Mahavir Education Trust's
SHAH & ANCHOR KUTCHHI ENGINEERING COLLEGE
Chembur, Mumbai - 400 088
UG Program in Artificial Intelligence and Data Science

Experiment No. 6

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

Theory:

Jenkins:

Jenkins is an open-source automation tool written in Java with plugins built for Continuous Integration purposes. Jenkins is used to build and test your software projects 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 you to continuously deliver your software by integrating with a large number of testing and deployment technologies.

If 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 Distributed Architecture:

Jenkins uses a Master-Slave architecture to manage distributed builds. In this architecture, Master and Slave communicate through TCP/IP protocol.

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.

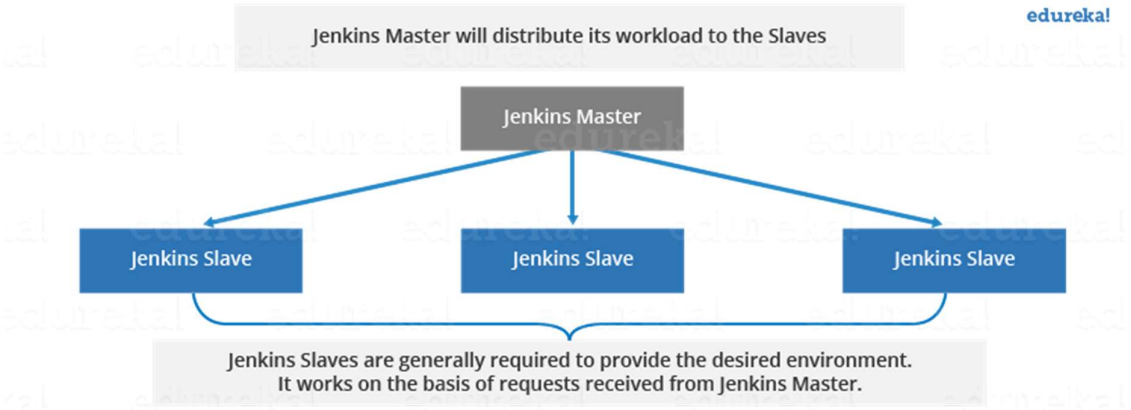
Jenkins Slave:

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.

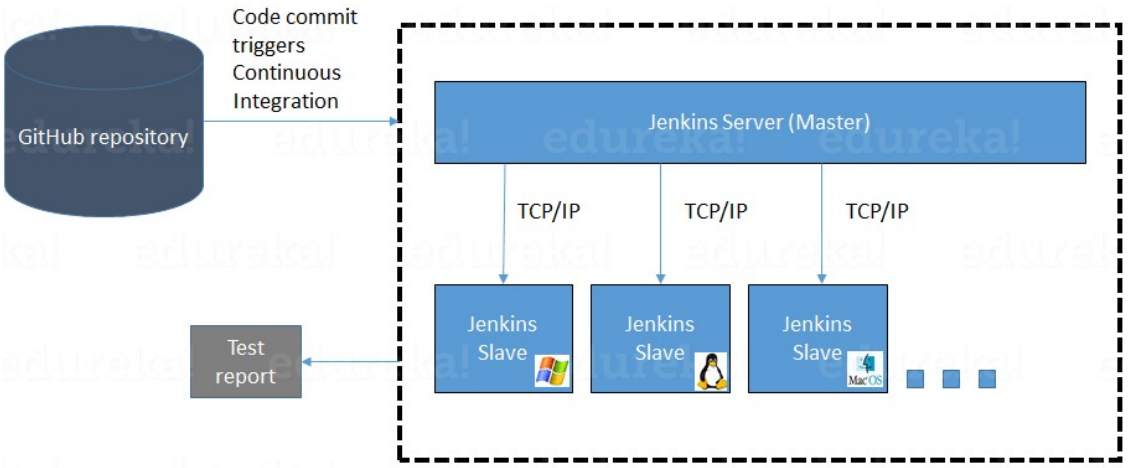
The diagram below is self-explanatory. It consists of a Jenkins Master which is managing three Jenkins Slave.



