

St. Francis Institute of Technology, Mumbai-400 103
Department Of Information Technology

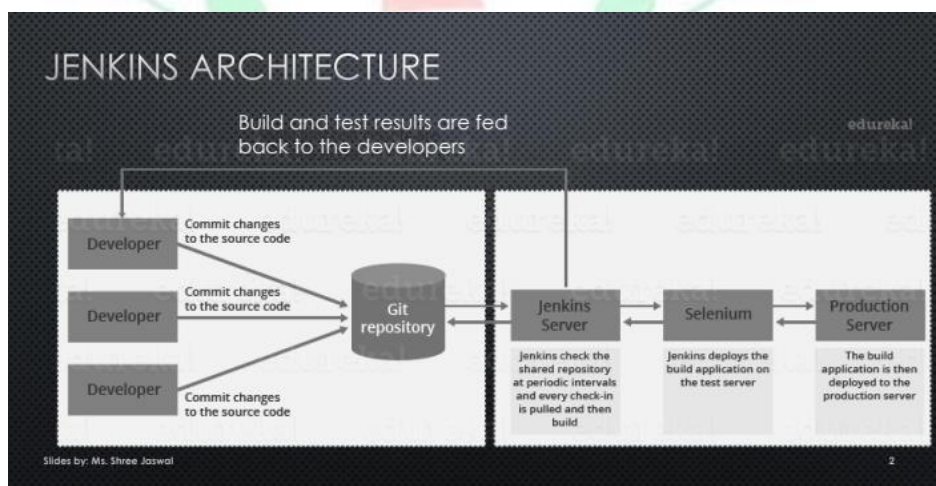
A.Y. 2023-2024

Class: TE-ITA/B, Semester: V

Subject: **DevOps Lab**

Experiment – 7: To understand master-slave architecture and scale your Jenkins standalone implementation by implementing slave nodes.

1. **Aim:** To understand master-slave architecture and scale your Jenkins standalone implementation by implementing slave nodes
2. **Objectives:** Aim of this experiment is that, the students will be able to do
 - Jenkins management
 - Adding a slave node to Jenkins
3. **Outcomes:** After study of this experiment, the students will be able
 - To understand the importance of Jenkins to Build and deploy Software Applications on server environment.
4. **Prerequisite:** Knowledge of Computer Networks concept of Master-slave architecture
5. **Requirements:** Jenkins, JDK, python, Personal Computer, Windows operating system, browser, Internet Connection, Microsoft Word.
6. **Pre-Experiment Exercise:**
Brief Theory: Refer shared material
7. **Laboratory Exercise**
 - A. **Procedure:**
 - a. **Answer the following:**
 - Explain the architecture of Jenkins with diagram.



Jenkins Architecture

Here's how Jenkins elements are put together and interact:

Developers commit changes to the source code, found in the repository.

The Jenkins CI server checks the repository at regular intervals and pulls any newly available code.

The Build Server builds the code into an executable file. In case the build fails, feedback is sent to the developers.

