

## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

### **Theory:**

Programming in Jenkins:

Continuous Integration is a software development practice where members of a team integrate their work frequently, usually each person integrates at least daily leading to multiple integrations per day. Each integration is verified by an automated build (including test) to detect integration errors as quickly as possible.” In simple way, Continuous integration (CI) is the practice of frequently building and testing each change done to your code automatically. Jenkins is a self-contained, open-source automation server which can be used to automate all sorts of tasks related to building, testing, and delivering or deploying software.

Our first job will execute the shell commands. The freestyle project provides enough options and features to build the complex jobs that you will need in your projects.

### **Example 1**

#### **Example 1.1: Deploying a freestyle app in Jenkins**

**Creating a job:**

**Start building your software project**

Create a job



## Software Engineering & Project Management Lab


### Experiment No: - 05


**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**


**Naming the job and setting it as freestyle:**


**Enter an item name**


» Required field


**Freestyle project**  
Classic, general-purpose job type that checks out from up to one SCM, executes build steps serially, followed by post-build steps like archiving artifacts and sending email notifications.

**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.

**Multibranch Pipeline**  
Creates a set of Pipeline projects according to detected branches in one SCM repository.

**Organization Folder**  
Creates a set of multibranch project subfolders by scanning for repositories.

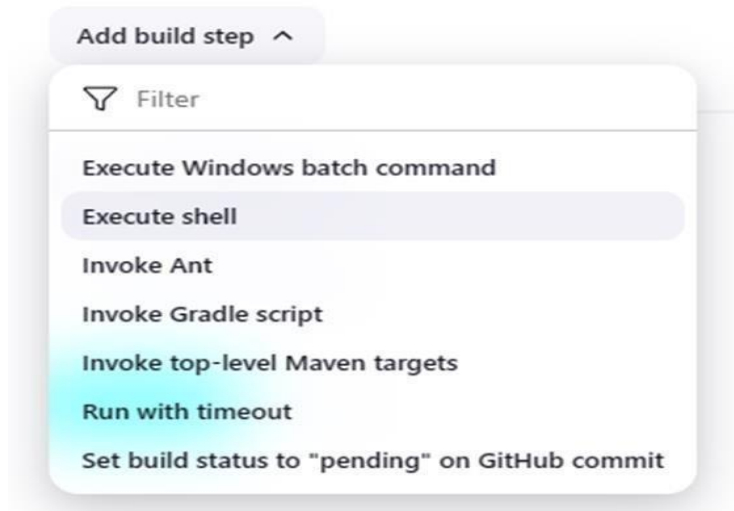
**Selecting build type as “Execute shell”:**

## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

#### Build Steps



**Entering a simple command for the shell execution:**



**Applying and saving the project configuration:**



## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

**Building the project:**

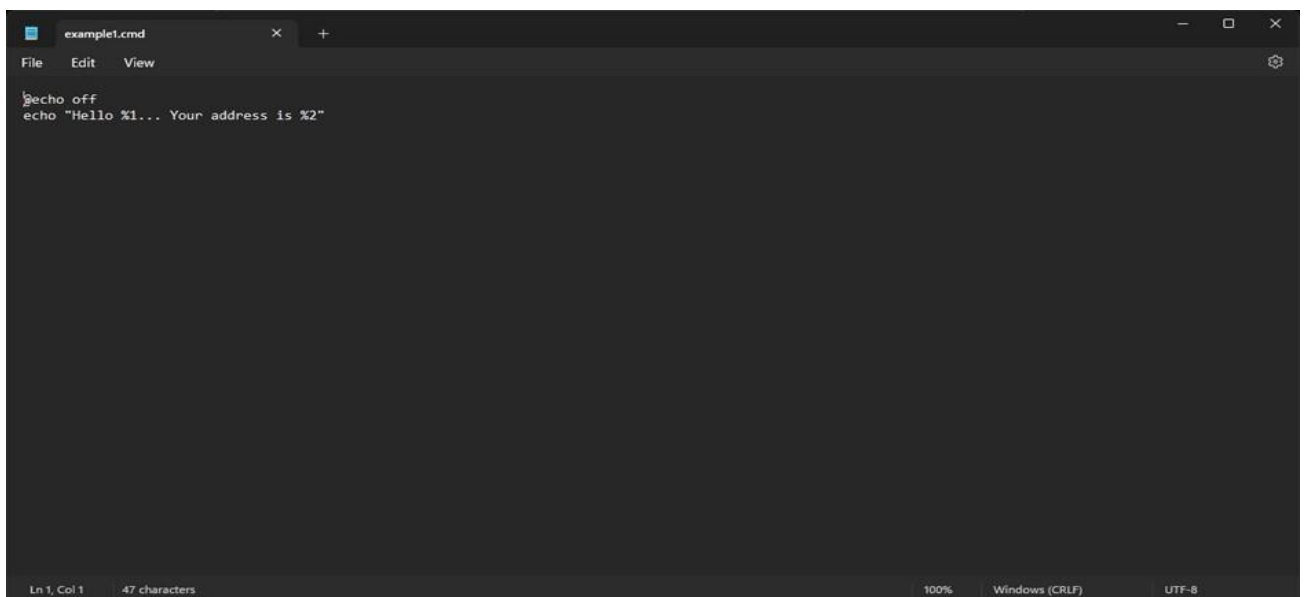


**Console output (after building):**



**Example 1.2: Taking parameters through files**

**Contents of script example1.cmd:**



## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

**Executing script example1.cmd on the terminal:**

```
Microsoft Windows [Version 10.0.22621.3296]
(c) Microsoft Corporation. All rights reserved.

C:\Users\AI&DS 202>Microsoft Windows [Version 10.0.22631.3155] (c) Microsoft Corporation. All rights reserved.
'Microsoft' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\AI&DS 202>C:\Admin\Academics\TSEC\Start3\SEPM>example1.cmd
The system cannot find the path specified.

C:\Users\AI&DS 202>"Hello... Your address is "
'"Hello... Your address is "' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\AI&DS 202>C:\Admin\Academics\TSEC\Start3\SEPM>example1.cad Tanishq
The system cannot find the path specified.

C:\Users\AI&DS 202>"Hello Tanihsq... Your address is "
'"Hello Tanihsq... Your address is "' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\AI&DS 202>C:\Admin\Academics\TSEC\Start3\SEPM>example1.cmd Tanishq Girgaon "Helle Tanishq... Your address is Gi
rgaon"
The system cannot find the path specified.
```

**Modifying the Jenkins project to execute the script while supplying required parameters:**

Build Steps

≡ Execute Windows batch command ?