How Jenkins Master and Slave Architecture works?

Now let us look at an example in which we use Jenkins for testing in different environments like Ubuntu, MAC, Windows, etc.

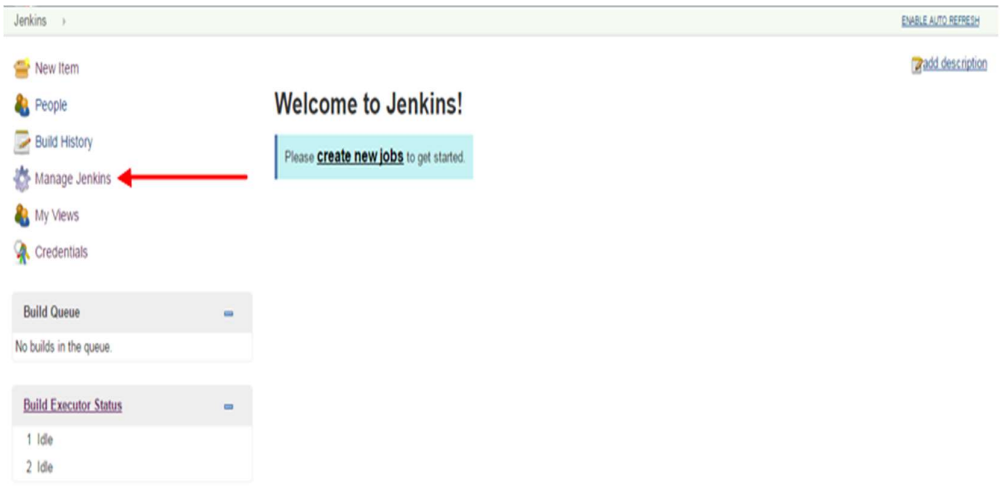
The diagram below represents the same:



The above image represents the following functions:

- Jenkins checks the Git repository at periodic intervals for any changes made in the source code.
- Each builds requires a different testing environment which is not possible for a single Jenkins server. In order to perform testing in different environments, Jenkins uses various Slaves as shown in the diagram.
- Jenkins Master requests these Slaves to perform testing and to generate test reports.

Output:



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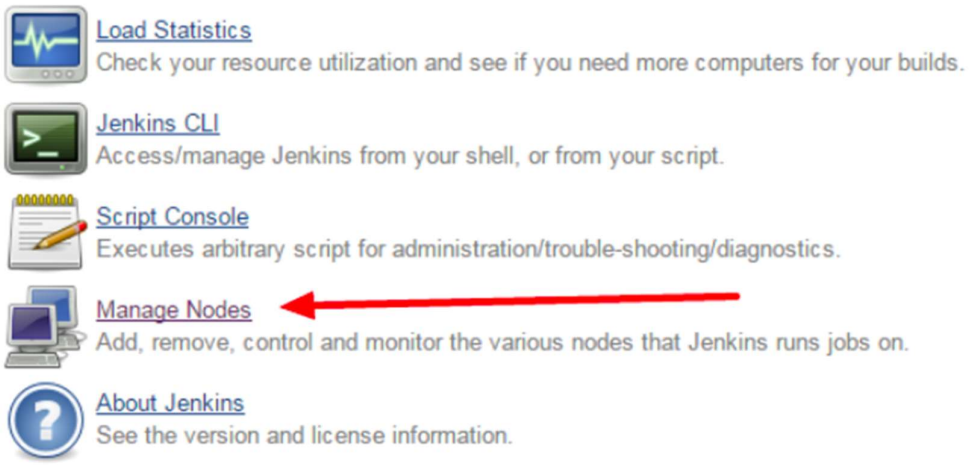
