

# Experiment No 4\_52

**Title:** Implementation of Continuous Integration/Continuous Development with Jenkins and Java & Cloning in GitHub

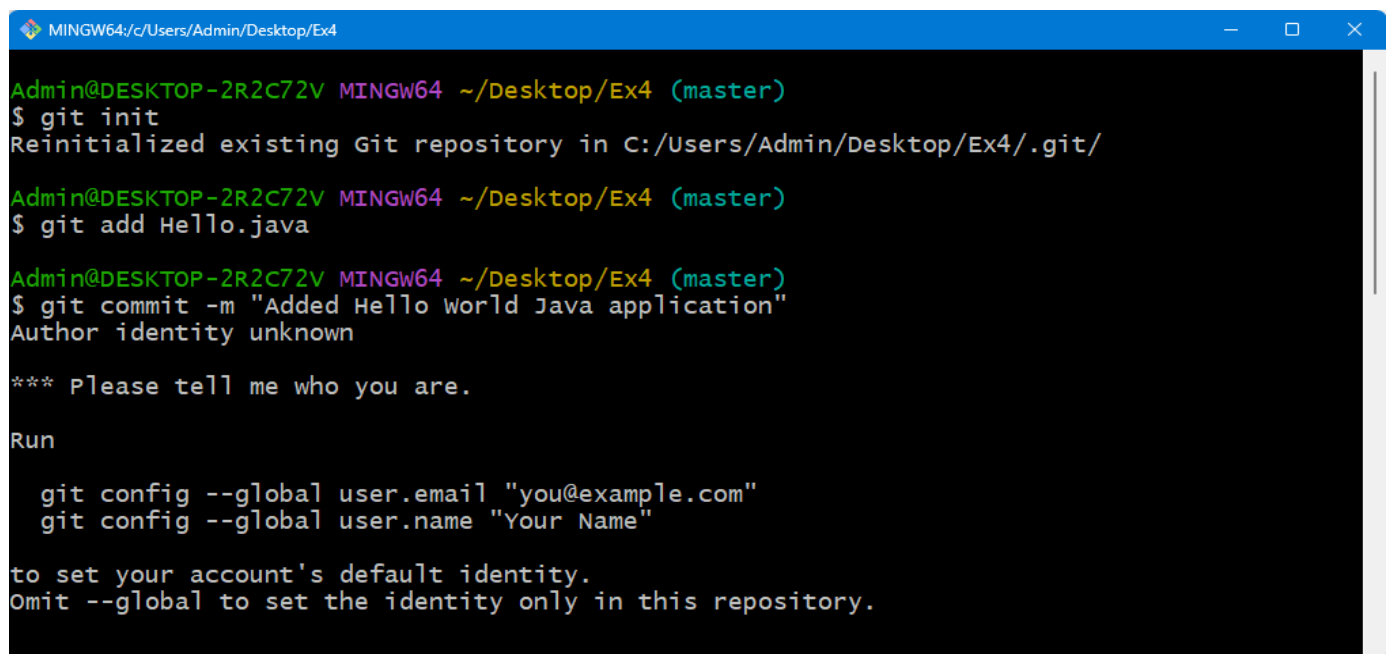
## Objective:

To implement Continuous Integration (CI) and Continuous Development (CD) using Jenkins and Java by automating code building, testing, and deployment.

## Steps:

### 1.Set Up a Java Application:

- Created a simple Java application (e.g., printing "Hello World").
- Committed the code to a GitHub repository.



```
MINGW64: c:/Users/Admin/Desktop/Ex4
Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git init
Reinitialized existing Git repository in C:/Users/Admin/Desktop/Ex4/.git/

Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git add Hello.java

Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git commit -m "Added Hello world Java application"
Author identity unknown

*** Please tell me who you are.

Run

  git config --global user.email "you@example.com"
  git config --global user.name "Your Name"

to set your account's default identity.
Omit --global to set the identity only in this repository.
```

```
MINGW64/c/Users/Admin/Desktop/Ex4
Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git config --global user.email "sangaleshubhangi308@gmail.com"

Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git config --global user.name "akshatasangale16"

Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git commit -m "Added Hello World Java application"
[master (root-commit) b1fff6b] Added Hello World Java application
1 file changed, 6 insertions(+)
create mode 100644 Hello.java

Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git remote add origin https://github.com/akshatasangale16/EX4.git

Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git push -u origin master
Enumerating objects: 3, done.
Counting objects: 100% (3/3), done.
Delta compression using up to 8 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 378 bytes | 378.00 KiB/s, done.
```

```
MINGW64/c/Users/Admin/Desktop/Ex4
$ git commit -m "Added Hello World Java application"
[master (root-commit) b1fff6b] Added Hello World Java application
1 file changed, 6 insertions(+)
create mode 100644 Hello.java


Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git remote add origin https://github.com/akshatasangale16/EX4.git

Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git push -u origin master
Enumerating objects: 3, done.
Counting objects: 100% (3/3), done.
Delta compression using up to 8 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 378 bytes | 378.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
To https://github.com/akshatasangale16/EX4.git
 * [new branch]      master -> master
branch 'master' set up to track 'origin/master'.

Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ |
```

