

TRAINING CONTENT

Continuous Integration

Session-2

YOUR NEXT DESTINATION
OF SOFTWARE OUTSOURCING

Lecture Outline

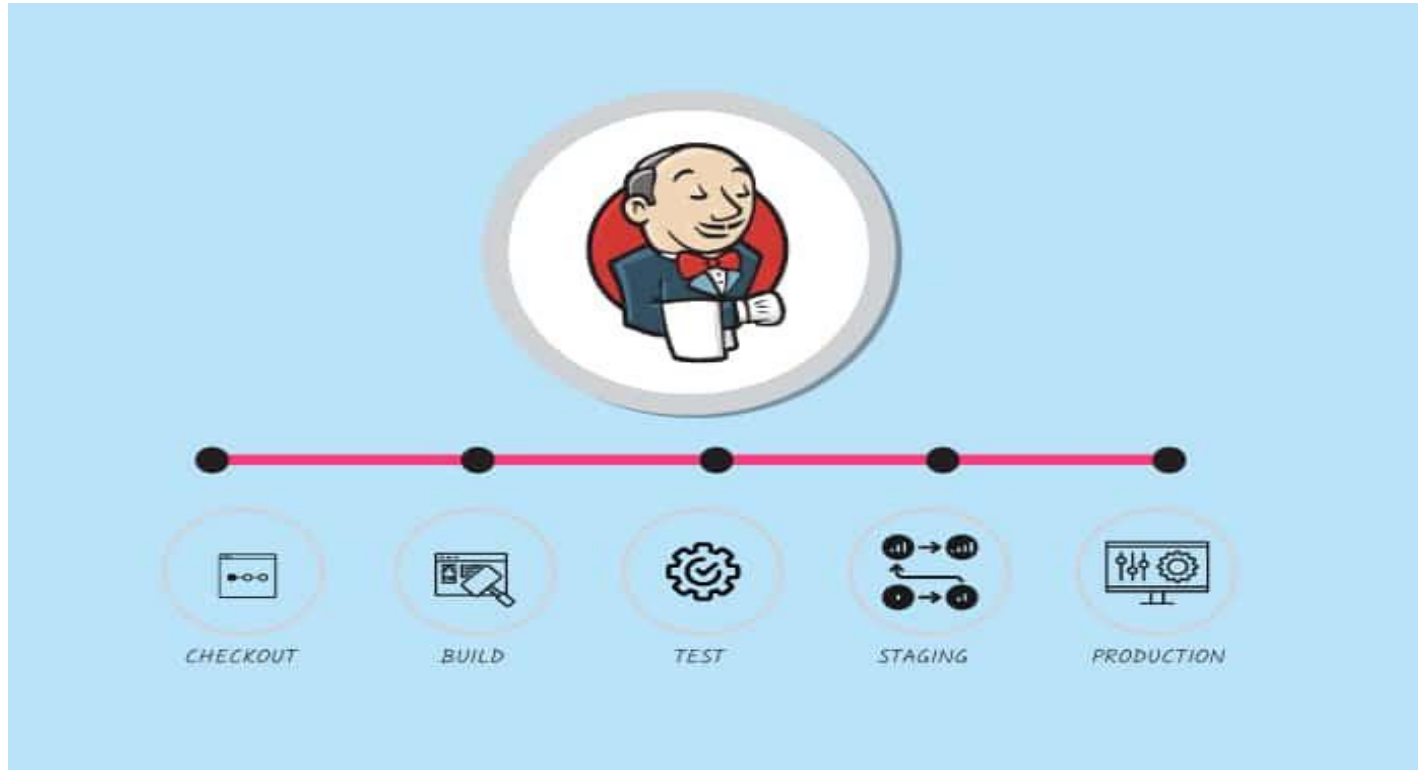
- ☐ JENKINS
- ☐ Continuous Integration
- ☐ Java installation and configuration
- ☐ Maven Installation
- ☐ Jenkins Installation and Configuration
- ☐ Exploring Jenkins Dashboard
- ☐ Creating Jobs
- ☐ Running the Jobs
- ☐ Setting up the global environments for Jobs
- ☐ Disabling and deleting jobs
- ☐ Understanding Deployment
- ☐ Jenkins Plugins
- ☐ Creating users
- ☐ Node Configuration
- ☐ Assignment

What is Jenkins



Jenkins is an open source automation server. It helps automate the parts of software development related to building, testing, and deploying, facilitating continuous integration and continuous delivery.

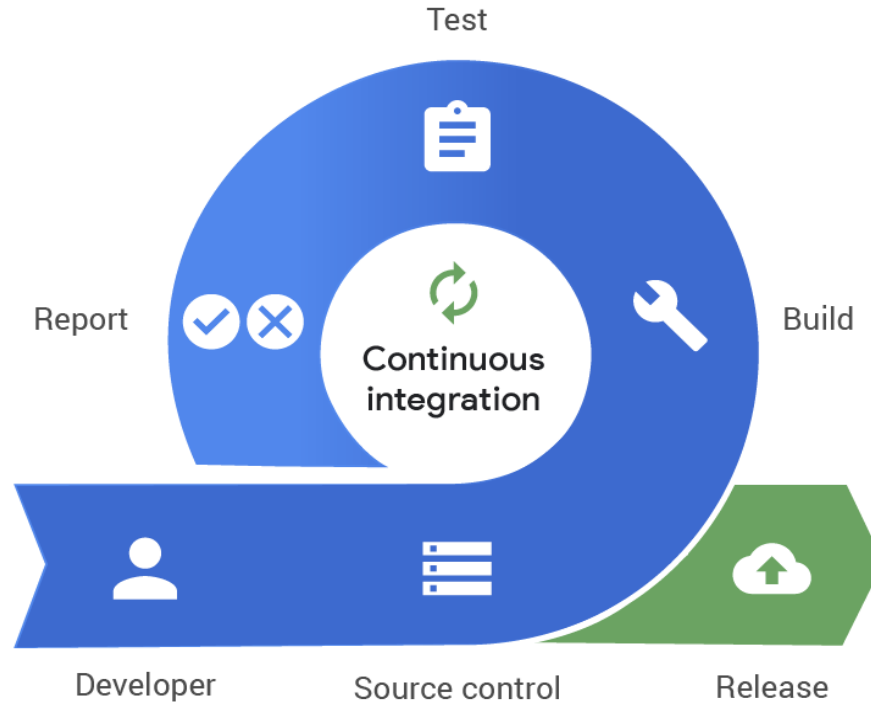
Overview of Jenkins



What is Continuous Integration

Continuous integration (CI) is the practice of automating the integration of code changes from multiple contributors into a single software project. It's a primary DevOps best practice, allowing developers to frequently merge code changes into a central repository where builds and tests then run.