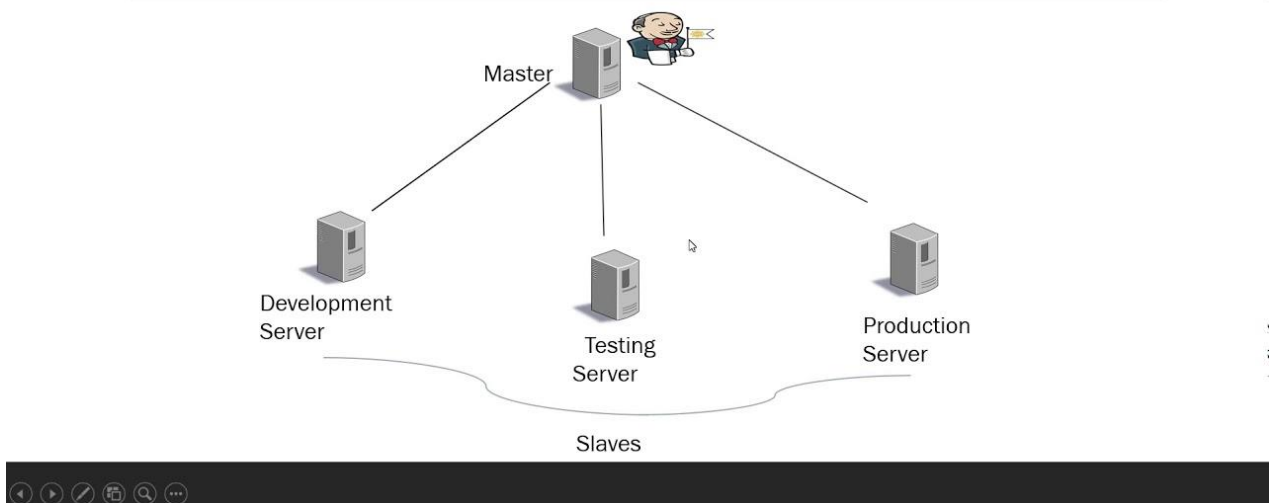
Jenkins deploys the build application to the test server. If the test fails, the developers are alerted.

If the code is error-free, the tested application is deployed on the production server.

The files can contain different code and be very large, requiring multiple builds. However, a single Jenkins server cannot handle multiple files and builds simultaneously; for that, a distributed Jenkins architecture is necessary.

- Explain the distributed architecture of Jenkins with diagram?
In a distributed Jenkins architecture, multiple build agents (slaves) are used to distribute the workload across different machines. This approach is beneficial for scalability, load balancing, and supporting a variety of build environments. Here's a diagram illustrating the distributed architecture of Jenkins:
In this distributed setup:

Jenkins distributed architecture



The Jenkins Master manages the overall configuration and job scheduling. Multiple build agents (slaves) can be added as needed, and they can run on different hardware or virtual machines.

Jobs can be configured to run on specific agents, allowing for parallel execution and efficient resource utilization.

Distributed builds can improve build performance and reduce queue times, making it suitable for large and complex projects.

Jenkins also supports other advanced features such as cloud-based agents (e.g., Amazon EC2 instances) that can be dynamically provisioned and decommissioned based on workload, further enhancing its scalability and flexibility.

b. Execute following (Refer the shared material) and attach screenshots:

- Create a slave node and connect it to master
- Use an existing project or a new project to run in the slave node

8. Post-Experiments Exercise

A. Extended Theory:

Nil

B. Questions:

- What are the ways to configure Jenkins node agent to communicate with Jenkins master?
- Which architecture is recommended for a scalable Jenkins environment?

C. Conclusion:

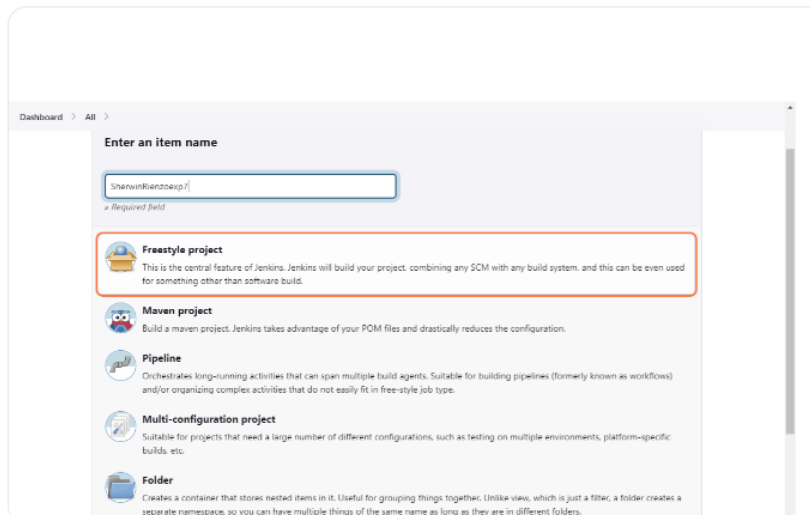
- Write what was performed in the experiment.
- Write the significance of the topic studied in the experiment.