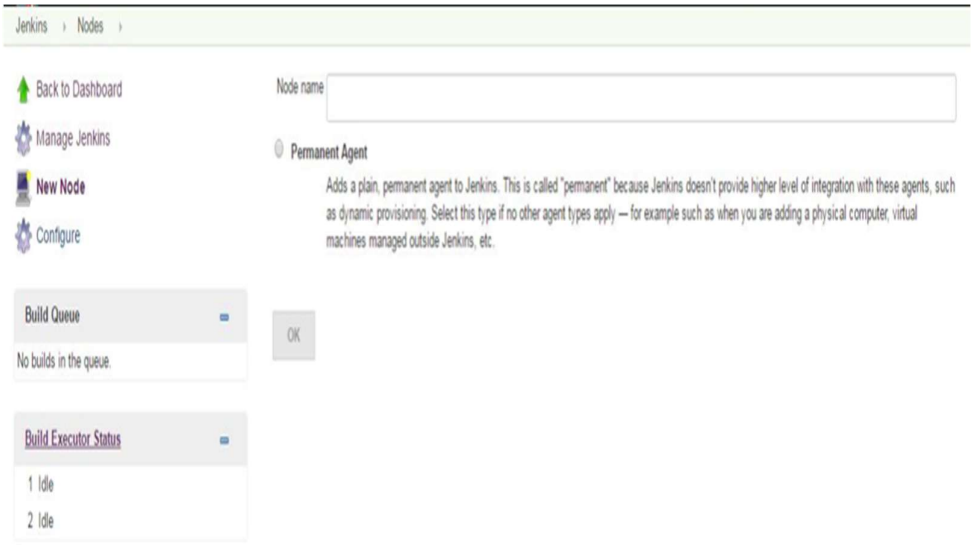
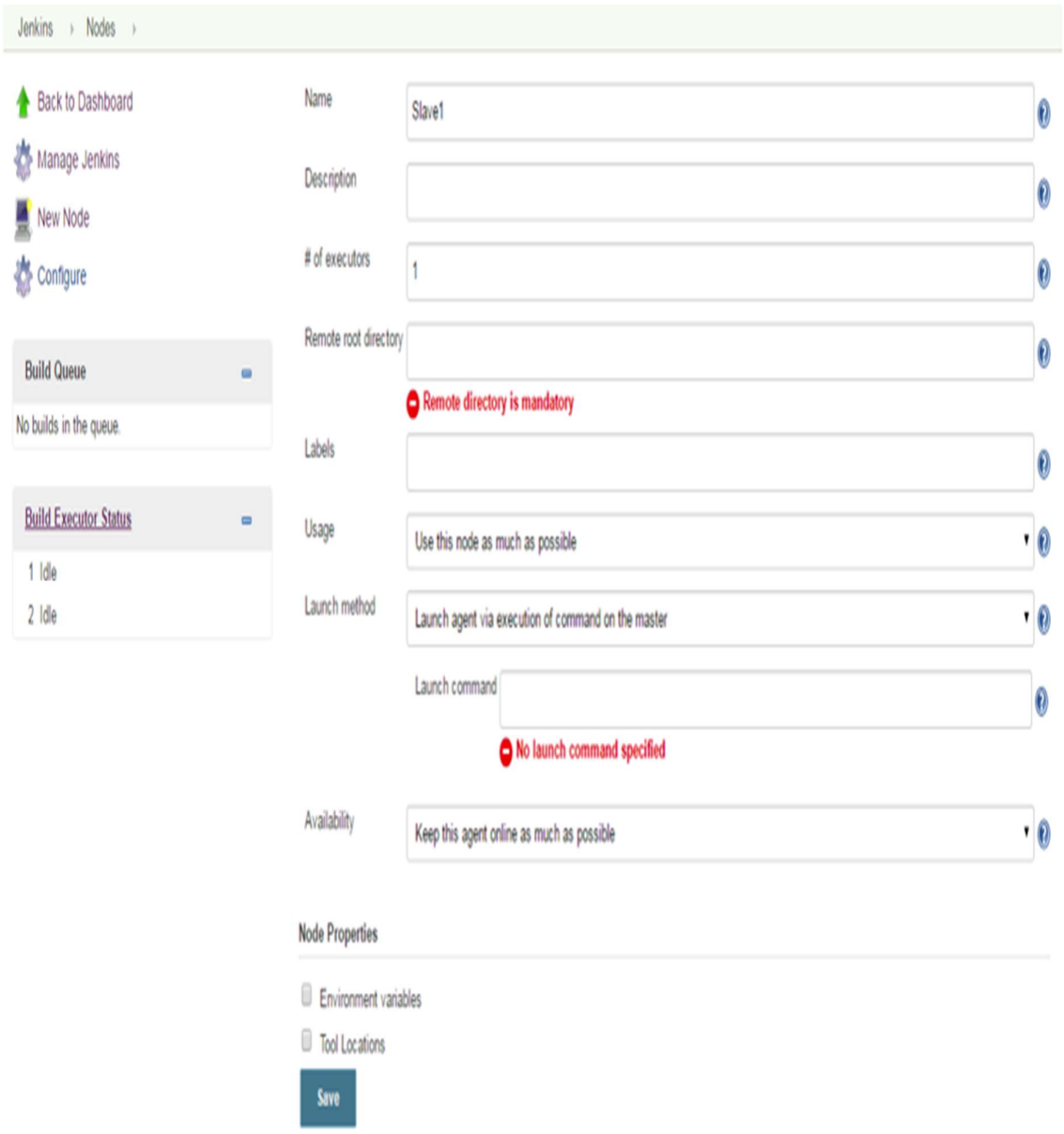
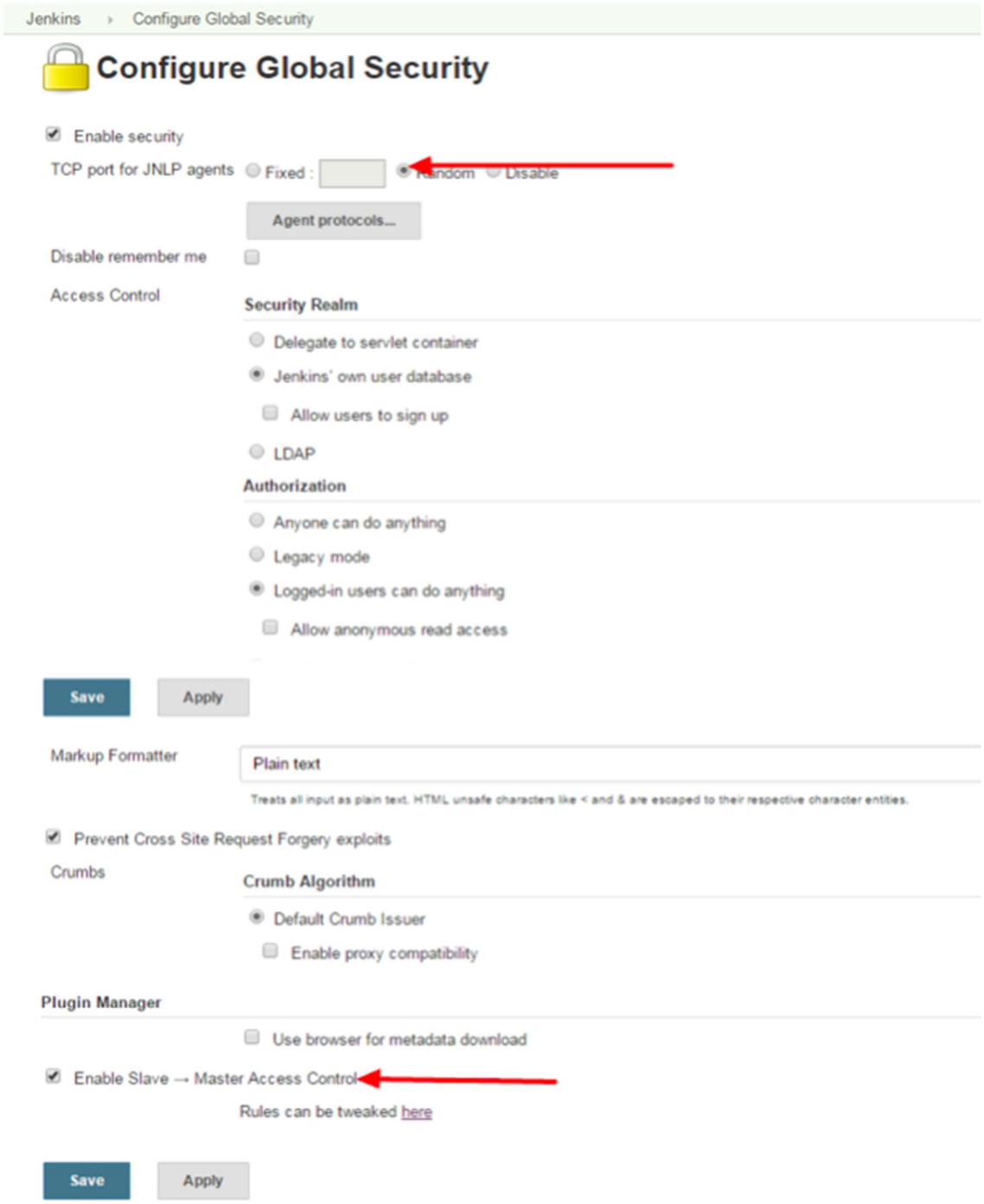