Command

See [the list of available environment variables](#)

C:\Admin\Academics\TSEC\Start3\SEPM\example1.cmd Siddhant Goregaon

Advanced ▾

Add build step ▾

## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

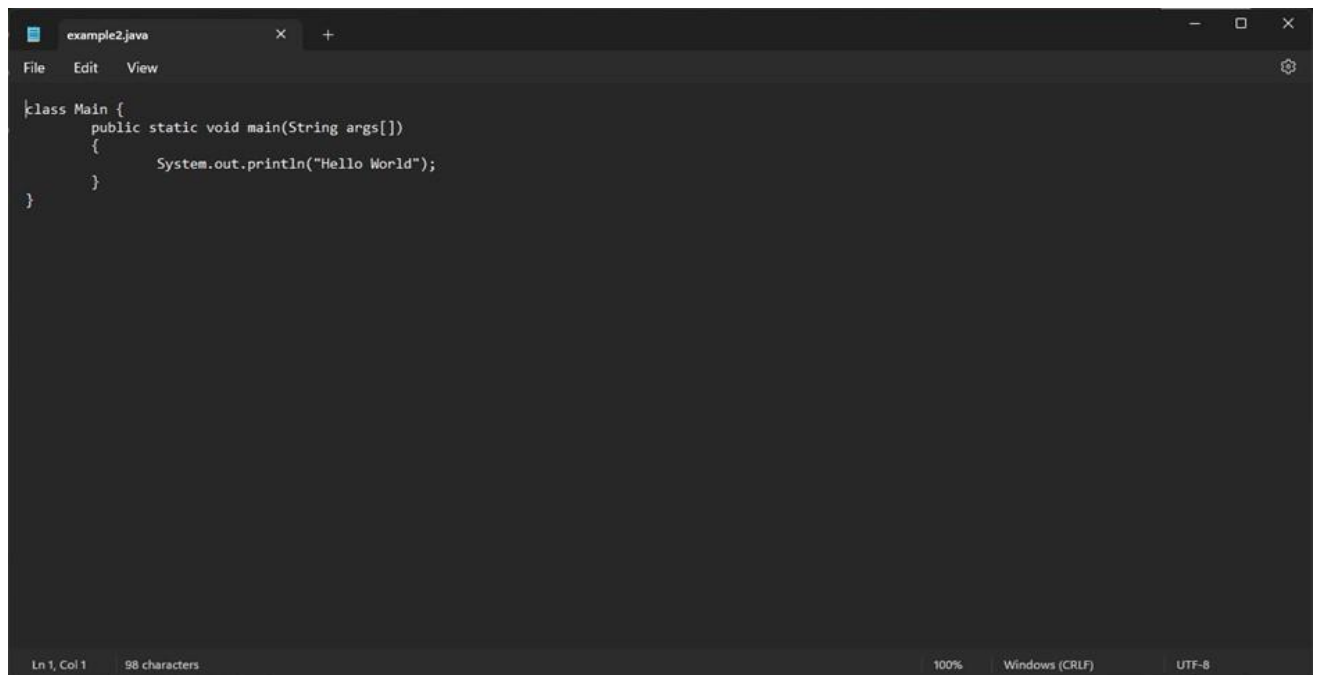
**Console output after building the modified project:**