D. References:

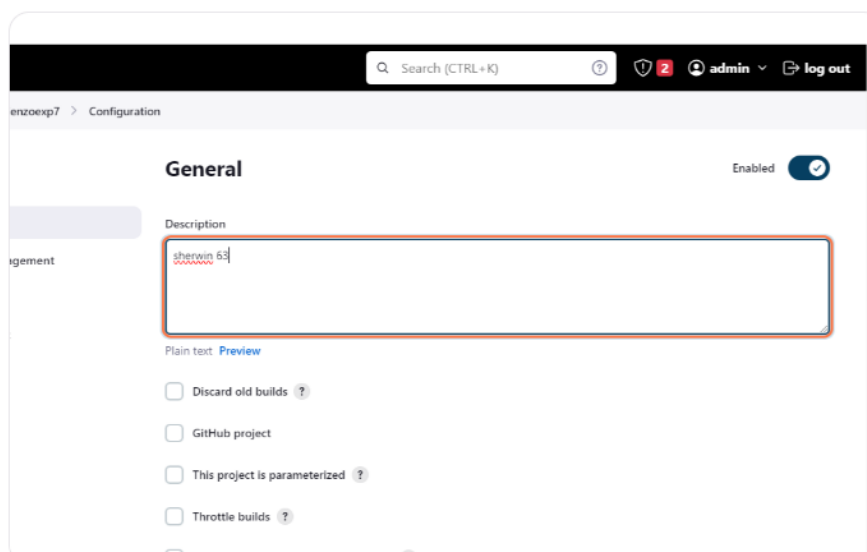
<https://jenkins.io/doc/>
<https://www.slideshare.net/abediaz/introduction-to-jenkins>
<https://www.studytonight.com/jenkins/jenkins-master-slave-configuration>
<https://www.edureka.co/blog/jenkins-master-and-slave-architecture-a-complete-guide/>



1 Click on Freestyle project...

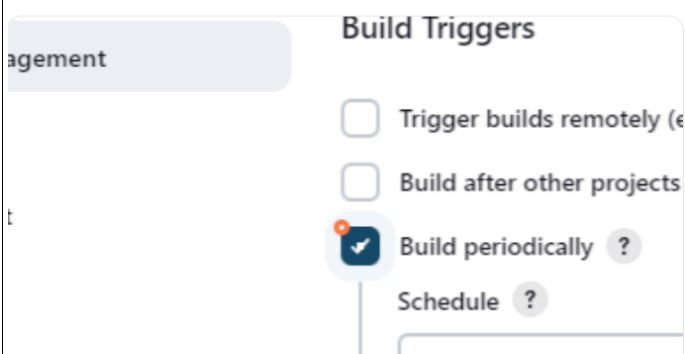


2 Click on description



4 Click on .spec

3 Check hudson-triggers-TimerTrigger



Build Triggers

- ☐ Trigger builds remotely (e.g., from scripts) ?
- ☐ Build after other projects are built ?
- ☒ Build periodically ?


Schedule ?

H/5 * * * *

Would last have run at Wednesday, 13 September, 2023 at 10:33:51 am India Standard Time; would next run at Wednesday, 13 September, 2023 at 10:38:51 am India Standard Time.

5 Click on Console Output...

cp7 > #1 > Console Output



Console Output

Started by user [admin](#)
Running as SYSTEM
Building on the built-in node in workspace C:\ProgramData\Jenkin
Finished: SUCCESS

6 Click on Status...

Jenkins

Dashboard > SherwinRienzoexp7

Status

Changes

Workspace

Build Now



Configure

Delete Project

Rename

Build History trend

Filter builds...

 #1
 Sep 13 2023 10:16:40
 #2
 Sep 13 2023 10:17:40

[Atom feed for all](#)
[Atom feed for failures](#)


Project SherwinRienzoexp7

sherwin 63

Permalinks

- Last build (#2), 1 min 46 sec ago
- Last stable build (#2), 1 min 46 sec ago
- Last successful build (#2), 1 min 46 sec ago
- Last completed build (#2), 1 min 46 sec ago

7 Click on Console Output...



Console Output

Started by timer
Running as SYSTEM
Building on the built-in node in workspace C:\ProgramData\Jenkins\jenkins\work
Finished: SUCCESS

8 Click on Manage Jenkins

Dashboard >

+ New Item

People All +

Build History

Manage Jenkins

My Views

Selenium Grid

Build Queue ▼

No builds in the queue.

