

Session 6.

Jenkins CI – Introduction and Installation

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Agenda



- Understanding Continuous Integration
- Introduction to Jenkins
- Build Cycle
- Jenkins Architecture
- Obtaining and installing Jenkins
- Installing and configuring Jenkins using WAR and RPM
- Java installation and configuration
- Maven Plugin Installation on Jenkins
- Exploring Jenkins Dashboard



Continuous Integration?



- Continuous Integration (CI) is a development practice that requires developers to integrate code into a shared repository several times a day.
- Each check-in is then verified by an automated build, allowing teams to detect problems early.



What is Jenkins?



- Jenkins is an open source continuous integration tool written in Java.
- The project was forked from Hudson after a dispute with Oracle.
- Jenkins provides continuous integration services for software development.
- It is a server-based system running in a servlet container such as Apache Tomcat.
- Jenkins is an award-winning application that monitors executions of repeated jobs, such as building a software project or jobs run by cron.
- Continuous integration server – **detects** changes in Subversion, **performs** tasks, **repeatedly**. (Build, Test, Deploy, Test, Package)



Jenkins Features



- Easy Installation - Jenkins is a platform-agnostic, ready to run with packages for Windows, Mac OS, and Unix-like operating systems.
- Easy Configuration - Jenkins is easily set up and configured using its web interface, featuring error checks and a built-in help function.
- Available Plugins - There are hundreds of plugins available in the Update Center, integrating with every tool in the CI and CD toolchain.
- Extensible - Jenkins can be extended by means of its plugin architecture, providing nearly endless possibilities for what it can do.
- Easy Distribution - Jenkins can easily distribute work across multiple machines for faster builds, tests, and deployments across multiple platforms.
- Free Open Source



Why do we need it?



- To integrate more frequently, detect errors quicker, improve quality and reduce cost
- Co-ordinate the running of tasks as part of workflows.
- Compile, test and package, deploy, script, verify, build vm's



