

## Experiment 07

Roll No.	70
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Class	D15-B
Subject	DevOps Lab
LO Mapped	<p>LO1: To understand the fundamentals of DevOps engineering and be fully proficient with DevOps terminologies, concepts, benefits, and deployment options to meet your business requirements</p> <p>LO2: To obtain complete knowledge of the “version control system” to effectively track changes augmented with Git and GitHub</p>

**Aim:** To understand Jenkins Master- Slave Architecture and scale your Jenkins standalone implementation by implementing slave nodes.

## **Theory:**

### **Jenkins Master**

Your main Jenkins server is the Master.

The Master's job is to handle:

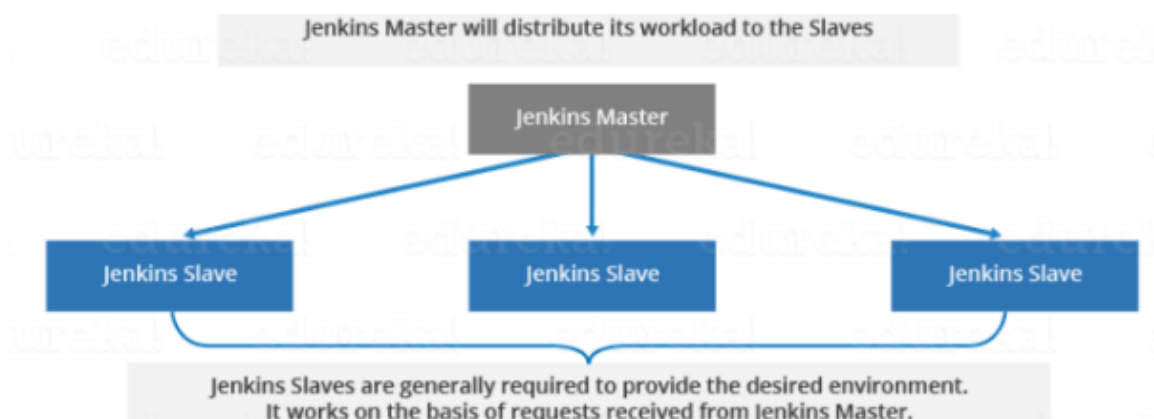
- Scheduling build jobs.
- Dispatching builds to the slaves for the actual execution.
- Monitor the slaves (possibly taking them online and offline as required).
- Recording and presenting the build results.
- A Master instance of Jenkins can also execute build jobs directly.

### **Jenkins Slave**

A Slave is a Java executable that runs on a remote machine.

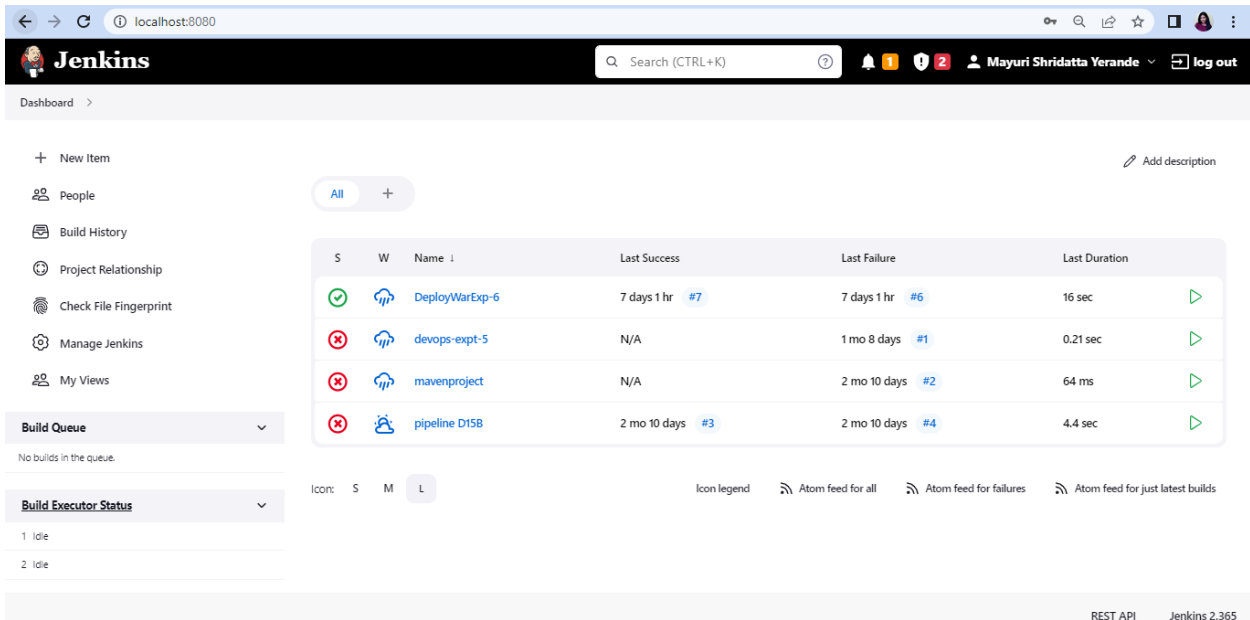
Following are the characteristics of Jenkins Slaves:

- It hears requests from the Jenkins Master instance.
- Slaves can run on a variety of operating systems.
- The job of a Slave is to do as they are told to, which involves executing build jobs dispatched by the Master.
- You can configure a project to always run on a particular Slave machine or a particular type of Slave machine, or simply let Jenkins pick the next available Slave.



## Implementation:

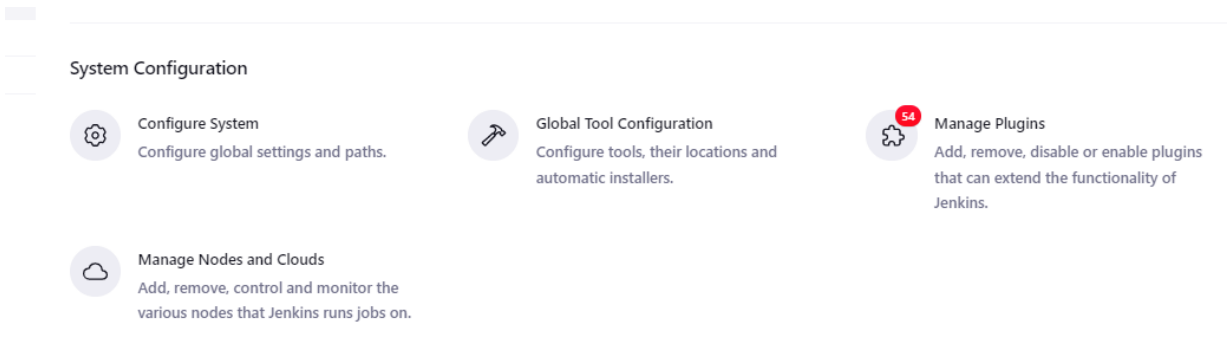
- Open your jenkins dashboard



The screenshot shows the Jenkins Dashboard at localhost:8080. The interface includes a sidebar with navigation options like 'New Item', 'People', 'Build History', and 'Project Relationship'. The main area displays a table of build jobs. The table has columns for status (S), icon (W), name, last success, last failure, and last duration. The jobs listed are 'DeployWarExp-6', 'devops-expt-5', 'mavenproject', and 'pipeline D15B'. Below the table, there are sections for 'Build Queue' (showing no builds) and 'Build Executor Status' (showing 2 idle executors). The bottom of the dashboard shows the REST API and Jenkins version 2.365.

S	W	Name	Last Success	Last Failure	Last Duration
✓	🔧	DeployWarExp-6	7 days 1 hr #7	7 days 1 hr #6	16 sec
✗	🔧	devops-expt-5	N/A	1 mo 8 days #1	0.21 sec
✗	🔧	mavenproject	N/A	2 mo 10 days #2	64 ms
✗	🔧	pipeline D15B	2 mo 10 days #3	2 mo 10 days #4	4.4 sec

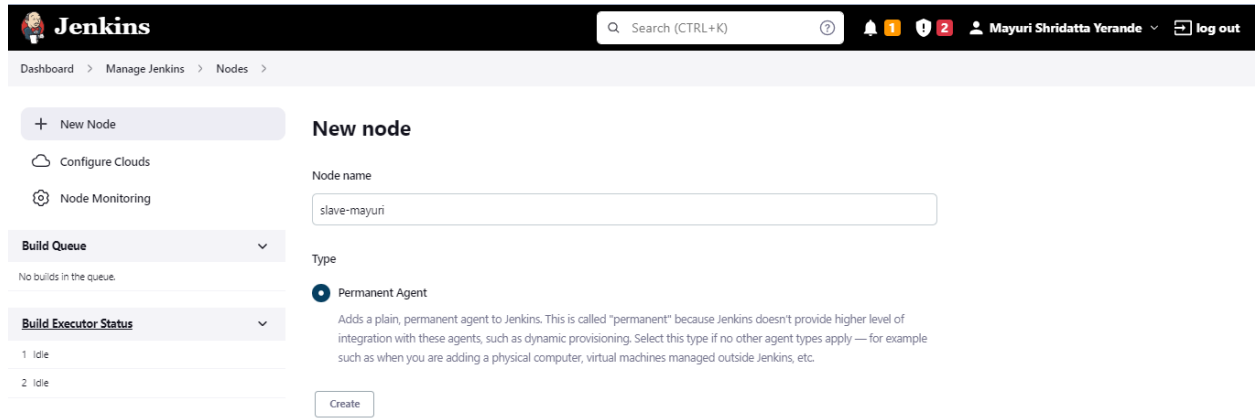
- Go to “manage jenkins”
- Go to “manage nodes and clouds”