S	W	Name ↓
✓	☀	exp6
✓	☀	exp7b
✓	☀	project1

9 Click on Security...

Clouds
Add, remove, and configure cloud instances to provision agents on-demand.

Security

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

Credentials
Configure credentials

10 Click on Random

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

Save Apply

11 Click on Nodes...

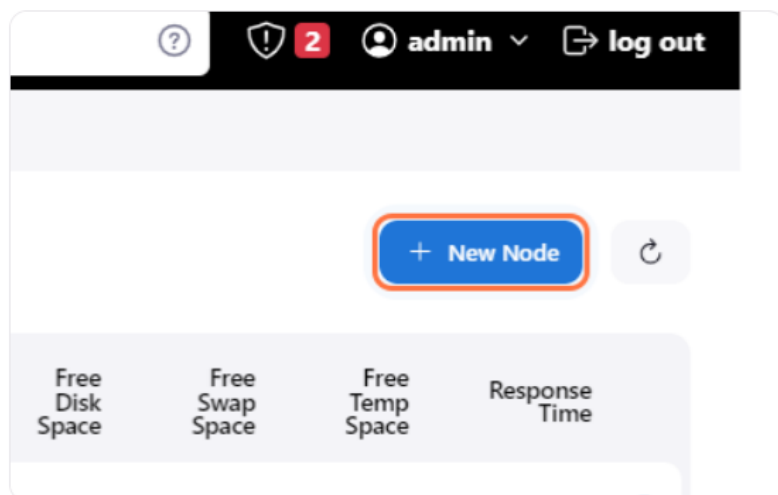
Tools

Configure tools, their locations and automatic installers.

