

Experiment 4 : To understand Continuous Integration, install and configure Jenkins with Maven/Ant/Gradle to set up a build job.

Aim : To understand the concept of **Continuous Integration (CI)** and implement it by installing and configuring **Jenkins** with **Maven, Ant, or Gradle** to automate the build process. This study aims to explore how Jenkins helps in setting up a CI pipeline, executing automated builds, and improving software development efficiency.

Theory :

Theory of Continuous Integration Using Jenkins with Maven, Ant, or Gradle

Introduction to Continuous Integration (CI)

Continuous Integration (CI) is a **software development practice** where developers frequently integrate their code changes into a shared repository. Each integration is verified using **automated builds and tests**, ensuring that issues are detected early. CI helps streamline the development process, reduces manual errors, and improves software quality.

Key principles of CI:

1. **Frequent Code Integration** – Developers merge changes multiple times a day.
2. **Automated Build Process** – Code is compiled, built, and tested automatically.
3. **Immediate Feedback** – Issues are detected early and fixed promptly.
4. **Consistent Environment** – CI ensures that software builds are reproducible across different environments.

To implement Continuous Integration, organizations use **CI tools like Jenkins**, which automates the build, test, and deployment process.

Jenkins: A CI/CD Automation Tool

Jenkins is an open-source **automation server** that enables developers to **automate software builds, tests, and deployments**. It supports integration with version control systems (Git, SVN) and build tools like **Maven, Ant, and Gradle**.

Key Features of Jenkins

- **Automated Builds:** Supports scheduled or triggered builds based on repository changes.

- **Build Pipelines:** Allows chaining multiple jobs for end-to-end automation.
 - **Plugin Support:** Offers 1,500+ plugins for integration with tools like Docker, Kubernetes, and Slack.
 - **Scalability:** Can distribute builds across multiple nodes for faster execution.
-

Build Tools: Maven, Ant, and Gradle

Build tools are essential in CI to **compile source code, resolve dependencies, and generate deployable artifacts.**

1. Apache Maven

- A widely used **Java-based build automation tool.**
- Uses **POM.xml (Project Object Model)** to define project dependencies, build lifecycle, and plugins.
- Supports phases like **clean, compile, test, package, install, and deploy.**
- Command to build a project:
 - mvn clean install

2. Apache Ant

- **Older than Maven**, but still used for Java builds.

- Uses an **XML-based build script (build.xml)** to define tasks.
- More flexible but requires explicit configurations.
- Command to execute a build:
- ant build

3. Gradle

- **Newer build tool**, used for **Java, Kotlin, and Android development**.
- Uses a **Groovy or Kotlin-based build script** instead of XML.
- Faster than Maven due to its **incremental build mechanism**.
- Command to build a project:
- gradle build

Jenkins Integration with Maven, Ant, and Gradle

Jenkins can be configured to **automate builds** using these tools. The integration process involves:

1. **Installing Jenkins** and setting up build tools.
2. **Creating a job in Jenkins** that fetches source code from Git.

3. **Configuring build steps** to invoke Maven, Ant, or Gradle commands.
 4. **Executing automated builds** and monitoring results.
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Advantages of Using Jenkins for CI

- **Faster Development Cycle** – Automated builds and testing reduce manual effort.
- **Early Bug Detection** – Continuous integration ensures quick issue identification.
- **Improved Collaboration** – Developers work on the latest stable codebase.
- **Efficient Deployment** – Jenkins supports integration with **Docker, Kubernetes, and cloud platforms**.

Implementation :

The image shows two screenshots of the Jenkins website. The top screenshot is the 'Download and deploy' page, which provides information about the Stable (LTS) and Weekly release lines. It includes links for 'Change log', 'Upgrade Guide', and 'Past Releases'. The bottom screenshot is the 'Thank you for downloading Windows installer' page, which provides instructions for changing boot configuration, starting/stopping the service, and inheriting an existing Jenkins installation. Both screenshots show the Jenkins logo and navigation menu at the top, and a footer with links to Resources, Project, Community, and Other.

Download and deploy

The Jenkins project produces two release lines: Stable (LTS) and weekly. Depending on your organization's needs, one may be preferred over the other. See the links below for more information and recommendations about the release lines.

