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EXPERIMENT NO. 5

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:

1. Introduction to Jenkins and CI/CD

Jenkins is an open-source automation server used for continuous integration and continuous deployment (CI/CD). It helps automate the software development lifecycle by building, testing, and deploying applications.

1.1 CI/CD Concepts

- Continuous Integration (CI): Automatically integrates code changes into a shared repository and runs tests.
- Continuous Deployment (CD): Automates the process of deploying applications to production or staging environments.

1.2 Tools Used

- Jenkins – Automation server.
- Maven/Gradle/Ant – Build automation tools.
- Tomcat – A web server for deploying Java applications.

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2. Installing and Configuring Jenkins

- Download and Install Jenkins:
  - Download from Jenkins official site. o Install and start the Jenkins service.
  - Access Jenkins at http://localhost:8080/.
- Install Required Plugins:
  - Go to Manage Jenkins > Plugin Manager.
  - Install Pipeline, Maven Integration, and Deploy to Container plugins.

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3. Creating a Jenkins Pipeline

Jenkins pipelines define a series of automated steps for building, testing, and deploying applications.

- Steps to Create a Pipeline

1. Open Jenkins Dashboard and click on New Item.
2. Select Pipeline and provide a project name.
3. Click OK and navigate to the Pipeline section.
4. Write a Pipeline script (Declarative or Scripted) to define the build and deployment process.

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4. Writing a Jenkins Pipeline Script

The following script builds a Java application using Maven and deploys it to Tomcat:

```
groovy CopyEdit pipeline {  agent any  stages
{  stage('Checkout Code') {  steps {
git 'https://github.com/your-repository.git'
    }
  }
  stage('Build with Maven') {
steps {
    sh 'mvn clean package'
    }
  }
  stage('Deploy to Tomcat') {
steps {
    deploy adapters: [tomcat8(credentialsId: 'tomcat-cred', path: '', url: 'http://yourtomcat-server:8080')],
    war: '**/*.war'
    }
  }
 }
}
```

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5. Configuring Jenkins for Deployment

1. Configure Tomcat Server:
    - Install Tomcat and start the server.
    - Set up a user with deployment privileges in conf/tomcat-users.xml: xml CopyEdit

```
<role rolename="manager-gui"/>
<role rolename="manager-script"/>
<user username="admin" password="admin" roles="manager-gui,manager-script"/>
```

    - Restart Tomcat.
2. Set Up Jenkins Credentials:
    - Go to Manage Jenkins > Credentials. o Add a username/password credential for Tomcat deployment.
3. Run the Pipeline in Jenkins:
    - Click Build Now to execute the pipeline. o Verify the deployment at http://your-tomcat-server:8080/your-app.

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Example 1 :
Creating a job:

Naming the job and setting it as freestyle:

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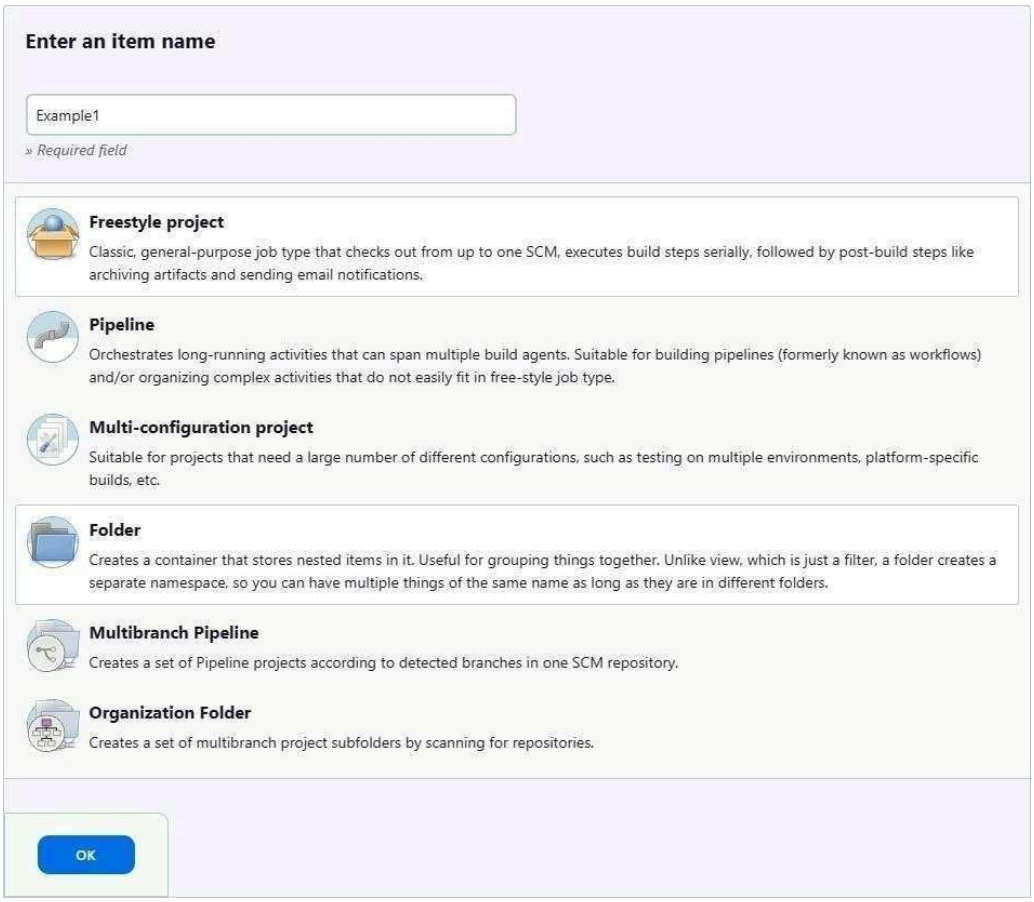

