Class: F.Y.MCA   **Semester: I AY2425**   Subject: **Software Engineering Lab**

Subject In charge: Nikhita Mangaonkar   **Course Code: MC503**

ROLL NO.: 2024510001   BATCH: A   NAME: Atharva Vasant Angre

EXPERIMENT NO: 10

EXPERIMENT TITLE: Study of continuous Integration and development tools.

Objective:

1.To understand the use of CI/CD tools

Concepts:

Software Configuration Management- SCM is like a system that helps developers keep track of all the changes in their software, such as new features, bug fixes, or updates. It ensures everyone works on the correct version, avoids conflicts, and keeps a history of what changed and why. SCM also automates tasks like building and releasing software, making the development process smoother and more reliable.

A CI/CD pipeline is like an automated assembly line for software development. It helps developers build, test, and deliver software updates quickly and efficiently.

Continuous Integration (CI) - CI is a practice where developers frequently upload their code to a shared space, usually a repository like GitHub. Each time new code is added, automated tests and checks run to ensure everything works together correctly. This way, problems are caught early, making it faster and easier to fix them. It also encourages teamwork and avoids big integration issues later.

Continuous Deployment (CD) - CD takes CI one step further by automatically delivering tested changes directly to the live system (like a website or app). If the automated tests pass, the updates go live without manual intervention. This means users always get the latest features or fixes quickly, and developers can focus on creating new things instead of managing updates.

Jenkin and its Features - Jenkins is a popular tool that helps automate the process of building, testing, and deploying software.

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Environment Setup for Jenkins

Prerequisites

- **Java Installation:** Jenkins requires Java to run. Install Java Development Kit (JDK) version 8 or later.

- **System Requirements:** Jenkins can run on Windows, macOS, or Linux. Ensure the system meets basic memory and disk space requirements.

Features:

- Pipeline Automation: You can create a step-by-step process (pipeline) for your software, from testing to deployment.

- Plugins: Jenkins works with other tools like Git for version control or Docker for containerization.

- Distributed Builds: It can use multiple computers to speed up tasks like testing or building large software.

- Notifications: Alerts are sent when something goes wrong, so you can fix it quickly.

- Web Interface: Jenkins provides a user-friendly dashboard to manage tasks easily.

- Cross-Platform: Works on any system, including Windows, macOS, and Linux.

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Now update the OS. Command: sudo apt-get update

```
System load:   0.0         Processes:           97
Usage of /:    21.0% of 7.57GB   Users logged in:      0
Memory usage: 21%          IPv4 address for eth0: 172.31.34.8
Swap usage:    0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status


The list of available updates is more than a week old.
To check for new updates run: sudo apt update


The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-172-31-34-8:~$ sudo apt-get update
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu focal InRelease
```

Add jenkins repository for ubuntu.

Command: sudo wget -O /usr/share/keyrings/jenkins-keyring.asc \ https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key

```
ubuntu@ip-172-31-34-8:~$ sudo wget -O /usr/share/keyrings/jenkins-keyring.asc \
>   https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key
--2023-11-21 20:56:55--  https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key
Resolving pkg.jenkins.io (pkg.jenkins.io)... 146.75.38.133, 2a04:4e42:78::645
Connecting to pkg.jenkins.io (pkg.jenkins.io)|146.75.38.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 3175 (3.1K) [application/pgp-keys]
Saving to: '/usr/share/keyrings/jenkins-keyring.asc'

/usr/share/keyrings/jenkins-k 100%[===============================================>]   3.10K  --.-KB/s

2023-11-21 20:56:55 (49.4 MB/s) - '/usr/share/keyrings/jenkins-keyring.asc' saved [3175/3175]
```

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Command: 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

```
ubuntu@ip-172-31-34-8:~$ 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
ubuntu@ip-172-31-34-8:~$ |
```

Now run 'sudo apt-get update' to update the Jenkins repository

```
ubuntu@ip-172-31-34-8:~$ sudo apt-get update
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu focal-backports InRelease
Ign:4 https://pkg.jenkins.io/debian-stable binary/ InRelease
Get:5 https://pkg.jenkins.io/debian-stable binary/ Release [2044 B]
Get:6 https://pkg.jenkins.io/debian-stable binary/ Release.gpg [833 B]
Get:7 https://pkg.jenkins.io/debian-stable binary/ Packages [25.9 kB]
Hit:8 http://security.ubuntu.com/ubuntu focal-security InRelease
Fetched 28.8 kB in 4s (6840 B/s)
Reading package lists... Done
```

Install JDK.