Stable (LTS)

Long-Term Support (LTS) release baselines are chosen every 12 weeks from the stream of regular releases. Every 4 weeks we release stable releases which include bug and security fix backports. [Learn more...](#)

[Change log](#) [Upgrade Guide](#) [Past Releases](#)

Weekly releases

This release line delivers bug fixes and new features rapidly to users and plugin developers who need them. It is generally delivered on a weekly cadence. [Learn more...](#)

[Change log](#) [Past Releases](#)

Downloading Jenkins

Jenkins is distributed as WAR files, native packages, installers, and Docker images. Follow these installation steps:

1. Before downloading, please take a moment to review the [Hardware and Software requirements](#) section of the User Handbook.
2. Select one of the packages below and follow the download instructions.
3. Once a Jenkins package has been downloaded, proceed to the [Installing Jenkins](#) section of the User Handbook.
4. You may also want to verify the package you downloaded. [Learn more about verifying Jenkins downloads.](#)

Download Jenkins 2.492.1 LTS for:

Generic Java package (.war)

SHA-256: c0534750a902734a4054ac30510b1b889c5d97b327af8b55869c3a03d99f8c

Download Jenkins 2.497 for:

Generic Java package (.war)

SHA-256: 9b0a677097160c3e1091056021a74604951a6c5446831620c30341570966

Thank you for downloading Windows installer

Download hasn't started? [Click this link](#)

Changing boot configuration

By default, your Jenkins runs at <https://localhost:8080/>. This can be changed by editing `jenkins.xml`, which is located in your installation directory. This file is also the place to change other boot configuration parameters, such as JVM options, HTTPS setup, etc.

Starting/stopping the service

Jenkins is installed as a Windows service, and it is configured to start automatically upon boot. To start/stop them manually, use the service manager from the control panel, or the `sc` command line tool.

Inheriting your existing Jenkins installation

If you'd like your new installation to take over your existing Jenkins data, copy your old data directory into the new `JENKINS_HOME` directory.

See Also

- [Running Jenkins behind Internet Information Server \(IIS\)](#)
- [Running Jenkins behind nginx](#)
- [Running Jenkins behind Apache](#)

Improve this page [Report page issue](#)

Resources
Downloads

Project
Structure and governance

Community
Forum

Other
Code of Conduct

The image shows two screenshots from a Windows 10 desktop. The top screenshot is a web browser displaying the Jenkins download page for version 2.497 LTS. The page lists various operating systems and architectures supported by Jenkins, including Docker, Kubernetes, Ubuntu/Debian, Red Hat Enterprise Linux and derivatives, Fedora, Windows, openSUSE, Arch Linux, FreeBSD, Gentoo, macOS, OpenBSD, and OpenIndiana Hipster. The bottom screenshot shows the Jenkins 2.497 Setup Wizard window. The wizard is titled 'Jenkins 2.497 Setup' and contains the following text: 'Welcome to the Jenkins 2.497 Setup Wizard', 'The Setup Wizard will install Jenkins 2.497 on your computer. Click Next to continue or Cancel to exit the Setup Wizard.', and 'This file is also the place to change other boot configuration parameters, from the control panel, or the `sc` command line tool.' The wizard has 'Back', 'Next', and 'Cancel' buttons at the bottom.

Download Jenkins 2.497 LTS for:

Operating System	Third party
Generic Java package (.war)	
Docker	
Kubernetes	
Ubuntu/Debian	
Red Hat Enterprise Linux and derivatives	
Fedora	
Windows	
openSUSE	
Arch Linux	Third party
FreeBSD	Third party
Gentoo	Third party
macOS	Third party
OpenBSD	Third party
OpenIndiana Hipster	Third party

Packages marked third party may not be updated as frequently as packages supported by the Jenkins project directly.

Thank you for downloading Windows installer

Download hasn't started? [Click this link](#)

Changing boot configuration

By default, your Jenkins runs at <https://localhost:8080/>. This can be changed to other ports, such as JVM options, HTTPS setup, etc.

Starting/stopping the service

Jenkins is installed as a Windows service, and it is configured to start automatically.

