

# Software Engineering & Project Management Lab Experiment No: - 04

## Aim: To understand Continuous Integration and configure Jenkins.

**Aim:** To understand Continuous Integration, install, and configure Jenkins with Maven/Ant/Gradle to set up a build job.

### **Theory:**

#### **Continuous Integration (CI):**

Continuous Integration is a software development practice where code changes are automatically built, tested, and integrated into a shared repository on a frequent basis. The primary goal of CI is to detect and address integration issues early in the development process, ensuring that the codebase remains stable and reliable. This approach allows teams to deliver high-quality software more efficiently and with greater confidence.

#### **Key Concepts of Continuous Integration:**

- **Version Control System (VCS):**

CI relies on a VCS (e.g., Git, SVN) to manage and track changes in the codebase. Developers commit their changes to the repository, triggering the CI process.

- **Automated Build:**

CI systems automate the process of compiling source code into executable artifacts. This ensures consistency and eliminates manual errors in the build process.

- **Automated Testing:**

CI includes automated testing to validate that code changes do not introduce new bugs or break existing functionality. Common types of tests include unit tests, integration tests, and acceptance tests.

- **Build Server:**

A CI server, like Jenkins, is responsible for orchestrating the CI process. It monitors the VCS for changes, triggers builds, runs tests, and provides feedback to developers.

#### **Installing and Configuring Jenkins with Maven/Ant/Gradle:**

1. **Install Jenkins:**

Download and install Jenkins from the official website.  
Start the Jenkins service.

2. **Configure Jenkins:**

Open Jenkins in a web browser and follow the initial setup wizard.  
Install necessary plugins, including the ones for Maven, Ant, or Gradle integration.

3. **Create a Jenkins Job:**

Click on "New Item" to create a new job.  
Choose the type of project (e.g., Freestyle project or Pipeline).  
Configure the job settings, such as source code repository, build triggers, and post-build actions.

4. **Configure Build Tool:**

If using Maven, specify the path to the Maven executable and configure Maven goals (e.g., clean install).  
For Ant or Gradle, configure the respective build tool settings.

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### 5. Save and Build:

Save the job configuration and manually trigger the build to test the setup.

Observe the build console output for any errors or issues.

### Continuous Integration Benefits:

#### ❖ Early Detection of Bugs:

CI ensures that code changes are continuously tested, allowing for the early detection and resolution of bugs.

#### ❖ Consistent Builds:

Automated builds eliminate variations caused by manual processes, ensuring that each build is consistent and reproducible.

#### ❖ Integration Testing:

CI helps in integrating code changes frequently, reducing the likelihood of integration issues that arise when merging changes from multiple developers.

#### ❖ Rapid Feedback:

Developers receive rapid feedback on the quality of their code through automated tests and build reports, enabling them to address issues promptly.

#### ❖ Improved Collaboration:

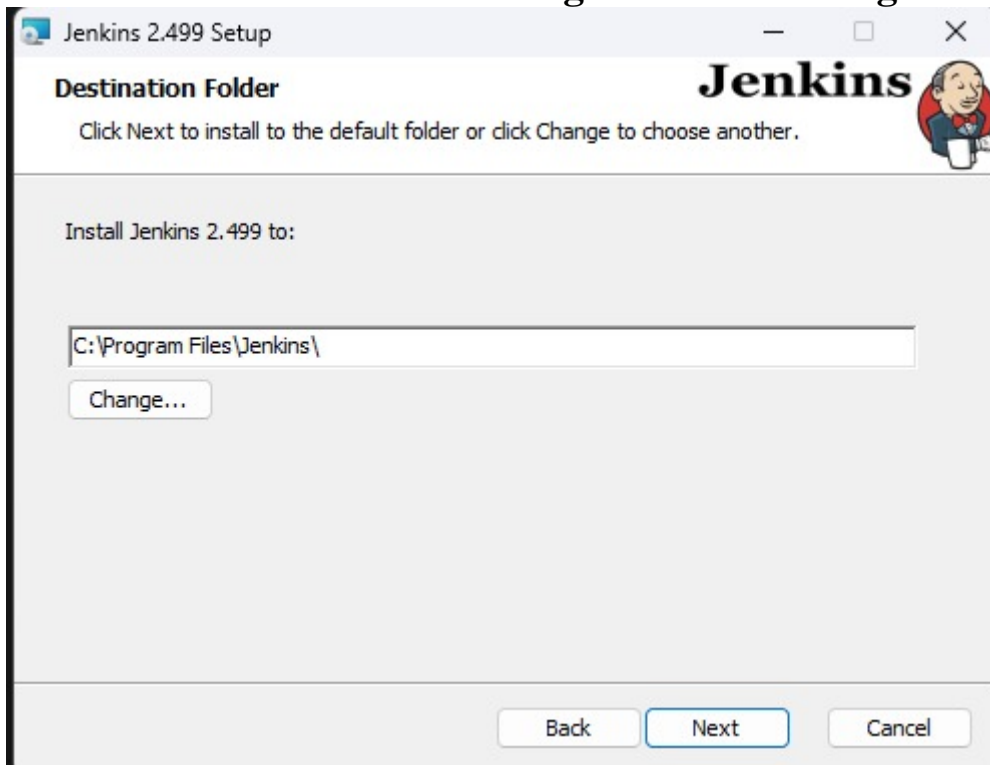
CI promotes collaboration by providing a central platform where developers can share and integrate their work regularly.