The screenshot shows the 'System Configuration' page in Jenkins. It features four main configuration options, each with a gear icon and a description:

- 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. (Indicated by a red '54' badge)
- Manage Nodes and Clouds**: Add, remove, control and monitor the various nodes that Jenkins runs jobs on.

- Click on new node
- Name your node (like slave-mayuri)



The image shows the Jenkins 'New node' configuration page. The header includes the Jenkins logo, a search bar, and user information. The left sidebar contains navigation links: 'New Node', 'Configure Clouds', 'Node Monitoring', 'Build Queue', and 'Build Executor Status'. The main content area is titled 'New node' and contains a 'Node name' text field with the value 'slave-mayuri'. Below this is a 'Type' section with a radio button selected for 'Permanent Agent'. A description for 'Permanent Agent' is provided. At the bottom is a 'Create' button.

**Jenkins** Search (CTRL+K) Mayuri Shridatta Yerande log out

Dashboard > Manage Jenkins > Nodes >

+ New Node

Configure Clouds

Node Monitoring

**Build Queue** No builds in the queue.

**Build Executor Status**

1 Idle

2 Idle

**New node**

Node name

slave-mayuri

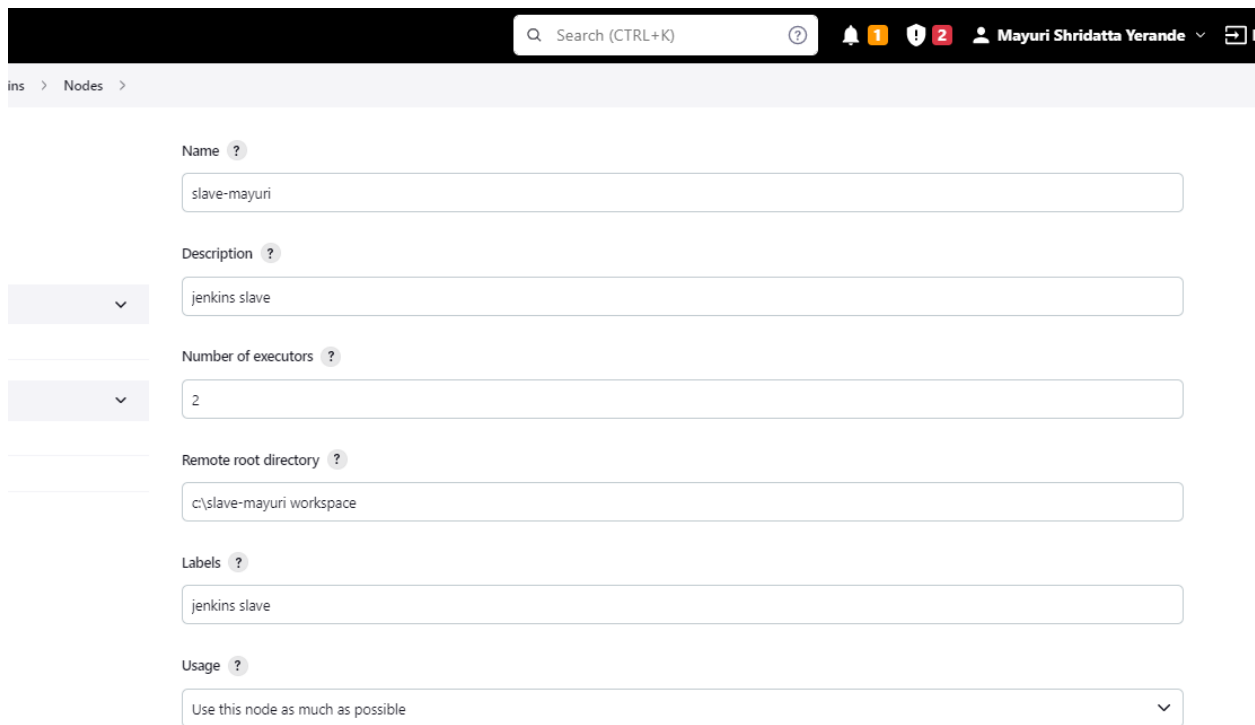
Type

☒ 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.