Inheriting your existing Jenkins installation

If you'd like your new installation to take over your existing Jenkins data, copy the `jenkins` folder from the old installation to the new one.

See Also

- [Running Jenkins behind Internet Information Server \(IIS\)](#)
- [Running Jenkins behind nginx](#)
- [Running Jenkins behind Apache](#)

Resources

- [Downloads](#)

Project

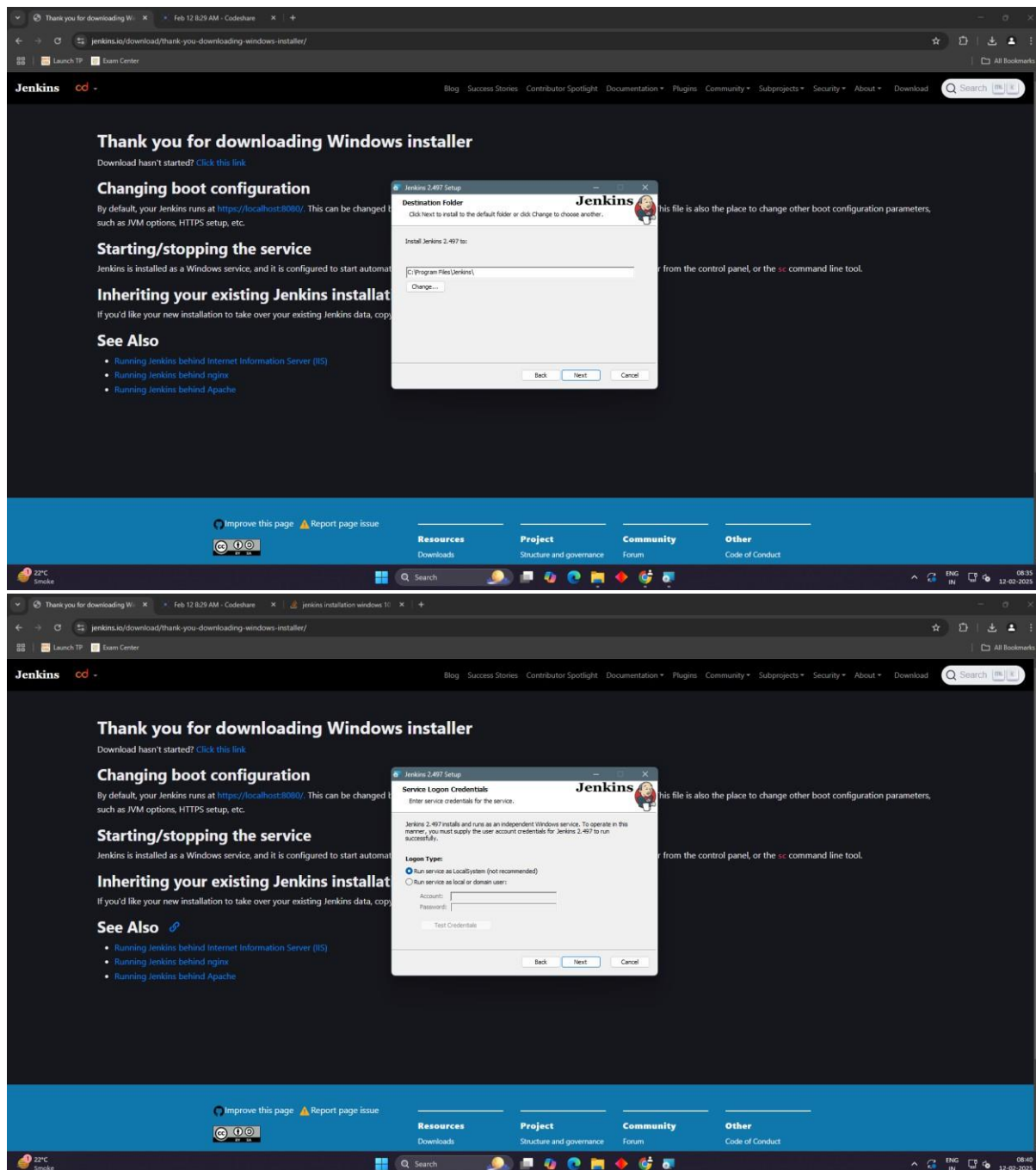
- [Structure and governance](#)

