DevOps Practical Session

1. Terminal Session: Creating a "Hello World" Java Application

1. Check if Java is Installed

```bash
ubuntu@ubuntu:~$ java -version
```

Output (if Java is not installed):

```csharp
Command 'java' not found, but can be installed with:
sudo apt install default-jdk
```

2. Install Java

```bash
ubuntu@ubuntu:~$ sudo apt update
[sudo] password for ubuntu:  ********
```

```bash
ubuntu@ubuntu:~$ sudo apt install openjdk-17-jdk -y
```

Output:

```csharp
Setting up openjdk-17-jdk-headless ...
java 17 is now installed.
```

3. Create a Project Directory

```bash
ubuntu@ubuntu:~$ mkdir hello-world-java
ubuntu@ubuntu:~$ cd hello-world-java
```

4. **Create the Java File**

```bash
ubuntu@ubuntu:~/hello-world-java$ vim HelloWorld.java
```

In Vim (after pressing i to enter insert mode), type this:

```java
public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("Hello, World!");
    }
}
```

Save and Exit:

Press Esc and type: wq

5. **Compile the Java Code**

```bash
ubuntu@ubuntu:~/hello-world-java$ javac HelloWorld.java
```

Output (no errors):

```csharp
[No output if compiled successfully]
```

6. **Run the Java Program**

```bash
ubuntu@ubuntu:~/hello-world-java$ java HelloWorld
```

Output:

```
Hello, World!
```

2. Terminal Session: Git Repository Initialization

1. **Check if Git is Installed**

```bash
ubuntu@ubuntu:~/hello-world-java$ git --version
```

Output (if Git is not installed):

```arduino
Command 'git' not found.
```

Install Git:

```bash
ubuntu@ubuntu:~/hello-world-java$ sudo apt update
ubuntu@ubuntu:~/hello-world-java$ sudo apt install git -y
```

Output (if installed successfully):

```
git version 2.x.x
```

2. **Initialize the Repository**

```bash
ubuntu@ubuntu:~/hello-world-java$ git init
```

Output:

```arduino
Initialized empty Git repository in /home/ubuntu/hello-world-java/.git/
```

3. **Check Git Status**

```bash
ubuntu@ubuntu:~/hello-world-java$ git status
```

Output:

```vbnet
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    HelloWorld.class
    HelloWorld.java

nothing added to commit but untracked files present (use "git add" to track)
```

4. **Stage Files for the First Commit**

```bash
ubuntu@ubuntu:~/hello-world-java$ git add .
```

Output (No message; files staged):

```csharp
[No output if successful]
```

Check Staged Files:

```bash
ubuntu@ubuntu:~/hello-world-java$ git status
```

Output:

```vbnet
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
    new file:   HelloWorld.class
    new file:   HelloWorld.java
```

5. **Make the Initial Commit**

   bash
   ubuntu@ubuntu:~/hello-world-java$ git commit -m "Initial commit: Added HelloWorld Java application"

   Output:

```sql
[master (root-commit) eadbeef] Initial commit: Added HelloWorld Java application
 2 files changed, 14 insertions(+)
 create mode 100644 HelloWorld.class
 create mode 100644 HelloWorld.java
```

3. Terminal Session: Pushing to GitHub

1. **Create a Repository on GitHub**

   - Open GitHub in your browser: GitHub
   - Log in and click on the **New Repository** button.
   - Fill in:
     - **Repository Name:** hello-world-java
     - **Privacy Setting:** Choose Private or Public.
   - Click **Create Repository**.
   - You'll get a repository URL like:
     https://github.com/your-username/hello-world-java.git

2. **Add Remote Repository**

   bash
   ubuntu@ubuntu:~/hello-world-java$ git remote add origin https://github.com/your-username/hello-world-java.git

   Check Remote:

```bash
ubuntu@ubuntu:~/hello-world-java$ git remote -v
```

   Output:

```perl
origin  https://github.com/your-username/hello-world-java.git (fetch)
origin  https://github.com/your-username/hello-world-java.git (push)
```

3. **Push to GitHub**

```bash
ubuntu@ubuntu:~/hello-world-java$ git branch -M main
```

```bash
ubuntu@ubuntu:~/hello-world-java$ git push -u origin main
```

Output:

```bash
Username for 'https://github.com': your-username
Password for 'https://your-username@github.com': ********

Enumerating objects: 3, done.
Counting objects: 100% (3/3), done.
Delta compression using up to 4 threads.
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 240 bytes | 240.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0)
To https://github.com/your-username/hello-world-java.git
 * [new branch]      main -> main
Branch 'main' set up to track remote branch 'main' from 'origin'.
```

4. **Verify Your Code on GitHub**
   - Go to your GitHub repository in your browser.
   - Your files (HelloWorld.java and HelloWorld.class) should now appear.