Create

- Fill the given details



The image shows the Jenkins 'New node' configuration page with the following details filled in:

- Name**: slave-mayuri
- Description**: jenkins slave
- Number of executors**: 2
- Remote root directory**: c:\slave-mayuri workspace
- Labels**: jenkins slave
- Usage**: Use this node as much as possible

The header and sidebar are the same as in the previous image.

ins > Nodes >

Name ?

slave-mayuri

Description ?

jenkins slave

Number of executors ?

2

Remote root directory ?

c:\slave-mayuri workspace

Labels ?

jenkins slave

Usage ?

Use this node as much as possible

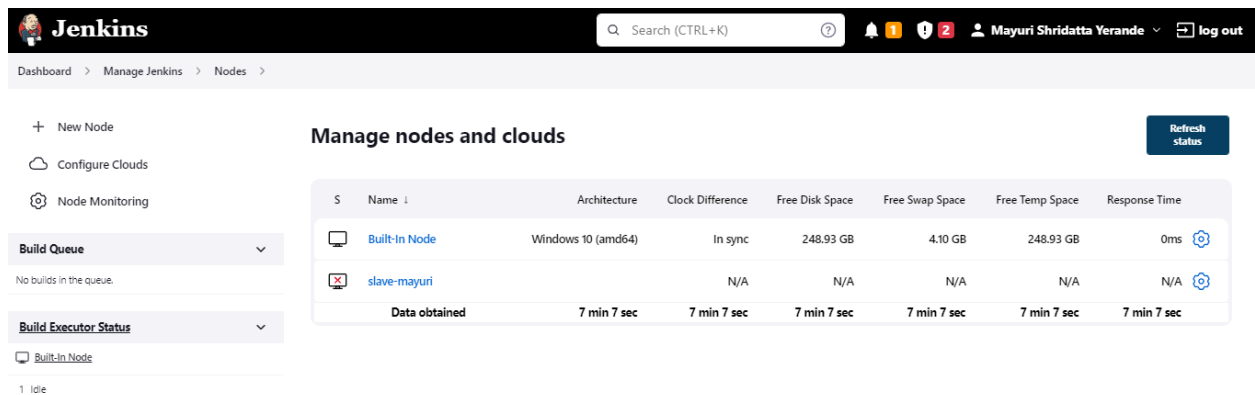
- Click on save

Keep this agent online as much as possible

#### Node Properties

- ☐ Disable deferred wipeout on this node ?
- ☐ Environment variables
- ☐ Tool Locations

Save



**Jenkins** Search (CTRL+K) Mayuri Shridatta Yerande log out

Dashboard > Manage Jenkins > Nodes >

+ New Node  
Configure Clouds  
Node Monitoring

**Build Queue** No builds in the queue.

**Build Executor Status** Built-In Node 1 idle

### Manage nodes and clouds

S	Name	Architecture	Clock Difference	Free Disk Space	Free Swap Space	Free Temp Space	Response Time
	Built-In Node	Windows 10 (amd64)	In sync	248.93 GB	4.10 GB	248.93 GB	0ms
	slave-mayuri		N/A	N/A	N/A	N/A	N/A
Data obtained		7 min 7 sec	7 min 7 sec	7 min 7 sec	7 min 7 sec	7 min 7 sec	7 min 7 sec

Refresh status

- Go to “configure global security” and do the following changes (after that, apply and save it)

Dashboard > Configure Global Security

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

localhost:8080

Save

Apply

- Go and check your node now
- Copy this line

Jenkins

Search (CTRL+K)

1 2 Mayuri Shridatta Yerande log out

Dashboard > Manage Jenkins > Nodes > slave-mayuri

Status

Delete Agent

Configure

Build History

Load Statistics

Log

Agent slave-mayuri (jenkins slave)