Command: sudo apt install fontconfig openjdk-17-jre

```
ubuntu@ip-172-31-34-8:~$ sudo apt install fontconfig openjdk-17-jre
Reading package lists... Done
Building dependency tree
Reading state information... Done
fontconfig is already the newest version (2.13.1-2ubuntu3).
openjdk-17-jre is already the newest version (17.0.8.1+1~us1-0ubuntu1~20.04).
0 upgraded, 0 newly installed, 0 to remove and 21 not upgraded.
1 not fully installed or removed.
After this operation, 0 B of additional disk space will be used.
Do you want to continue? [Y/n] y
Setting up jenkins (2.426.1)
```

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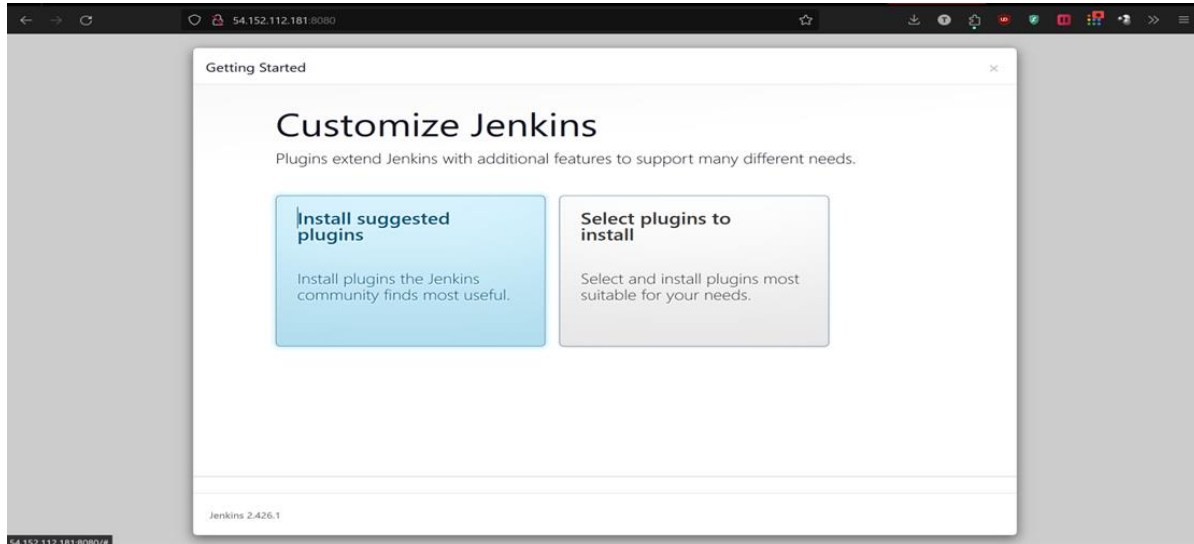**Class: F.Y.MCA**　　　　**Semester: I AY2425**　　　Subject: **Software Engineering Lab**

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Now install jenkins.