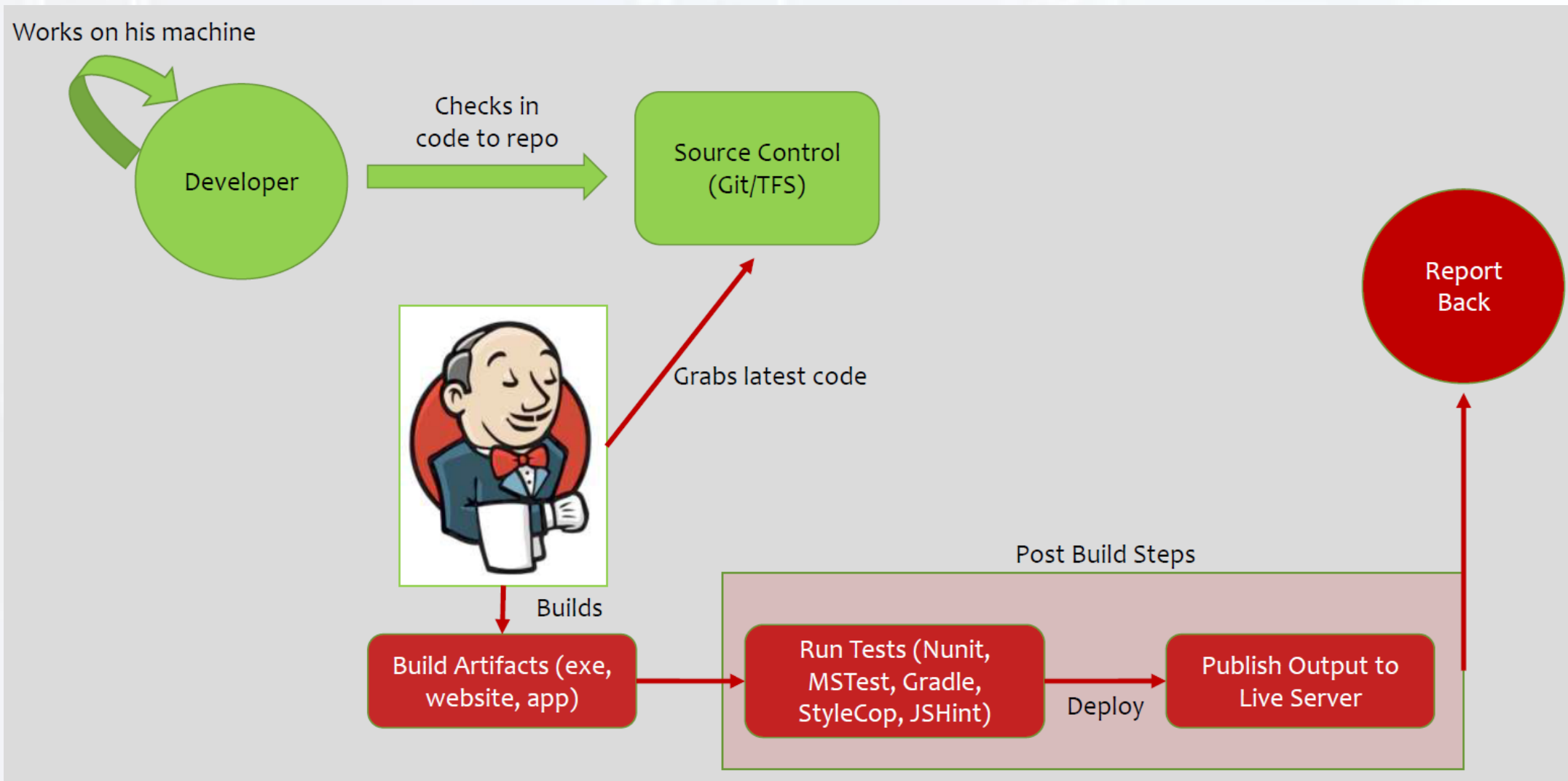
Terminology



- **Job** - a unit of work for a project
- **View** - user defined collection of jobs or a workflow
- **Master** - the central Jenkins master, does job scheduling
- **Slave** - executes one or more jobs within slots (executors)
- **Workspace** - the working area where a job is carried out
- **Plugin** - user defined collection of jobs or a workflow



Build Cycle





Jenkins Architecture



- 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.



Jenkins Architecture



Remote
Source Code
Repository

Jenkins master pulls the code every time there is a commit.

Jenkins Server (Master)

TCP/IP

TCP/IP

TCP/IP



Jenkins Slave



Jenkins Slave



Jenkins Slave

- Jenkins master distributes its workload to all slaves.
- On request from Jenkins master, the slaves carry out builds and tests and produce test reports.



Installing Java



- Jenkins is a Java application, so the first step is to install Java.
- Run the following command to install the OpenJDK 8 package.
`# yum install -y java-1.8.0-openjdk-devel`
The current version of Jenkins may not support Java 10 (and Java 11).
- If you have multiple versions of Java installed on your machine, make sure Java 8 is the default Java version.



Import GPG Key and Create Repo

- The next step is to enable the Jenkins repository.
- To do that, import the GPG key using the following curl command.
***# curl --silent --location http://pkg.jenkins-ci.org/redhat-stable/jenkins.repo | ***
sudo tee /etc/yum.repos.d/jenkins.repo
- And add the repository to your system with:
rpm --import https://pkg.jenkins.io/redhat/jenkins.io.key

This Command will not give any output.

```
[root@server ~]# curl --silent --location http://pkg.jenkins-ci.org/redhat-stable/jenkins.repo | sudo tee /etc/yum.repos.d/jenkins.repo
[jenkins]
name=Jenkins-stable
baseurl=http://pkg.jenkins.io/redhat-stable
gpgcheck=1
[root@server ~]#
```