Mark this node temporarily offline

Run from agent command line:

```
curl -sO http://localhost:8080/jnlpJars/agent.jar
java -jar agent.jar -jnlpUrl http://localhost:8080/manage/computer/slave%20mayuri/jenkins-agent.jnlp -secret
8504f4631285c591df2e572bc85de288da236e0e7e3aec3c6013e9e8225cd2df -workDir "c:\slave-mayuri workspace"
```

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

- Go to command prompt and paste the copied line

```
Microsoft Windows [Version 10.0.19044.2006]
(c) Microsoft Corporation. All rights reserved.

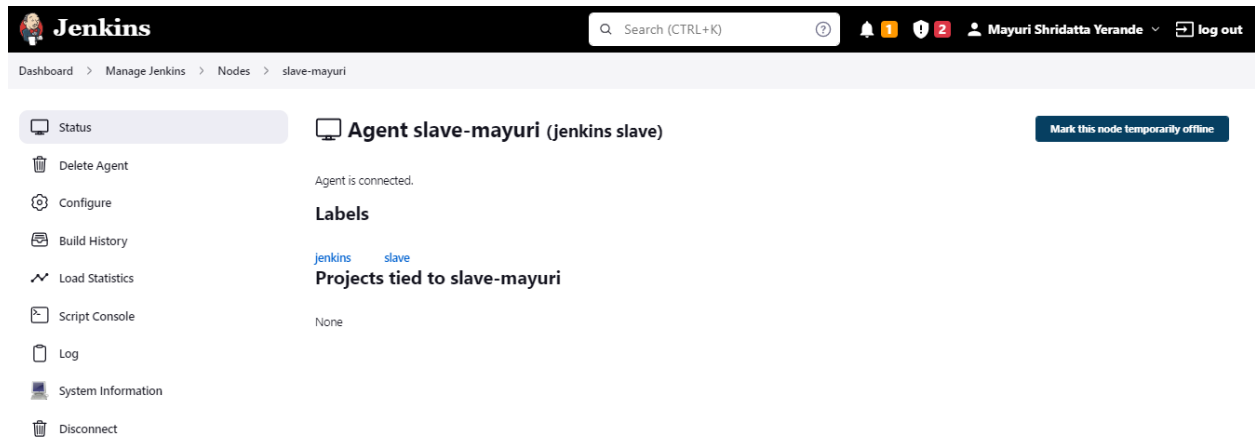
C:\Users\mayuri>java -jar agent.jar -jnlpUrl http://localhost:8080/manage/computer/slave%2Dmayuri/jenkins-agent.jnlp -secret d5d4f4631285c591df2e572bc85de288da236e0e7e3aec3c6013e9e8225cd2df -workDir "c:\slave-mayuri workspace"
```

```
(c) Microsoft Corporation. All rights reserved.

C:\Users\mayuri\Downloads>java -jar agent.jar -jnlpUrl http://localhost:8080/manage/computer/slave%2Dmayuri/jenkins-agent.jnlp -secret d5d4f4631285c591df2e572bc85de288da236e0e7e3aec3c6013e9e8225cd2df -workDir "c:\slave-mayuri workspace"
Oct 07, 2022 8:26:32 PM org.jenkinsci.remoting.engine.WorkDirManager initializeWorkDir
INFO: Using c:\slave-mayuri workspace\remoting as a remoting work directory
Oct 07, 2022 8:26:32 PM org.jenkinsci.remoting.engine.WorkDirManager setupLogging
INFO: Both error and output logs will be printed to c:\slave-mayuri workspace\remoting
Oct 07, 2022 8:26:33 PM hudson.remoting.jnlp.Main createEngine
INFO: Setting up agent: slave-mayuri
Oct 07, 2022 8:26:33 PM hudson.remoting.Engine startEngine
INFO: Using Remoting version: 3046.v38db_38a_b_7a_86
Oct 07, 2022 8:26:33 PM org.jenkinsci.remoting.engine.WorkDirManager initializeWorkDir
INFO: Using c:\slave-mayuri workspace\remoting as a remoting work directory
```