## Example 2

### Example 2.1: Running a Java program under Jenkins

**Creating a simple Java program:**

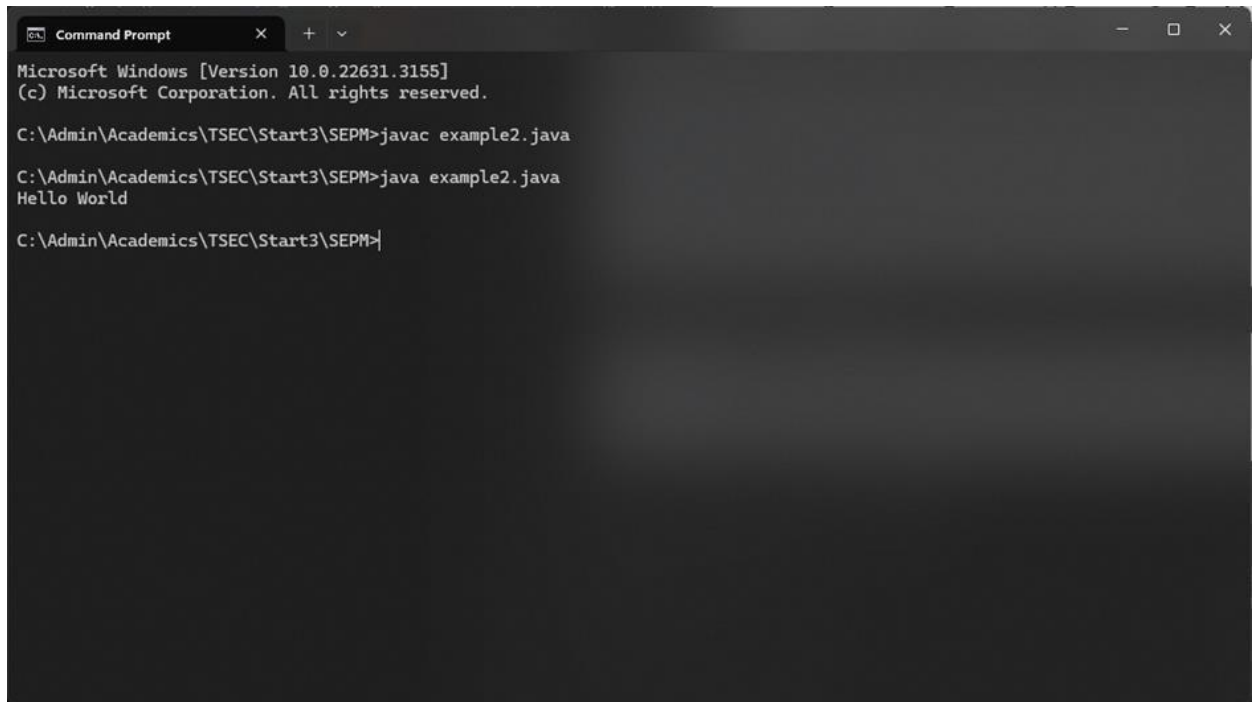


**Compiling and running the program on the terminal:**

## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**



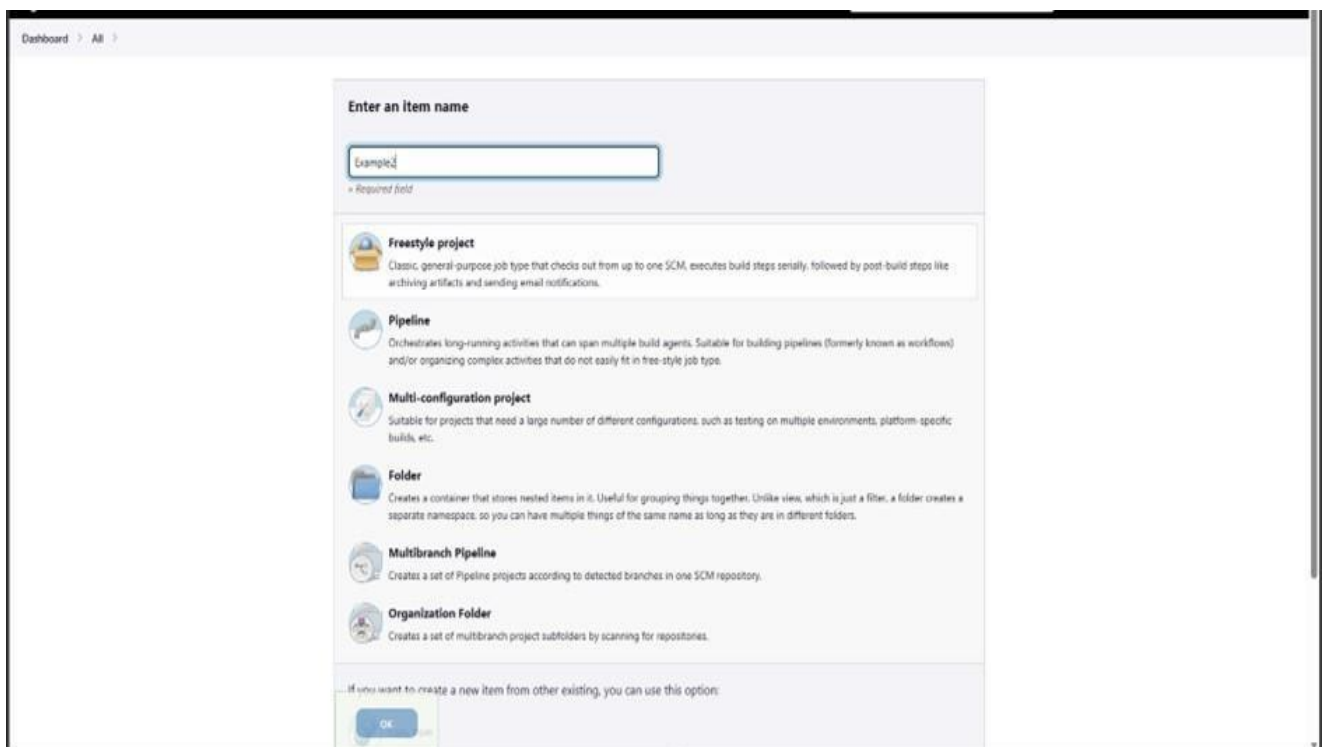
```
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Admin\Academics\TSEC\Start3\SEPM>javac example2.java

C:\Admin\Academics\TSEC\Start3\SEPM>java example2.java
Hello World

C:\Admin\Academics\TSEC\Start3\SEPM>
```

### Creating a new freestyle project:



## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

#### Configure new project:

##### Build Steps

Execute Windows batch command ?

Command

See the list of available environment variables

```
javac C:\Admin\Academics\TSEC\Start3\SEPM\example2.java
java C:\Admin\Academics\TSEC\Start3\SEPM\example2.java
```

Advanced ▾

Add build step ▾

#### Console output after building:

##### ✓ Console Output

```
Started by user Siddhant Chetlur
Running as SYSTEM
[EnvInject] - Loading node environment variables.
Building in workspace C:\ProgramData\Jenkins\.jenkins\workspace\Example2
[Example2] $ cmd /c call C:\WINDOWS\TEMP\jenkins15296462484398614135.bat

C:\ProgramData\Jenkins\.jenkins\workspace\Example2>javac C:\Admin\Academics\TSEC\Start3\SEPM\example2.java
C:\ProgramData\Jenkins\.jenkins\workspace\Example2>java C:\Admin\Academics\TSEC\Start3\SEPM\example2.java
Hello World

C:\ProgramData\Jenkins\.jenkins\workspace\Example2>exit 0
Finished: SUCCESS
```