Overview of Continuous Integration



Jenkins Installation and Configuration



Download the Installation Windows MSI installer and follow the steps

Step 1: Setup wizard

On opening the Windows Installer, an Installation Setup Wizard appears, Click Next.

Step 2: Select destination folder

Select the destination folder to store your Jenkins Installation and click Next to continue.

Step 3: Service logon credentials

Specify the domain user name and password, click on Next.

Step 4: Port selection

Specify the port on which Jenkins will be running, click on Next.

Step 5: Select Java home directory

The installation process checks for Java on your machine. If the needed Java version is not installed, you will be prompted to install it. Once your Java home directory has been selected, click on Next.

Step 6: Custom setup

Select other services that need to be installed with Jenkins and click on Next.

Step 7: Install Jenkins

Click on the Install button to start the installation. Once the installation completes, click on Finish.

Java Installation

1. Go to the Manual download page. Download and run the installer.
2. The installation process starts. Click the Install button to accept the license terms and to continue with the installation.

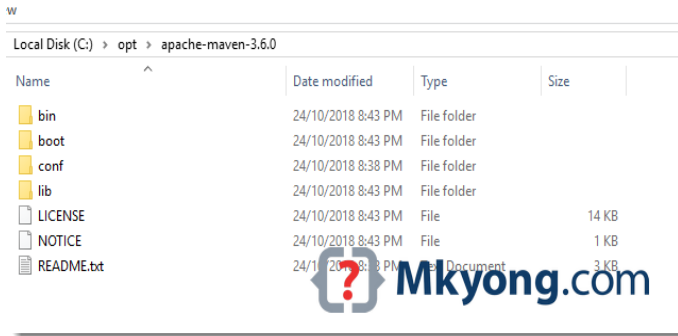


Maven Installation

Step 1. Visit Maven official website, download the Maven zip file, for example : apache-maven-3.6.0-bin.zip.

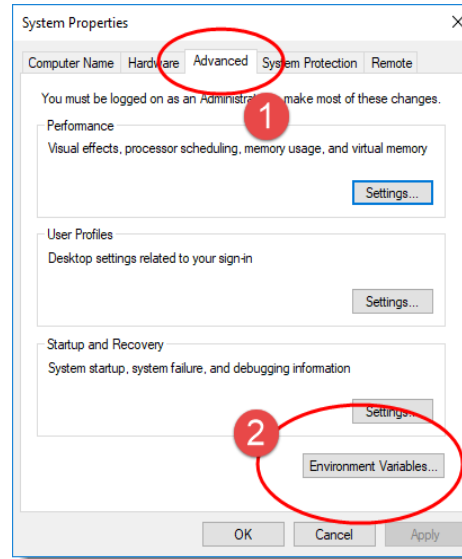
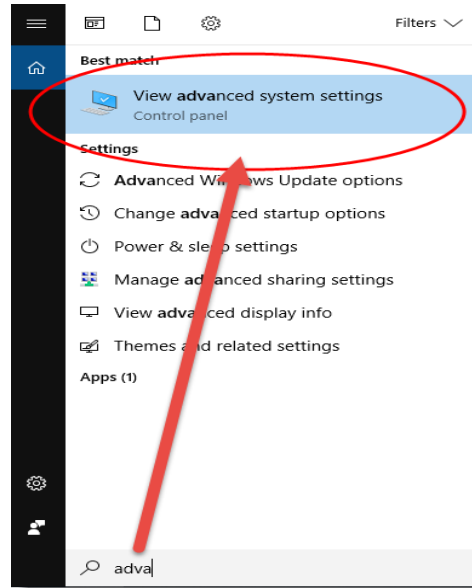


Step 2. Unzip it to a folder. In this article, we are using c:\opt\apache-



Maven Installation

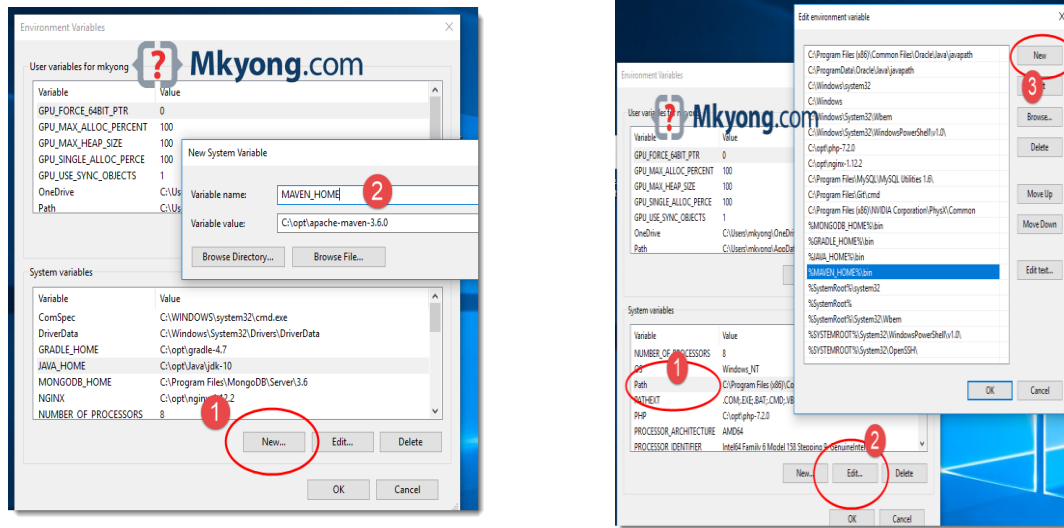
Step 3. Add a MAVEN_HOME system variables, and point it to the Maven folder.



Step 4. In System Properties dialog, select Advanced tab and clicks on the Environment Variables... button.