### Implementation:



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Jenkins 2.499 Setup

**Destination Folder**

Click Next to install to the default folder or click Change to choose another.

Install Jenkins 2.499 to:

C:\Program Files\Jenkins\

Change...

Back Next Cancel



Jenkins 2.499 Setup

**Service Logon Credentials**

Enter service credentials for the service.

Jenkins 2.499 installs and runs as an independent Windows service. To operate in this manner, you must supply the user account credentials for Jenkins 2.499 to run successfully.

**Logon Type:**

☐ Run service as LocalSystem (not recommended)

☒ Run service as local or domain user:

Account:

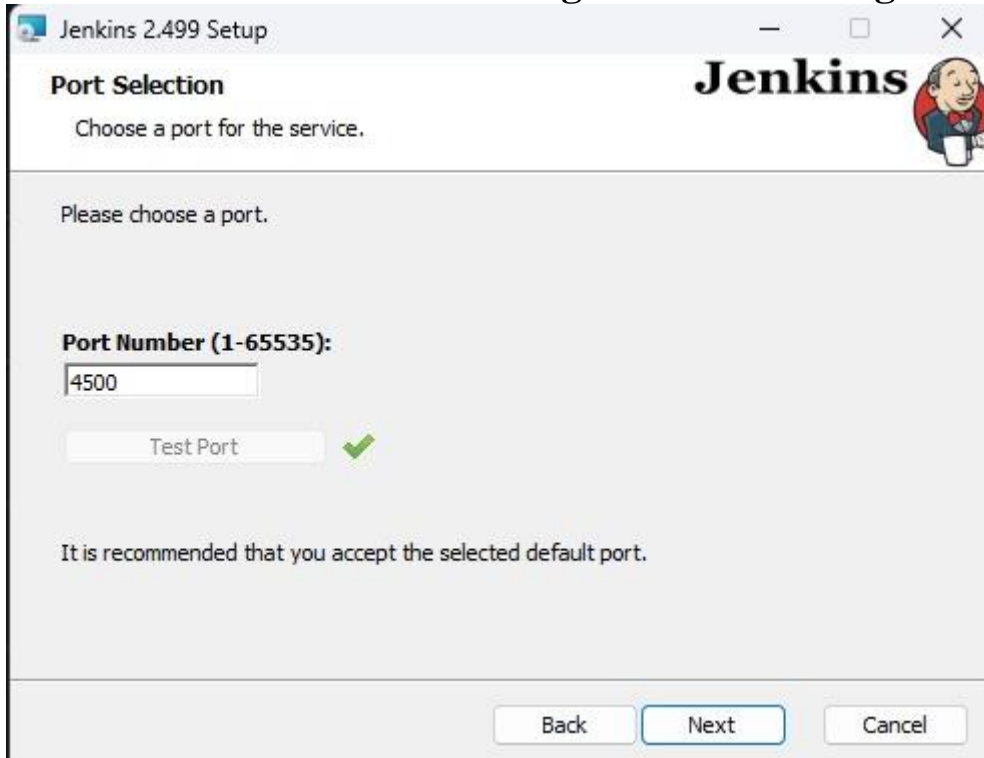
Password:

Test Credentials  Credentials must be tested to continue

Back Next Cancel

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The screenshot shows the 'Jenkins 2.499 Setup' window with the 'Port Selection' tab. The window title is 'Jenkins 2.499 Setup'. The Jenkins logo is in the top right corner. The text 'Choose a port for the service.' is displayed. Below it, 'Please choose a port.' is written. A text box labeled 'Port Number (1-65535):' contains the value '4500'. A 'Test Port' button is next to the text box, with a green checkmark to its right. At the bottom, there are three buttons: 'Back', 'Next' (highlighted with a blue border), and 'Cancel'. A message at the bottom states: 'It is recommended that you accept the selected default port.'