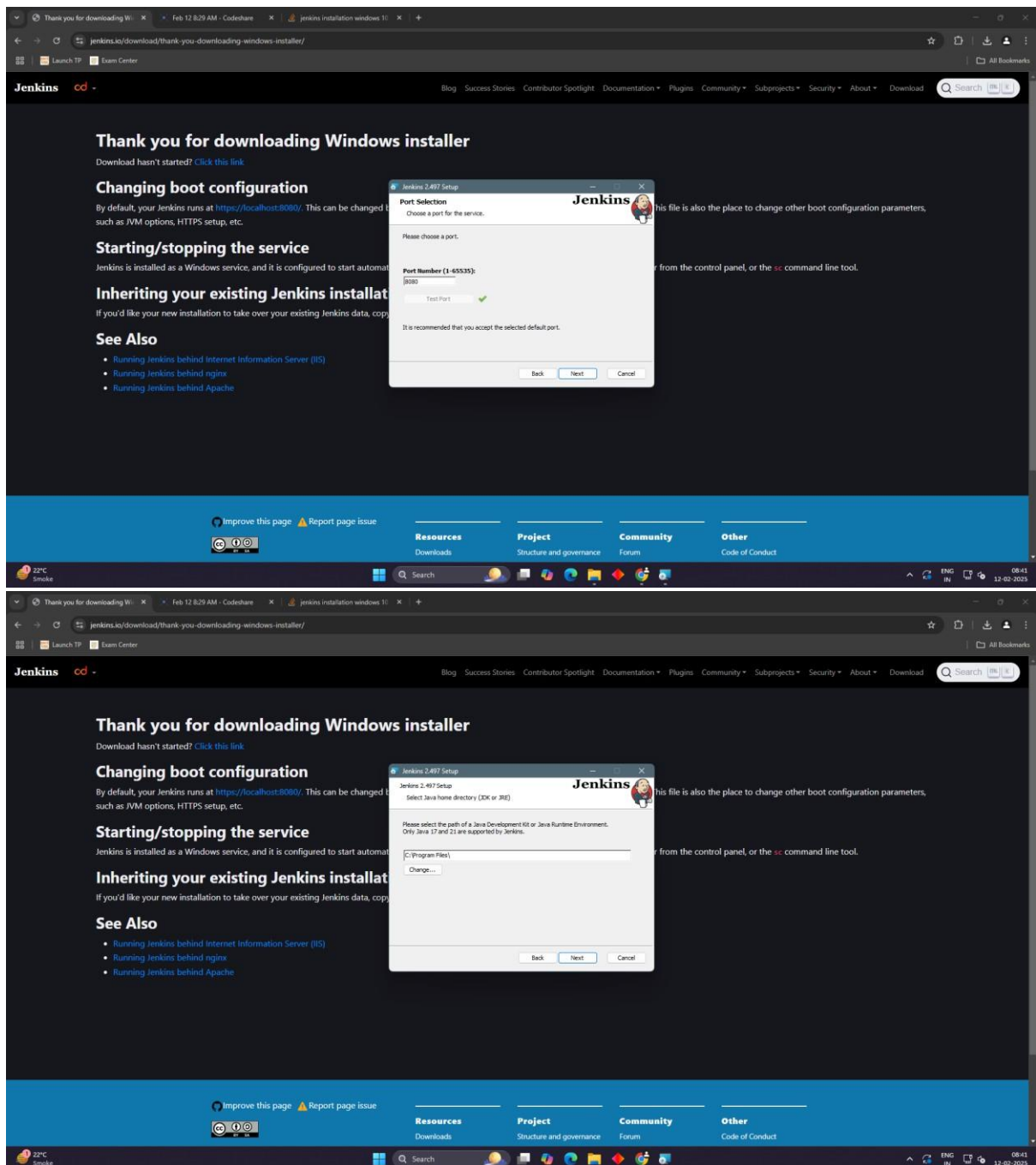
Community