Install Jenkins

- Once the repository is enabled, install the latest stable version of Jenkins by typing:

yum install -y Jenkins

Package	Arch	Version	Repository	Size
Installing: jenkins	noarch	2.263.2-1.1	jenkins	64 M
Transaction Summary				
Install 1 Package				
Total download size: 64 M				
Installed size: 64 M				
Downloading packages:				
jenkins-2.263.2-1.1.noarch.rpm			64 MB	00:01:26
Running transaction check				
Running transaction test				
Transaction test succeeded				
Running transaction				
Installing : jenkins-2.263.2-1.1.noarch				1/1
Verifying : jenkins-2.263.2-1.1.noarch				1/1
Installed:				
jenkins.noarch 0:2.263.2-1.1				
Complete!				
[root@server ~]#				



Start and Enable Jenkins



- After the installation process is completed, start and enable the Jenkins service to start on system boot

*systemctl enable --now jenkins*

- To check whether it started successfully run:

*systemctl status jenkins*

```
[root@server ~]# systemctl start jenkins && systemctl enable jenkins
jenkins.service is not a native service, redirecting to /sbin/chkconfig.
Executing /sbin/chkconfig jenkins on
[root@server ~]# systemctl status jenkins
● jenkins.service - LSB: Jenkins Automation Server
   Loaded: loaded (/etc/rc.d/init.d/jenkins; bad; vendor preset: disabled)
   Active: active (running) since Sun 2021-01-17 05:15:47 EST; 10s ago
     Docs: man:systemd-sysv-generator(8)
    CGroup: /system.slice/jenkins.service
            └─11856 /etc/alternatives/java -Dcom.sun.akuma.Daemon=daemonized -Djava.awt.headless=true -DJENKIN...

Jan 17 05:15:45 server.example.com systemd[1]: Starting LSB: Jenkins Automation Server...
Jan 17 05:15:45 server.example.com runuser[11842]: pam_unix(runuser:session): session opened for user jen...d=0)
Jan 17 05:15:47 server.example.com jenkins[11837]: Starting Jenkins [ OK ]
Jan 17 05:15:47 server.example.com systemd[1]: Started LSB: Jenkins Automation Server.
Hint: Some lines were ellipsized, use -l to show in full.
[root@server ~]#
```



Open Firewall Ports



- If you are installing Jenkins on a remote CentOS server that is protected by a firewall you need to port 8080. Use the following commands to open the necessary port:

firewall-cmd --permanent --zone=public --add-port=8080/tcp

firewall-cmd --reload



Installing with WAR File

Jenkins is running from the previous steps. Stop Jenkins if running and disable it. Alternatively you can remove Jenkins with ***yum erase Jenkins***.

- Download latest Jenkins WAR file from [here](#).

```
[root@server ~]# wget http://mirrors.jenkins.io/war-stable/latest/jenkins.war
--2021-01-17 05:19:59-- http://mirrors.jenkins.io/war-stable/latest/jenkins.war
Resolving mirrors.jenkins.io (mirrors.jenkins.io)... 52.202.51.185
Connecting to mirrors.jenkins.io (mirrors.jenkins.io)|52.202.51.185|:80... connected.
HTTP request sent, awaiting response... 302 Found
Location: http://ftp-chi.osuosl.org/pub/jenkins/war-stable/2.263.2/jenkins.war [following]
--2021-01-17 05:20:00-- http://ftp-chi.osuosl.org/pub/jenkins/war-stable/2.263.2/jenkins.war
Resolving ftp-chi.osuosl.org (ftp-chi.osuosl.org)... 64.50.236.52, 2600:3402:200:227::2
Connecting to ftp-chi.osuosl.org (ftp-chi.osuosl.org)|64.50.236.52|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 67285886 (64M) [application/x-java-archive]
Saving to: 'jenkins.war'

12% [=====>] 8,329,897 233KB/s
```




Run the war file to install Jenkins

- Run the command **java -jar jenkins.war**
java -jar jenkins.war
- Take note of the Password displayed during installation.
- We will use this password for the initial login later.

```
Jenkins initial setup is required. An admin user has been created and a password generated.  
Please use the following password to proceed to installation:
```

```
fd65449d86d74d29ac0547c5574036a6
```

```
This may also be found at: /root/.jenkins/secrets/initialAdminPassword
```

```
*****  
*****  
*****
```



Setup Jenkins



- To set up your new Jenkins installation, open your browser and type your domain or IP address followed by port 8080:

<http://10.10.0.100:8080>

- A screen similar to the following will appear, prompting you to enter the Administrator password that is created during the installation:

Getting Started

Unlock Jenkins

To ensure Jenkins is securely set up by the administrator, a password has been written to the log (not sure where to find it?) and this file on the server:

`/var/lib/jenkins/secrets/initialAdminPassword`

Please copy the password from either location and paste it below.