Maven Installation

Step 5. In “Environment variables” dialog, System variables, Clicks on the New... button and add a MAVEN_HOME variable and point it to c:\opt\apache-maven-3.6.0



Step 6. In system variables, find PATH, clicks on the Edit... button. In “Edit environment variable” dialog, clicks on the New button and add this %MAVEN_HOME%\bin

Step 6. Done, start a new command prompt, type mvn –

```
C:\Users\mkyong>mvn -version
Apache Maven 3.6.0 (97c98ec64a1fdfee7767ce5fffb20918da4f719f3; 2018-10-25T02:41:47+08:00)
Maven home: C:\opt\apache-maven-3.6.0\bin\..
Java version: 10.0.1, vendor: Oracle Corporation, runtime: C:\opt\Java\jdk-10
```

FAQ 1. 'mvn' is not recognized as an internal or external command?

```
> mvn -version
'mvn' is not recognized as an internal or external command,
operable program or batch file.
```

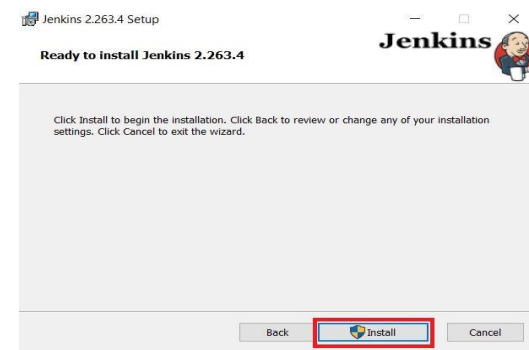
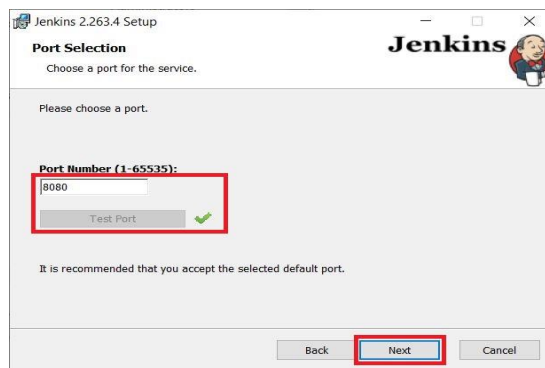
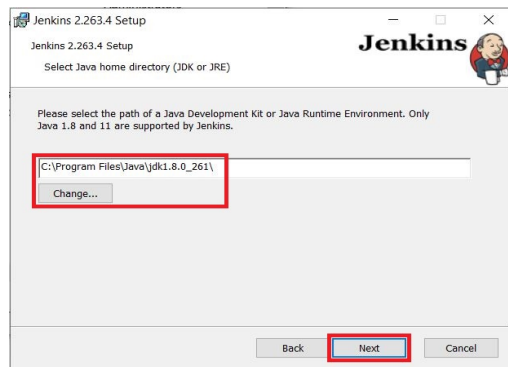
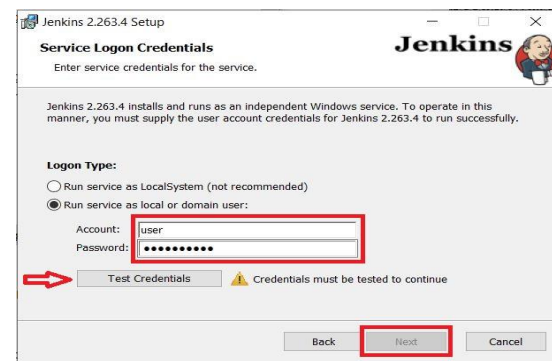
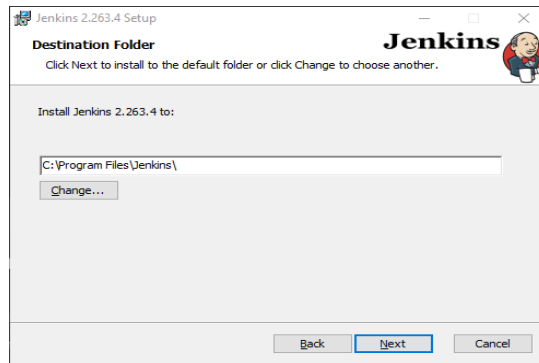
Answer: Refer to Step 4, make sure the %MAVEN_HOME%\bin is added to the PATH system variable.

FAQ 2. The JAVA_HOME environment variable is not defined

```
C> mvn -version
The JAVA_HOME environment variable is not defined correctly
This environment variable is needed to run this program
NB: JAVA_HOME should point to a JDK not a JRE
```

Answer: Refer to Step 2, make sure JDK is installed and the JAVA_HOME system variable is configured.

Jenkins Installation and Configuration



Jenkins Installation and Configuration



Post-installation setup wizard

After downloading, installing and running Jenkins, the post-installation setup wizard begins.

Step 1

Browse to <http://localhost:8080> (or whichever port you configured for Jenkins when installing it) and wait until the Unlock Jenkins page appears.

Step 2

The initial Administrator password should be found under the Jenkins installation path. For default installation location to `C:\Program Files\Jenkins\secrets`.

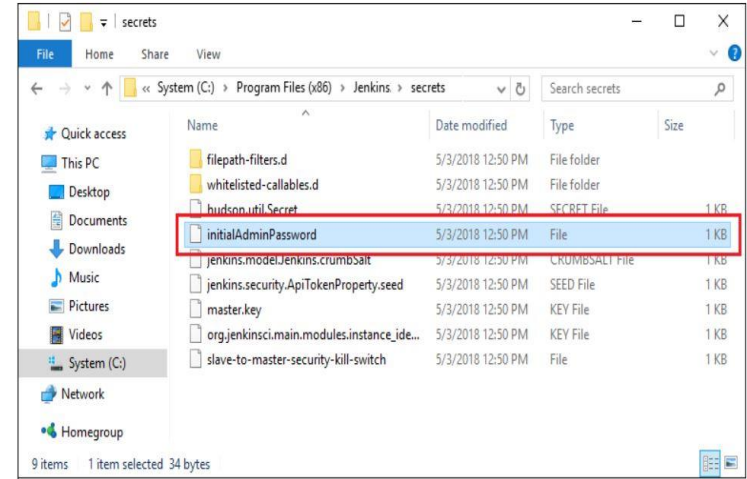
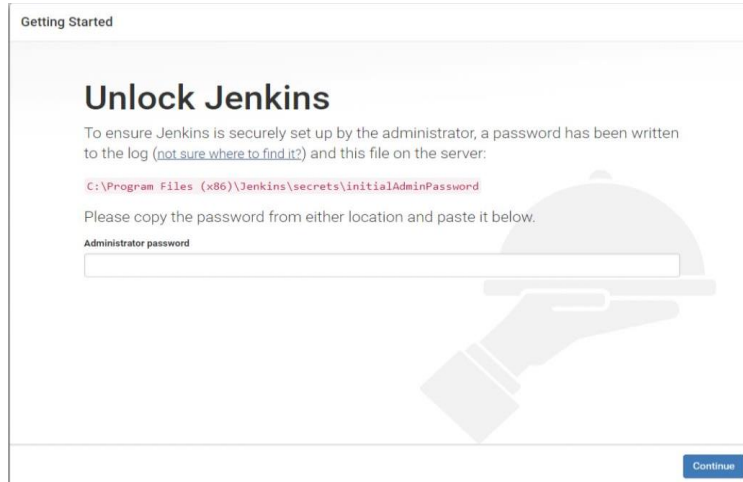
Step 3

Open the highlighted file and copy the content of the initialAdminPassword file.