## 2. Configure Jenkins:

- Installed Jenkins and logged into the web interface.
- Created a new Jenkins job to pull code from the GitHub repository.
- Configured automatic build triggers for code changes.

Jenkins

🔍

🛡️

👤 Akshata Sangale

🚪 log out

Dashboard > Experiment No 4 >

Status

</> Changes

📁 Workspace

▶ Build Now

⚙️ Configure

🗑️ Delete Project

📄 Git Polling Log

✏️ Rename

Experiment No 4

Add description

Permalinks


Builds

Today

🟢 #2 6:11 AM

🟢 #1 6:11 AM

REST APIJenkins 2.492.2

Jenkins

🔍

🛡️

👤 Akshata Sangale

🚪 log out

Dashboard > Experiment No 4 > #1 > Console Output

Status

</> Changes

📄 Console Output

📄 Edit Build Information

🗑️ Delete build '#1'

📄 Polling Log

🕒 Timings

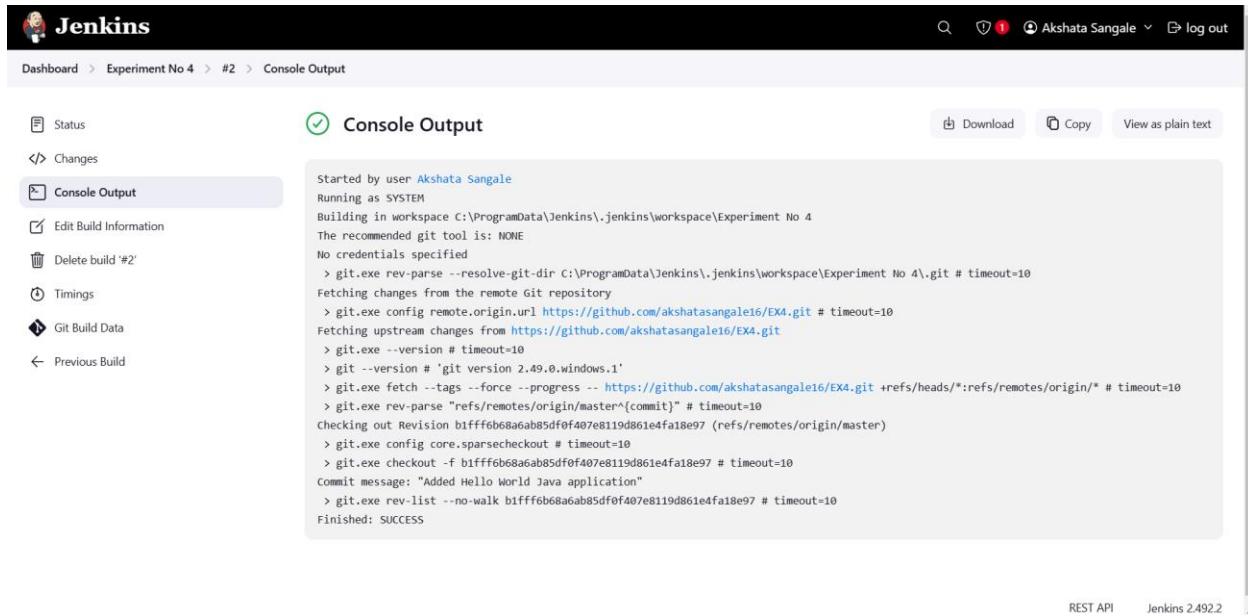
🔍 Git Build Data

➔ Next Build

Console Output

DownloadCopyView as plain text

Started by an SCM change  
Running as SYSTEM  
Building in workspace C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4  
The recommended git tool is: NONE  
No credentials specified  
Cloning the remote git repository  
Cloning repository https://github.com/akshatasangale16/EX4.git  
> git.exe init C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4 # timeout=10  
Fetching upstream changes from https://github.com/akshatasangale16/EX4.git  
> git.exe --version # timeout=10  
> git --version # 'git version 2.49.0.windows.1'  
> git.exe fetch --tags --force --progress -- https://github.com/akshatasangale16/EX4.git +refs/heads/\*:refs/remotes/origin/\* # timeout=10  