Command: sudo apt-get install jenkins -y

```
ubuntu@ip-172-31-34-8:~$ sudo apt-get install jenkins -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
jenkins is already the newest version (2.426.1).
0 upgraded, 0 newly installed, 0 to remove and 21 not upgraded.
ubuntu@ip-172-31-34-8:~$
```

Command:

Sudo systemctl enable jenkins && sudo systemctl start jenkins && sudo systemctl status jenkins

```
ubuntu@ip-172-31-34-8:~$ sudo systemctl enable jenkins
Synchronizing state of jenkins.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable jenkins
ubuntu@ip-172-31-34-8:~$
```

```
ubuntu@ip-172-31-34-8:~$ sudo systemctl start jenkins
ubuntu@ip-172-31-34-8:~$ sudo systemctl status jenknins
Unit jenkins.service could not be found.
ubuntu@ip-172-31-34-8:~$ sudo systemctl status jenkins
● jenkins.service - Jenkins Continuous Integration Server
     Loaded: loaded (/lib/systemd/system/jenkins.service; enabled; vendor preset: enabled)
     Active: active (running) since Tue 2023-11-21 21:11:10 UTC; 8min ago
   Main PID: 18372 (java)
      Tasks: 41 (limit: 1126)
     Memory: 316.4M
     CGroup: /system.slice/jenkins.service
             └─18372 /usr/bin/java -Djava.awt.headless=true -jar /usr/share/java/jenkins.war --webroot=/var/cache/jenkins/war --httpPort=8080

Nov 21 21:10:43 ip-172-31-34-8 jenkins[18372]: 89ad5fd159954738a8c5e911932adbd4
Nov 21 21:10:43 ip-172-31-34-8 jenkins[18372]: This may also be found at: /var/lib/jenkins/secrets/initialAdminPassword
Nov 21 21:10:43 ip-172-31-34-8 jenkins[18372]: *************************************************************
Nov 21 21:10:43 ip-172-31-34-8 jenkins[18372]: *************************************************************
Nov 21 21:10:43 ip-172-31-34-8 jenkins[18372]: *************************************************************
Nov 21 21:11:10 ip-172-31-34-8 jenkins[18372]: 2023-11-21 21:11:10.772+0000 [id=31]      INFO      jenkins.InitReactorRunner$1#onAttained: Comp>
Nov 21 21:11:10 ip-172-31-34-8 jenkins[18372]: 2023-11-21 21:11:10.803+0000 [id=24]      INFO      hudson.lifecycle.Lifecycle#onReady: Jenkins >
Nov 21 21:11:10 ip-172-31-34-8 systemd[1]: Started Jenkins Continuous Integration Server.
Nov 21 21:11:10 ip-172-31-34-8 jenkins[18372]: 2023-11-21 21:11:10.957+0000 [id=47]      INFO      h.m.DownloadService$Downloadable#load: Obtai>
Nov 21 21:11:10 ip-172-31-34-8 jenkins[18372]: 2023-11-21 21:11:10.958+0000 [id=47]      INFO      hudson.util.Retrier#start: Performed the act>
lines 1-19/19 (END)
```

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Now set the java environment variable.

Command:

Update-alternatives –config java

Export JAVA_HOME=<your java path>

Echo $JAVA_HOME

Copy the java path.

```
ubuntu@ip-172-31-35-202:~$ update-alternatives --config java
There are 2 choices for the alternative java (providing /usr/bin/java).

  Selection    Path                                          Priority   Status
------------------------------------------------------------------------------
* 0            /usr/lib/jvm/java-21-openjdk-amd64/bin/java    2111       auto mode
  1            /usr/lib/jvm/java-17-openjdk-amd64/bin/java    1711       manual mode
  2            /usr/lib/jvm/java-21-openjdk-amd64/bin/java    2111       manual mode

Press <enter> to keep the current choice[*], or type selection number:
ubuntu@ip-172-31-35-202:~$ export JAVA_HOME=/usr/lib/jvm/java-21-openjdk-amd64
ubuntu@ip-172-31-35-202:~$ echo $JAVA_HOME
/usr/lib/jvm/java-21-openjdk-amd64
```