### Example 3

#### Example 3.1: Parameterise build

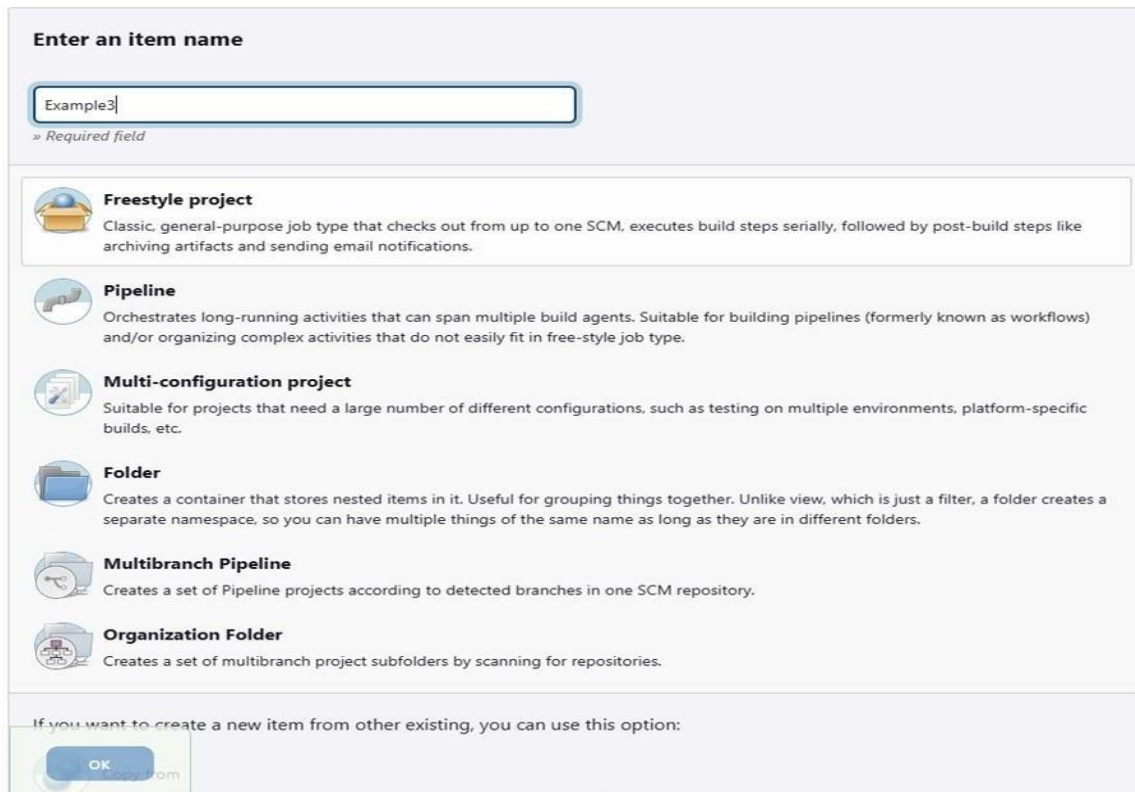


## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

#### Creating a new freestyle project:

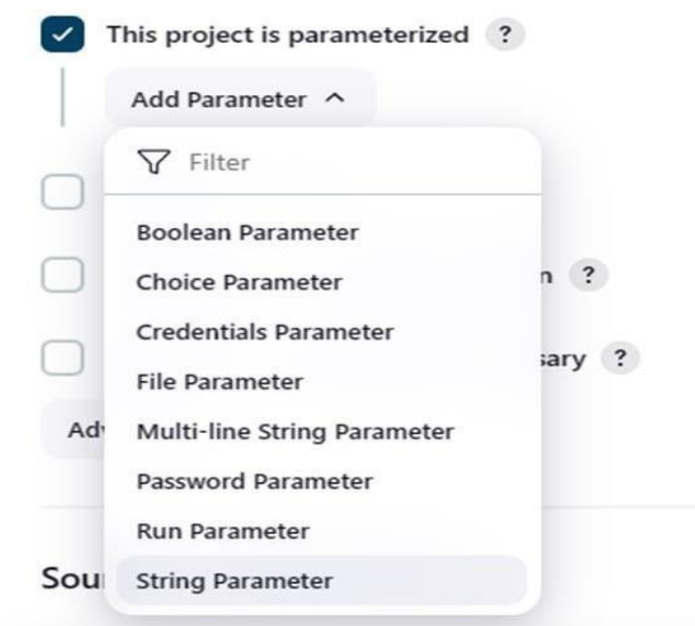


The screenshot shows the Jenkins 'Enter an item name' dialog box. At the top, there is a text input field containing 'Example3' and a 'Required field' note. Below this, a list of project types is displayed, each with an icon and a description:

- Freestyle project**: Classic, general-purpose job type that checks out from up to one SCM, executes build steps serially, followed by post-build steps like archiving artifacts and sending email notifications.
- 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.
- Multibranch Pipeline**: Creates a set of Pipeline projects according to detected branches in one SCM repository.
- Organization Folder**: Creates a set of multibranch project subfolders by scanning for repositories.

At the bottom, there is a note: 'If you want to create a new item from other existing, you can use this option:' followed by an 'OK' button and a 'Copy from' button.

#### Enabling parameterisation and adding a String parameter:



The screenshot shows the Jenkins 'This project is parameterized' dialog box. The checkbox 'This project is parameterized' is checked. Below it, there is an 'Add Parameter' button with an upward arrow. A dropdown menu is open, showing the following options:

- Filter
- Boolean Parameter
- Choice Parameter
- Credentials Parameter
- File Parameter
- Multi-line String Parameter
- Password Parameter
- Run Parameter
- String Parameter

## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

**Configuring the string parameter as Fname:**



The screenshot shows the Jenkins 'String Parameter' configuration dialog. It has a title bar 'String Parameter' with a menu icon and a close button. The 'Name' field is labeled 'Fname'. The 'Default Value' field is empty. The 'Description' field is empty. At the bottom, there is a 'Plain text' label, a 'Preview' link, and a checkbox labeled 'Trim the string' which is currently unchecked.

**Adding a choice parameter and configuring it as City with the following choices:**



The screenshot shows the Jenkins 'Choice Parameter' configuration dialog. It has a title bar 'Choice Parameter' with a menu icon and a close button. The 'Name' field is labeled 'City'. The 'Choices' field is a list box containing the following items: 'Bandra', 'Kalyan', 'Dombivali', 'Churchgate', 'Thane', and 'Dadar'. The 'Description' field is empty. At the bottom, there is a 'Plain text' label and a 'Preview' link.

## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

**Creating a script which takes 2 arguments for name and city:**

```
C:\Users\AI&DS 202>Microsoft Windows [Version 10.0.22631.3155] (c) Microsoft Corporation. All rights reserved.
'Microsoft' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\AI&DS 202>C:\Admin\Academics\TSEC\Start3\SEPH>example3.cmd
The system cannot find the path specified.

C:\Users\AI&DS 202>Hello your name is and your city is
'Hello' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\AI&DS 202>C:\Admin\Academics\TSEC\Start3\SEPH example3.cmd Tanishq
The system cannot find the path specified.

C:\Users\AI&DS 202>Hello your name is Tanishq and your city is
'Hello' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\AI&DS 202>C:\Admin\Academics\TSEC\Start3\SEPM>example3.cmd Tansishq Bandra
The system cannot find the path specified.

C:\Users\AI&DS 202>Hello your name is Tanishq and your city is Bandra
'Hello' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\AI&DS 202>C:\Admin\Academics\TSEC\Start3\SEPH|
```

**Configuring build steps:**

#### Build Steps

≡ Execute Windows batch command ?