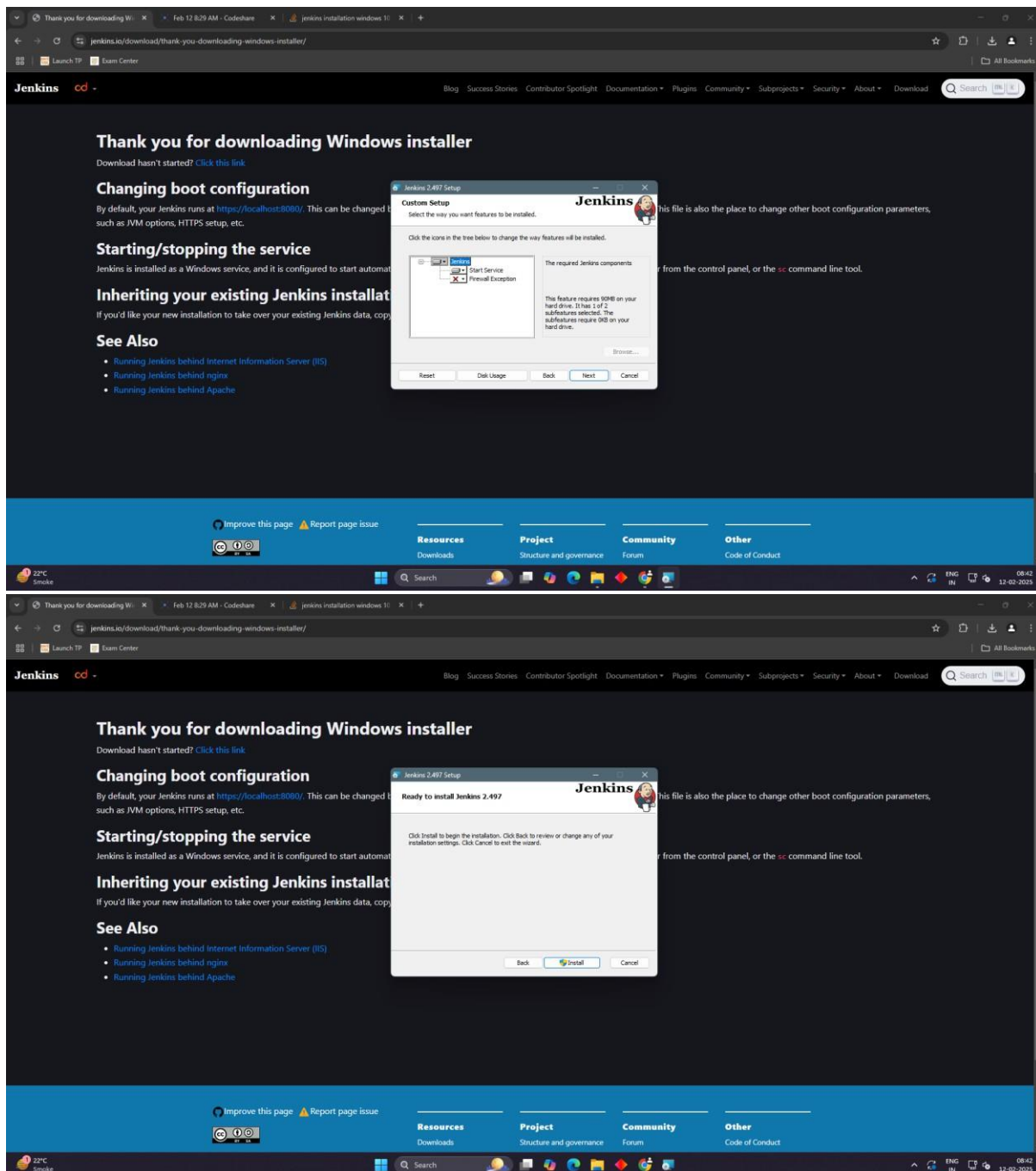
- [Forum](#)