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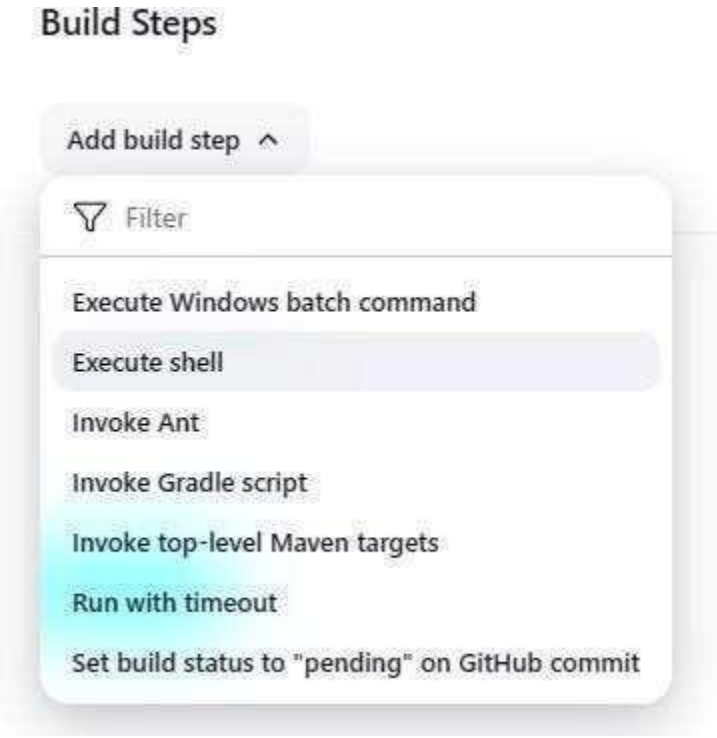
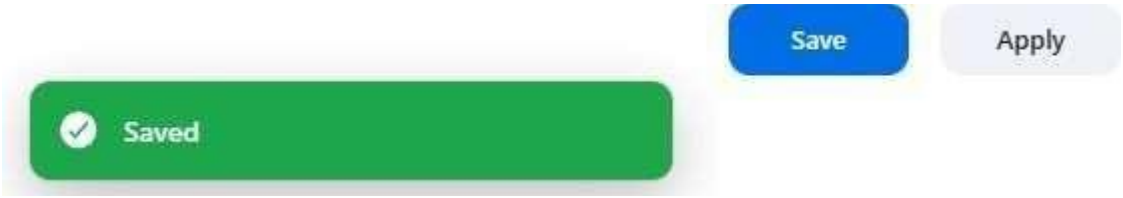
Selecting build type as “Execute shell”:



Entering a simple command for the shell execution:

Applying and saving the project configuration:



Building the project:

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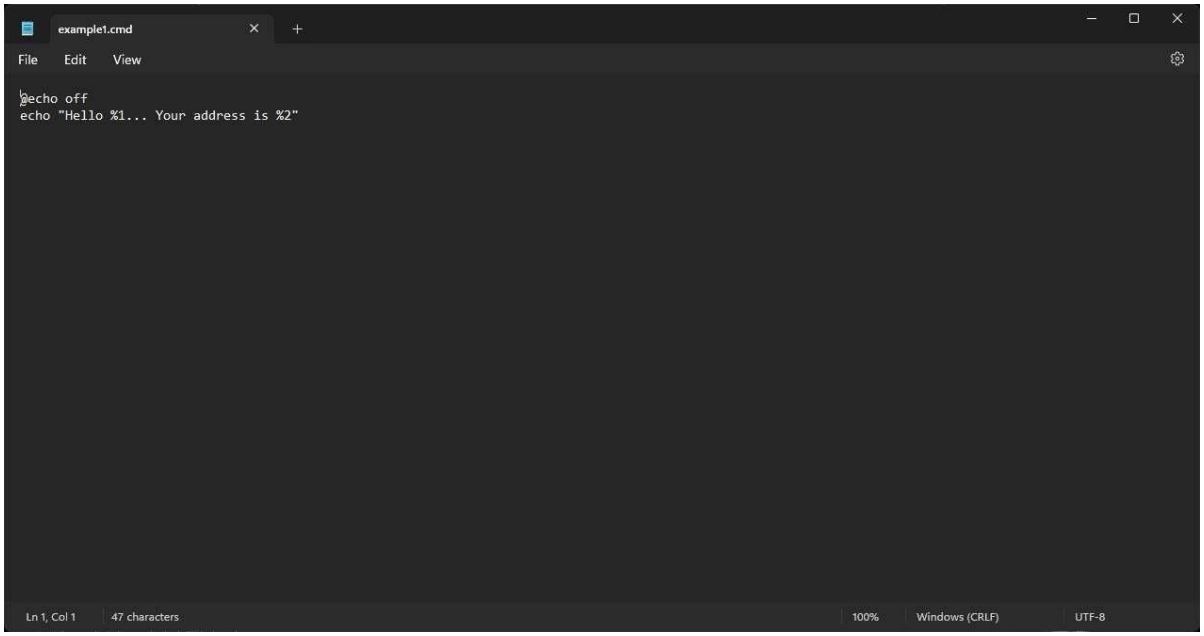
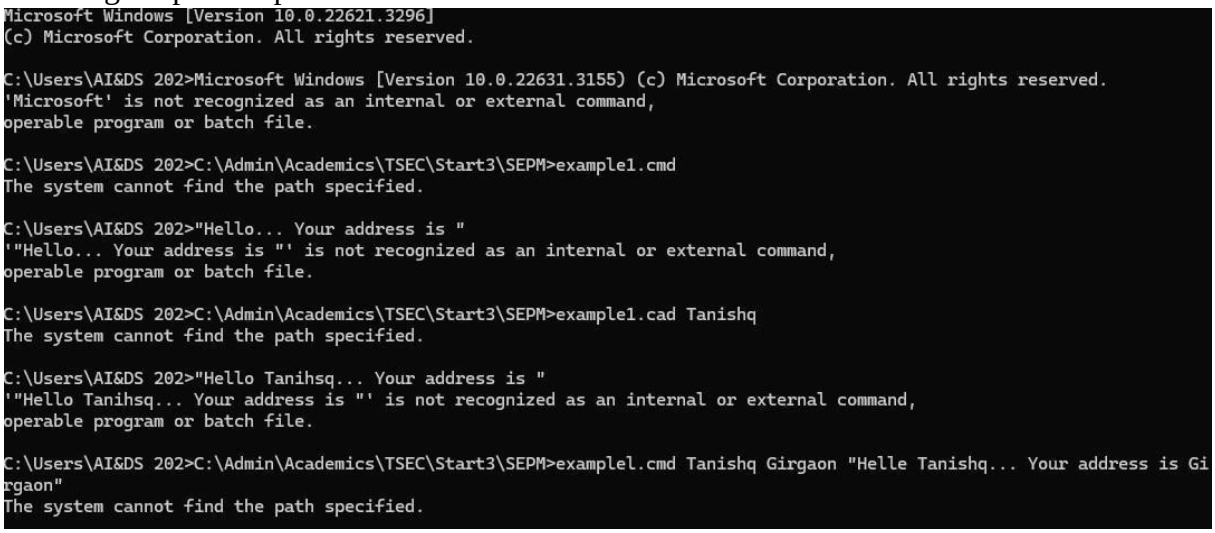
Console output (after building):

Example 1.2: Taking parameters through files Contents of script

example1.cmd:



Executing script example1.cmd on the terminal:



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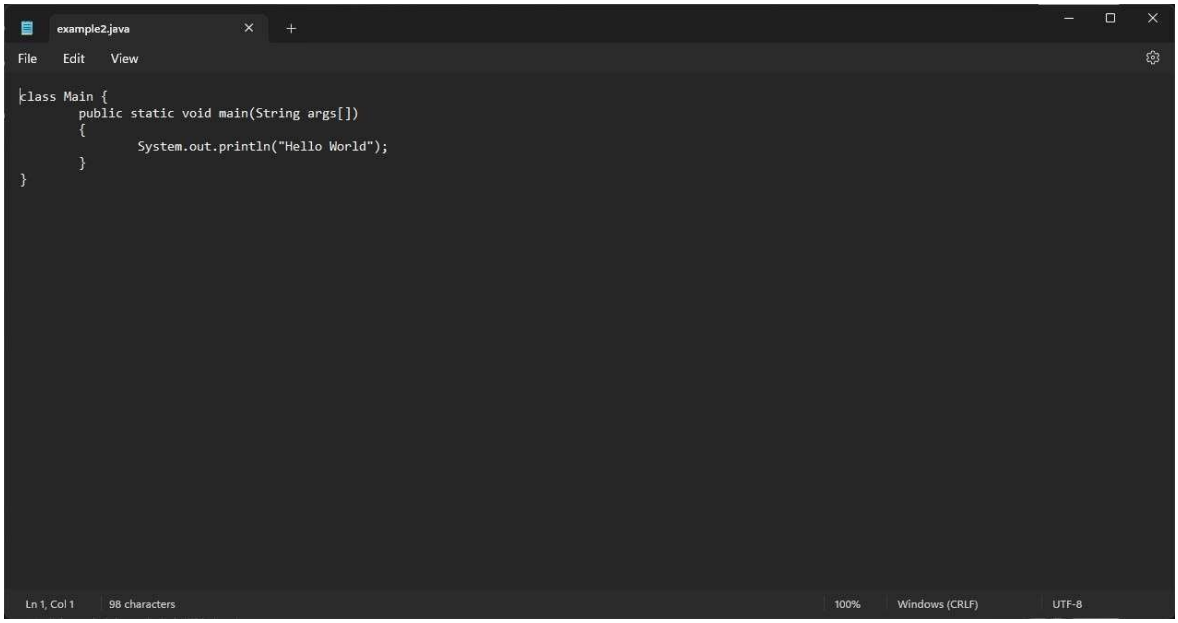
Modifying the Jenkins project to execute the script while supplying required parameters:

Console output after building the modified project:

Example 2 Example 2.1: Running a Java program under Jenkins

Creating a simple Java program:



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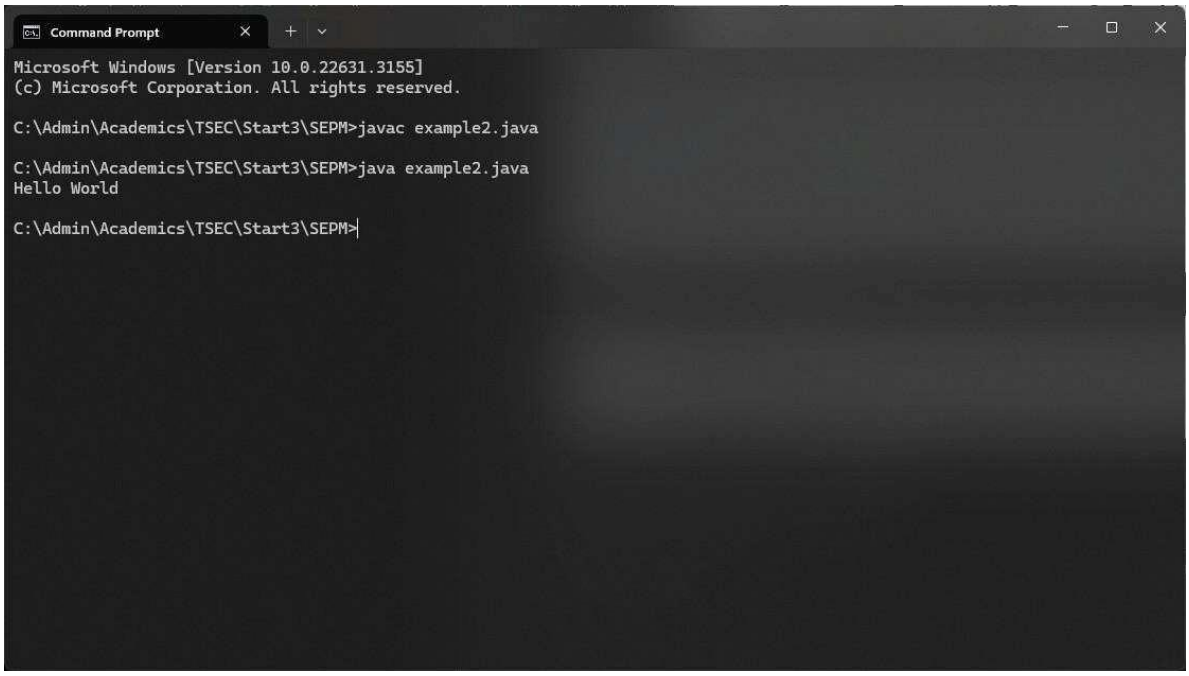
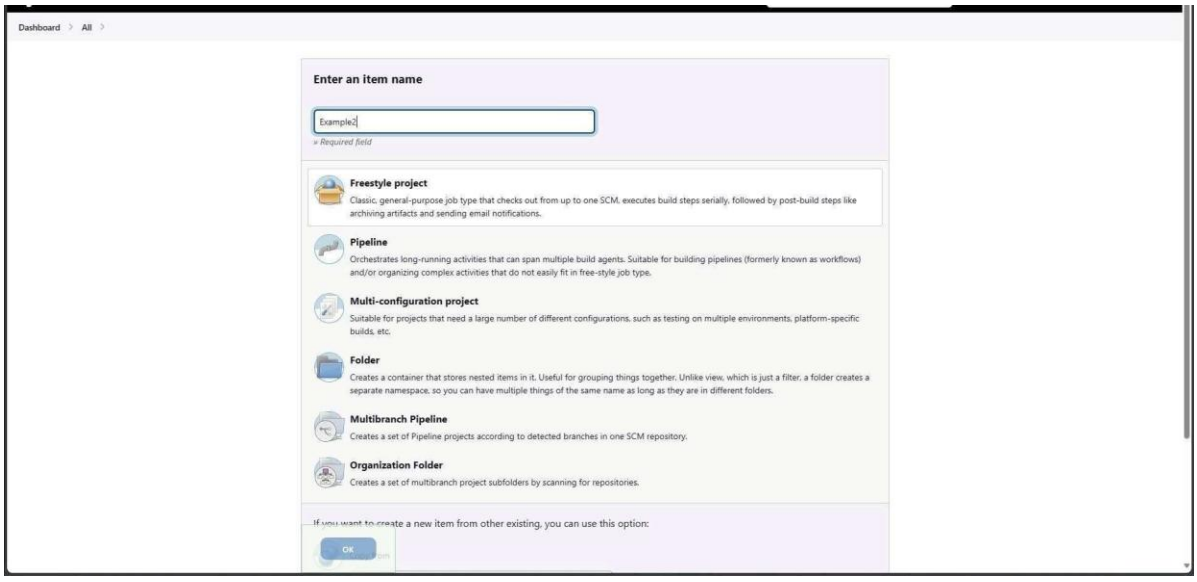
Compiling and running the program on the terminal:



Creating a new freestyle project:



Configure new project:

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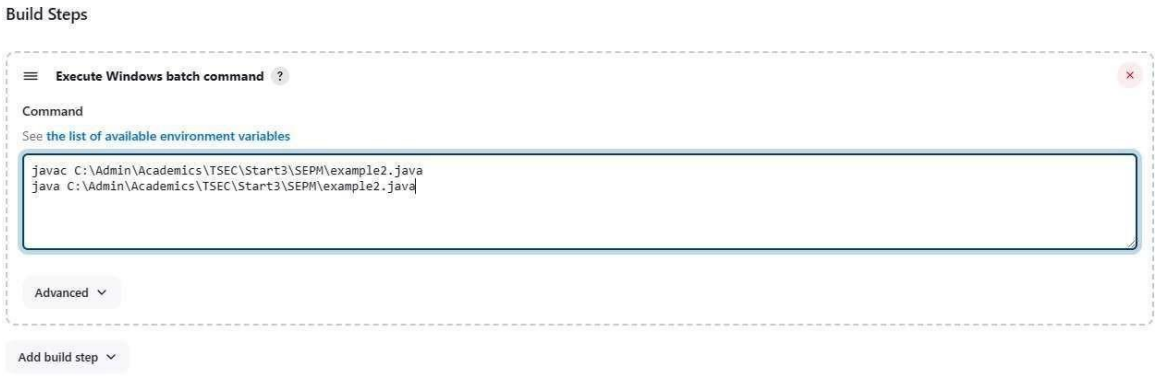

Console output after building:

Example 3 Example 3.1: Parameterise build

Creating a new freestyle project:

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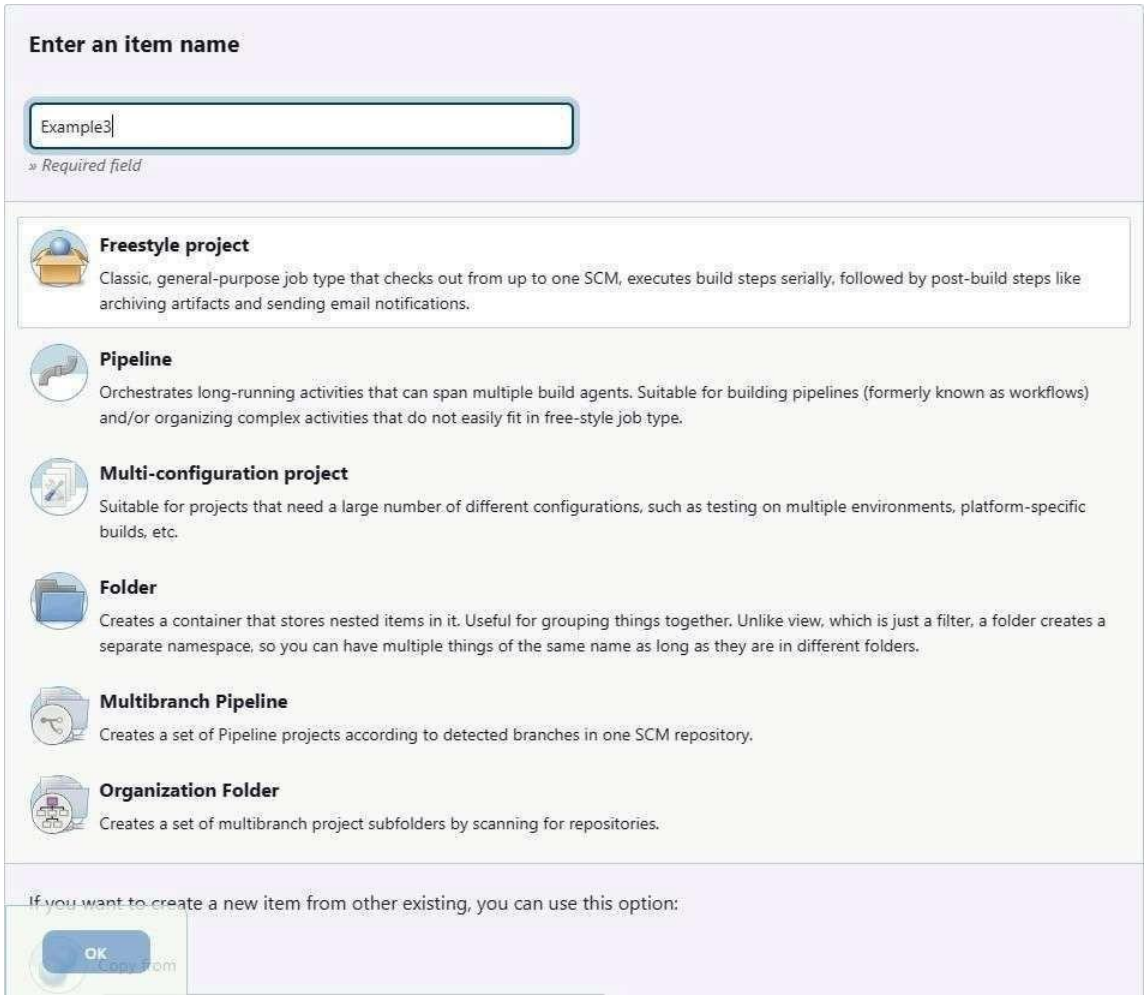

Enabling parameterisation and adding a String parameter:

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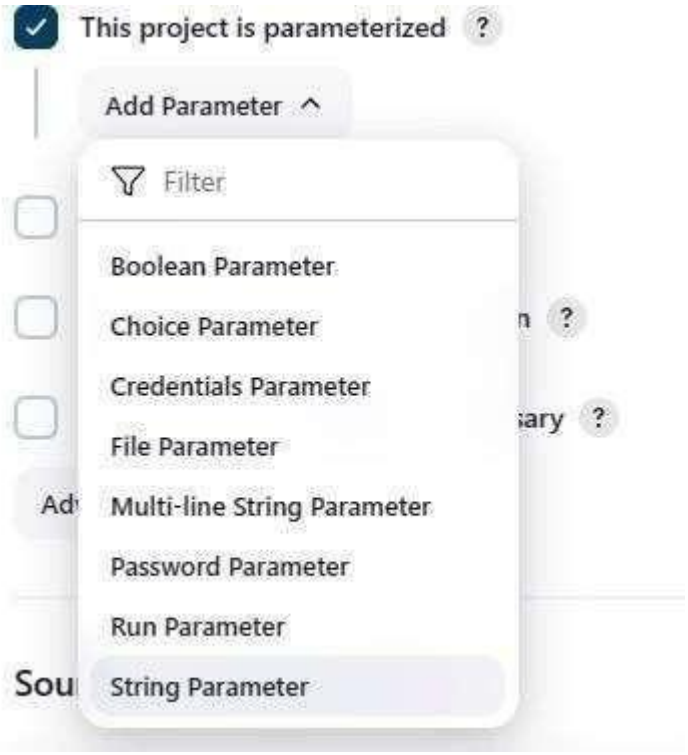