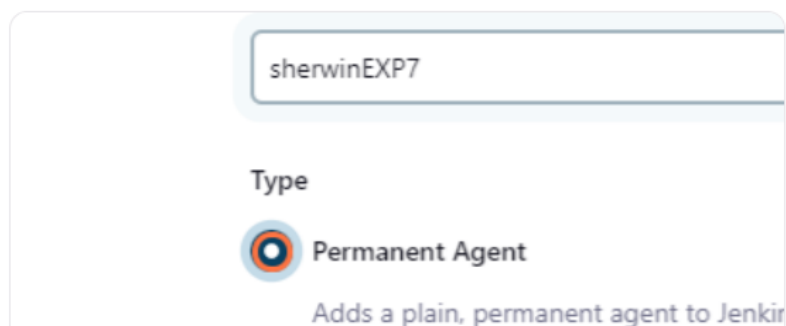
Nodes

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

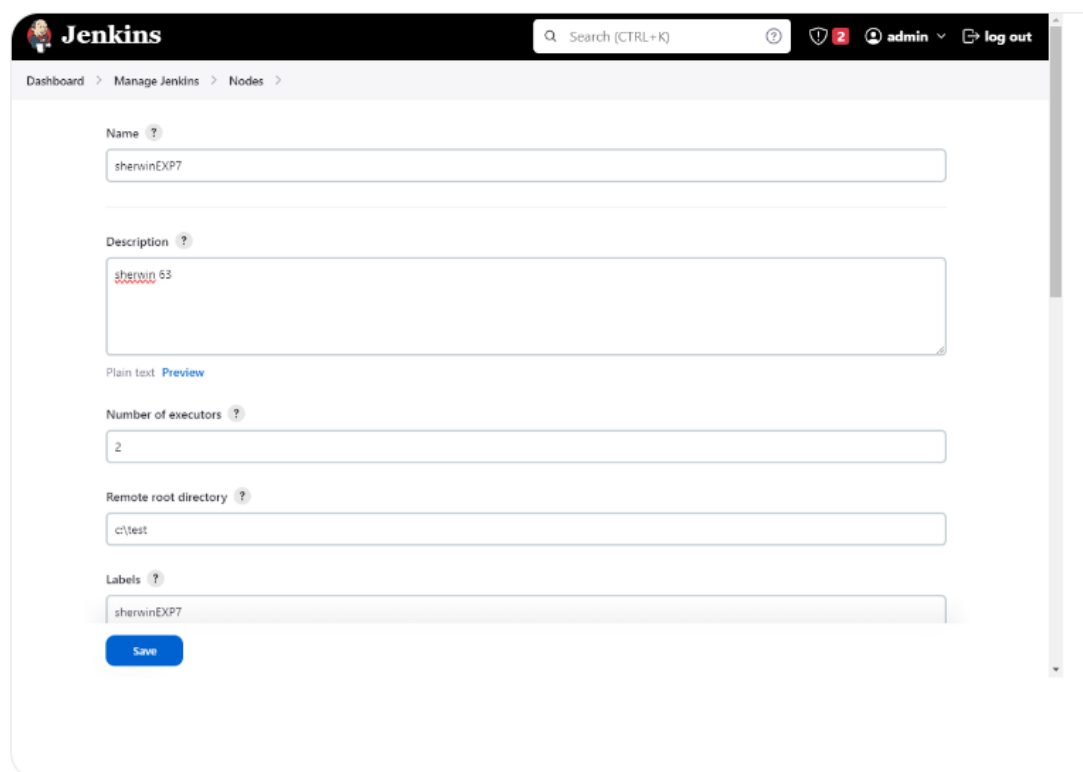
12 Click on New Node



13 Select Permanent Agent

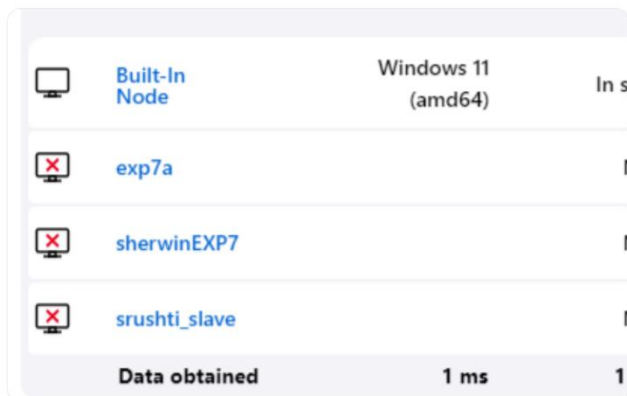


14 Click on highlight



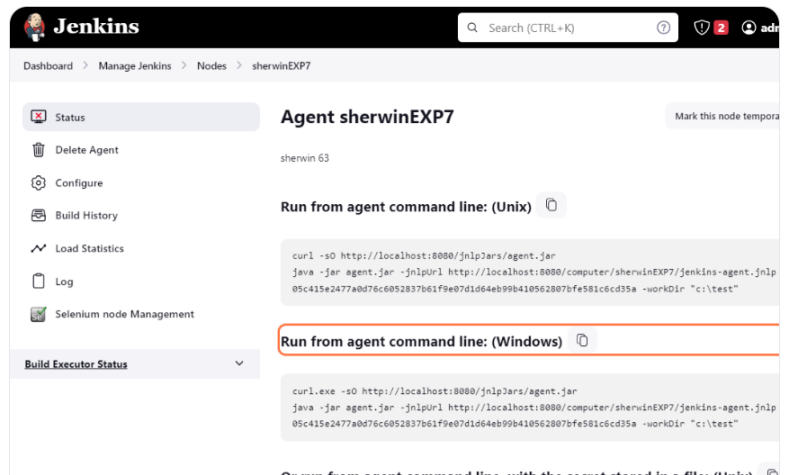
16 Click on Run from agent command line: (Windows)

15 Click on Nodes...



Name	Architecture	Online
Built-In Node	Windows 11 (amd64)	In sync
exp7a		
sherwinEXP7		
srushti_slave		