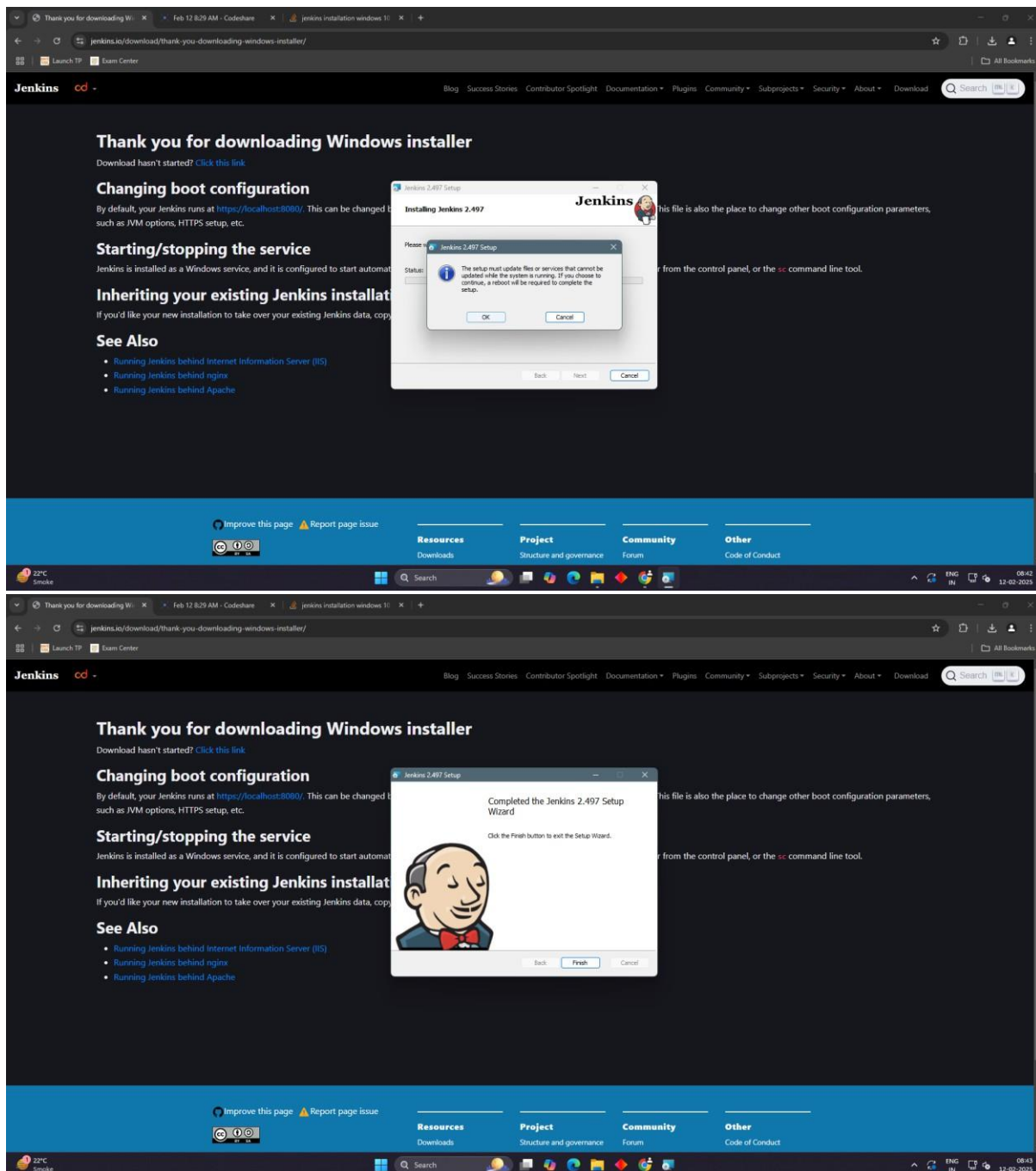
Other