Command

See the list of available environment variables

C:\Admin\Academics\TSEC\Start3\SEPM\example3.cmd %Fname% %City%

Advanced ▾

Add build step ▾

## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

**Entering parameters for build:**

#### Project Example3

This build requires parameters:

Fname

City

▶ Build

Cancel

**Console output after building:**

#### ✓ Console Output

```
Started by user Siddhant Chetlur
Running as SYSTEM
[EnvInject] - Loading node environment variables.
Building in workspace C:\ProgramData\Jenkins\jenkins\workspace\Example3
[Example3] $ cmd /c call C:\WINDOWS\TEMP\Jenkins14094536165150986151.bat

C:\ProgramData\Jenkins\jenkins\workspace\Example3>C:\Admin\Academics\TSEC\Start3\SEPH\example3.cmd Siddhant Bandra
Hello your name is Siddhant and your city is Bandra
Finished: SUCCESS
```

### Example 3.2: Running a Java program with parameters

**Creating a Java program with an input argument:**



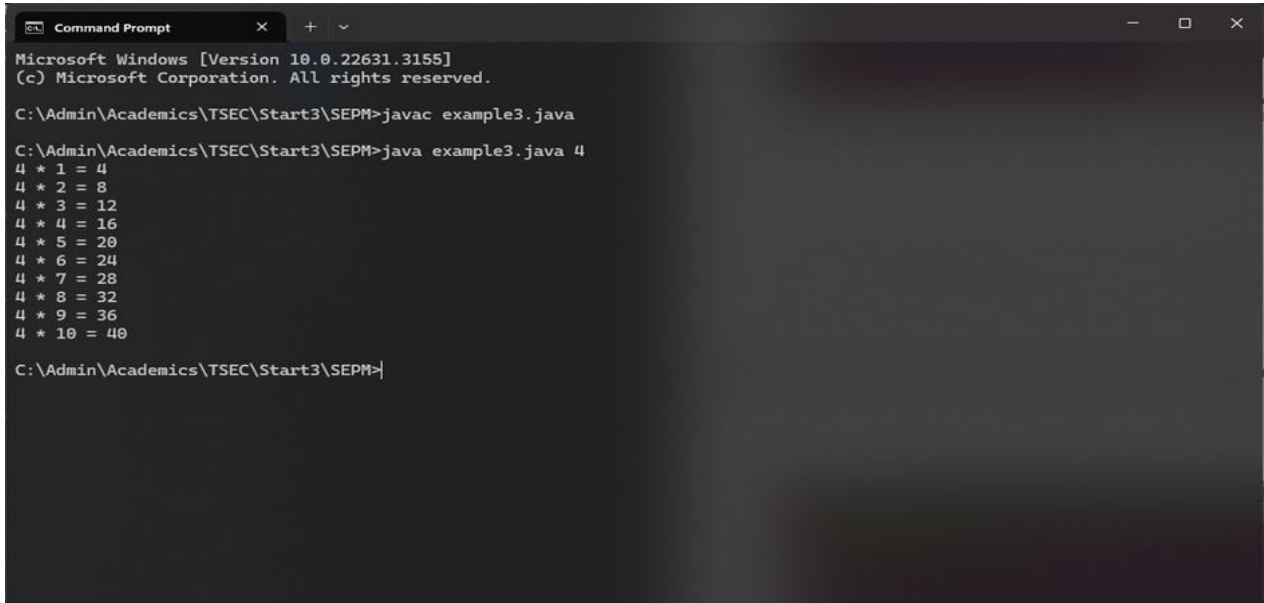
```
class Main {
    public static void main(String[] args) {
        int i;
        int num = Integer.parseInt(args[0]);
        for (i = 1; i < 11; i++) {
            System.out.println(num + " * " + i + " = " + num * i);
        }
    }
}
```

## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

**Testing the program on the terminal:**



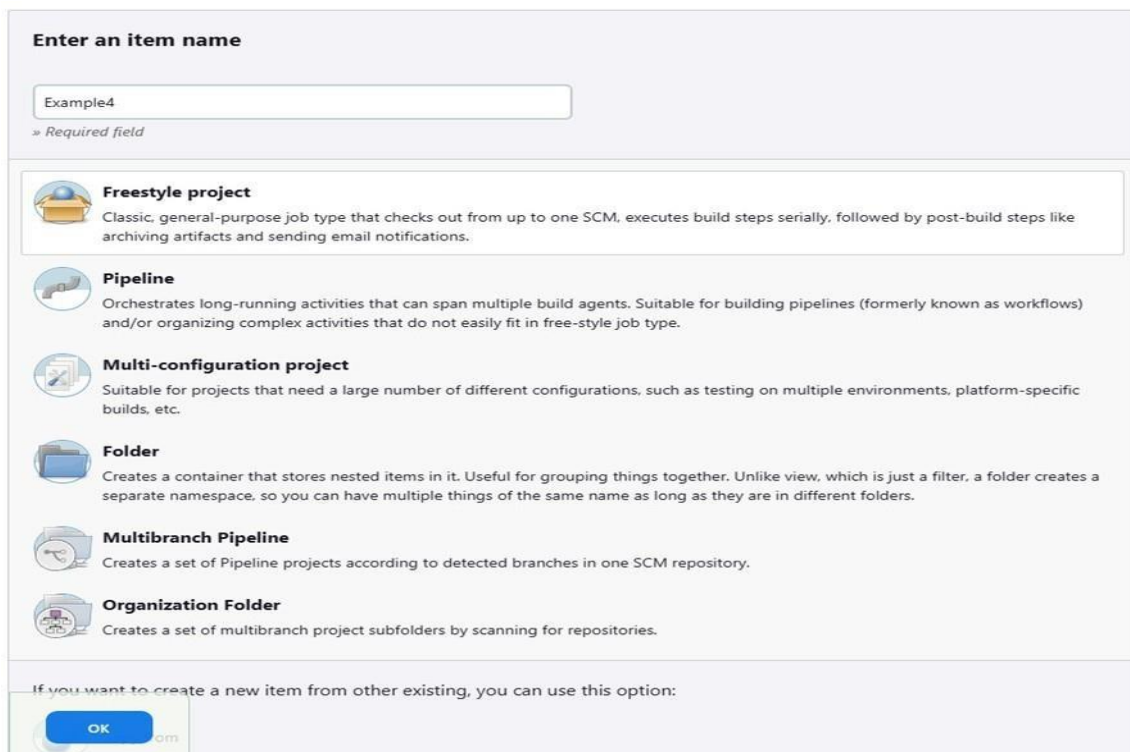
```
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Admin\Academics\TSEC\Start3\SEPM>javac example3.java

C:\Admin\Academics\TSEC\Start3\SEPM>java example3.java 4
4 * 1 = 4
4 * 2 = 8
4 * 3 = 12
4 * 4 = 16
4 * 5 = 20
4 * 6 = 24
4 * 7 = 28
4 * 8 = 32
4 * 9 = 36
4 * 10 = 40

C:\Admin\Academics\TSEC\Start3\SEPM>
```