4. Terminal Session: Installing Jenkins

1. **Update the System Packages**

```bash
ubuntu@ubuntu:~$ sudo apt update -y && sudo apt upgrade -y
[sudo] password for ubuntu: ********
```

Output:

```python
Hit:1 http://archive.ubuntu.com/ubuntu focal InRelease
... (other packages listed)
```

2. **Install Java (Required for Jenkins)**

   Jenkins requires Java to run, so install OpenJDK:

```bash
ubuntu@ubuntu:~$ sudo apt install openjdk-11-jdk -y
```

   Verify the Installation:

```bash
ubuntu@ubuntu:~$ java -version
```

   Output:

```mathematica
openjdk version "11.0.x"
OpenJDK Runtime Environment ...
```

3. **Add Jenkins Repository Key**

   bash
   ubuntu@ubuntu:~$ sudo wget -O /usr/share/keyrings/jenkins-keyring.asc https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key

   Output:

```lua
--2024-12-27 00:00:00-- https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key
Resolving pkg.jenkins.io...
jenkins.io-2023.key saved.
```

4. **Add Jenkins Repository**

   bash
   ubuntu@ubuntu:~$ echo "deb [signed-by=/usr/share/keyrings/jenkins-keyring.asc] https://pkg.jenkins.io/debian-stable binary/" | sudo tee /etc/apt/sources.list.d/jenkins.list > /dev/null

5. **Update Package Lists and Install Jenkins**

```bash
ubuntu@ubuntu:~$ sudo apt update -y
```

Install Jenkins:

```bash
ubuntu@ubuntu:~$ sudo apt install jenkins -y
```

Output:

Setting up jenkins ...

6. **Start and Enable Jenkins**

```bash
ubuntu@ubuntu:~$ sudo systemctl start jenkins
ubuntu@ubuntu:~$ sudo systemctl enable jenkins
```

Check Jenkins Status:

```bash
ubuntu@ubuntu:~$ sudo systemctl status jenkins
```

Output:

```arduino
● jenkins.service - Jenkins Continuous Integration Server
Active: active (running) since Fri YYYY-MM-DD HH:MM:SS
```

7. **Access Jenkins**
   - Open a browser and go to:

```arduino
http://localhost:8080
```

   - (Replace localhost with your server's IP if using a remote machine.)
   - You will be prompted to unlock Jenkins.

8. **Unlock Jenkins**

```bash
ubuntu@ubuntu:~$ sudo cat /var/lib/jenkins/secrets/initialAdminPassword
```

9. **Install Suggested Plugins**

- Choose “Install suggested plugins” and wait for the installation to complete.

10. **Create an Admin User**

- Enter your preferred username, password, and email.
- Click **Save and Finish**.

5. Terminal Session: Configuring Jenkins Job

1. Access Jenkins Dashboard

1. Open a browser on the Ubuntu machine or connect remotely.
2. Go to:

```arduino
http://localhost:8080
```

2. Login

- Login with the credentials you set up earlier (admin username and password).

3. Create a New Job

1. Click on **"New Item"** from the Jenkins dashboard.
2. Enter a name for your job, such as HelloWorld-Java-Job.
3. Select **"Freestyle project"** and click **OK**.

4. Configure Job Details

1. **Source Code Management (SCM)**:

- Choose **Git**.
- In the repository URL field, enter the URL of your GitHub repository:

```arduino
https://github.com/your-username/hello-world-java.git
```

If authentication is required:
- Add Jenkins credentials for GitHub.

2. **Build Triggers**:

- Select **Poll SCM** if you want periodic builds.
- Set the schedule (e.g., every 5 minutes):
  H/5 * * * *

3. **Add Build Steps**:

   - Under the **Build** section, choose **Execute Shell**.
   - Add the following script:

```bash
javac HelloWorld.java
java HelloWorld
```

5. Save and Build Job

1. Click **Save** to save the job configuration.
2. On the job's page, click **Build Now**.

6. Check Build Status

1. In the **Build History**, click the build number (e.g., #1).
2. Go to **Console Output** to view the results.

Sample Console Output (If Successful):

```csharp
Building in workspace /var/lib/jenkins/workspace/HelloWorld-Java-Job
[INFO] Checking out repository...
[INFO] Running shell script
[INFO] Compiling HelloWorld.java
[INFO] Executing program:
Hello, World!

Finished: SUCCESS
```

6. Terminal Session: Configuring Jenkins Pipeline

1. Access Jenkins Dashboard

- Open your browser on the Ubuntu machine.
- Navigate to:

```arduino
http://localhost:8080
```

2. Create a New Pipeline Job

- From the Jenkins Dashboard, click **New Item**.
- Enter a name for your pipeline job, such as HelloWorld-Java-Pipeline.
- Select **Pipeline** and click **OK**.

3. Write the Pipeline Script

- Scroll down to the **Pipeline** section.
- Select **Pipeline script** and paste the following code:

```
pipeline {
    agent any

    stages {
        stage('Clone') {
            steps {
                git branch: 'main', url: 'https://github.com/your-username/hello-world-java.git '
            }
        }

        stage('Build') {
            steps {
                sh 'javac HelloWorld.java'
            }
        }

        stage('Run') {
            steps {
                sh 'java HelloWorld'
            }
        }
    }

    post {
        success {
            echo 'Build and execution successful!'
        }
        failure {
            echo 'Build or execution failed!'
        }
    }
}
```

4. Save and Run the Pipeline

- Click **Save**.
- On the pipeline job's page, click **Build Now**.

5. Monitor Pipeline Progress

- View the pipeline's progress in **Build History** and check the **Console Output**.
- The output should show:
    - Git repository cloning.
    - Java code compilation.
    - Execution of java HelloWorld

Sample Console Output (If Successful):

```
[Pipeline] Start of Pipeline
[Pipeline] { (Clone)
Cloning repository...
Cloning branch 'main' of repository ' https://github.com/your-username/hello-world-java.git '
[Pipeline] { (Build)
Compiling HelloWorld.java...
[Pipeline] { (Run)
Executing program...
Hello, World!
[Pipeline] End of Pipeline
Finished: SUCCESS
```