Configuring the string parameter as Fname:

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

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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.cnd
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:

Entering parameters for build:

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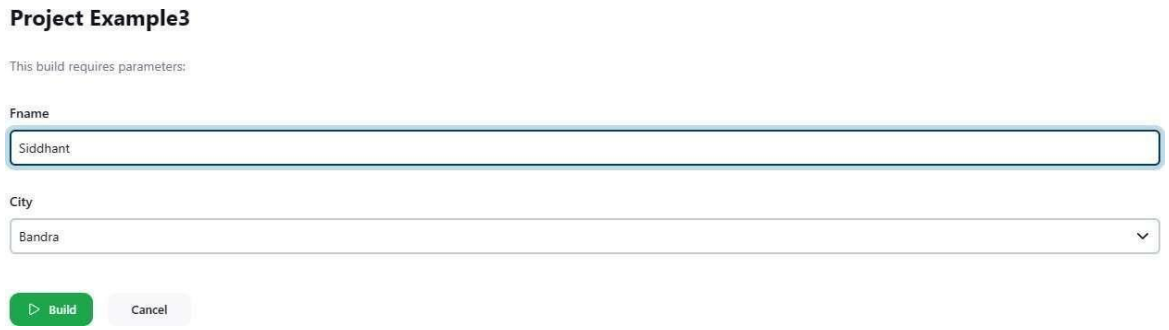
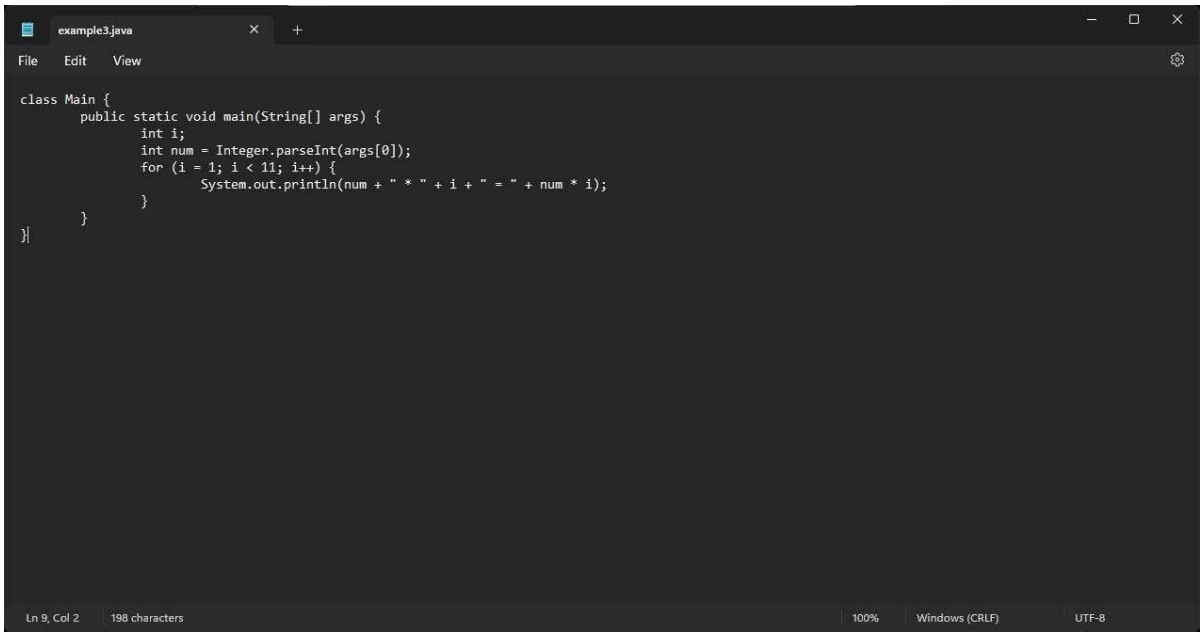


Console output after building:

Example 3.2: Running a Java program with parameters Creating

a Java program with an input argument:



Testing the program on the terminal:

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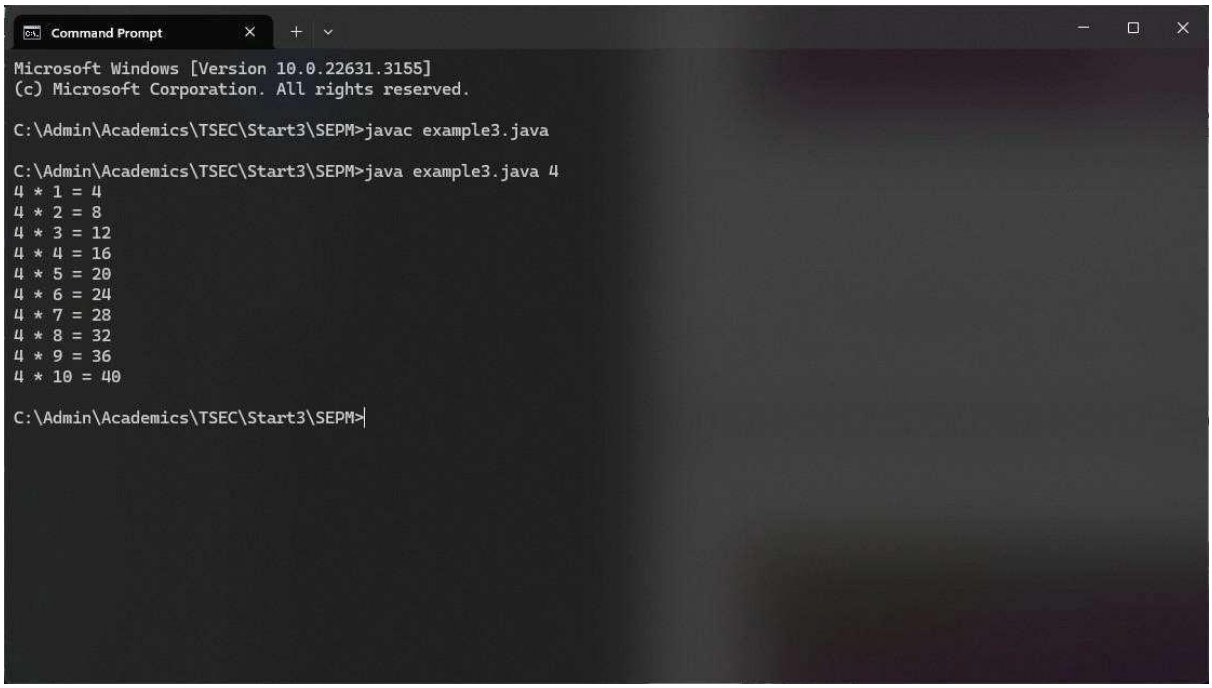