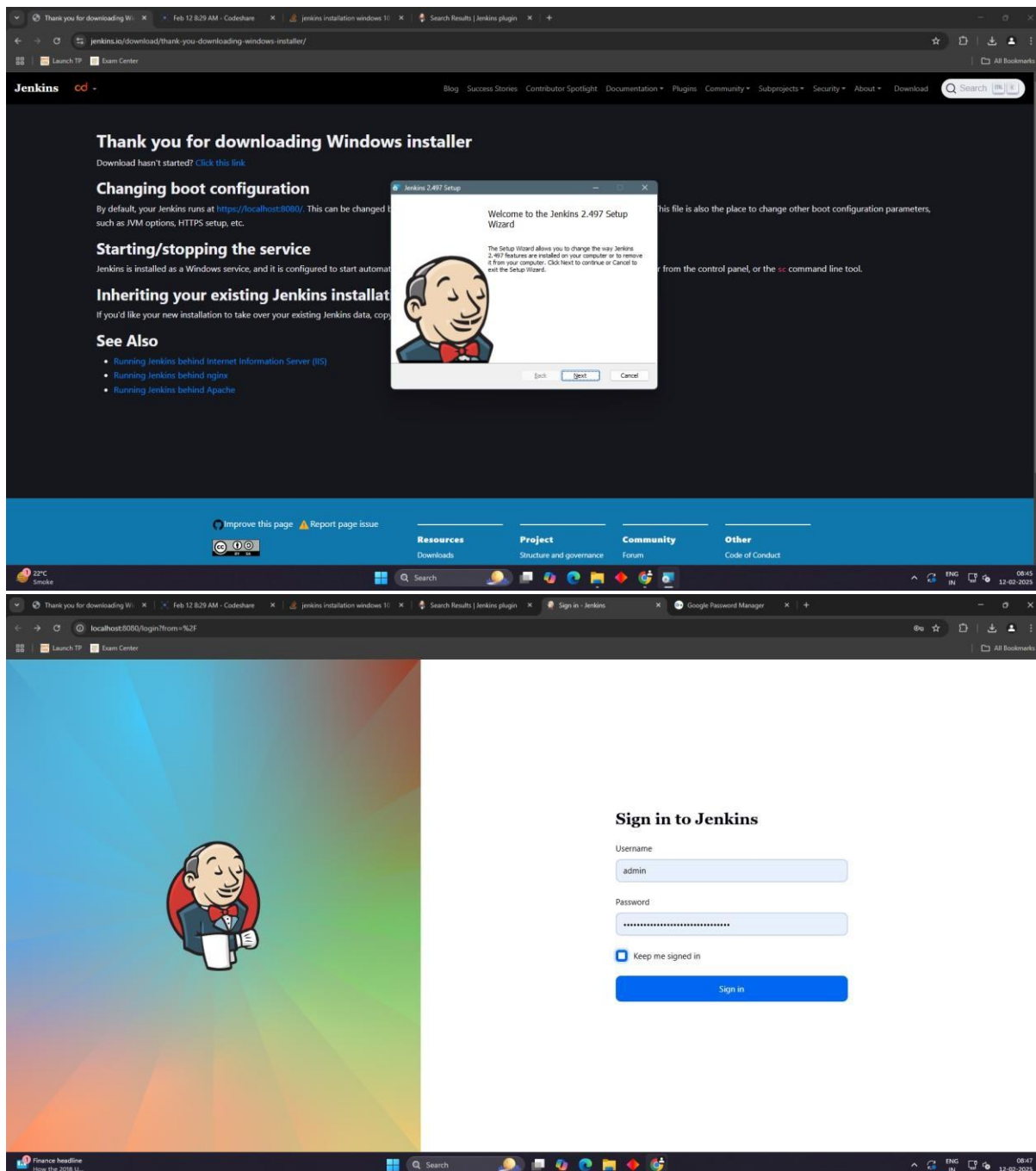
- [Code of Conduct](#)