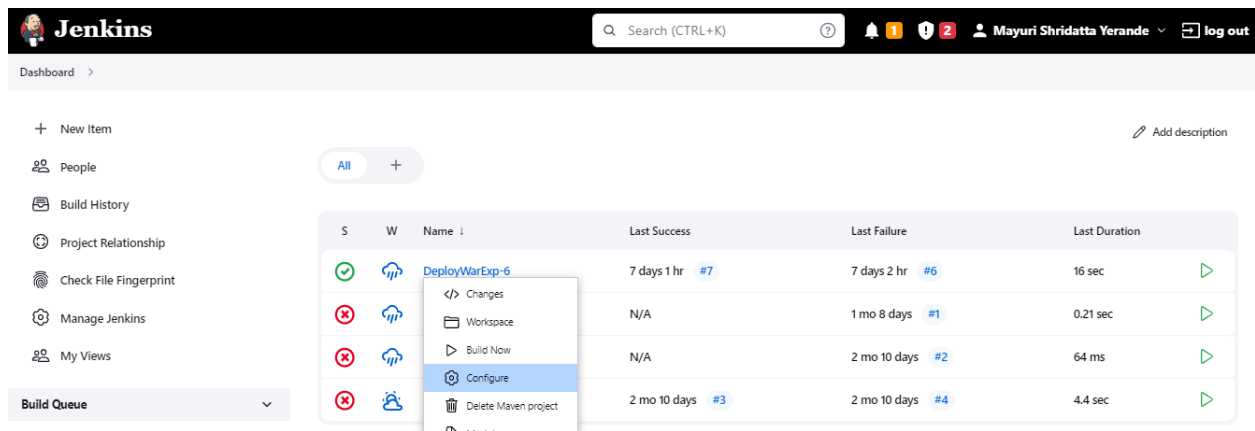
```
cmd Select C:\Windows\System32\cmd.exe - java -jar agent.jar -jnlpUrl http://localhost:8080/manage/computer/slave%2Dmayuri/jenkins-agent.jnlp -secret...
Oct 07, 2022 8:26:32 PM org.jenkinsci.remoting.engine.WorkDirManager setupLogging
INFO: Both error and output logs will be printed to c:\slave-mayuri workspace\remoting
Oct 07, 2022 8:26:33 PM hudson.remoting.jnlp.Main createEngine
INFO: Setting up agent: slave-mayuri
Oct 07, 2022 8:26:33 PM hudson.remoting.Engine startEngine
INFO: Using Remoting version: 3046.v38db_38a_b_7a_86
Oct 07, 2022 8:26:33 PM org.jenkinsci.remoting.engine.WorkDirManager initializeWorkDir
INFO: Using c:\slave-mayuri workspace\remoting as a remoting work directory
Oct 07, 2022 8:26:33 PM hudson.remoting.jnlp.Main$CuiListener status
INFO: Locating server among [http://localhost:8080/]
Oct 07, 2022 8:26:33 PM org.jenkinsci.remoting.engine.JnlpAgentEndpointResolver resolve
INFO: Remoting server accepts the following protocols: [JNLP4-connect, Ping]
Oct 07, 2022 8:26:33 PM hudson.remoting.jnlp.Main$CuiListener status
INFO: Agent discovery successful
  Agent address: localhost
  Agent port: 18860
  Identity: 91:3b:8a:f4:58:67:1f:b3:f4:c9:2b:e8:89:bd:8e:34
Oct 07, 2022 8:26:33 PM hudson.remoting.jnlp.Main$CuiListener status
INFO: Handshaking
Oct 07, 2022 8:26:33 PM hudson.remoting.jnlp.Main$CuiListener status
INFO: Connecting to localhost:18860
Oct 07, 2022 8:26:33 PM hudson.remoting.jnlp.Main$CuiListener status
INFO: Trying protocol: JNLP4-connect
Oct 07, 2022 8:26:33 PM org.jenkinsci.remoting.protocol.impl.BIONetworkLayer$Reader run
INFO: Waiting for ProtocolStack to start.
Oct 07, 2022 8:26:34 PM hudson.remoting.jnlp.Main$CuiListener status
INFO: Remote identity confirmed: 91:3b:8a:f4:58:67:1f:b3:f4:c9:2b:e8:89:bd:8e:34
Oct 07, 2022 8:26:34 PM hudson.remoting.jnlp.Main$CuiListener status
INFO: Connected
```

- Thus now the agent is connected.



The screenshot shows the Jenkins interface for managing a slave agent named 'slave-mayuri'. The left sidebar contains a menu with options: Status, Delete Agent, Configure, Build History, Load Statistics, Script Console, Log, System Information, and Disconnect. The main content area shows the agent's status as 'Agent is connected.' and a 'Mark this node temporarily offline' button. Below this, there are sections for 'Labels' (jenkins, slave) and 'Projects tied to slave-mayuri' (None).