**Creating a new freestyle project:**



**Enter an item name**

Example4

» Required field

- Freestyle project**  
Classic, general-purpose job type that checks out from up to one SCM, executes build steps serially, followed by post-build steps like archiving artifacts and sending email notifications.
- 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.
- Multibranch Pipeline**  
Creates a set of Pipeline projects according to detected branches in one SCM repository.
- Organization Folder**  
Creates a set of multibranch project subfolders by scanning for repositories.

If you want to create a new item from other existing, you can use this option:

OK

## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

**Parameterise the project by adding a string parameter as follows:**

☒ This project is parameterized ?

String Parameter ?

Name ?

num

Default Value ?

Description ?

Plain text [Preview](#)

☐ Trim the string ?

[Add Parameter](#) ▾

**Configure the build steps:**

Build Steps

Execute Windows batch command ?

Command

[See the list of available environment variables](#)

```
javac C:\Admin\Academics\TSEC\Start3\SEPM\example3.java
java C:\Admin\Academics\TSEC\Start3\SEPM\example3.java %num%
```

[Advanced](#) ▾

[Add build step](#) ▾

**Entering the parameter for the build:**

#### Project Example4

This build requires parameters:

num

25

 Build

 Cancel

## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

#### Console output after building:

##### Console Output

```
Started by user Siddhant Chetlur
Running as SYSTEM
[EnvInject] - Loading node environment variables.
Building in workspace C:\ProgramData\Jenkins\jenkins\workspace\Example4
[Example4] $ cmd /c call C:\WINDOWS\TEMP\jenkins15119185770823247708.bat

C:\ProgramData\Jenkins\jenkins\workspace\Example4>javac C:\Admin\Academics\TSEC\Start3\SEPH\example3.java

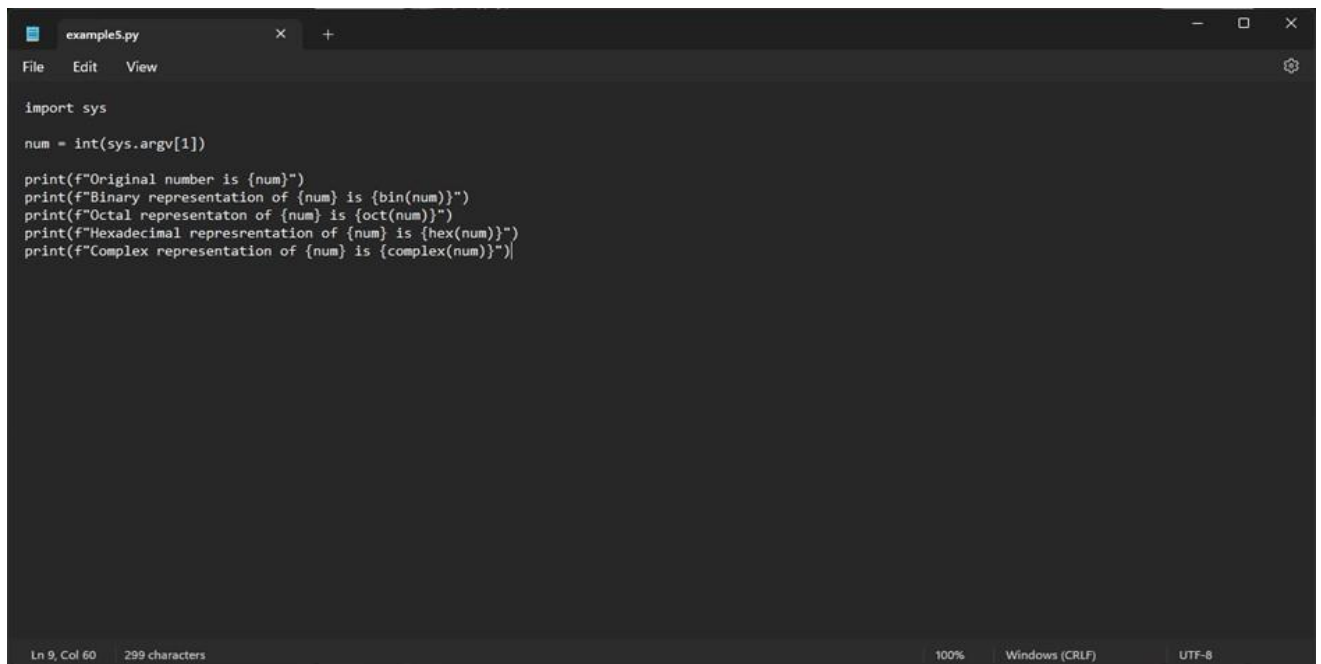
C:\ProgramData\Jenkins\jenkins\workspace\Example4>java C:\Admin\Academics\TSEC\Start3\SEPH\example3.java 25
25 * 1 = 25
25 * 2 = 50
25 * 3 = 75
25 * 4 = 100
25 * 5 = 125
25 * 6 = 150
25 * 7 = 175
25 * 8 = 200
25 * 9 = 225
25 * 10 = 250

C:\ProgramData\Jenkins\jenkins\workspace\Example4>exit 0
Finished: SUCCESS
```

### Example 5

#### Example 5.1: Running a Python program

#### Creating a simple Python script:



```
import sys

num = int(sys.argv[1])

print(f"Original number is {num}")
print(f"Binary representation of {num} is {bin(num)}")
print(f"Octal representation of {num} is {oct(num)}")
print(f"Hexadecimal representation of {num} is {hex(num)}")
print(f"Complex representation of {num} is {complex(num)}")
```



## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**


**Running the Python script on the terminal:**


```
Command Prompt
C:\Admin\Academics\TSEC\Start3\SEPM>python example5.py 10
Original number is 10
Binary representation of 10 is 0b1010
Octal representation of 10 is 0o12
Hexadecimal representation of 10 is 0xa
Complex representation of 10 is (10+0j)
C:\Admin\Academics\TSEC\Start3\SEPM>
```


**Creating a new freestyle project:**


**Enter an item name**


» Required field


**Freestyle project**  
Classic, general-purpose job type that checks out from up to one SCM, executes build steps serially, followed by post-build steps like archiving artifacts and sending email notifications.

