



# Vidyavardhini's College of Engineering and Technology

## Department of Artificial Intelligence & Data Science

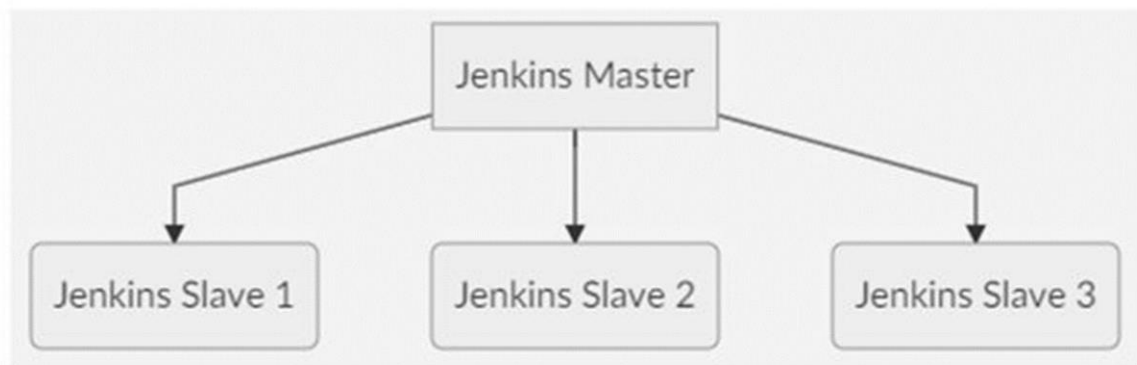
### Experiment No. 06

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

#### **Theory:**

A Jenkins master comes with the basic installation of Jenkins, and in this configuration, the master handles all the tasks for your build system. You are working on multiple projects, you may run multiple jobs on each project. Some projects need to run on some nodes, and in this process, we need to configure slaves. Jenkins slaves connect to the Jenkins master using the Java Network Launch Protocol.

Jenkins Master and Slave Architecture



The Jenkins master acts to schedule the jobs, assign slaves, and send builds slaves to execute the jobs. It will also monitor the slave state (offline or online) and get back the build result responses from slaves and the display build results on the console output. The workload of building jobs is delegated to multiple slaves.

#### **Steps:**

- Click on Manage Jenkins in the left corner on the Jenkins dashboard. - Scroll down, Click on Manage Nodes and clouds.



- Select New Node and enter the name of the node in the Node Name field.



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Select **New Node** and enter the name of the node in the Node Name field.



The image shows the Jenkins 'New Node' dialog box. It has a sidebar with links: 'Back to Dashboard', 'Manage Jenkins', 'New Node' (selected), and 'Configure Clouds'. The main area has a 'Node name' input field. Below it, the 'Permanent Agent' option is selected, with a description: '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.' There is an 'OK' button at the bottom right.

- Select Permanent Agent and click the OK button. Initially, you will get only one option, "Permanent Agent." Once you have one or more slaves you will get the "Copy Existing Node" option.

Select **Permanent Agent** and click the **OK** button. Initially, you will get only one option, "Permanent Agent." Once you have one or more slaves you will get the "Copy Existing Node" option.



S	Name	Architecture	Clock Difference	Free Disk Space	Free Swap Space	Free Temp Space	Response Time
	master	Windows 10 (amd64)	In sync	132.81 GB	5.12 GB	132.81 GB	
	Parallel_Agent_01		N/A	N/A	N/A	N/A	
Data obtained		6 min 4 sec	6 min 4 sec	6 min 4 sec	6 min 4 sec	6 min 4 sec	6 min 4

Refresh status

In the above screen shot, Parallel\_Agent\_01 was Created and currently it is in offline mode.

- Click on configure, Provide the details.
  - Name -Parallel\_Agent\_01.
  - Number of executors- 5.
  - Remote root directory-We have to provide a Jenkins path.
  - Labels-Parallel\_Agent.
  - Launch method-Launch agent by connecting it to the master.



	Parallel_Agent_01		N/A	N/A	N/A	N/A	
17 min		17 min	17 min	17 min	17 min	17 min	17

Refresh status

Context menu for Parallel\_Agent\_01:

- Delete Agent
- Configure
- Build History
- Load Statistics
- Log

- Node Properties Tab:
  - Check Environment variables Provide the Java path
  - Check Tool Locations

Provide the Git path and click on save button.