Administrator password

Continue



Take note of the Password



- If you have installed Jenkins using **yum**, use the following command to print the password on your terminal:

cat /var/lib/jenkins/secrets/initialAdminPassword

You should see a 32-character long alphanumeric password as shown below:

2115173b548f4e99a203ee99a8732a32

- Copy the password from your terminal, paste it into the Administrator password field and click **Continue**.

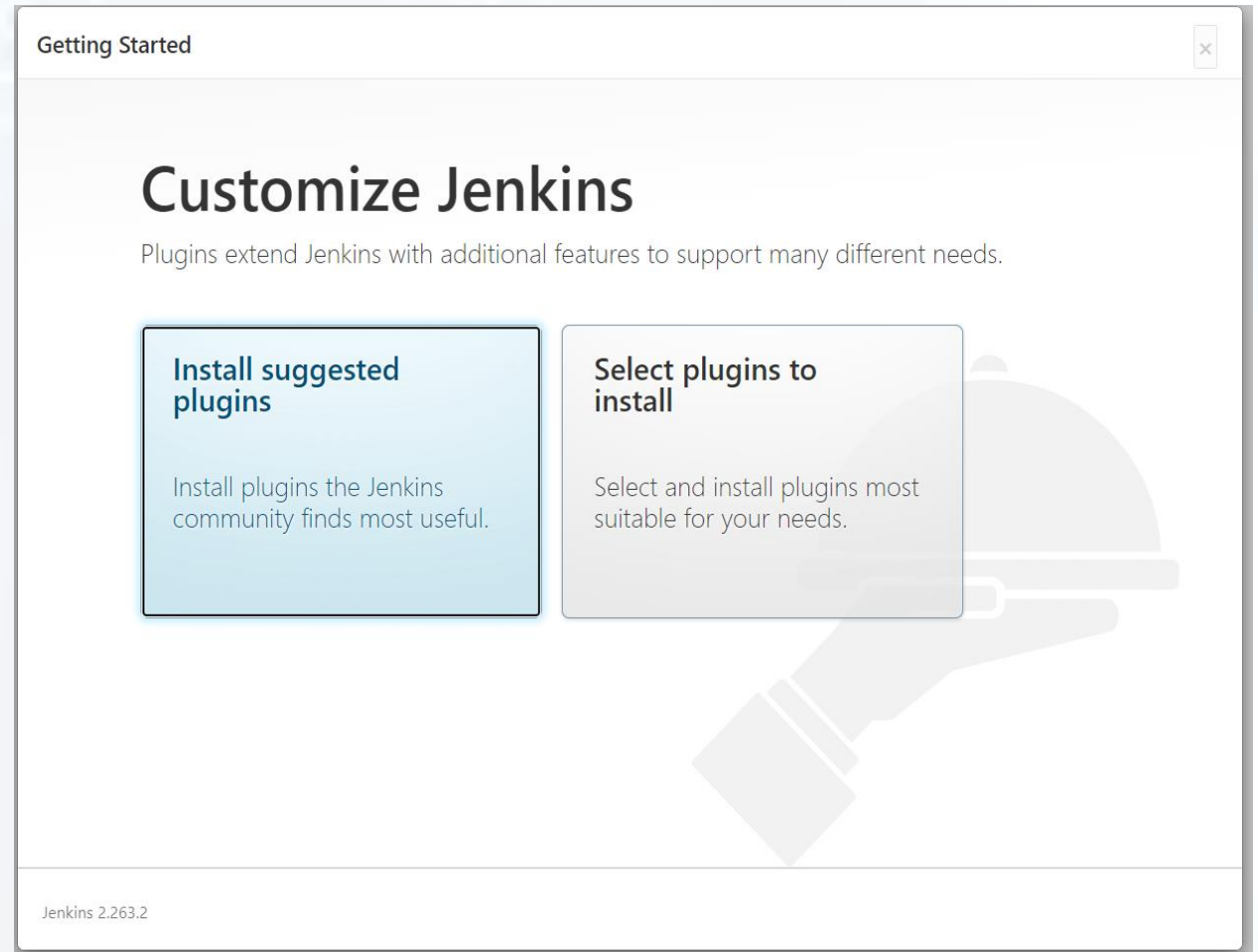


Customize Jenkins



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





Create First Admin User