Step 4

On the Unlock Jenkins page, paste this password into the Administrator password, click Continue.

Jenkins Installation and Configuration



Customizing Jenkins with plugins

After unlocking Jenkins, the Customize Jenkins page appears. Here you can install any number of useful plugins as part of your initial setup.

If you are not sure what plugins you need, choose Install suggested plugins. You can install (or remove) additional Jenkins plugins at a later via the Manage Jenkins > Manage Plugins

Creating the first administrator user

Finally, after customizing Jenkins with plugins, Jenkins asks you to create your first administrator user.

1. When the Create First Admin User page appears, specify the details for your administrator user in the respective fields and click Save and Finish.
2. When the Jenkins is ready page appears, click Start using Jenkins.
3. If required, log in to Jenkins with the credentials of the user you just created and you are ready to start using Jenkins!

Exploring Jenkins Dashboard

Jenkins Dashboard

1. Dashboard

2. Breadcrumbs

3. Sidebar

4. Build Queue

5. Build Executor Status

6. "All" view

7. Jobs/projects

8. Build

9. Build status

10. Build trend

1

2

3

4

5

6

7

8

9

10

ENABLE AUTO REFRESH

add description

| S | W | Name | Last Success | Last Failure | Last Duration |
|---|---|-------------------------------|---|--|---------------|
| | | App | 6 mo 15 days - #32 | N/A | 44 sec |
| | | Base Image Build | 5 mo 13 days - #31 kohsuke@acmecorp-base | 5 days 1 hr - #32 kohsuke@acmecorp-base | 23 sec |
| | | Just another build | 5 mo 13 days - #11 | 6 mo 21 days - #4 | 14 sec |
| | | With custom build environment | 5 mo 13 days - #7 | 6 mo 21 days - #1 | 6.7 sec |

Legend RSS for all RSS for failures RSS for just latest builds

Build Queue

No builds in the queue.

Build Executor Status

1 part of App #64

2 part of App #63

Wasted Minutes

0 ms were wasted because you didn't have enough executors.

Exploring Jenkins Dashboard



Breadcrumbs: We can traverse pages and breadcrumb will show the path indices.

Sidebar: It contains most important things which we have in Jenkins

Build Queue and Build Executor : When we will start running job it will show up here. By default it provides two executor, when we will start jobs they will wait in the queue and after finishing the current jobs they will start executing.

All view: In All view section we can see all the jobs which we have in the Jenkins

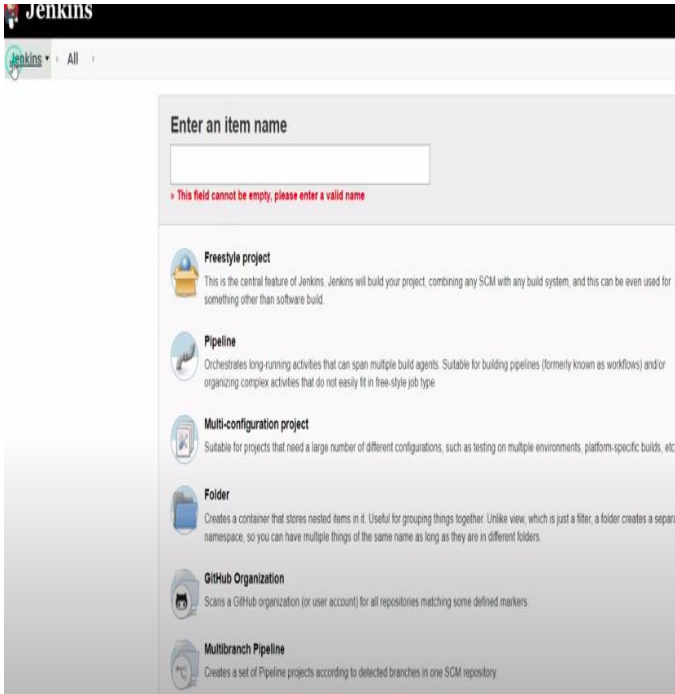
Build Status: Here we can see ball icon and Blue means build is success, Red is failure and Grey means it has not started yet.

New Item: It is used to create a new job

Manage Jenkins: It allows a Jenkins administrator to manage plugins using, users security, nodes, credentials and global tools configurations.

Exploring Jenkins Dashboard

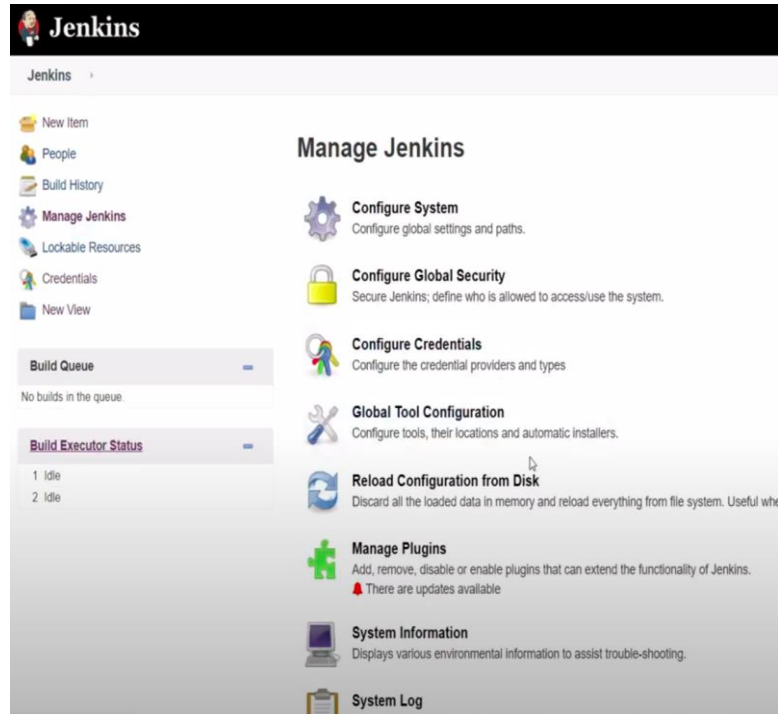
New Item



The screenshot shows the 'New Item' page in the Jenkins dashboard. At the top, there's a header with the Jenkins logo and a navigation bar. Below the header, there's a section titled 'Enter an item name' with a text input field. A red error message below the field states: 'This field cannot be empty, please enter a valid name'. Below the input field, there's a list of project types with icons and descriptions:

- Freestyle project**: This is the central feature of Jenkins. Jenkins will build your project, combining any SCM with any build system, and this can be even used for something other than software build.
- Pipeline**: Orchestrates long-running activities that can span multiple build agents. Suitable for building pipelines (formerly known as workflows) and/or organizing complex activities that do not easily fit in free-style job type.
- Multi-configuration project**: Suitable for projects that need a large number of different configurations, such as testing on multiple environments, platform specific builds, etc.
- Folder**: Creates a container that stores nested items in it. Useful for grouping things together. Unlike view, which is just a filter, a folder creates a separate namespace, so you can have multiple things of the same name as long as they are in different folders.
- GitHub Organization**: Scans a GitHub organization (or user account) for all repositories matching some defined markers.
- Multibranch Pipeline**: Creates a set of Pipeline projects according to detected branches in one SCM repository.

Manage Jenkins



The screenshot shows the 'Manage Jenkins' page in the Jenkins dashboard. The page has a header with the Jenkins logo and a navigation bar. Below the header, there's a section titled 'Manage Jenkins' with a list of configuration options:

- Configure System**: Configure global settings and paths.
- Configure Global Security**: Secure Jenkins; define who is allowed to access/use the system.
- Configure Credentials**: Configure the credential providers and types.
- Global Tool Configuration**: Configure tools, their locations and automatic installers.
- Reload Configuration from Disk**: Discard all the loaded data in memory and reload everything from file system. Useful when you have updated the configuration files.
- Manage Plugins**: Add, remove, disable or enable plugins that can extend the functionality of Jenkins. There are updates available.
- System Information**: Displays various environmental information to assist trouble-shooting.
- System Log**

On the left side of the page, there's a sidebar with a list of links: New Item, People, Build History, Lockable Resources, Credentials, New View, Build Queue, and Build Executor Status. The 'Build Queue' section shows 'No builds in the queue.' The 'Build Executor Status' section shows a list of executors: 1 Idle, 2 Idle.

Exploring Jenkins Dashboard



Dashboard

new item

People

Build History

Manage Jenkins

My Views

New View

Build Queue

No builds in the queue.

Build Executor Status

1 Idle

2 Idle

Manage Jenkins

Building on the built-in node can be a security issue. You should set up distributed builds. See [the documentation](#).

Java 11 is the recommended version to run Jenkins on; please consider upgrading.

System Configuration

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.

Manage Nodes and Clouds
Add, remove, control and monitor the various that Jenkins runs jobs on.

Security

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

Manage Users
Create/delete/modify users that can log in to this Jenkins

Status Information

System Information
Displays various environmental information to assist trouble-shooting.

System Log
System log captures output from java.util.logging output related to Jenkins.

Load Statistics
Check your resource utilization and see if you need more computers for your builds.

About Jenkins
See the version and license information.

Troubleshooting

Manage Old Data
Scrub configuration files to remove remnants from old plugins and earlier versions.

Tools and Actions

Reload Configuration from Disk
Discard all the loaded data in memory and reload everything from file system. Useful when you modified config files directly on disk.

Jenkins CLI
Access/manage Jenkins from your shell, or from your script.

Script Console
Executes arbitrary script for administration/trouble-shooting/diagnostics.

Prepare for Shutdown
Stops executing new builds, so that the system eventually shut down safely.

Manage Jenkins



Manage Nodes and Cloud: Here Master is our localhost. We can add slave nodes

A screenshot of the Jenkins 'Nodes' page. The breadcrumb navigation shows 'Jenkins > Nodes'. On the left, there is a sidebar with links: 'Back to Dashboard' (with a green arrow icon), 'Manage Jenkins' (with a gear icon), 'New Node' (with a laptop icon), 'Configure Clouds' (with a cloud icon), and 'Node Monitoring' (with a gear icon). The main content area has a table with one entry: 'master' with a laptop icon. Below the table is a button labeled 'Data obtained'. At the bottom, there are two expandable sections: 'Build Queue' showing 'No builds in the queue.' and 'Build Executor Status' showing two 'Idle' executors.

Global Tools Configuration: From here we can configure various tools like JDK, Maven and version control etc

A screenshot of the Jenkins 'Global Tool Configuration' page. The breadcrumb navigation shows 'Dashboard > Global Tool Configuration'. The left sidebar is identical to the previous screenshot. The main content area is titled 'Global Tool Configuration' with a wrench icon. It contains three sections: 'Maven Configuration' with fields for 'Default settings provider' and 'Default global settings provider', both set to 'Use default maven settings'; 'JDK' with a section for 'JDK installations' containing an 'Add JDK' button and a note 'List of JDK installations on this system'; and 'Maven' with a section for 'Maven installations' containing an 'Add Maven' button and a note 'List of Maven installations on this system'. At the bottom right are 'Save' and 'Apply' buttons.

Manage Jenkins



Configure System: Here we can set Jenkins Location, Global Properties, Environment variables, Shell etc

Plugin Management: We can install, remove, update plugin from here

Jenkins Location

Jenkins URL

⚠ Please set a valid host name, instead of localhost

System Admin e-mail address

Serve resource files from another domain

Resource Root URL

Without a resource root URL, resources will be served from the Jenkins URL with Content-Security-Policy set.

Global properties

- ☐ Environment variables
- ☐ Tool Locations

Usage Statistics

- ☒ Help make Jenkins better by sending anonymous usage statistics and crash reports to the Jenkins project.