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Jenkins - Nodes - Parallel\_Agent\_01

Back to List  
Status  
Delete Agent  
Configure  
Build History  
Load Statistics  
Log  
Build Executor Status

Name: Parallel\_Agent\_01  
Description:  
# of executors: 5  
Remote root directory: C:\Program Files\Jenkins  
Labels: Parallel\_Agent  
Usage: Use this node as much as possible  
Launch method: Launch agent by connecting it to the master  
☐ Disable Workspace  
Custom workspace path:  
Internal data directory: /workspace  
☐ Fail if workspace is missing

Availability: Keep this agent online as much as possible

Node Properties

☒ Environment variables  
List of variables:  
Name: Java\_Home  
Value: C:\Program Files\Java\jdk1.8.0\_171  
Delete  
Add

☒ Tool Locations  
List of tool locations:  
Name: (GIT) GIT\_HOME  
Home: C:\Program Files\Git\bin\git.exe  
Delete  
Add

Save

- Click on Go to the security configuration screen and change it. It will redirect to Configure Global Security → Agents > click on Fixed radio button port: 49187 and click on save Button. Go back to Nodes settings.

Jenkins - Nodes - Parallel\_Agent\_01

Back to List  
Status  
Delete Agent  
Configure  
Build History  
Load Statistics  
Log  
Build Executor Status

Agent Parallel\_Agent\_01  
Mark this node temporarily offline

Labels  
Parallel\_Agent  
Projects tied to Parallel\_Agent\_01  
None

- We can see the screen,

Jenkins - Nodes - Parallel\_Agent\_01

Back to List  
Status  
Delete Agent  
Configure  
Build History  
Load Statistics  
Log  
Build Executor Status

Agent Parallel\_Agent\_01  
Mark this node temporarily offline

Connect agent to Jenkins one of these ways:

- Launch agent from browser
- Run from agent command line

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

Labels  
Parallel\_Agent  
Projects tied to Parallel\_Agent\_01  
None

- Click on Launch button, it will download the launch agent in your system.
- Jenkins-slave.exe file should copy in the Jenkins folder which you installed in your system.
- Double Click on jenkins - slave.exe.



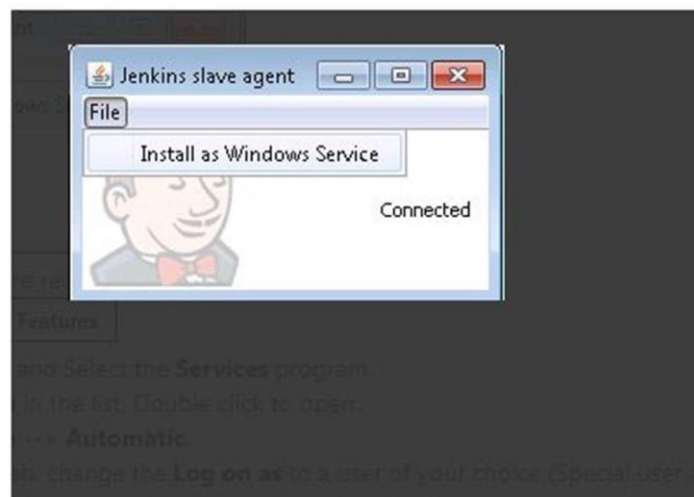
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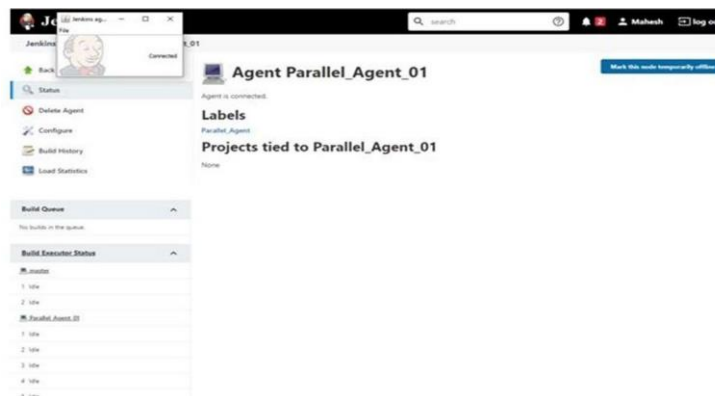
I Disk (C:) > Program Files > Jenkins