- 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

Getting Started

Create First Admin User

Username:

Password:

Confirm password:

Full name:

E-mail address:

Jenkins 2.263.2 [Skip and continue as admin](#) [Save and Continue](#)



Instance Configuration

- 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.
- To complete the setup confirm the URL by clicking on the ***Save and Finish*** button

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 2.263.2

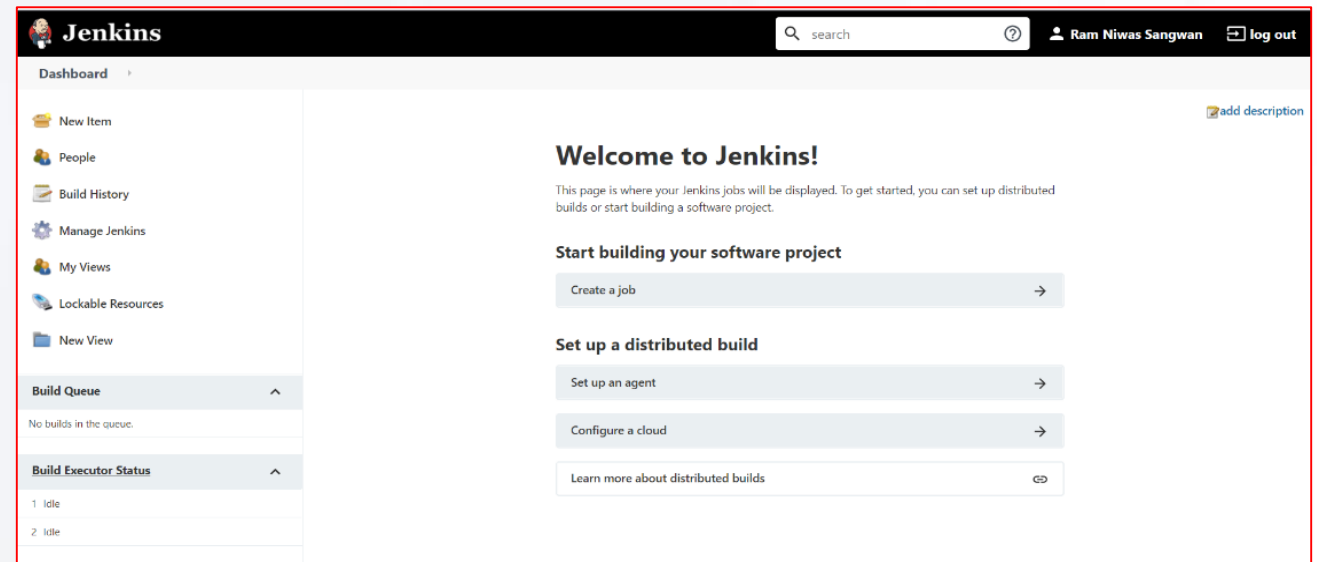
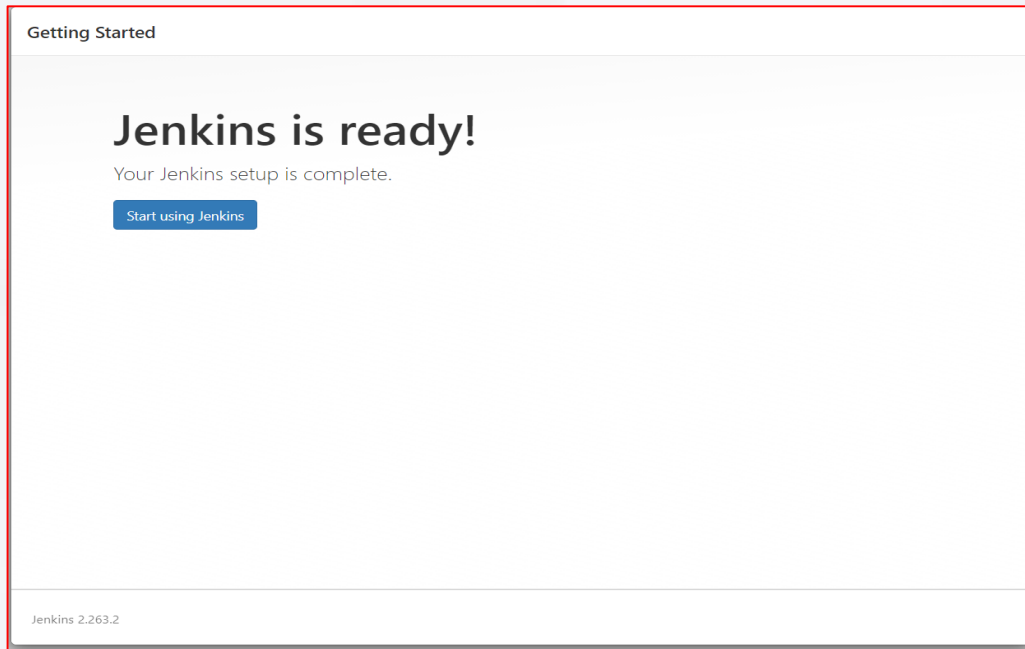
[Not now](#) [Save and Finish](#)