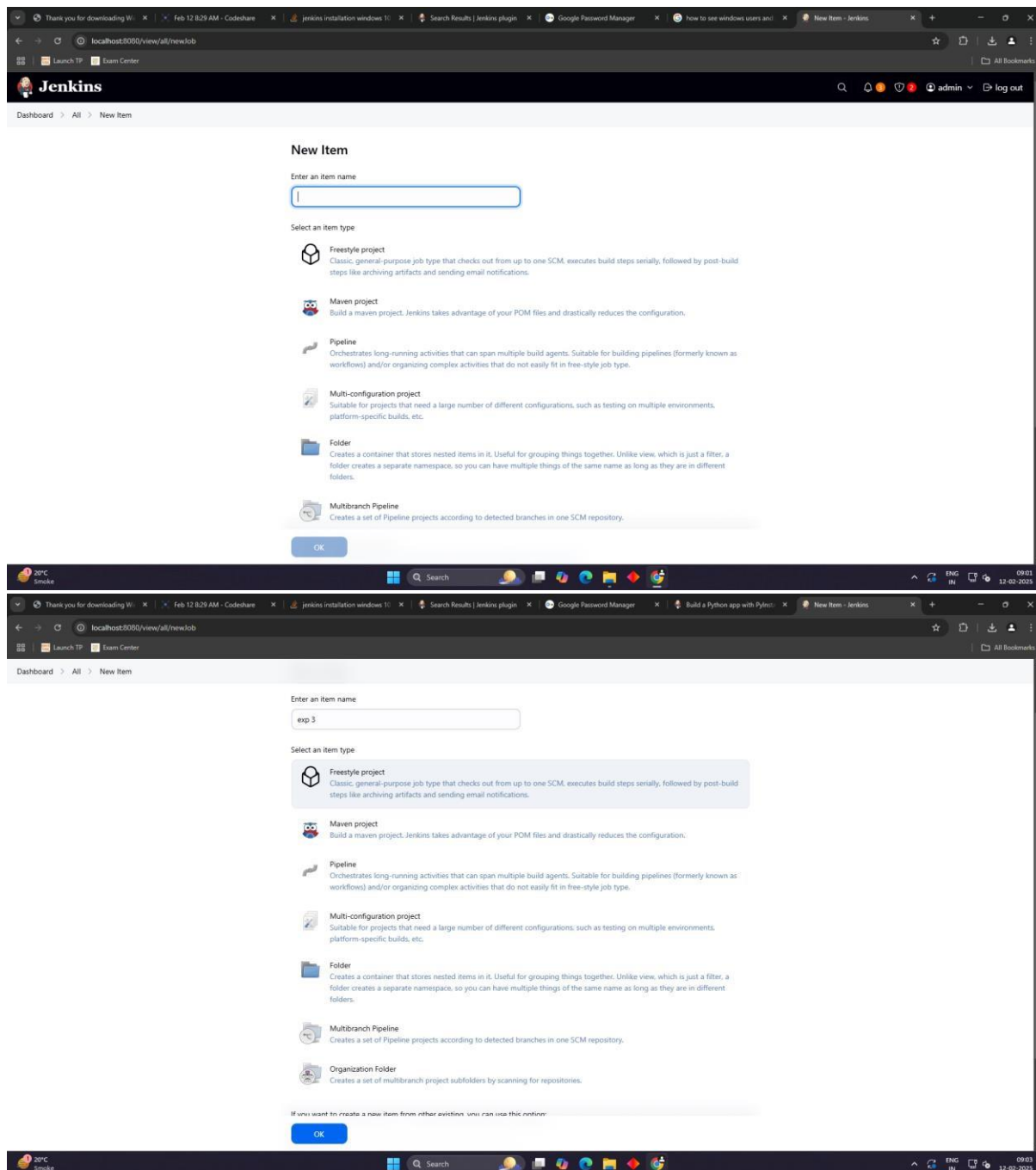
The image shows two screenshots of the Jenkins installation and login process.

Top Screenshot: Jenkins 2.497 Setup Wizard

The browser window displays the Jenkins website with the heading "Thank you for downloading Windows installer". Below this, there are sections for "Changing boot configuration", "Starting/stopping the service", "Inheriting your existing Jenkins installation", and "See Also". A "Jenkins 2.497 Setup Wizard" window is overlaid on the page. The wizard has a title bar and a cartoon character. The text inside the wizard says: "Welcome to the Jenkins 2.497 Setup Wizard. The Setup Wizard allows you to change the way Jenkins 2.497 features are installed on your computer or to remove it from your computer. Click next to continue or Cancel to exit the Setup Wizard." There are "Back", "Next", and "Cancel" buttons at the bottom.

Bottom Screenshot: Jenkins Sign in Page

The browser window displays the Jenkins login page. The heading is "Sign in to Jenkins". There are input fields for "Username" (containing "admin") and "Password" (masked with dots). There is a checkbox labeled "Keep me signed in" which is checked. A blue "Sign in" button is at the bottom right. The background features a large cartoon character on the left.



Conclusion : Thus we have successfully installed and configured Jenkins.