Name	Date modified	Type	Size
jenkins-slave.wrapper.log	08-02-2021 11:21	Text Document	2 KB
jenkins_agent.pid	08-02-2021 11:21	PID File	1 KB
jenkins-slave.err.log	08-02-2021 11:21	Text Document	0 KB
jenkins-slave.out.log	08-02-2021 11:21	Text Document	0 KB
jenkins-slave.exe	08-02-2021 11:20	Application	606 KB
jenkins-slave.xml	08-02-2021 11:20	XML Document	4 KB
slave.jar	08-02-2021 11:20	Executable Jar File	1,486 KB
slave-agent.jnlp	08-02-2021 11:19	JNLP File	1 KB
jenkins.err.log	08-02-2021 11:17	Text Document	8 KB
jenkins.out.log	08-02-2021 11:15	Text Document	1 KB
jenkins.wrapper.log	08-02-2021 11:15	Text Document	3 KB
jenkins.xml	08-02-2021 11:13	XML Document	3 KB
jenkins.exe.config	25-01-2021 17:08	XML Configuratio...	1 KB
Jenkins.war	25-01-2021 17:06	WAR File	65,711 KB
jenkins.exe	25-01-2021 14:58	Application	606 KB
remoting	08-02-2021 11:20	File folder	

- Run the launch agent, click on the run button and it will show connected.



- In the screenshot below, we can see the connected popup, click on the file menu, select the install as service and click yes button. Once it is done, refresh the page.

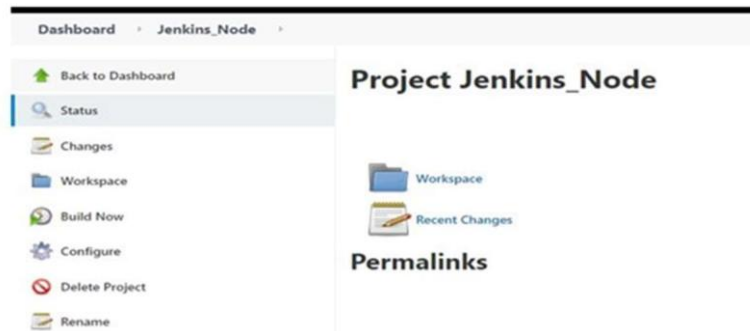


- we can see the Build executors. One is master and other is Parallel\_agent\_01 In Master node, we can see the number of executors as 2.
  1. In Parallel\_agent\_01, we can see the number of executors as 5.
  2. Go to build job -> configure.

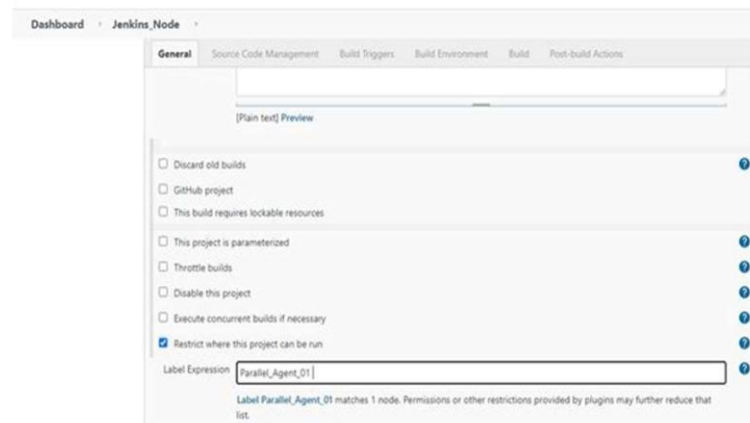


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3. In the General tab, check on Restrict where this project can be run.
4. In Label Expression, we have to select the node name where we need to execute the build job.



5. We can create more nodes as well.

### Conclusion:

#### Q1. How does Jenkins communicate between master and slave?

Jenkins communicates with slave nodes using the Java Network Launch Protocol (JNLP). The master initiates the connection and sends build tasks to the slaves, which then execute the tasks and report back the results to the master.

#### Q2. How many slaves can be connected to Jenkins master?

Jenkins can handle a large number of slave nodes connected to a single master. The exact limit depends on various factors such as system resources, network configuration, and workload. In practice, Jenkins can support hundreds or even thousands of slave nodes in large-scale distributed build environments.