> git.exe config remote.origin.url https://github.com/akshatasangale16/EX4.git # timeout=10  
> git.exe config --add remote.origin.fetch +refs/heads/\*:refs/remotes/origin/\* # timeout=10  
Avoid second fetch  
> git.exe rev-parse "refs/remotes/origin/master^{commit}" # timeout=10  
Checking out Revision b1ffff6b68a6ab85df0f407e8119d861e4fa18e97 (refs/remotes/origin/master)  
> git.exe config core.sparsecheckout # timeout=10  
> git.exe checkout -f b1ffff6b68a6ab85df0f407e8119d861e4fa18e97 # timeout=10  
Commit message: "Added Hello World Java application"  
First time build. Skipping changelog.  
Finished: SUCCESS



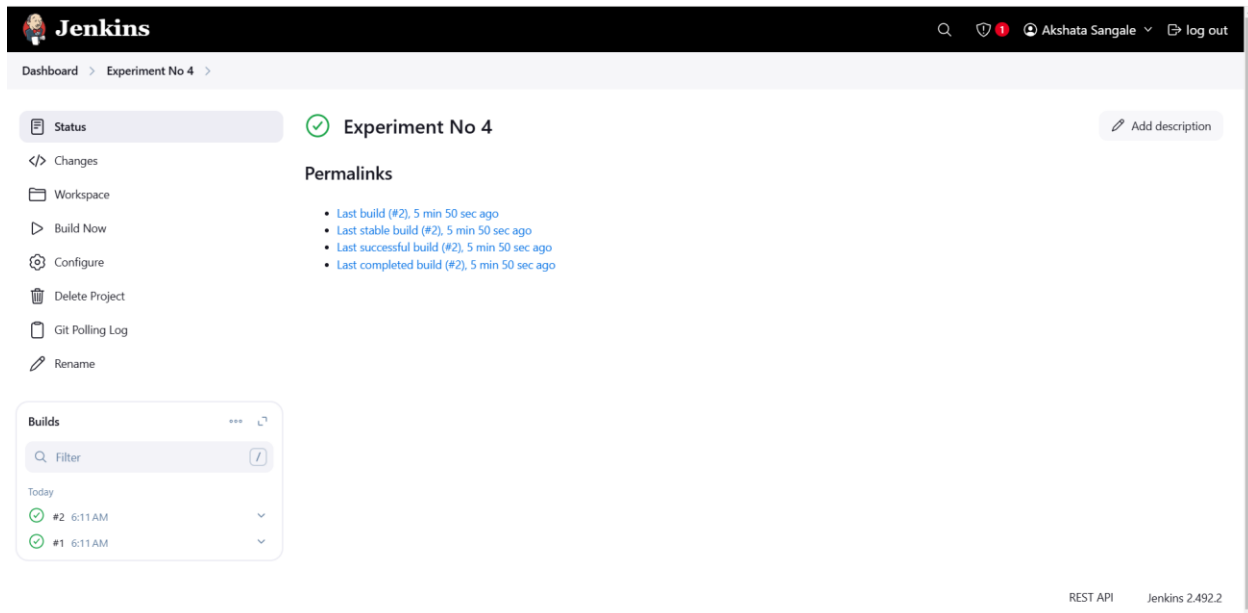
The screenshot shows the Jenkins web interface. The top navigation bar includes the Jenkins logo, a search icon, a shield icon, a user profile icon for 'Akshata Sangale', and a 'log out' button. The breadcrumb trail is 'Dashboard > Experiment No 4 > #2 > Console Output'. On the left sidebar, the 'Console Output' tab is selected. The main content area displays the console output for build #2, which is a successful build. The output text shows the build process starting with 'Started by user Akshata Sangale', running as 'SYSTEM', and performing a series of Git operations: cloning the repository, fetching changes, checking out a specific revision, and committing a new message. The build ends with 'Finished: SUCCESS'. At the bottom right of the console output area, there are links for 'REST API' and 'Jenkins 2.492.2'.