Data obtained 1 ms 1



Dashboard > Manage Jenkins > Nodes > sherwinEXP7

Agent sherwinEXP7

sherwin 63

Run from agent command line: (Unix)

```
curl -sO http://localhost:8080/jnlpJars/agent.jar
java -jar agent.jar -jnlpUrl http://localhost:8080/computer/sherwinEXP7/jenkins-agent.jnlp
05c415e2477a0d76c6052837b61f9e07d1d64eb99b410562807bfe581c6cd35a -workDir "c:\test"
```

Run from agent command line: (Windows)

```
curl.exe -sO http://localhost:8080/jnlpJars/agent.jar
java -jar agent.jar -jnlpUrl http://localhost:8080/computer/sherwinEXP7/jenkins-agent.jnlp
05c415e2477a0d76c6052837b61f9e07d1d64eb99b410562807bfe581c6cd35a -workDir "c:\test"
```

```
Microsoft Windows [Version 10.0.22000.1098]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Lenovo>curl.exe -sO http://localhost:8080/jnlpJars/agent.jar & java -jar agent.jar -jnlpUrl http://localhost:8080/computer/sherwinEXP7/jenkins-agent.jnlp -secret 05c415e2477a0d76c6052837b61f9e07d1d64eb99b410562807bfe581c6cd35a -workDir "c:\test"

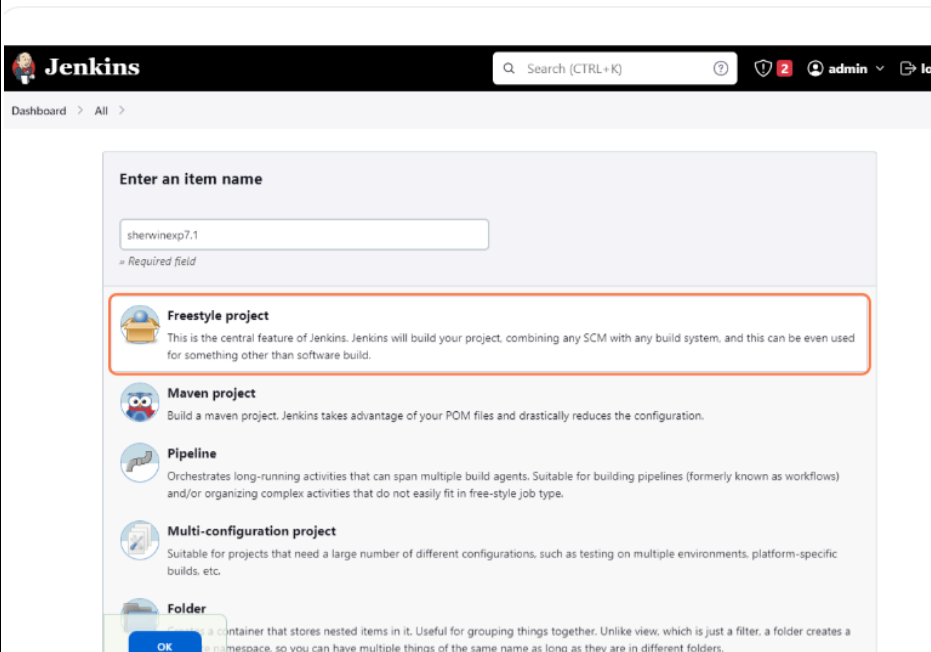
Sep 13, 2023 11:06:14 AM org.jenkinsci.remoting.engine.WorkDirManager initializeWorkDir
INFO: Using c:\test\remoting as a remoting work directory
Sep 13, 2023 11:06:14 AM org.jenkinsci.remoting.engine.WorkDirManager setupLogging
INFO: Both error and output logs will be printed to c:\test\remoting
Sep 13, 2023 11:06:14 AM hudson.remoting.jnlp.Main createEngine
INFO: Setting up agent: sherwinEXP7
Sep 13, 2023 11:06:14 AM hudson.remoting.Engine startEngine
INFO: Using Remoting version: 3131.vf2b_b_798b_ce99
Sep 13, 2023 11:06:14 AM org.jenkinsci.remoting.engine.WorkDirManager initializeWorkDir
INFO: Using c:\test\remoting as a remoting work directory
Sep 13, 2023 11:06:14 AM hudson.remoting.jnlp.Main$CuiListener status
INFO: Locating server among [http://localhost:8080/]
Sep 13, 2023 11:06:14 AM org.jenkinsci.remoting.engine.JnlpAgentEndpointResolver resolve
INFO: Remoting server accepts the following protocols: [JNLP4-connect, Ping]
Sep 13, 2023 11:06:14 AM hudson.remoting.jnlp.Main$CuiListener status
INFO: Agent discovery successful
Agent address: localhost
Agent port: 58295
Identity: 33:97:28:03:6a:3b:20:4e:86:6a:78:a3:85:05:70:fa
Sep 13, 2023 11:06:14 AM hudson.remoting.jnlp.Main$CuiListener status
INFO: Handshaking
Sep 13, 2023 11:06:14 AM hudson.remoting.jnlp.Main$CuiListener status
INFO: Connecting to localhost:58295
Sep 13, 2023 11:06:14 AM hudson.remoting.jnlp.Main$CuiListener status
```