Fingerprints

- ☐ Disable Fingerprint Cleanup

Administrative monitors configuration

Global Build Discarders

- ☐ Project Build Discarder

Jenkins

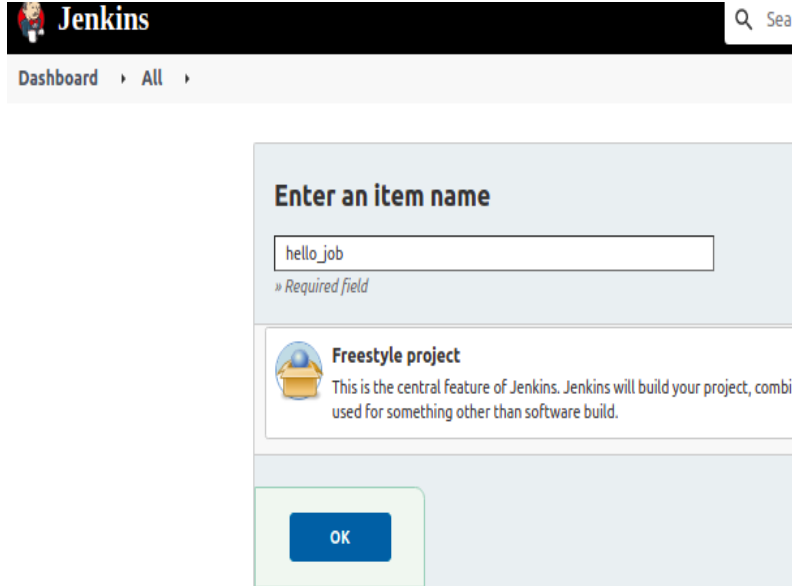
Dashboard > Plugin Manager >

Updates Available Installed Advanced

| Install | Name |
|---|-------------------------------|
| | Branch API UNAVAILABLE |
| <input type="button" value="api-plugin"/> | |
| <p>This plugin provides an API for multiple branch b</p> <p>This version of the plugin exists but it is not being typically the case when plugin requirements, e.g. a are not satisfied. See the plugin documentation for requirements.</p> | |
| | LDAP UNAVAILABLE |
| <input type="button" value="Authentication and User Management"/> | |
| <p>Adds LDAP authentication to Jenkins</p> <p>This version of the plugin exists but it is not being</p> | |

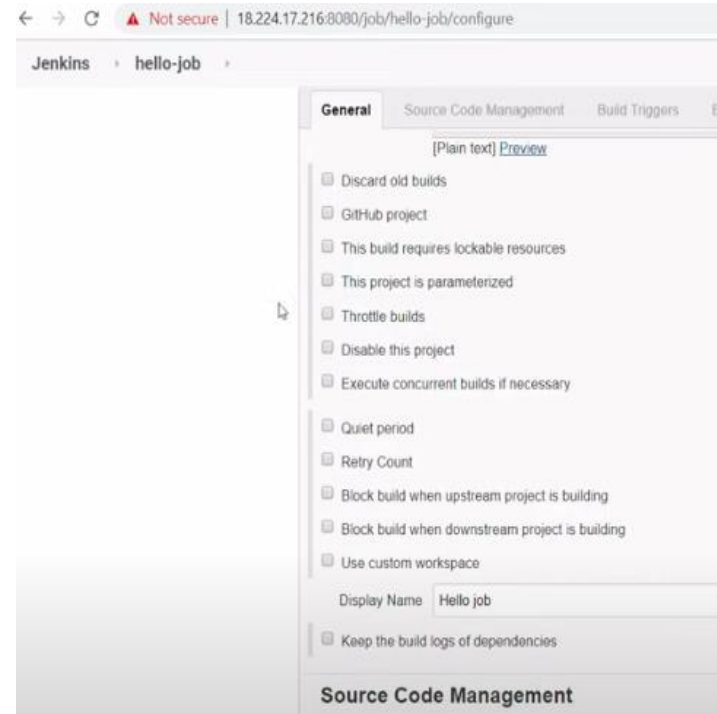
Manage Jenkins

Creating a Job: Click on new item, give a name of the job, select Freestyle project and then click on ok



The image shows the Jenkins 'Enter an item name' dialog. At the top, there's a search bar with the Jenkins logo and a 'Search' button. Below it, the breadcrumb 'Dashboard > All >' is visible. The main section is titled 'Enter an item name' and contains a text input field with 'hello_job' entered. Below the input field, it says '» Required field'. Underneath, there's a section for 'Freestyle project' with a blue icon of a house and a brief description: 'This is the central feature of Jenkins. Jenkins will build your project, combined for something other than software build.' At the bottom, there's a large blue 'OK' button.

General: Give a display name or any other section that you want



The image shows the Jenkins configuration page for a job named 'hello-job'. The browser address bar shows '18.224.17.216:8080/job/hello-job/configure'. The page has a breadcrumb 'Jenkins > hello-job >'. The 'General' tab is selected, showing various options with checkboxes: 'Discard old builds', 'GitHub project', 'This build requires lockable resources', 'This project is parameterized', 'Throttle builds', 'Disable this project', 'Execute concurrent builds if necessary', 'Quiet period', 'Retry Count', 'Block build when upstream project is building', 'Block build when downstream project is building', 'Use custom workspace', and 'Keep the build logs of dependencies'. The 'Display Name' field is set to 'Hello job'. Below the 'General' tab, the 'Source Code Management' section is partially visible.