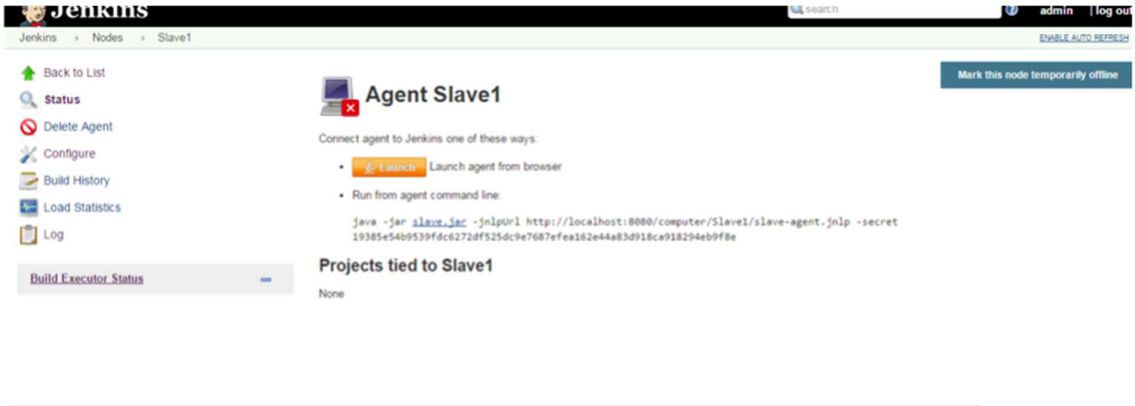
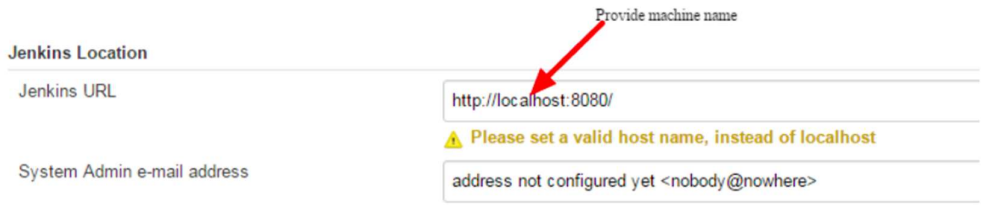