Jenkins is Ready



- Finally, click on the Start using Jenkins button and you will be redirected to the Jenkins dashboard logged in as the admin user you have created in one of the previous steps.

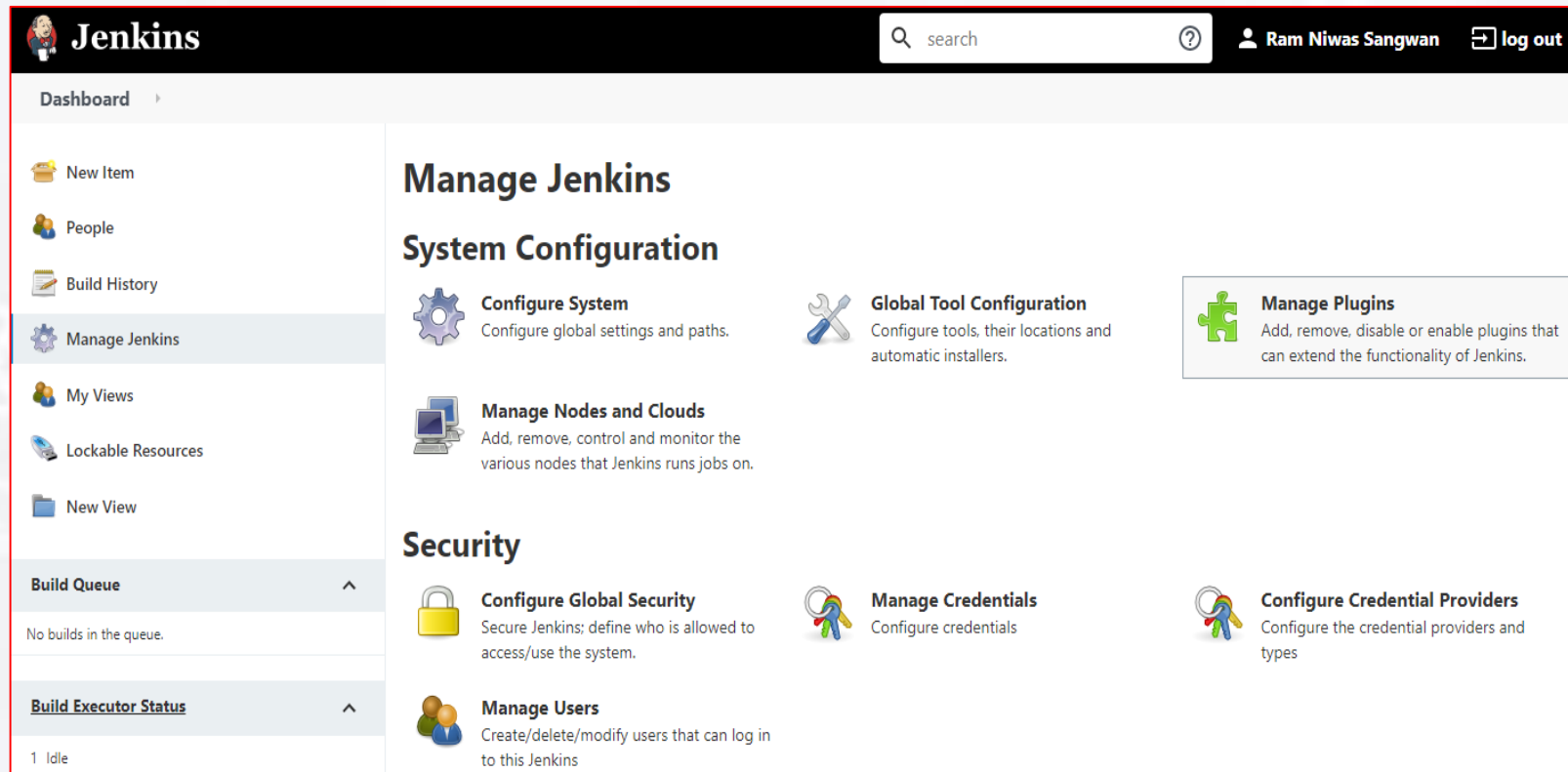




Setting up Jenkins and Maven



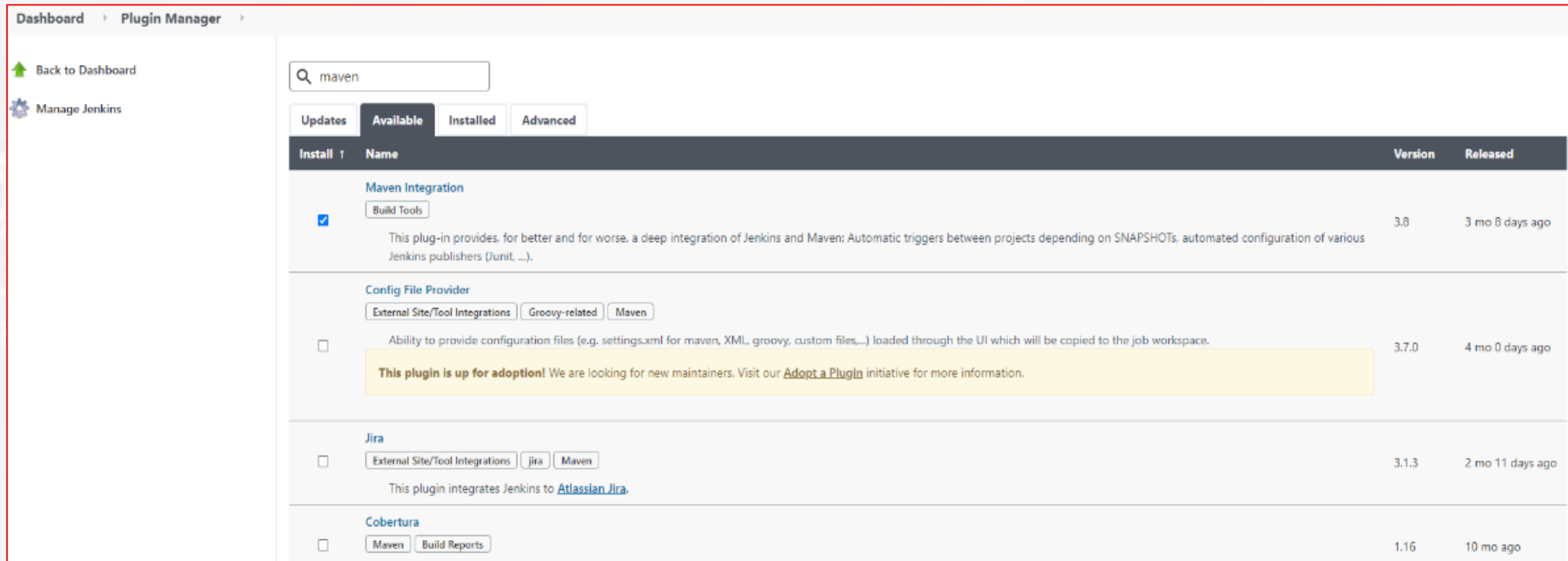
- In the Jenkins dashboard (Home screen), click **Manage Jenkins** from the left-hand side menu.