Dashboard > Experiment No 4 > #2 > Console Output

Console Output

Started by user Akshata Sangale  
Running as SYSTEM  
Building in workspace C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4  
The recommended git tool is: NONE  
No credentials specified  
> git.exe rev-parse --resolve-git-dir C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4\.git # timeout=10  
Fetching changes from the remote Git repository  
> git.exe config remote.origin.url https://github.com/akshatasangale16/EX4.git # timeout=10  
Fetching upstream changes from https://github.com/akshatasangale16/EX4.git  
> git.exe --version # timeout=10  
> git --version # 'git version 2.49.0.windows.1'  
> git.exe fetch --tags --force --progress -- https://github.com/akshatasangale16/EX4.git +refs/heads/\*:refs/remotes/origin/\* # timeout=10  
> git.exe rev-parse "refs/remotes/origin/master^{commit}" # timeout=10  
Checking out Revision b1fff6b68a6ab85df0f407e8119d861e4fa18e97 (refs/remotes/origin/master)  
> git.exe config core.sparsecheckout # timeout=10  
> git.exe checkout -f b1fff6b68a6ab85df0f407e8119d861e4fa18e97 # timeout=10  
Commit message: "Added Hello World Java application"  
> git.exe rev-list --no-walk b1fff6b68a6ab85df0f407e8119d861e4fa18e97 # timeout=10  
Finished: SUCCESS

REST API Jenkins 2.492.2



The screenshot shows the Jenkins web interface for the 'Experiment No 4' build. The top navigation bar is the same as the previous screenshot. The breadcrumb trail is 'Dashboard > Experiment No 4'. On the left sidebar, the 'Status' tab is selected. The main content area displays the 'Experiment No 4' overview. It includes a 'Permalinks' section with four links: 'Last build (#2), 5 min 50 sec ago', 'Last stable build (#2), 5 min 50 sec ago', 'Last successful build (#2), 5 min 50 sec ago', and 'Last completed build (#2), 5 min 50 sec ago'. Below this, there is a 'Builds' section with a search filter and a list of builds. The list shows two builds, both with a green status icon and a time of 6:11 AM. At the bottom right of the builds section, there are links for 'REST API' and 'Jenkins 2.492.2'.

Dashboard > Experiment No 4

Experiment No 4

Permalinks

- Last build (#2), 5 min 50 sec ago
- Last stable build (#2), 5 min 50 sec ago
- Last successful build (#2), 5 min 50 sec ago
- Last completed build (#2), 5 min 50 sec ago

Builds

Filter

Today

- #2 6:11 AM
- #1 6:11 AM

REST API Jenkins 2.492.2

### 3.Build and Test the Application:

- Jenkins automatically compiled the Java code and ran tests.
- Monitored the build logs and test results.

Dashboard > Experiment No 4 > #8 > Console Output

Status

Changes

Console Output

Edit Build Information

Delete build '#8'

Polling Log

Timings

Git Build Data

Previous Build

✓ Console Output

Download

Copy

View as plain text

Started by an SCM change

Running as SYSTEM

Building in workspace C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4

The recommended git tool is: NONE

No credentials specified

> git.exe rev-parse --resolve-git-dir C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4\.git # timeout=10

Fetching changes from the remote Git repository

> git.exe config remote.origin.url https://github.com/akshatasangale16/EX4.git # timeout=10

Fetching upstream changes from https://github.com/akshatasangale16/EX4.git

> git.exe --version # timeout=10

> git --version # 'git version 2.49.0.windows.1'

> git.exe fetch --tags --force --progress -- https://github.com/akshatasangale16/EX4.git +refs/heads/\*:refs/remotes/origin/\* # timeout=10

> git.exe rev-parse "refs/remotes/origin/master^{commit}" # timeout=10

Checking out Revision c686019d07f93d621bcc8aea9e82f2173657cf0e (refs/remotes/origin/master)

> git.exe config core.sparsecheckout # timeout=10

> git.exe checkout -f c686019d07f93d621bcc8aea9e82f2173657cf0e # timeout=10

Commit message: "Added Hello World Java application"

> git.exe rev-list --no-walk 5b3a96c0efd761296fea70f3a910dc3a63496993 # timeout=10