**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.

**Multibranch Pipeline**  
Creates a set of Pipeline projects according to detected branches in one SCM repository.

**Organization Folder**  
Creates a set of multibranch project subfolders by scanning for repositories.

If you want to create a new item from other existing, you can use this option:

from



## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

**Parameterising the project with a string parameter as follows:**

☒ This project is parameterized ?

#### String Parameter ?

Name ?

Default Value ?

Description ?

Plain text [Preview](#)

☐ Trim the string ?

Add Parameter

**Configuring the build steps:**

Build Steps

#### Execute Windows batch command ?

Command

See [the list of available environment variables](#)

```
python C:\Admin\Academics\TSEC\Start3\SEPM\example5.py %num%
```

Advanced

Add build step

**Setting the parameter for the build:**

#### Project Example5

This build requires parameters:

num

## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

#### Console output after building:

##### ✓ Console Output

```
Started by user Siddhant Chetlur
Running as SYSTEM
[EnvInject] - Loading node environment variables.
Building in workspace C:\ProgramData\Jenkins\.jenkins\workspace\Example5
[Example5] $ cmd /c call C:\WINDOWS\TEMP\jenkins11157306491994478222.bat

C:\ProgramData\Jenkins\.jenkins\workspace\Example5>python C:\Admin\Academics\TSEC\Start3\SEPM\example5.py 10
Original number is 10
Binary representation of 10 is 0b1010
Octal representation of 10 is 0o12
Hexadecimal representation of 10 is 0xa
Complex representation of 10 is (10+0j)

C:\ProgramData\Jenkins\.jenkins\workspace\Example5>exit 0
Finished: SUCCESS
```

#### Some Screenshots:

##### Configure

- General
- Build Triggers
- Advanced Project Options
- Pipeline

Advanced ▾

##### Pipeline

Definition

Pipeline script

```
1= pipeline {
2  agent any
3
4  stages {
5    stage('Build') {
6      steps {
7        echo 'Building.. This is the build phase'
8      }
9    }
10   stage('Test') {
11     steps {
12       echo 'Testing.. This is the testing phase'
13     }
14   }
15   stage('Deploy') {
16     steps {
17       echo 'Deploying.... This is the deployment phase'
18     }
19   }
20   stage('PostDeploy') {
21     steps {
22       echo 'Postdeployment phase....'
23     }
24   }
25 }
26 }
```

☒ Use Groovy Sandbox ?

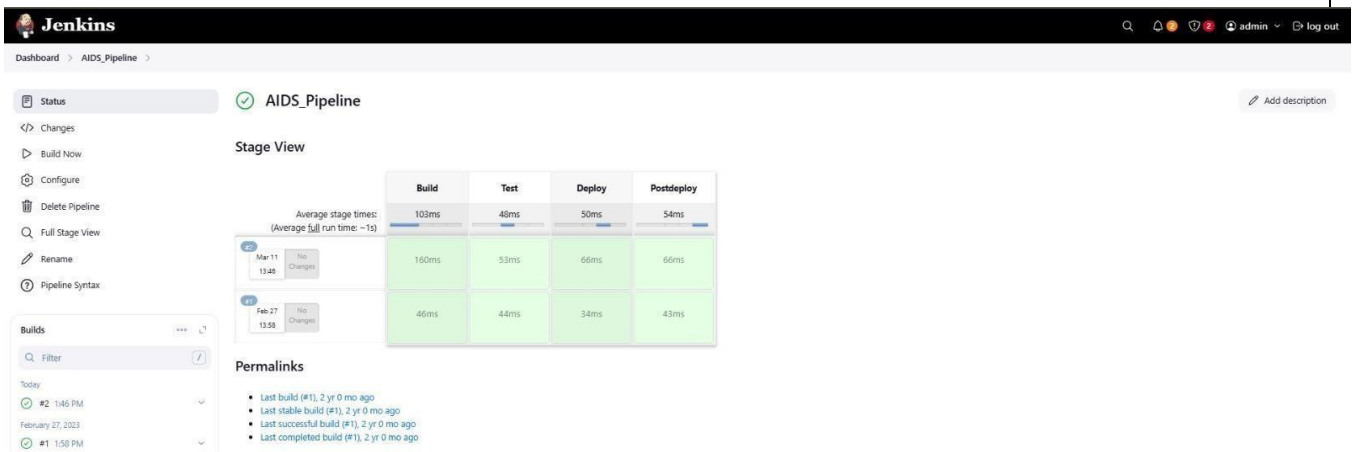
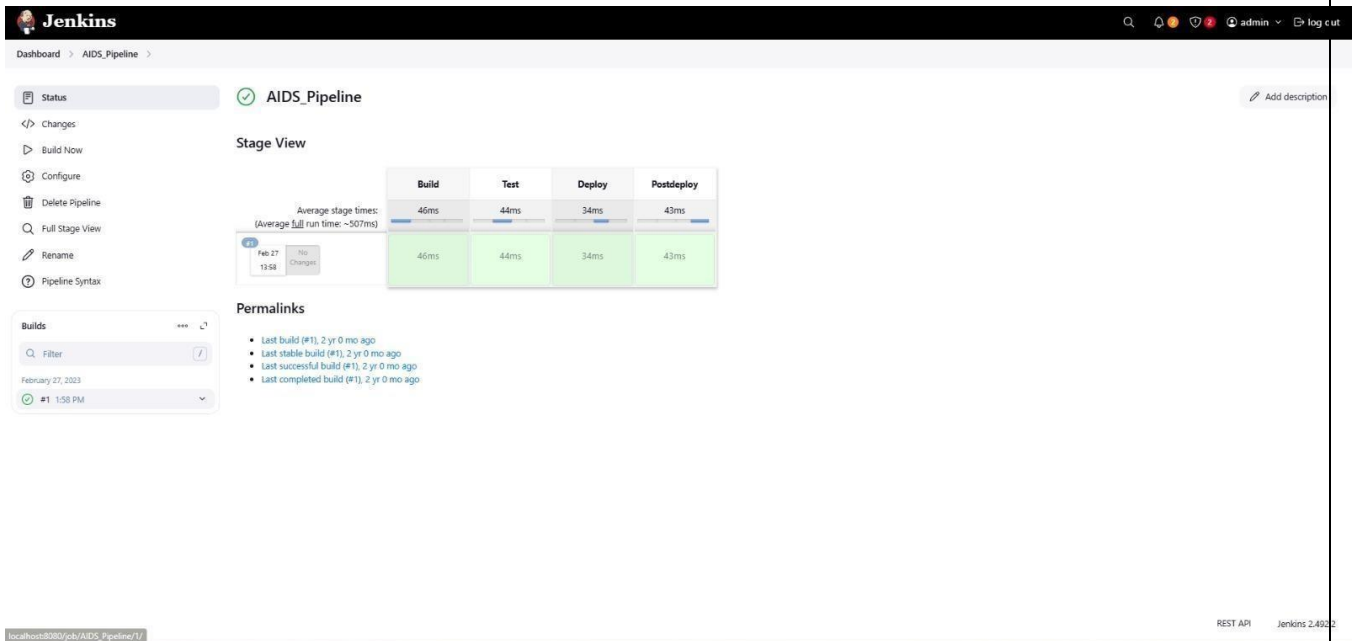
Pipeline Syntax