Maven for Jenkins



- Visit <http://10.10.0.100:8080/pluginManager/available> directly.
- OR
- In the Configure system screen, click on **Manage Plugins**.



The screenshot shows the Jenkins Plugin Manager interface. The 'Available' tab is selected, and a search for 'maven' has been performed. The results are displayed in a table with columns for 'Install', 'Name', 'Version', and 'Released'.

Install	Name	Version	Released
<input checked="" type="checkbox"/>	Maven Integration Build Tools This plug-in provides, for better and for worse, a deep integration of Jenkins and Maven: Automatic triggers between projects depending on SNAPSHOTS, automated configuration of various Jenkins publishers (JUnit, ...).	3.0	3 mo 8 days ago
<input type="checkbox"/>	Config File Provider External Site/Tool Integrations Groovy-related Maven Ability to provide configuration files (e.g. settings.xml for maven, XML, groovy, custom files...) loaded through the UI which will be copied to the job workspace. This plugin is up for adoption! We are looking for new maintainers. Visit our Adopt a Plugin initiative for more information.	3.7.0	4 mo 0 days ago
<input type="checkbox"/>	Jira External Site/Tool Integrations jira Maven This plugin integrates Jenkins to Atlassian Jira .	3.1.3	2 mo 11 days ago
<input type="checkbox"/>	CoBERTura Maven Build Reports	1.16	10 mo ago



Search Maven for Jenkins

- In the search box type **Maven**.
- You will see all plugins for Maven.
- Select the checkbox in front of the plugins and Click on the button **Install without restart** given at the bottom.

Install without restart

Download now and install after restart

Update information obtained: 8 min 21 sec ago

Check now



Install Maven and Restart Jenkins

- Plugin Installation will start. After installation is done click on the checkbox **“Restart Jenkins when Installation is complete and no jobs running.”**

Installing Plugins/Upgrades

Preparation

- Checking internet connectivity
- Checking update center connectivity
- Success

WMI Windows Agents

Success

Javadoc

Success

Maven Integration

Installing

Maven Info

Pending

Maven Dependency Update Trigger

Pending

H2 API

Pending

Config File Provider

Pending

Pipeline Maven Integration

Pending

Maven Repository Scheduled Cleanup

Pending

Maven Invoker

Pending

Maven Repository Server

Pending

Maven Metadata Plugin for Jenkins CI server

Pending

Maven Integration

Pending



[Go back to the top page](#)


(you can start using the installed plugins right away)



☐

Restart Jenkins when installation is complete and no jobs are running





Explore the Dashboard


 **Jenkins**


 **Ram Niwas Sangwan**  **log out**


Dashboard


 **New Item**


 **People**


 **Build History**

 **Manage Jenkins**

 **Maven Repository**

 **My Views**

 **Lockable Resources**

 **New View**


Build Queue ^

No builds in the queue.

Build Executor Status ^

1 Idle

2 Idle

 [add description](#)

Welcome to Jenkins!

This page is where your Jenkins jobs will be displayed. To get started, you can set up distributed builds or start building a software project.

Start building your software project

Create a job →

Set up a distributed build

Set up an agent →

Configure a cloud →

Learn more about distributed builds ↗



Thank You