- Now configure one of your project



The screenshot shows the Jenkins 'Build Queue' page. The left sidebar contains a menu with options: New Item, People, Build History, Project Relationship, Check File Fingerprint, Manage Jenkins, My Views, and Build Queue. The main content area shows a table of builds in the queue. A context menu is open over the first build, 'DeployWarExp-6', showing options: Changes, Workspace, Build Now, Configure, and Delete Maven project. The 'Configure' option is highlighted.

S	W	Name	Last Success	Last Failure	Last Duration
✓	🔧	DeployWarExp-6	7 days 1 hr #7	7 days 2 hr #6	16 sec
✗	🔧	</> Changes	N/A	1 mo 8 days #1	0.21 sec
✗	🔧	Workspace	N/A	2 mo 10 days #2	64 ms
✗	🔧	Build Now	N/A	2 mo 10 days #3	4.4 sec
✗	🔧	Delete Maven project	2 mo 10 days #4		

- Restrict your slave from that project
- (apply and save after that)



☐ Throttle builds ?

☐ Execute concurrent builds if necessary ?

☒ Restrict where this project can be run ?

Label Expression ?

slave-mayuri

Label **slave-mayuri** matches 1 node. Permissions or other restrictions provided by plugins may further reduce that list.

Advanced...

Source Code Management

Save Apply

- Click on build now

**Jenkins** Search (CTRL+K) Mayuri Shridatta Yerande log out

Dashboard > devops-expt-5 > #2

Status

</> Changes

Console Output

Edit Build Information

Delete build '#2'

Git Build Data

Previous Build

**Build #2 (Oct 7, 2022, 8:53:47 PM)**

Keep this build forever

Started 15 sec ago

Took 5.9 sec on slave-mayuri

Add description

No changes.