Creating a new freestyle project:

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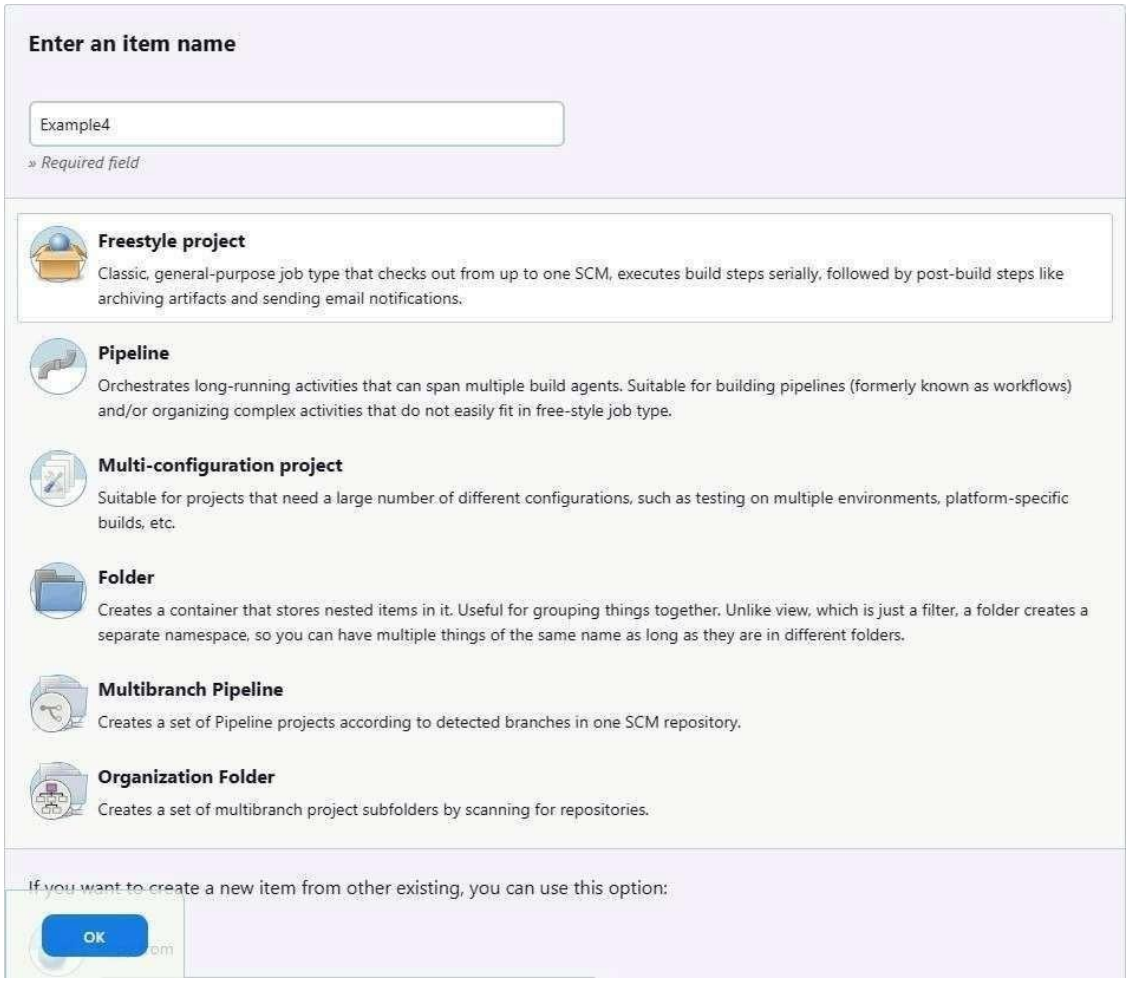

Parameterise the project by adding a string parameter as follows:

Configure the build steps:

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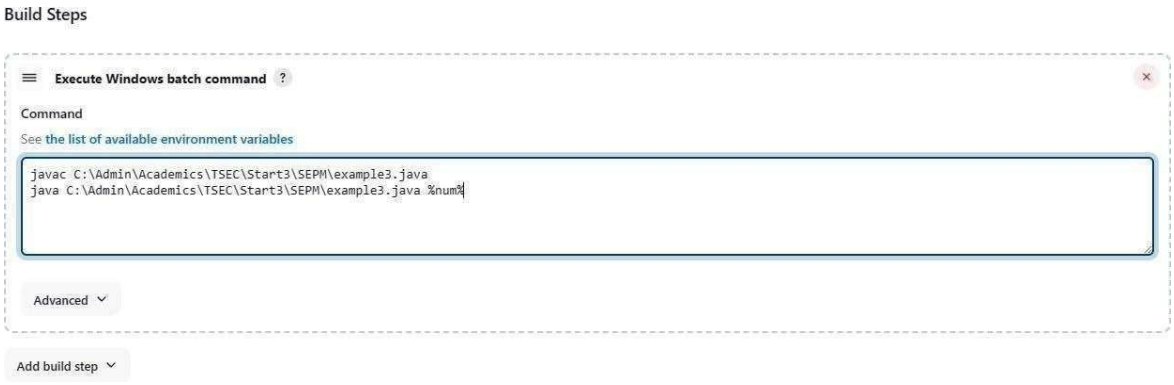
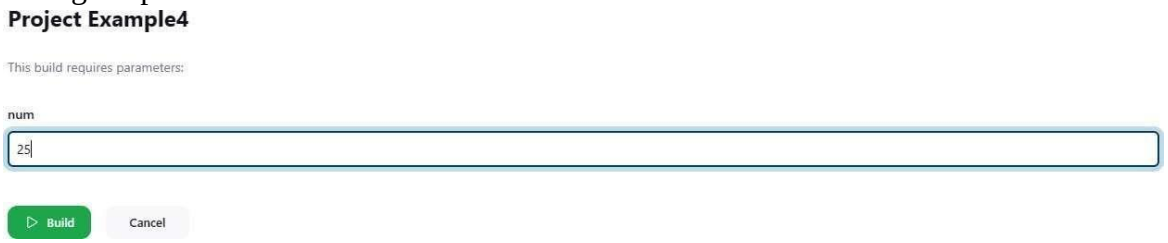


Entering the parameter for the build:



Console output after building:

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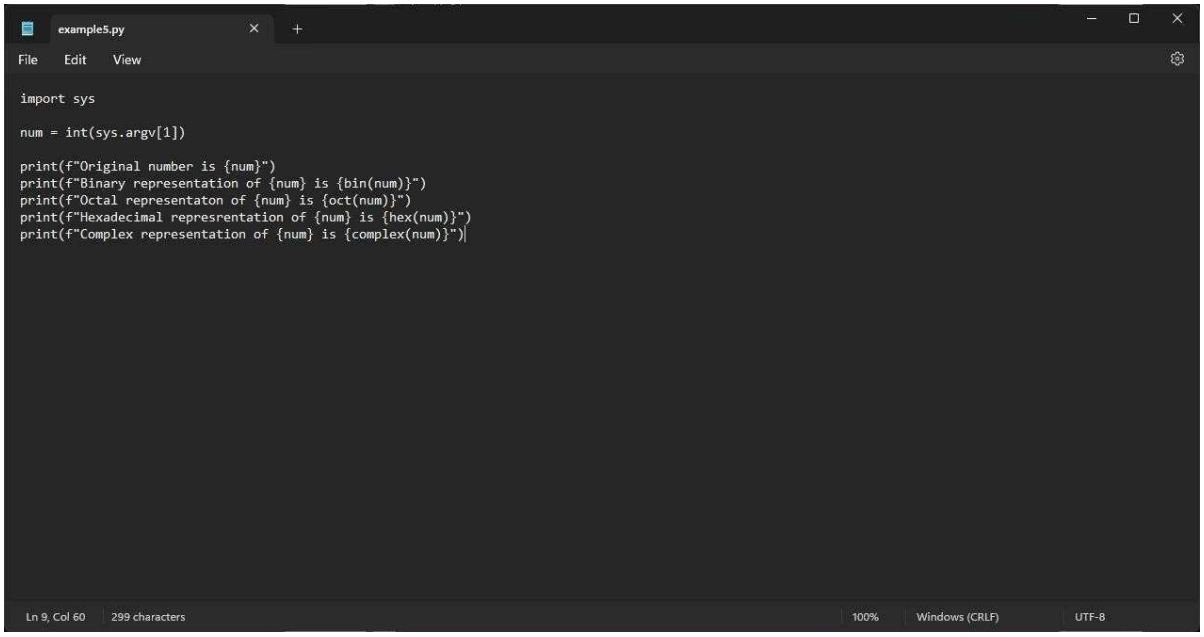
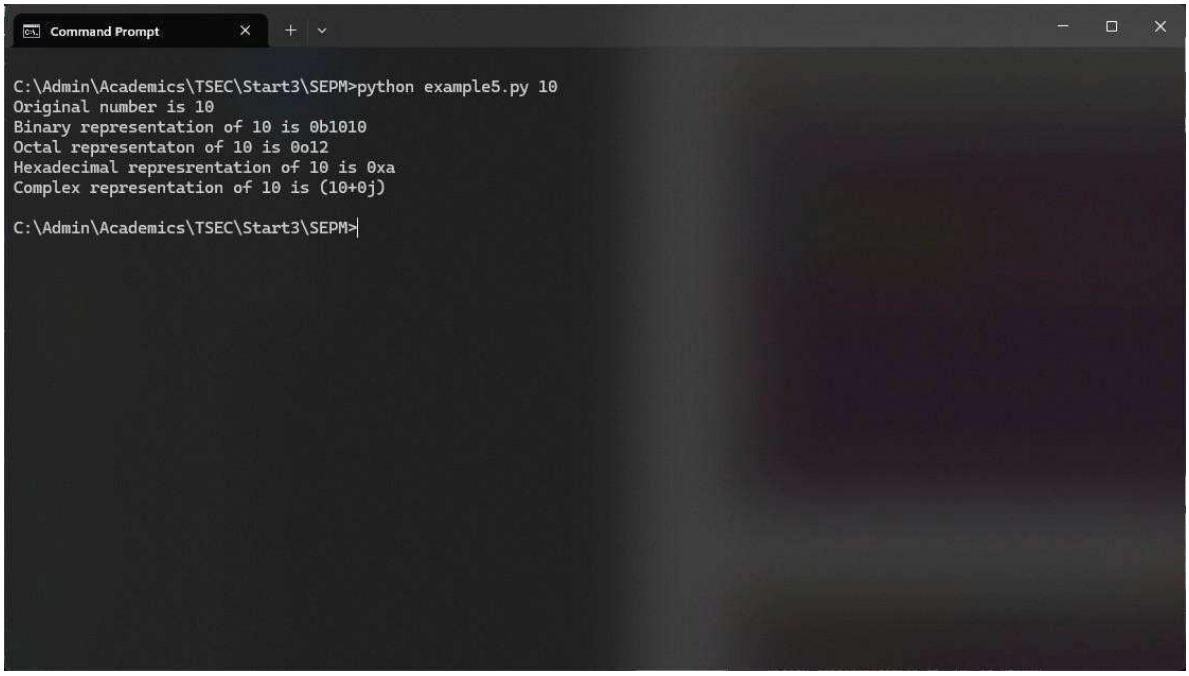
Example 5 Example

5.1: Running a Python program Creating a simple Python script:



Running the Python script on the terminal:



Creating a new freestyle project:

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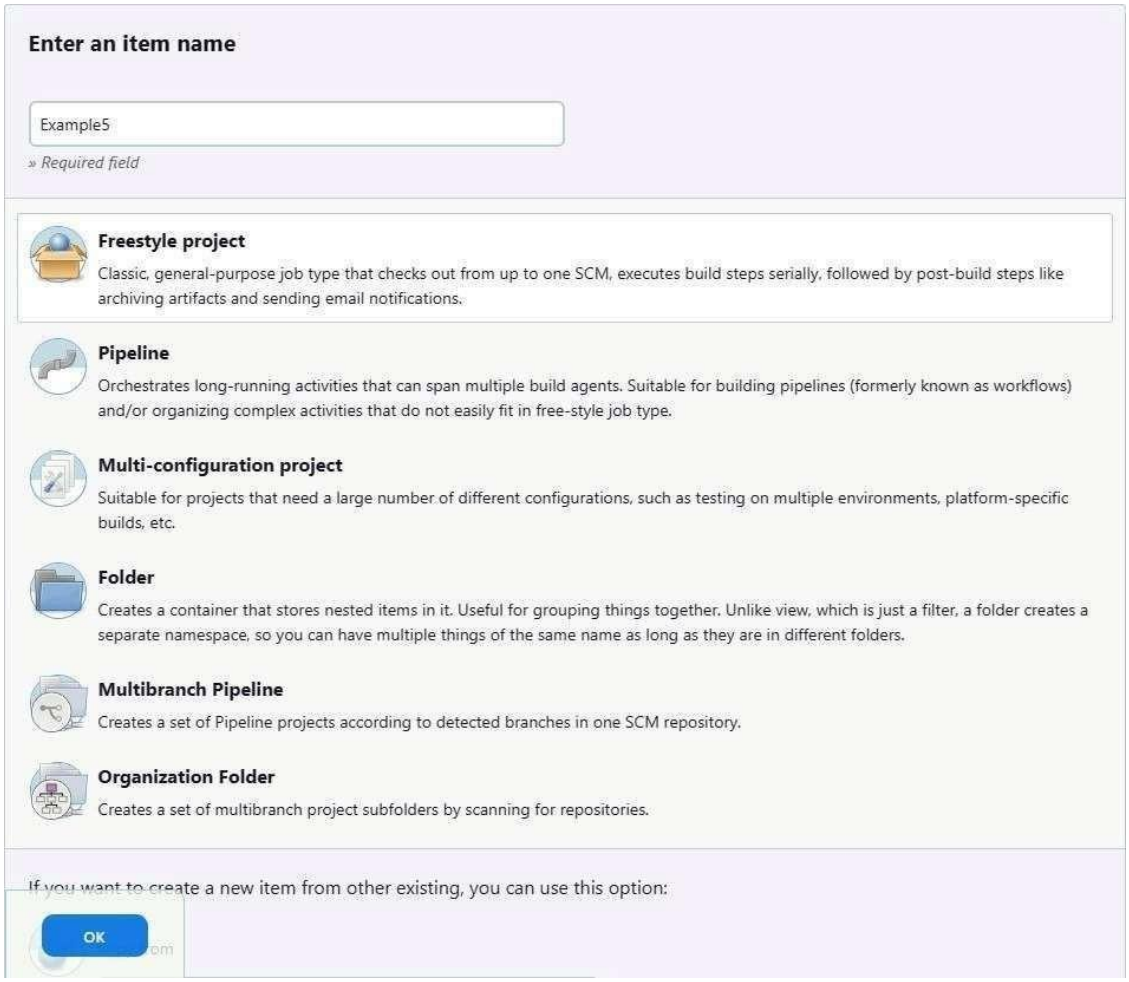
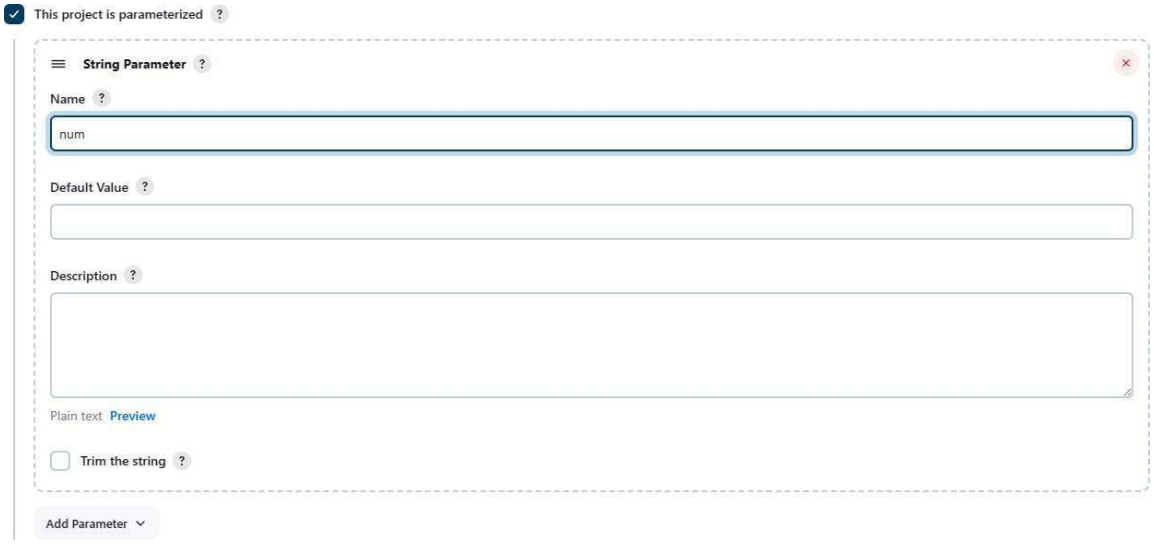


Parameterising the project with a string parameter as follows:



Configuring the build steps:

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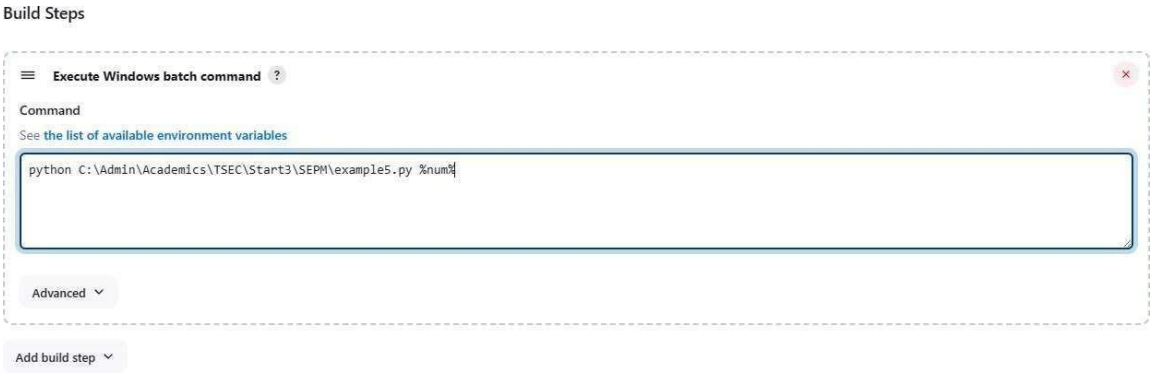
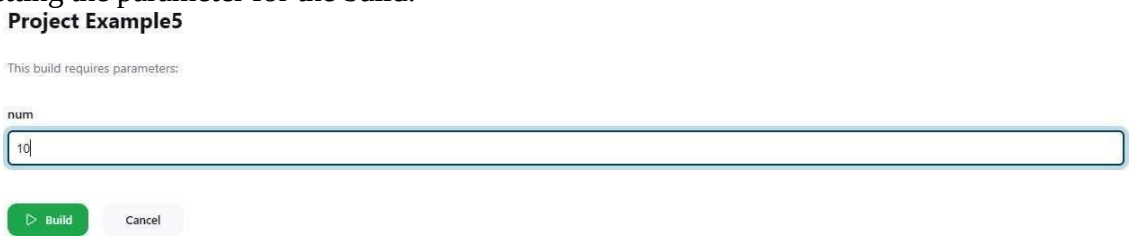


Setting the parameter for the build:



Console output after building:

Conclusion

This experiment demonstrated how to automate a software build and deployment process using Jenkins. By integrating Maven, Gradle, or Ant, we streamlined the compilation and testing of applications, while Jenkins facilitated continuous deployment to a Tomcat server.