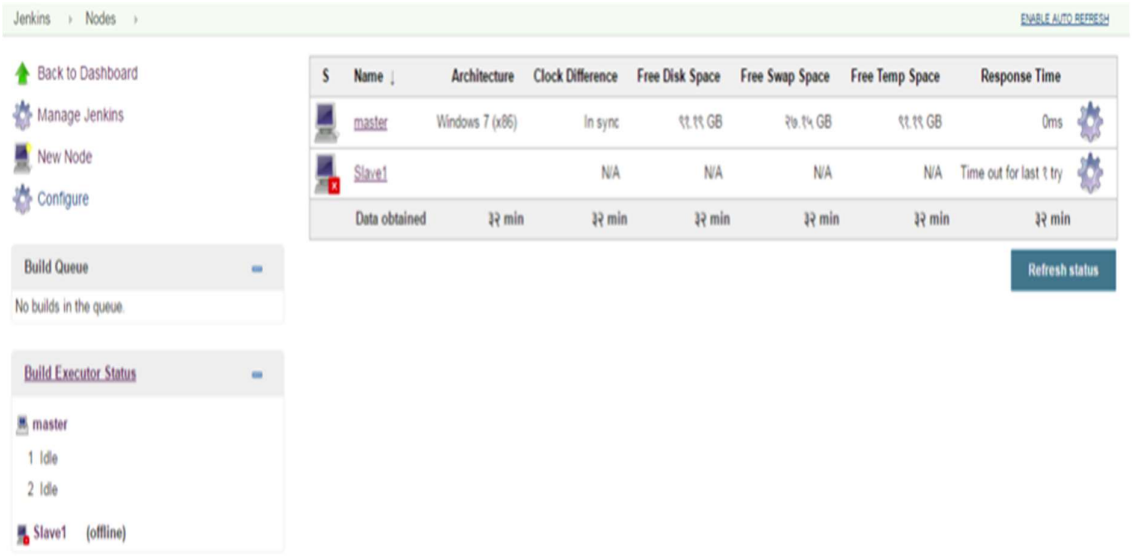



Jenkins › Nodes ›
Back to Dashboard
Manage Jenkins
New Node
Configure
Build Queue
No builds in the queue.
Build Executor Status
1 Idle
2 Idle
Name
Slave1
Description
# of executors
1
Remote root directory
Remote directory is mandatory
Labels
Usage
Use this node as much as possible
Launch method
Launch agent via execution of command on the master
Launch command
No launch command specified
Availability
Keep this agent online as much as possible
Node Properties
Environment variables
Tool Locations
Save


Jenkins › Configure Global Security
Configure Global Security
Enable security
TCP port for JNLP agents
Fixed :
Random
Disable
Agent protocols...
Disable remember me
Access Control
Security Realm
Delegate to servlet container
Jenkins' own user database
Allow users to sign up
LDAP
Authorization
Anyone can do anything
Legacy mode
Logged-in users can do anything
Allow anonymous read access
Save
Apply
Markup Formatter
Plain text
Treats all input as plain text. HTML unsafe characters like < and & are escaped to their respective character entities.
Prevent Cross Site Request Forgery exploits
Crumbs
Crumb Algorithm
Default Crumb Issuer
Enable proxy compatibility
Plugin Manager
Use browser for metadata download
Enable Slave → Master Access Control
Rules can be tweaked here
Save
Apply


Jenkins
Jenkins › Nodes › Slave1
admin | log out
ENABLE AUTO REFRESH
Back to List
Status
Delete Agent
Configure
Build History
Load Statistics
Log
Build Executor Status
Mark this node temporarily offline
Agent Slave1
Connect agent to Jenkins one of these ways:
Launch agent from browser
Run from agent command line:
java -jar slave.jar -jnlpUrl http://localhost:8080/computer/Slave1/slave-agent.jnlp -secret 19385e54b9539fdc6272df525dc9e7687efea162e44a83d918ca918294eb9f8e
Projects tied to Slave1
None