Manage Jenkins



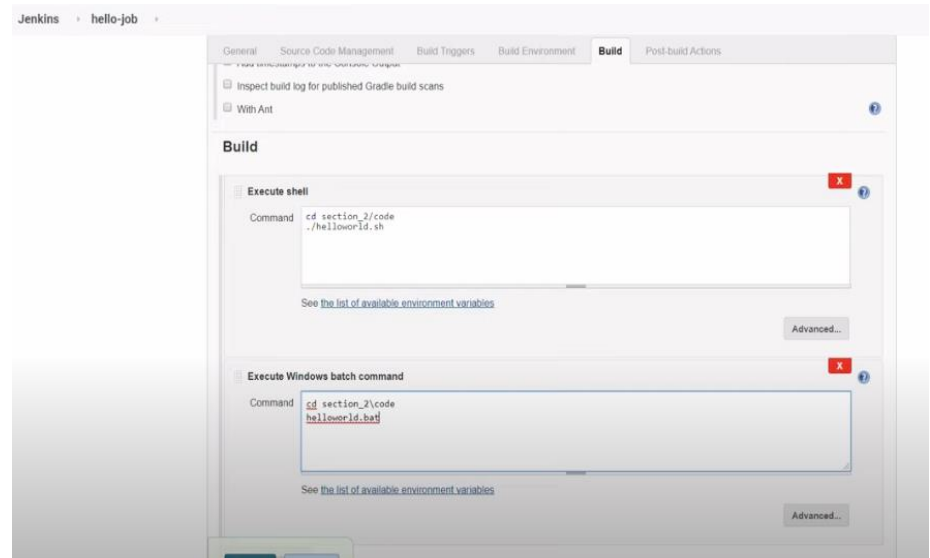
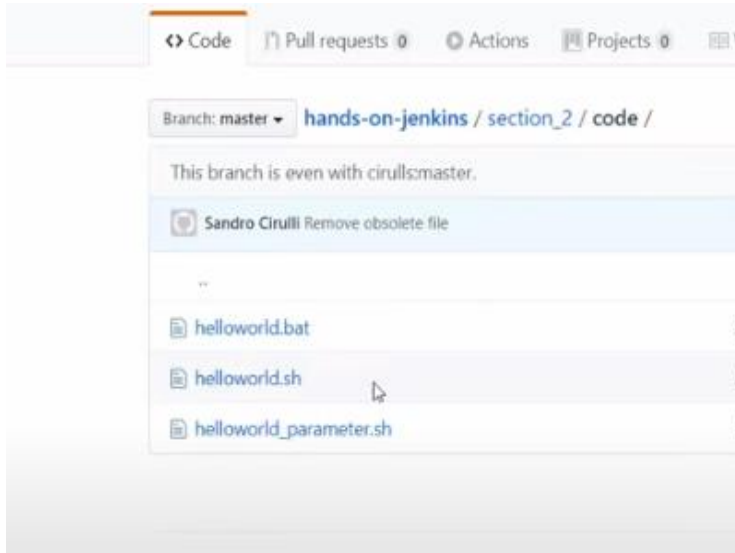
Source Code Management:: Here select Git, give a repository url , branch name and credential if the repository is private. Here for us its a public repository.

A screenshot of the Jenkins web interface showing the configuration for a job named "hello-job". The "Source Code Management" tab is selected. Under "Source Code Management", the "Git" radio button is chosen. In the "Repositories" section, the "Repository URL" is set to "https://github.com/pankajchhatri/hands-on-jenkins.git" and "Credentials" is set to "- none -". In the "Branches to build" section, the "Branch Specifier (blank for 'any')" is set to "*/master". The "Repository browser" is set to "(Auto)". There are buttons for "Add Repository", "Add Branch", and "Add" for additional behaviours. A "Subversion" option is also visible at the bottom.

Manage Jenkins



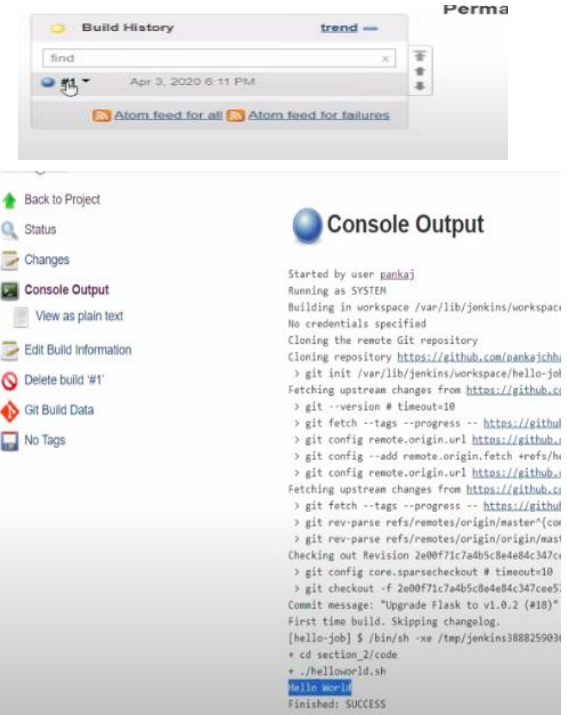
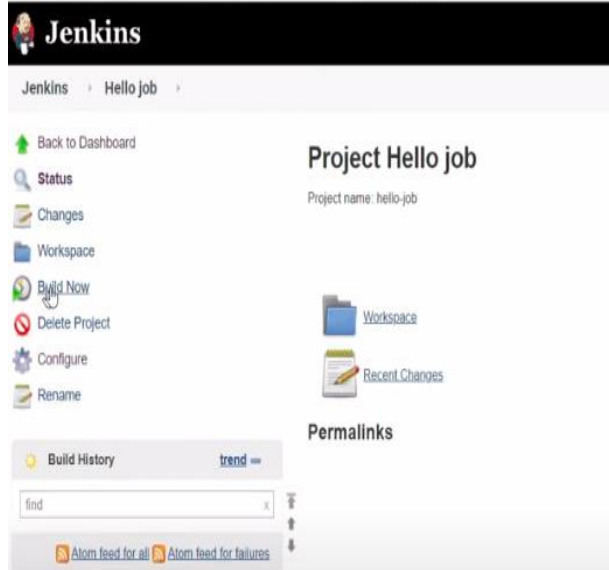
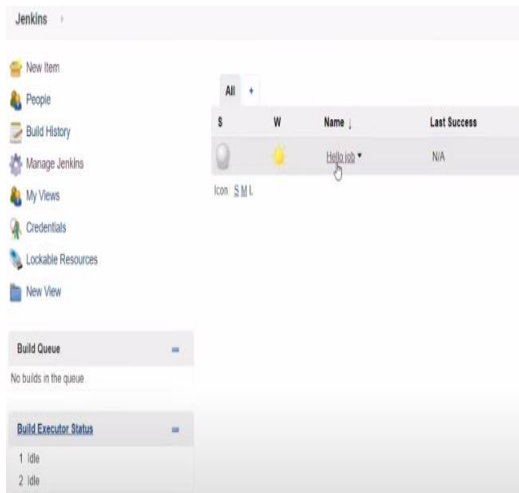
Build: Here we can use build option, also we can use other option if needed. Here we are executing shell from inside the project to print Hello world. Click apply and save.



Manage Jenkins



Run a job: Got to the dashboard, we can see the job here Click on it, after that click on build Now.. In build History we can see the executed job, after clicking it we can see the console output.



Manage Jenkins: System Configuration



Setting up global environments/global properties



Configure System

Configure global settings and paths.

Global properties

☐ Disable deferred wipeout on this node

☒ Environment variables

List of variables

Name

ANT_OPTS

Value

-Dfile.encoding=ISO-8859-1

Name

JAVA_TOOL_OPTIONS

Value

-Dfile.encoding=ISO-8859-1

Name

LANG

Value

en_US.UTF-8

Setting up global Tool Configuration: Use your own home path for JDK, GIT etc



Global Tool Configuration

Configure tools, their locations and automatic installers.