Now copy the IP address mentioned under the ec2 connect tab
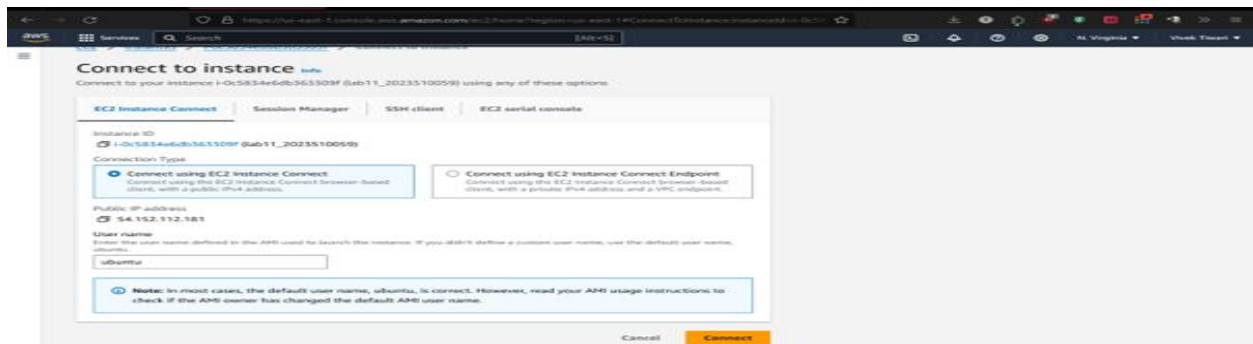
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Ip address:8080 to open the jenkins dashboard
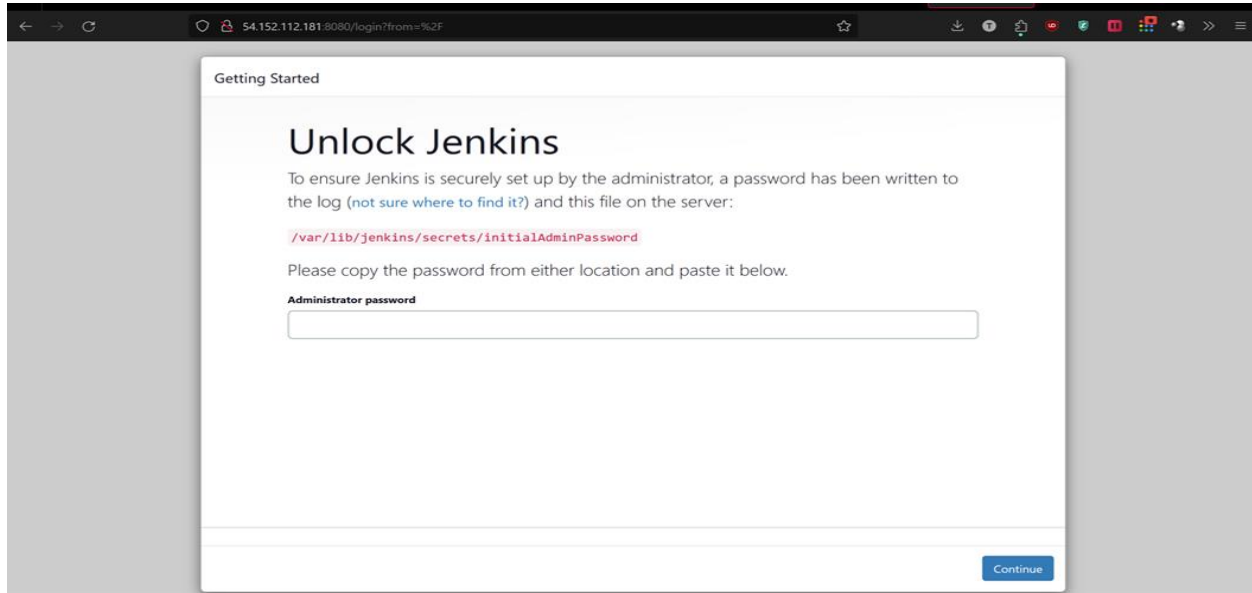
Command: sudo cat <jenkins path>

To obtain the password

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Now install all the suggested plugins