Provide machine name
Jenkins Location
Jenkins URL
http://localhost:8080/
Please set a valid host name, instead of localhost
System Admin e-mail address
address not configured yet <nobody@nowhere>


Jenkins › Nodes ›
ENABLE AUTO REFRESH
Back to Dashboard
Manage Jenkins
New Node
Configure
Build Queue
No builds in the queue.
Build Executor Status
master
1 Idle
2 Idle
Slave1 (offline)
S
Name
Architecture
Clock Difference
Free Disk Space
Free Swap Space
Free Temp Space
Response Time
master
Windows 7 (x86)
In sync
GB
GB
GB
0ms
Slave1
N/A
N/A
N/A
N/A
Time out for last try
Data obtained
min
min
min
min
min
Refresh status

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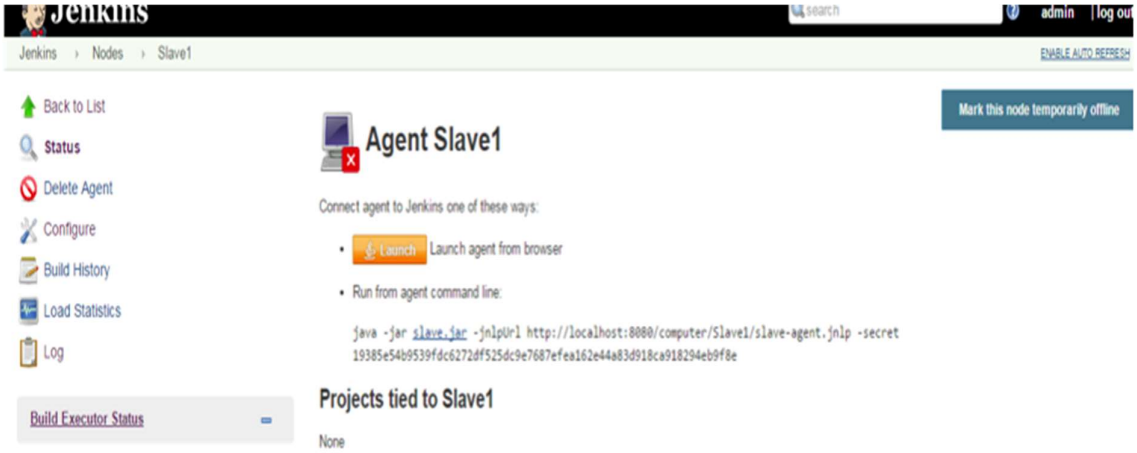