[Experiment No 4] \$ cmd /c call C:\Windows\TEMP\jenkins1761661672537007580.bat

C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4>javac Hellow.java

C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4>exit 0

Finished: SUCCESS

localhost:8081/job/Experiment No 4/8/configure

Jenkins

🔍 🛡️ 📢 Akshata Sangale 📄 log out

Dashboard > Experiment No 4 >

Status

Changes

Workspace

Build Now

Configure

Delete Project

Git Polling Log

Rename

✓ Experiment No 4

Add description

Permalinks

- Last build (#8), 2 min 9 sec ago
- Last stable build (#8), 2 min 9 sec ago
- Last successful build (#8), 2 min 9 sec ago
- Last completed build (#8), 2 min 9 sec ago

Builds

Filter

Today

✓ #8 6:31 AM

✓ #2 6:11 AM

✓ #1 6:11 AM

Dashboard > Experiment No 4 > #12 > Console Output

Git Build Data

Previous Build

```
C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4>git.exe --version # timeout=10
> git --version # 'git version 2.49.0.windows.1'
> git.exe fetch --tags --force --progress -- https://github.com/akshatasangale16/EX4.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git.exe rev-parse "refs/remotes/origin/master^{commit}" # timeout=10
Checking out Revision c686019d07f93d621bcc8aea9e82f2173657cf0e (refs/remotes/origin/master)
> git.exe config core.sparsecheckout # timeout=10
> git.exe checkout -f c686019d07f93d621bcc8aea9e82f2173657cf0e # timeout=10
Commit message: "Added Hello World Java application"
> git.exe rev-list --no-walk c686019d07f93d621bcc8aea9e82f2173657cf0e # timeout=10
[Experiment No 4] $ cmd /c call C:\Windows\TEMP\jenkins2754063863682706932.bat

C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4>javac Hellow.java

C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4>exit 0
[Experiment No 4] $ cmd /c call C:\Windows\TEMP\jenkins2448168534455449823.bat

C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4>java -cp .;junit-4.13.2.jar;hamcrest-core-1.3.jar org.junit.runner.JUnitCore
HelloworldTest
JUnit version 4.13.2
.
Time: 0.017
OK (1 test)

C:\ProgramData\Jenkins\jenkins\workspace\Experiment No 4>exit 0
Finished: SUCCESS
```

**Jenkins** 🔍 🛡️ ⓘ 👤 Akshata Sangale 📄 log out

Dashboard > Experiment No 4 >

Status

Changes

Workspace

Build Now

Configure

Delete Project

Git Polling Log

Rename

Experiment No 4

Add description

Permalinks

- Last build (#12), 59 sec ago
- Last stable build (#12), 59 sec ago
- Last successful build (#12), 59 sec ago
- Last completed build (#12), 59 sec ago

Builds

Filter

Today

- #12 6:47 AM
- #8 6:31 AM
- #2 6:11 AM
- #1 6:11 AM

## 4. Deploy the Application:

- If the build was successful, deployed the application.
- Deployment options: copying the JAR file to a server

Dashboard > Experiment No 4 > #21 > Console Output

```
[Experiment No 4] $ cmd /c call C:\Windows\TEMP\jenkins18001720738379532355.bat

C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>javac Hellow.java

C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>exit 0
[Experiment No 4] $ cmd /c call C:\Windows\TEMP\jenkins6461882560432990476.bat

C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>java -cp .;junit-4.13.2.jar;hamcrest-core-1.3.jar org.junit.runner.JUnitCore
HelloWorldTest
JUnit version 4.13.2
.
Time: 0.01

OK (1 test)

C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>exit 0
[Experiment No 4] $ cmd /c call C:\Windows\TEMP\jenkins7386908953513093984.bat

C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>javac --release 21 -d out Hellow.java

C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>"C:\Program Files\Java\jdk-21\bin\jar" cf Hellow.jar -C out .

C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>exit 0
Finished: SUCCESS
```

