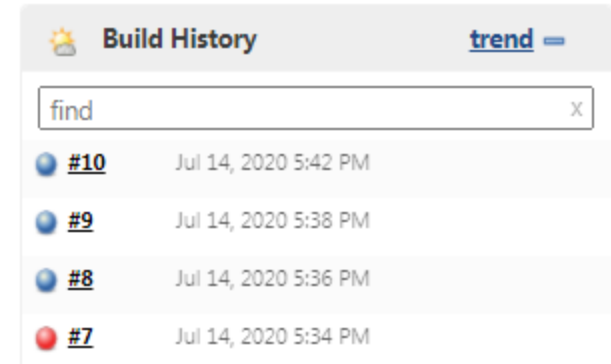
```
sudo docker rm -f $(docker ps -qa)
sudo docker build /home/ec2-user/workspace/test1 -t newcentos
sudo docker run -it -p 82:80 -d newcentos
```

See [the list of available environment variables](#)

[Advanced...](#)[Add build step ▾](#)[Save](#)[Apply](#)

Lab: Step 10

Now in Jenkins click on build now –wait --
blue ball --means successful,
red ball means error
click on blue ball to see the detail



Now you can go to testing System and check #docker images and #docker ps

Finally copy the Testing System public IP and paste in browser –Check the output
Repeat the task and Check:

Modify files in developer –push to github—Build now –check the output in web browser

Lab: Step 11

Configure Auto trigger

1) Open Jenkins – Job(test1) –Configure—
Selct github hook trigger

2) Open Github – open Repository
–Settings –Webhooks – Add webhook
–put Jenkins system IP:8080/github-webhooks/ ---Create

Build Triggers

- ☐ Trigger builds remotely (e.g., from scripts)
- ☐ Build after other projects are built
- ☐ Build periodically
- ☒ GitHub hook trigger for GITScm polling
- ☐ Poll SCM

deepak-kumar-rtS / july13

<> Code ⓘ Issues 🔗 Pull requests ▶ Actions 📁 Projects 📖 Wiki ⓘ Security 📈 Insights ⚙️ Settings

Options

Manage access

Security & analysis

Branches

Webhooks

Notifications

Integrations

Deploy keys

Secrets

Actions

Webhooks / Manage webhook

We'll send a POST request to the URL below with details of any subscribed events. You can also specify v (JSON, x-www-form-urlencoded, etc). More information can be found in [our developer documentation](#).

Payload URL *

http://35.154.223.246:8080/github-webhook/

Content type

application/x-www-form-urlencoded

Secret

Which events would you like to trigger this webhook?

Lab: Step 12

Configure CI-CD Pipelining

Jenkin dashboard

ALL (+) -- click on + ---> output : list view and my view -- build pipeline view (should be here, if not then install from plugins)

How : Jenkins --manage jenkins --manage plugins ---available -- filter : build pipeline (type in search box)

select build pipeline -- install without restart

Jenkins --- ALL (+) -- click on + : Now build pipeline view appear
view name: CI-CD pipeline -----ok

Build pipeline view title : CI-CD

pipeline flow --select initial job --- test ----ok

Now ALL, CI-CD : click on CI-CD
test