Jenkins 2.499 Setup

**Port Selection**

Choose a port for the service.

Please choose a port.

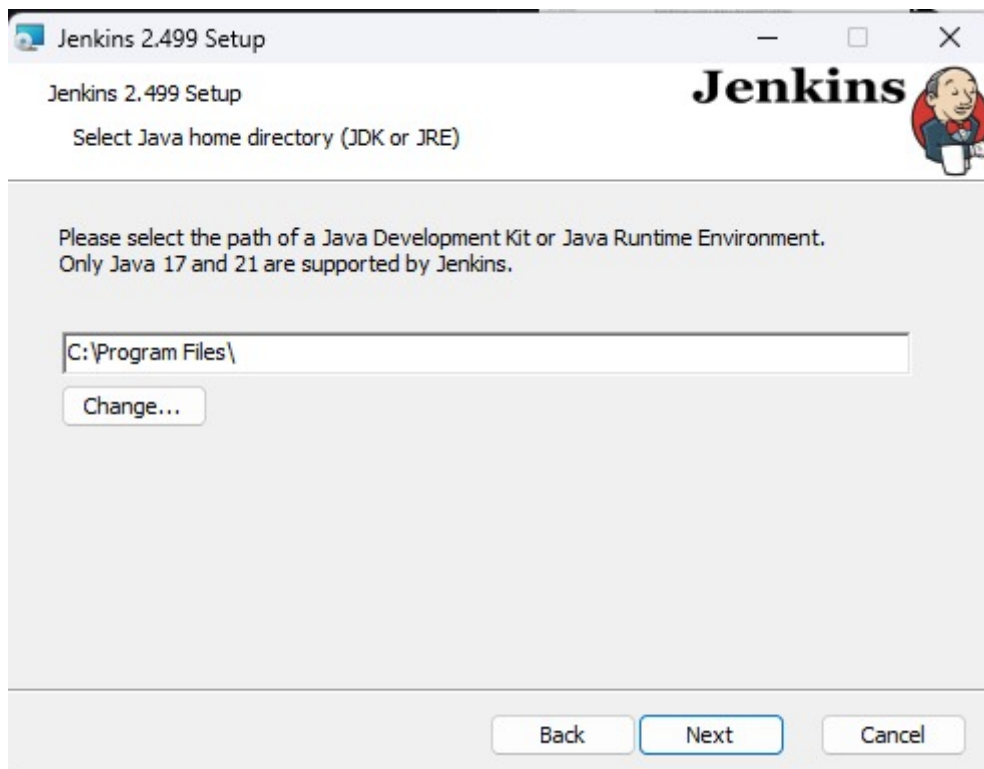
**Port Number (1-65535):**

4500

Test Port ✓

It is recommended that you accept the selected default port.

Back Next Cancel



The screenshot shows the 'Jenkins 2.499 Setup' window with the 'Select Java home directory (JDK or JRE)' tab. The window title is 'Jenkins 2.499 Setup'. The Jenkins logo is in the top right corner. The text 'Select Java home directory (JDK or JRE)' is displayed. Below it, 'Please select the path of a Java Development Kit or Java Runtime Environment. Only Java 17 and 21 are supported by Jenkins.' is written. A text box contains the path 'C:\Program Files\'. A 'Change...' button is below the text box. At the bottom, there are three buttons: 'Back', 'Next' (highlighted with a blue border), and 'Cancel'.

Jenkins 2.499 Setup

**Select Java home directory (JDK or JRE)**

Please select the path of a Java Development Kit or Java Runtime Environment. Only Java 17 and 21 are supported by Jenkins.