Save Apply

# Software Engineering & Project Management Lab

## Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**



# Software Engineering & Project Management Lab

## Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**

The screenshot shows the Jenkins interface for a pipeline named 'AIDS\_Pipeline' at build #2. The 'Pipeline Steps' tab is selected, displaying a table of steps. The steps are organized into stages: 'Build', 'Test', 'Deploy', and 'Postdeploy'. Each step includes its name, duration, arguments, and status (all are successful, indicated by green checkmarks).

Step	Arguments	Status
Start of Pipeline - (2.1 sec in block)		✓
node - (0.78 sec in block)		✓
node block - (0.51 sec in block)		✓
stage - (0.19 sec in block)	Build	✓
stage block (Build) - (0.13 sec in block)		✓
echo - (13 ms in self)	Building.. This is the build phase	✓
stage - (68 ms in block)	Test	✓
stage block (Test) - (39 ms in block)		✓
echo - (13 ms in self)	Testing.. This is the testing phase	✓
stage - (80 ms in block)	Deploy	✓
stage block (Deploy) - (40 ms in block)		✓
echo - (1 ms in self)	Deploying.... This is the deployment phase	✓
stage - (67 ms in block)	Postdeploy	✓
stage block (Postdeploy) - (40 ms in block)		✓
echo - (2 ms in self)	Postdeployment phase...	✓

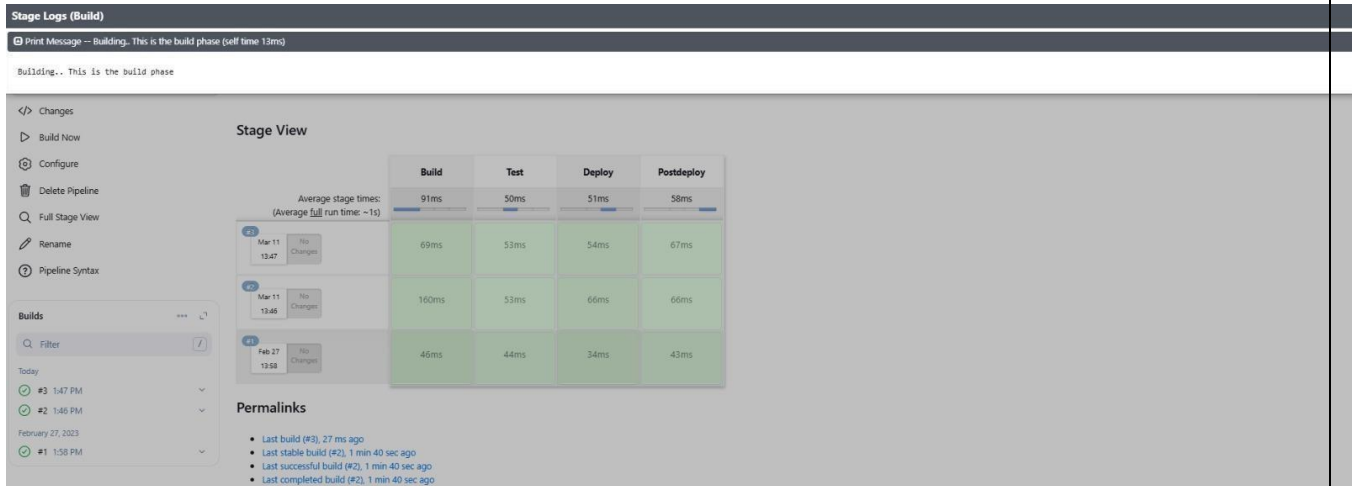
The screenshot shows the 'Console Output' tab for the same Jenkins build. It displays the raw output of the pipeline, including the Jenkinsfile content and the execution logs for each step. The output confirms the successful completion of the pipeline.

```
Started by user admin
[Pipeline] Start of Pipeline
[Pipeline] node
Running on Jenkins in C:\ProgramData\Jenkins\workspace\AIDS_Pipeline
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Build)
[Pipeline] echo
Building.. This is the build phase
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Test)
[Pipeline] echo
Testing.. This is the testing phase
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Deploy)
[Pipeline] echo
Deploying.... This is the deployment phase
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Postdeploy)
[Pipeline] echo
Postdeployment phase....
[Pipeline] }
[Pipeline] // stage
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

## Software Engineering & Project Management Lab

### Experiment No: - 05

**Aim: To Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server**



**Conclusion:** Thus, we have successfully Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, created a pipeline script to Test and deploy an application over the tomcat server.