Now create a user, this will be used to login to jenkins dashboard
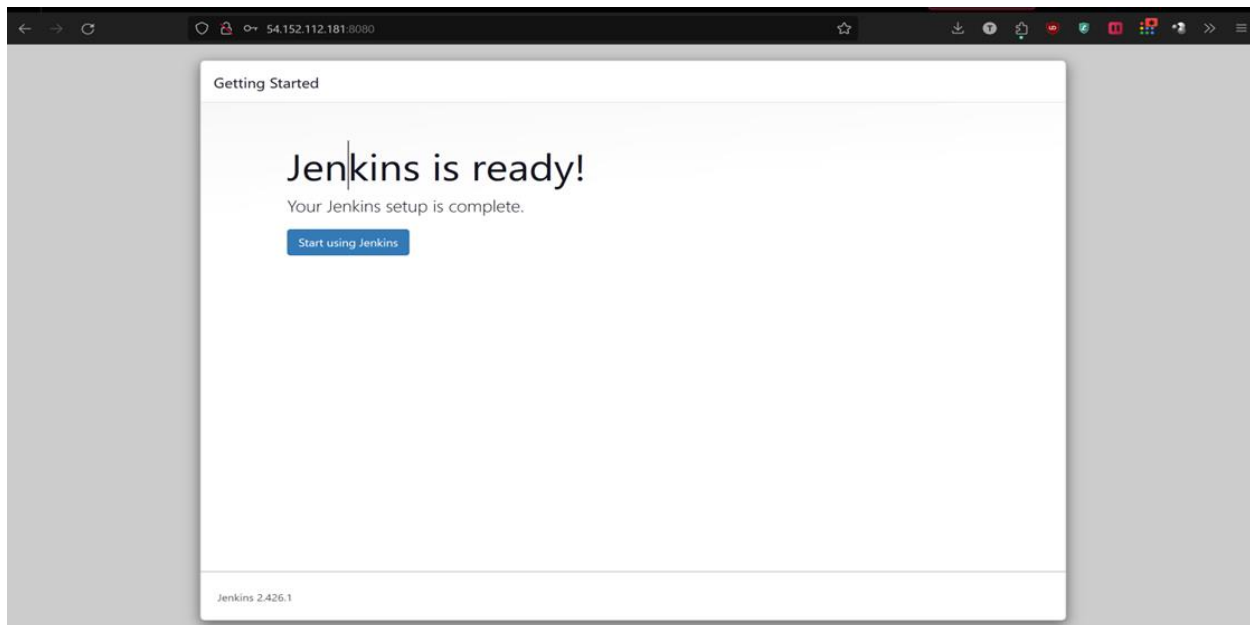
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Log in using the credentials
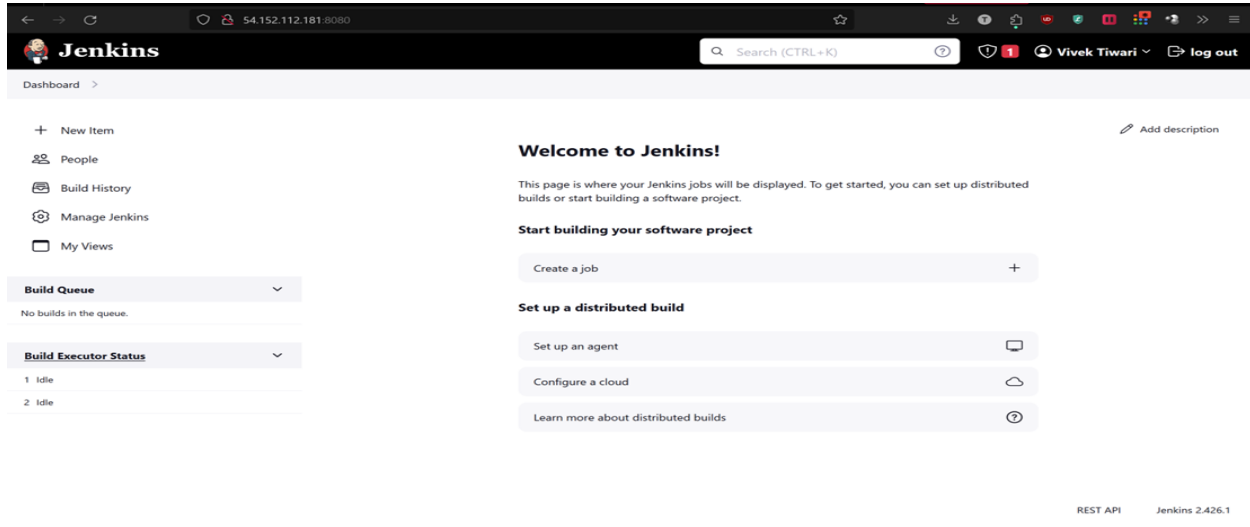
Now go to manage jenkins and paste the java environment variable path in jdk.
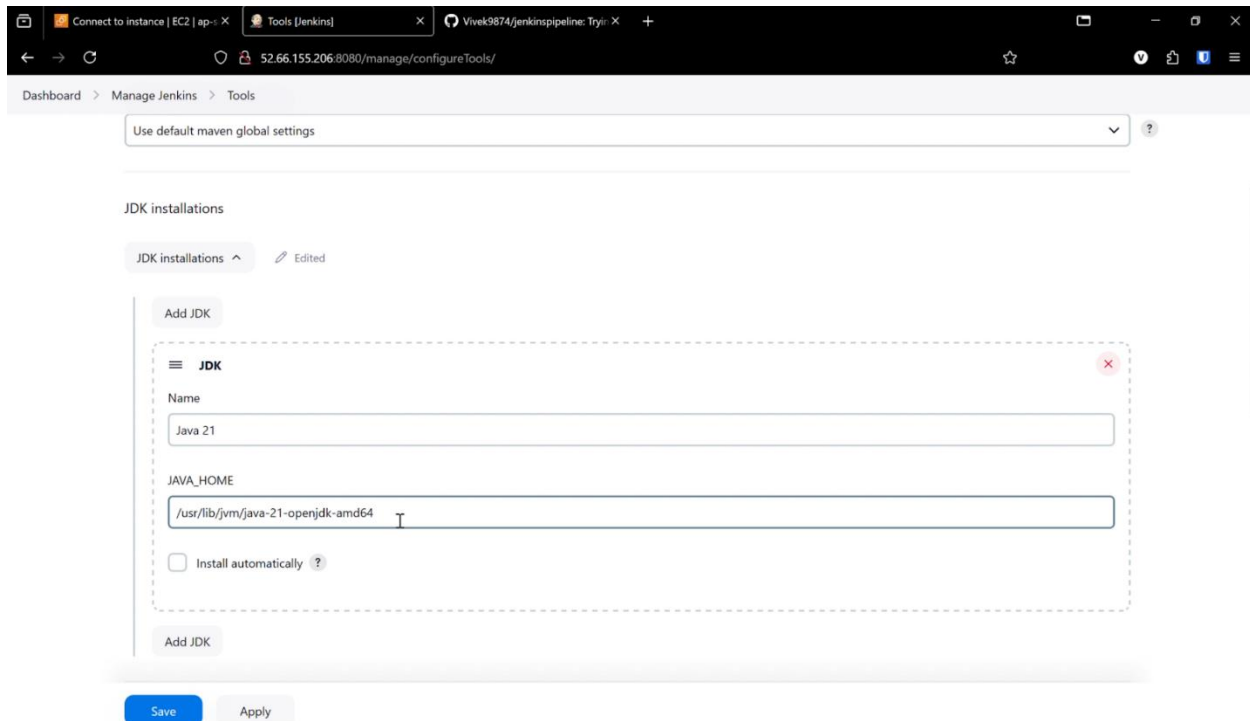
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Now create a freestyle project & Enter a description

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Under source code management, select git. Provide the URL of your **public** repository. Specify the branch name too

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Under Build environment, select execute shell

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Enter shell commands to execute your java code.

Now save and build the project.

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You'll be able to see the output of your java code in the console output