17 Click on [online]

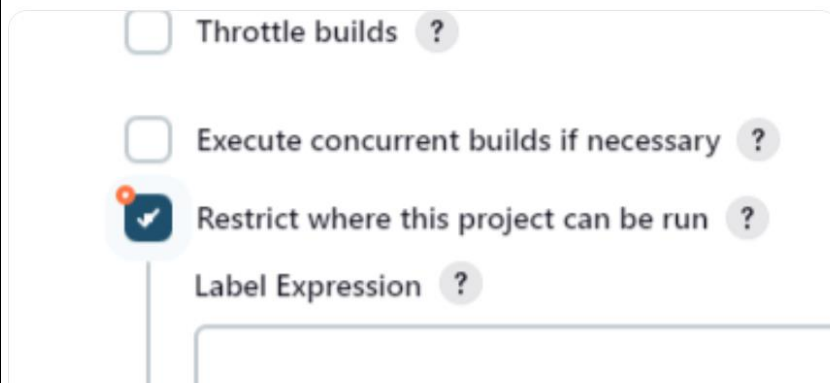
	Name	Architecture	Online
✓	Built-In Node	Windows 11 (amd64)	In sync
✗	exp7a		N/A
✓	sherwinEXP7	Windows 11 (amd64)	In sync

NEW FREE STYLE PROJECT

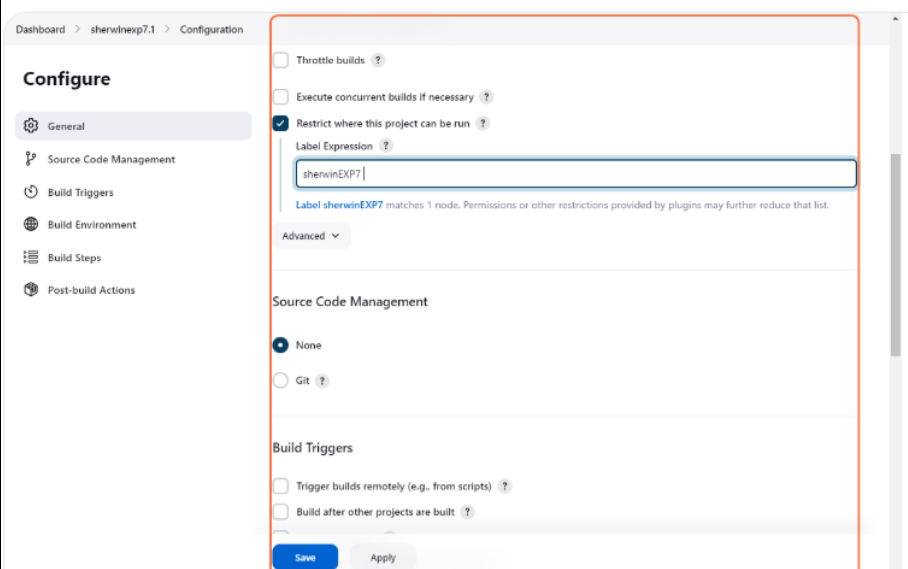
18 Click on Freestyle project...