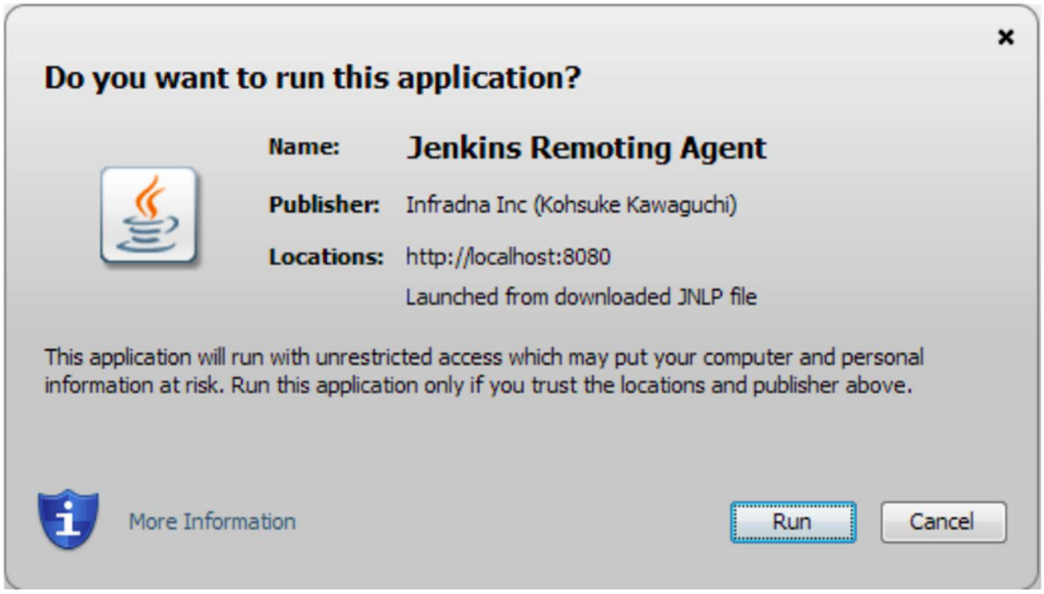

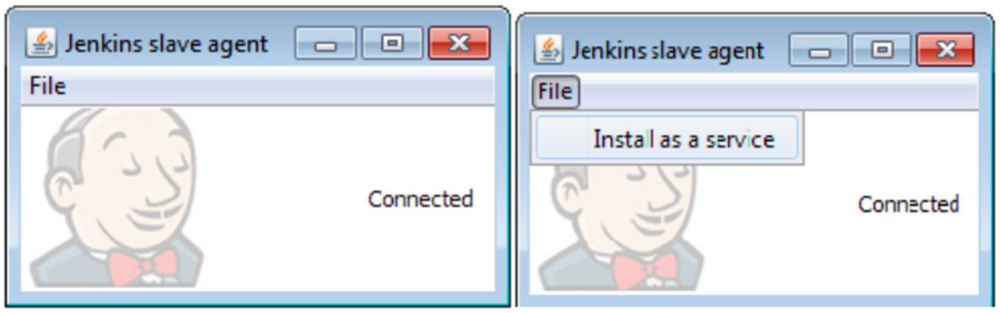

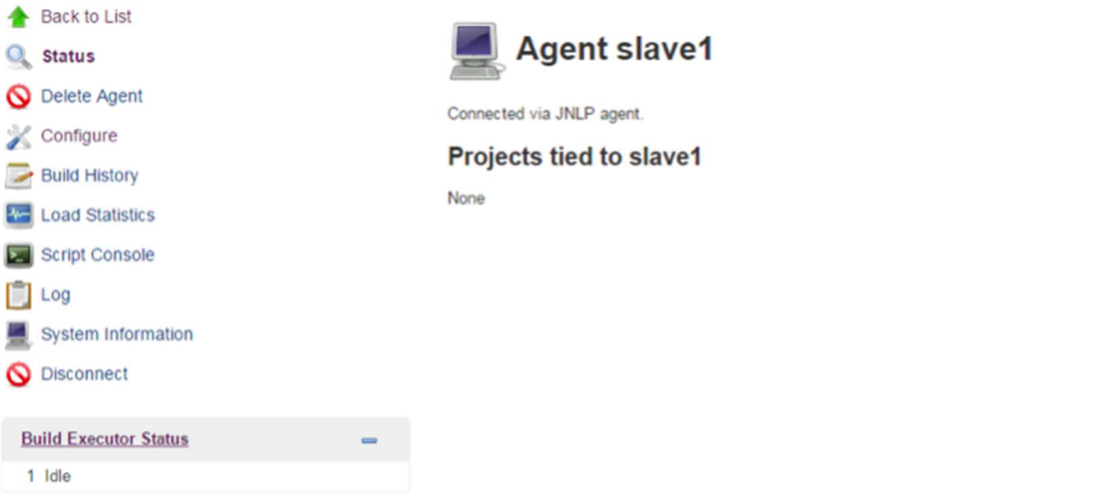

Conclusion:

Hence, we have successfully understood & configured Master-Slave Architecture & Implemented slave nodes for standalone Jenkins program.