REST API Jenkins 2.492.2

Dashboard > Experiment No 4 > #23 > Console Output

```
JUnit version 4.13.2
.
Time: 0.016

OK (1 test)

C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>exit 0
[Experiment No 4] $ cmd /c call C:\Windows\TEMP\jenkins1168191721076517965.bat

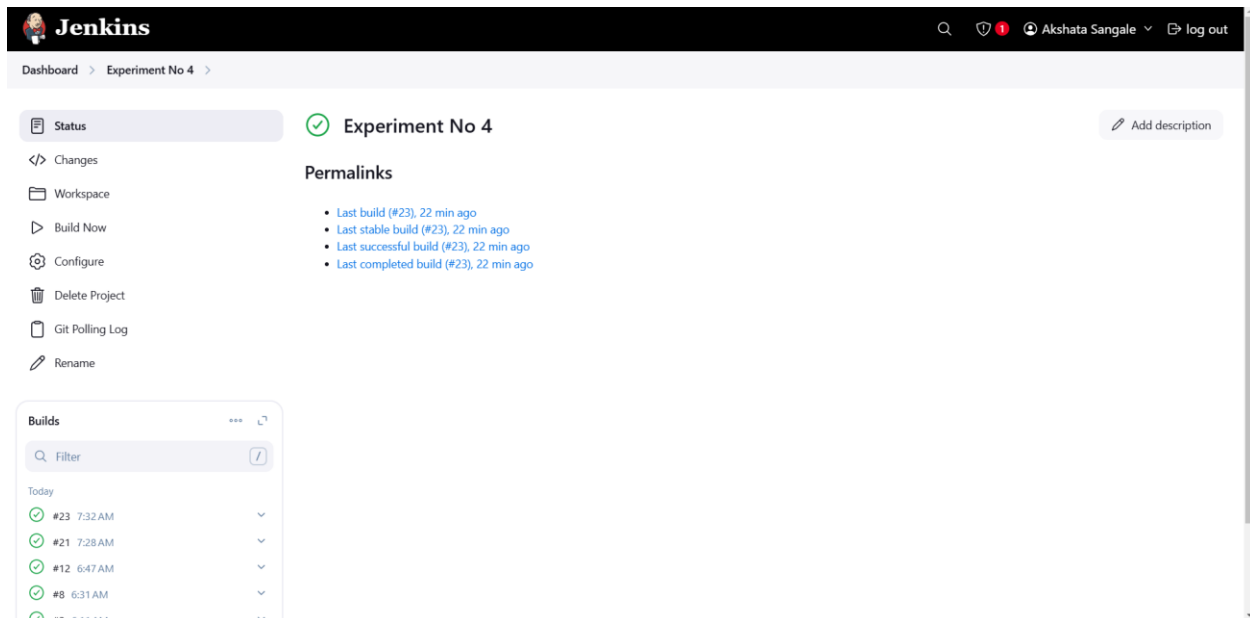
C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>javac --release 21 -d out Hellow.java

C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>"C:\Program Files\Java\jdk-21\bin\jar" cf
Hellow.jar -C out .

C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>exit 0
[Experiment No 4] $ cmd /c call C:\Windows\TEMP\jenkins11859177162411565188.bat

C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>copy Hellow.jar C:\Deployment\Hellow.jar
1 file(s) copied.

C:\ProgramData\Jenkins\.jenkins\workspace\Experiment No 4>exit 0
Finished: SUCCESS
```



## 5. Automate the CI/CD Pipeline:

- Repeated the process for every new commit, ensuring continuous integration and delivery.

```
Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git add .

Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git commit -m "Updated Hello World message"
[master c9c3c84] Updated Hello World message
7 files changed, 11 insertions(+), 1 deletion(-)
create mode 100644 HelloWorldTest.class
create mode 100644 HelloWorldTest.java
create mode 100644 Hellow.jar
create mode 100644 hamcrest-core-1.3.jar
create mode 100644 junit-4.13.2.jar
create mode 100644 out/Hellow.class
```



```
Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git remote add origin https://github.com/akshatasangale16/EX4.git
error: remote origin already exists.

Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$ git push origin master
Enumerating objects: 12, done.
Counting objects: 100% (12/12), done.
Delta compression using up to 8 threads
Compressing objects: 100% (9/9), done.
Writing objects: 100% (10/10), 366.76 KiB | 30.56 MiB/s, done.
Total 10 (delta 1), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
To https://github.com/akshatasangale16/EX4.git
   c686019..c9c3c84  master -> master

Admin@DESKTOP-2R2C72V MINGW64 ~/Desktop/Ex4 (master)
$
```

## Conclusion:

This experiment demonstrated how Jenkins automates CI/CD, ensuring efficient software development. It covered code integration, testing, and deployment, making the process faster and more reliable for production environments.