19 Check hasSlaveAffinity



20 Click on General



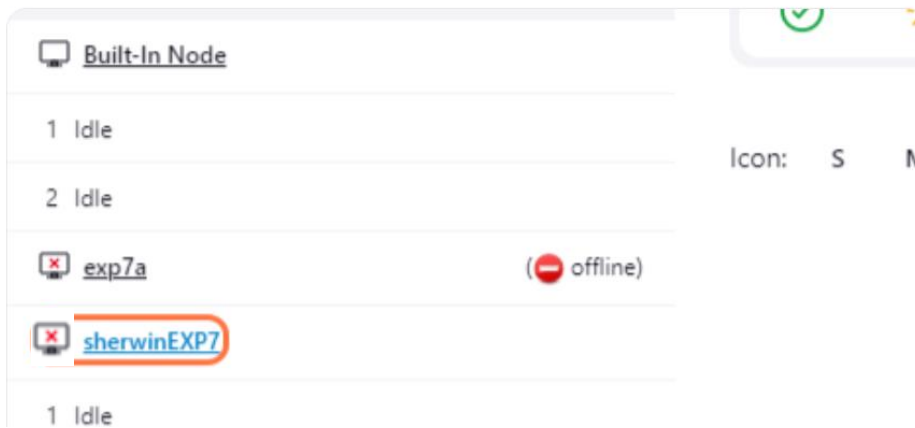
22 Click on Console Output...

Console Output

```
Started by user admin
Running as SYSTEM
Building remotely on sherwinEXP7 in workspace c:\test\workspace\sherwinexp7
[sherwinexp7.1] $ cmd /c call C:\Users\Lenovo\AppData\Local\Temp\jenkins8
c:\test\workspace\sherwinexp7.1>echo "hello sherwin"
"hello sherwin"
c:\test\workspace\sherwinexp7.1>exit 0
Finished: SUCCESS
```

[MAKE SLAVE NODE OFFLINE TEMPORARYILY](#) AND MAKE IT ONLINE AGAIN

23 Click on sherwinEXP7



Built-In Node

Node Name	Status
1 Idle	
2 Idle	
exp7a	(offline)
sherwinEXP7	
1 Idle	

Icon: S M

CREATED ANOTHER NODE TIED TO MY PROJECT

Jenkins

Search (CTRL+K)

?

2

admin

log out

ard > SherwinRienzoexp77777 > #1 > Console Output

status

changes

Console Output

View as plain text

Build Information

Delete build '#1'

✓ Console Output

Started by user admin

Running as SYSTEM

Building remotely on sherwinEXP7 in workspace c:\test\workspace\SherwinRienzoexp77777

[SherwinRienzoexp77777] \$ cmd /c call C:\Users\Lenovo\AppData\Local\Temp\jenkins1600763189587591470.bat

c:\test\workspace\SherwinRienzoexp77777>echo " SHERWIN RIENZO"

" SHERWIN RIENZO"

c:\test\workspace\SherwinRienzoexp77777>exit 0

Finished: SUCCESS

enkins

Search (CTRL+K)

?

2

admin

log out

rd > Nodes > sherwinEXP7

atus

delete Agent

onfigure

uild History

oad Statistics

ript Console

g

ystem Information

isconnect

elenium node Management

ecutor Status

Agent sherwinEXP7

Mark this node temporarily offline

?

sherwin 63

Edit description

Agent is connected.

Projects tied to sherwinEXP7

S	W	Name	Last Success	Last Failure	Last Duration	
✓	☀	sherwinexp7.1	12 min #1	N/A	0.25 sec	▶
✓	☀	SherwinRienzoexp77777	12 sec #1	N/A	0.22 sec	▶

Icon: S M L Icon legend Atom feed for all Atom feed for failures Atom feed for just latest builds