Started by user Mayuri Shridatta Yerande

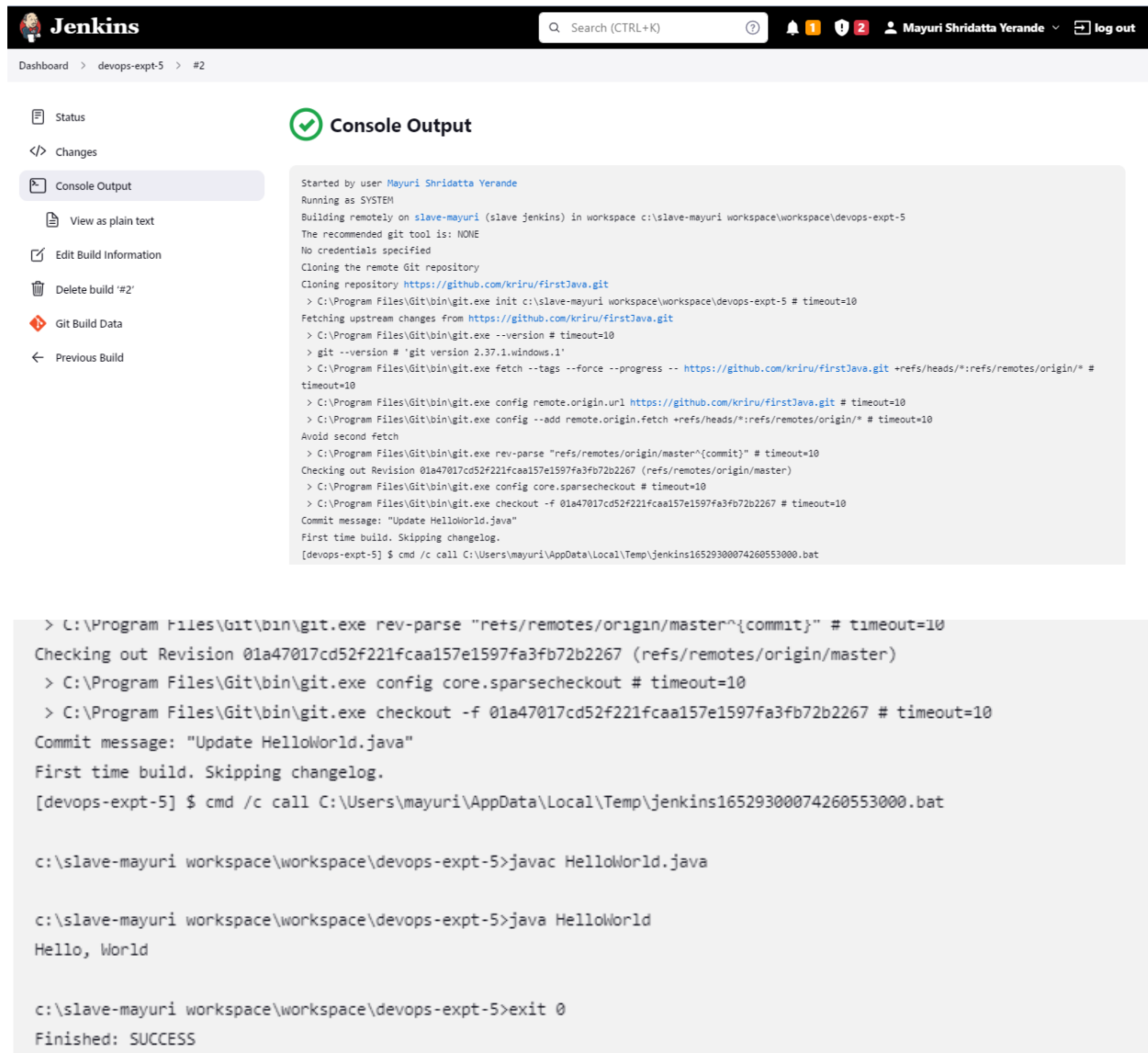
git

Revision: 01a47017cd52f221fcaa157e1597fa3fb72b2267

Repository: <https://github.com/kriiru/firstJava.git>

- refs/remotes/origin/master

- Go to console output:



The screenshot displays the Jenkins web interface. The top navigation bar includes the Jenkins logo, a search bar, and user information for Mayuri Shridatta Yerande. The left sidebar shows the build history for 'devops-expt-5', with the current build (#2) selected. The main area is titled 'Console Output' and shows the following log:

```

Started by user Mayuri Shridatta Yerande
Running as SYSTEM
Building remotely on slave-mayuri (slave jenkins) in workspace c:\slave-mayuri workspace\workspace\devops-expt-5
The recommended git tool is: NONE
No credentials specified
Cloning the remote Git repository
Cloning repository https://github.com/kriru/firstJava.git
> C:\Program Files\Git\bin\git.exe init c:\slave-mayuri workspace\workspace\devops-expt-5 # timeout=10
Fetching upstream changes from https://github.com/kriru/firstJava.git
> C:\Program Files\Git\bin\git.exe --version # timeout=10
> git --version # 'git version 2.37.1.windows.1'
> C:\Program Files\Git\bin\git.exe fetch --tags --progress -- https://github.com/kriru/firstJava.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> C:\Program Files\Git\bin\git.exe config remote.origin.url https://github.com/kriru/firstJava.git # timeout=10
> C:\Program Files\Git\bin\git.exe config --add remote.origin.fetch +refs/heads/*:refs/remotes/origin/* # timeout=10
Avoid second fetch
> C:\Program Files\Git\bin\git.exe rev-parse "refs/remotes/origin/master^{commit}" # timeout=10
Checking out Revision 01a47017cd52f221fcaa157e1597fa3fb72b2267 (refs/remotes/origin/master)
> C:\Program Files\Git\bin\git.exe config core.sparsecheckout # timeout=10
> C:\Program Files\Git\bin\git.exe checkout -f 01a47017cd52f221fcaa157e1597fa3fb72b2267 # timeout=10
Commit message: "Update HelloWorld.java"
First time build. Skipping changelog.
[devops-expt-5] $ cmd /c call C:\Users\mayuri\AppData\Local\Temp\jenkins16529300074260553000.bat

> C:\Program Files\Git\bin\git.exe rev-parse "refs/remotes/origin/master^{commit}" # timeout=10
Checking out Revision 01a47017cd52f221fcaa157e1597fa3fb72b2267 (refs/remotes/origin/master)
> C:\Program Files\Git\bin\git.exe config core.sparsecheckout # timeout=10
> C:\Program Files\Git\bin\git.exe checkout -f 01a47017cd52f221fcaa157e1597fa3fb72b2267 # timeout=10
Commit message: "Update HelloWorld.java"
First time build. Skipping changelog.
[devops-expt-5] $ cmd /c call C:\Users\mayuri\AppData\Local\Temp\jenkins16529300074260553000.bat

c:\slave-mayuri workspace\workspace\devops-expt-5>javac HelloWorld.java

c:\slave-mayuri workspace\workspace\devops-expt-5>java HelloWorld
Hello, World

c:\slave-mayuri workspace\workspace\devops-expt-5>exit 0
Finished: SUCCESS

```

**Conclusion:** We successfully understood Jenkins Master- Slave Architecture and scaled our Jenkins standalone implementation by implementing slave nodes.