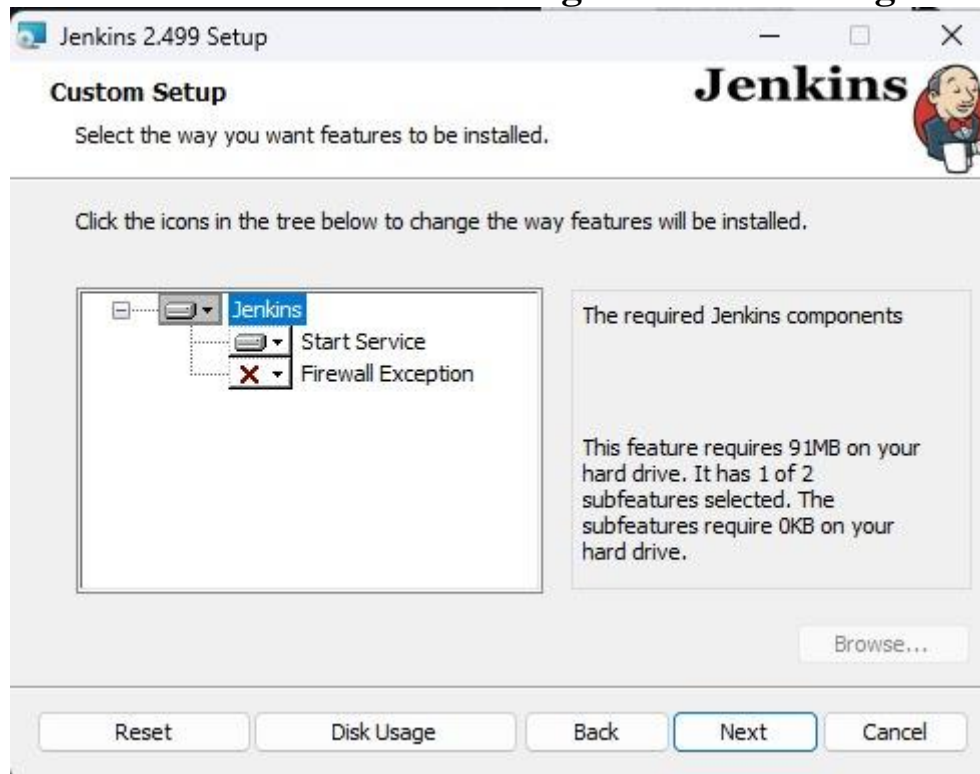
C:\Program Files\

Change...

Back Next Cancel

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## Aim: To understand Continuous Integration and configure Jenkins.



The screenshot shows the Jenkins community Discourse forum page. The header includes the Jenkins logo and navigation links like 'Documentation', 'GitHub', 'Chat', and social media icons. The main content area is titled 'Welcome to the Jenkins community' and features a search bar. Below this, there are tabs for 'categories', 'tags', 'Categories', 'Latest', 'New', 'Unread', 'Top' (selected), and 'Unseen'. A 'New Topic' button is also present. The main list of topics shows a 'Welcome to Discourse' post with 2 replies, 2.1k views, and a date of Mar 2024. Another post mentions 'K8s pod as jenkins node shell script hang'. A 'Top Responses' sidebar lists users like Markus Winter, Mark Waite, Bruno Verachten, Alyssat, and Alex Earl with their respective heart counts.

Topic	Replies	Views	Activity
Welcome to Discourse This is a channel for discussions about Jenkins, currently in beta. If you have questions about Jenkins, you'll probably want to ask them here. Jenkins Code of Conduct applies to all communications here. Please be kind! ... read more	2	2.1k	Mar 2024
K8s pod as jenkins node shell script hang : shell script finished all the commands, but will hang quite long, several minutes even more than one hour Using Jenkins	0	3	7m
After the update to 2.492.1, UI stopped displaying information about the build's start	5	13	5h

Top Responses	
Markus Winter	182
Mark Waite	128
Bruno Verachten	62
Alyssat	20
Alex Earl	17

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### Getting Started

## Getting Started

✓ Folders	✓ OWASP Markup Formatter	○ Build Timeout	○ Credentials Binding	** Ionicons API
○ Timestampers	○ Workspace Cleanup	○ Ant	○ Gradle	Folders
○ Pipeline	○ GitHub Branch Source	○ Pipeline: GitHub Groovy Libraries	○ Pipeline: Stage View	OWASP Markup Formatter
○ Git	○ SSH Build Agents	○ Matrix Authorization Strategy	○ PAM Authentication	
○ LDAP	○ Email Extension	○ Mailer		

Jenkins 2.426.3

Dashboard >

[Add description](#)

+ New Item

People

Build History

Manage Jenkins

My Views

Build Queue

No builds in the queue.

Build Executor Status

1 Idle

2 Idle

### 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 ?

REST API Jenkins 2.426.3

**Conclusion:** Thus, we have successfully understood Continuous Integration, installation, and configuration of Jenkins with Maven/Ant/Gradle to set up a build job.

**LO Mapping:** LO3 is mapped.