JDK

Name

Java_1.7

JAVA_HOME

/home/bjit/jdk1.7.0_80

☐ Install automatically

Git

Git installations

Git

Name

Default

Path to Git executable ?

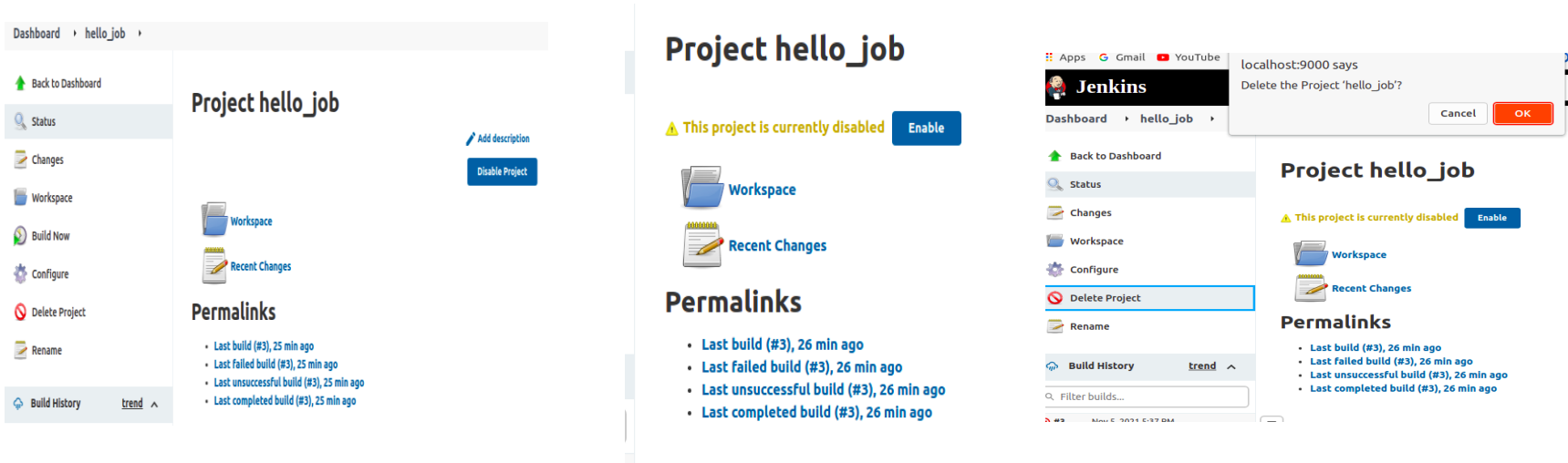
git

☐ Install automatically ?

Add Git -

Disabling and Deleting Job

To enable , disable and delete a job we need to go to dashboard and then click on a job.



The image displays three screenshots of the Jenkins web interface, illustrating the steps to manage a job named 'hello_job'.

Left Screenshot: Shows the Jenkins dashboard for 'hello_job'. The left sidebar contains a menu with options: 'Back to Dashboard', 'Status', 'Changes', 'Workspace', 'Build Now', 'Configure', 'Delete Project', and 'Rename'. The main content area shows 'Project hello_job' with a 'Disable Project' button. Below this, there are links for 'Workspace' and 'Recent Changes', and a 'Permalinks' section listing build history.

Middle Screenshot: Shows the 'Project hello_job' page. A yellow warning message states 'This project is currently disabled' with an 'Enable' button. Below this, there are links for 'Workspace' and 'Recent Changes', and a 'Permalinks' section listing build history.

Right Screenshot: Shows the 'Project hello_job' page with the 'Delete Project' option selected in the left sidebar. A confirmation dialog box is open, asking 'Delete the Project 'hello_job'?' with 'Cancel' and 'OK' buttons.

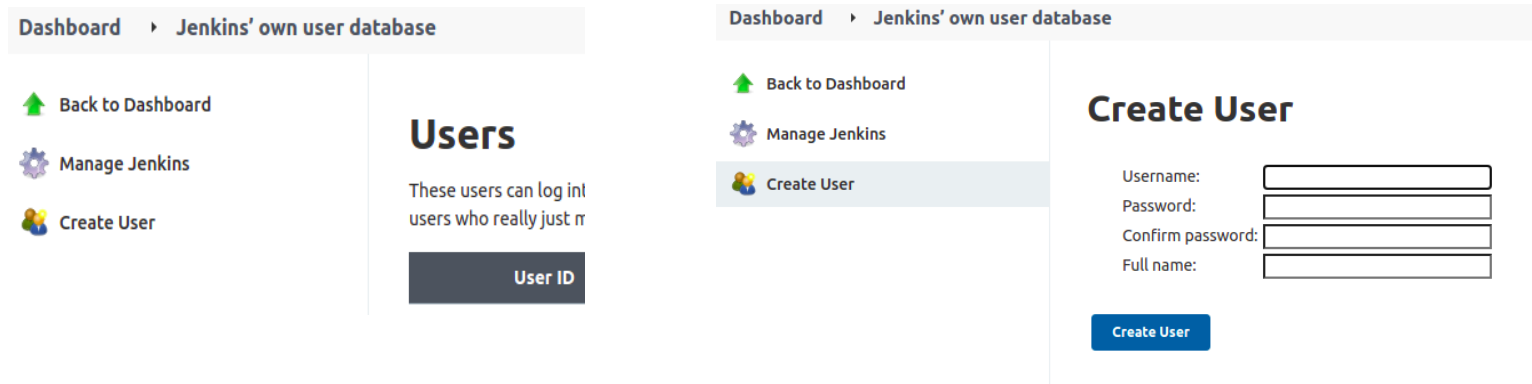
Here we can see the Blue button. By clicking this we can enable and disable a job. Also we can click Delete project from the left menu and then a popup will open, now click ok to delete a job.

Manage Jenkins: Creating a User

From Manage Jenkins in Security section we can find Manage Users



After clicking on Manage Users we can see a dashboard of Users list.
In the left sidebar there is a button 'Create User'.
Click on it and fill-up the form with new user and password



A white L-shaped graphic consisting of a vertical line and a horizontal line meeting at a right angle, positioned to the left of the "Thank You" text.

Thank You

A white L-shaped graphic consisting of a vertical line and a horizontal line meeting at a right angle, positioned to the right of the "Thank You" text.

Get in touch with us:

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