Academic Year – 2023-24

Class: F.Y.MCA   **Semester: I**   **Subject:** Software Engineering   **Course Code:** MC503

Subject In charge: Nikhita Mangaonkar

Roll No: 2023510059   **Batch:** C

Name: Vivek Tiwari

Experiment No: 11

Experiment Title: CI/CD Tools,

Objectives:

1. To create EC2 instance on AWS.

2. To deploy Jenkins service on the instance.

3. To create a pipeline in Jenkins.

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Steps:

1. Search for EC2 on AWS and launch an instance.

2. Select OS of your choice:

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3. Confirm Instance type:

▼ **Instance type** Info

Instance type

t2.micro		Free tier eligible
Family: t2 1 vCPU 1 GiB Memory Current generation: true		
On-Demand Windows base pricing: 0.0162 USD per Hour		
On-Demand SUSE base pricing: 0.0116 USD per Hour		
On-Demand RHEL base pricing: 0.0716 USD per Hour		
On-Demand Linux base pricing: 0.0116 USD per Hour		

◯ All generations

Compare instance types

Additional costs apply for AMIs with pre-installed software

4. Create a key pair and save the downloaded file to a organised folder:

Create key pair   ✕

Key pair name
Key pairs allow you to connect to your instance securely.

lab11Vivek59|

The name can include upto 255 ASCII characters. It can't include leading or trailing spaces.

Key pair type

◉ **RSA**
RSA encrypted private and public key pair

◯ **ED25519**
ED25519 encrypted private and public key pair

Private key file format
◉ .pem
For use with OpenSSH

◯ .ppk
For use with PuTTY

⚠ When prompted, store the private key in a secure and accessible location on your computer. **You will need it later to connect to your instance.** Learn more ☑

Cancel   **Create key pair**

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▼ **Key pair (login)** Info

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - *required*

lab11Vivek59   ▼   ↻ Create new key pair

---

5. Enable all network settings:

▼ **Network settings** Info   Edit

Network Info
vpc-0d1602ead38f9dce0

Subnet Info
No preference (Default subnet in any availability zone)

Auto-assign public IP Info
Enable

Firewall (security groups) Info
A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

| ● Create security group | ○ Select existing security group |

We'll create a new security group called '**launch-wizard-1**' with the following rules:

☑ **Allow SSH traffic from**   Anywhere
   Helps you connect to your instance   0.0.0.0/0

☑ **Allow HTTPS traffic from the internet**
   To set up an endpoint, for example when creating a web server

☑ **Allow HTTP traffic from the internet**
   To set up an endpoint, for example when creating a web server

⚠ Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting   ✕
   security group rules to allow access from known IP addresses only.

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6. Confirm your choices, so as not to get billed unnecessarily:

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API Calls to the instance:

```
{
 "MaxCount": 1,
 "MinCount": 1,
 "ImageId": "ami-06aa3f7caf3a30282",
 "InstanceType": "t2.micro",
 "KeyName": "lab11Vivek59",
 "EbsOptimized": false,
 "NetworkInterfaces": [
   {
     "AssociatePublicIpAddress": true,
     "DeviceIndex": 0,
     "Groups": [
       "<groupId of the new security group created below>"
     ]
   }
 ],
 "TagSpecifications": [
   {
     "ResourceType": "instance",
     "Tags": [
       {
         "Key": "Name",
         "Value": "lab11_2023510059"
       }
     ]
   }
 ],
 "MetadataOptions": {
   "HttpTokens": "required",
   "HttpEndpoint": "enabled",
   "HttpPutResponseHopLimit": 2
 },
 "PrivateDnsNameOptions": {
   "HostnameType": "ip-name",
   "EnableResourceNameDnsARecord": true,
   "EnableResourceNameDnsAAAARecord": false
 }
}
```
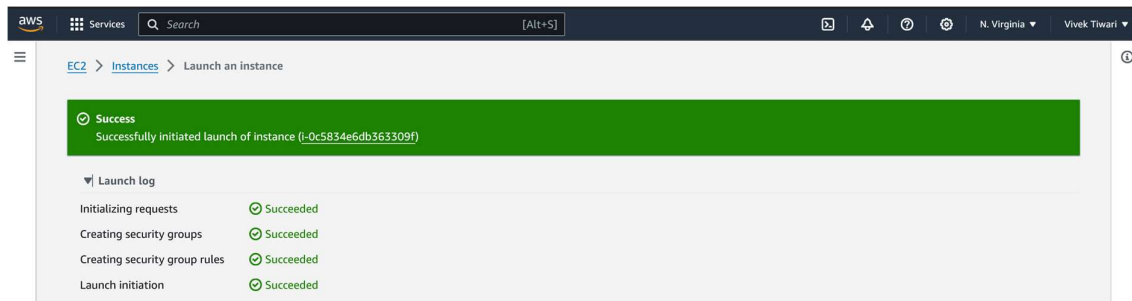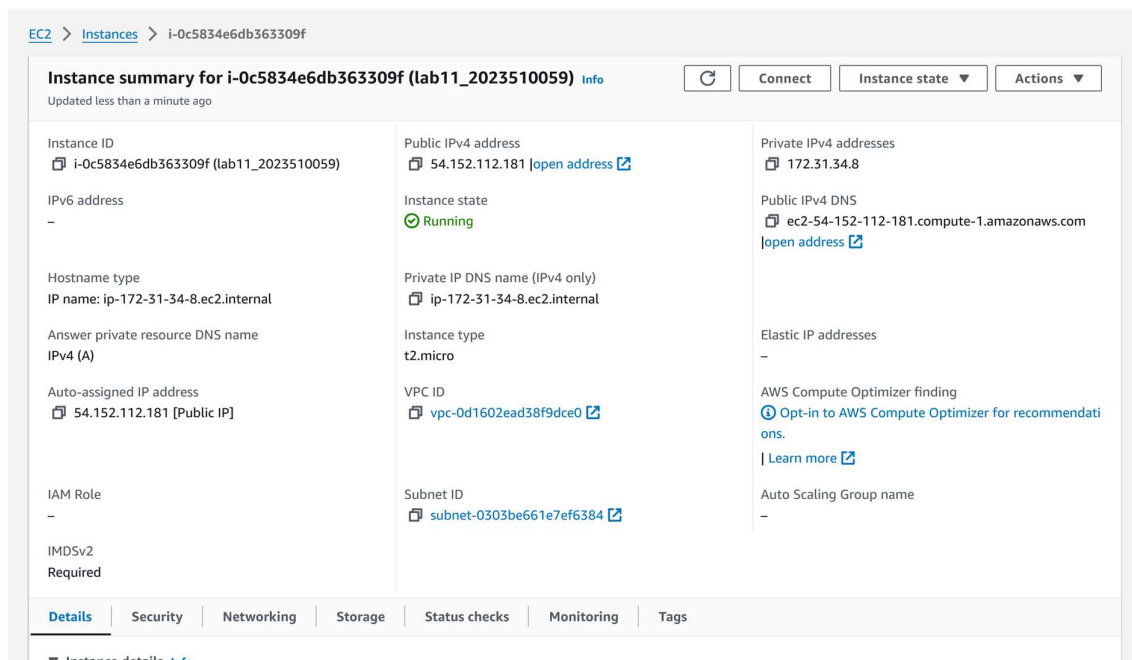
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7. You've successfully created an EC2 instance:

8. Check all the details:

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9. Now create a custom TCP protocol using any port number you like, 8080 has been used here:

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10. Now connect to the EC2 instance using CLI via SSH protocol:
    To do so:
    - Head over to your EC2 instance and click on connect.
    - Click on the SSH tab and copy the command present there.
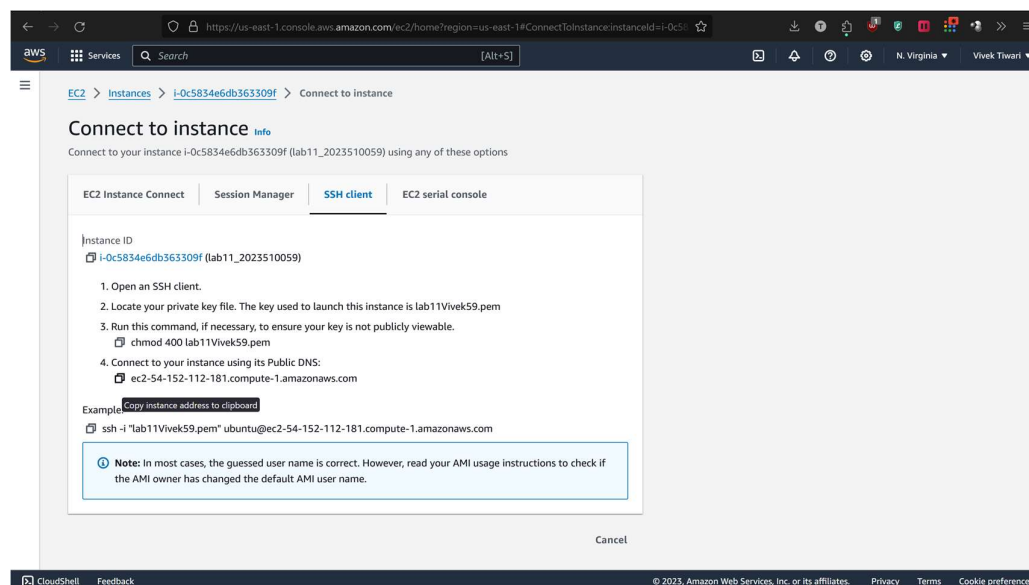
    - Open the directory where you've stored the .pem file.
    - Open a CLI in that directory
    - Now run the copied SSH command in the CLI window.

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- Run the command 'sudo apt-get update' to update your Linux machine.

```
 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
```

11. Now adding Jenkins repository for ubuntu:
Command 1:
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 2:
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:~$ 
```

12. 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
```

Before installing Jenkins, install openjdk -17 using the 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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13. Now install Jenkins using the 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:~$
```

14. Now run the command 'sudo systemctl enable 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:~$
```

15. Start Jenkins service using the command 'sudo systemctl start Jenkins'

To check if Jenkins is running or not, use the command 'sudo systemctl status jenkins'

```
ubuntu@ip-172-31-34-8:~$ sudo systemctl start jenkins
ubuntu@ip-172-31-34-8:~$ sudo systemctl status jenkins
Unit jenknins.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)
```
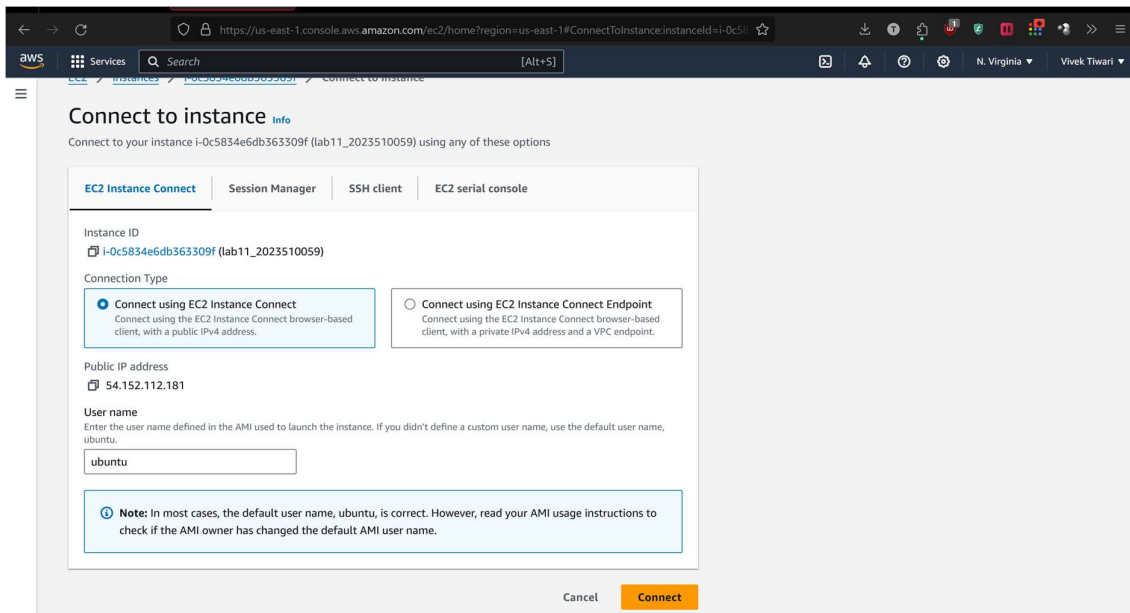
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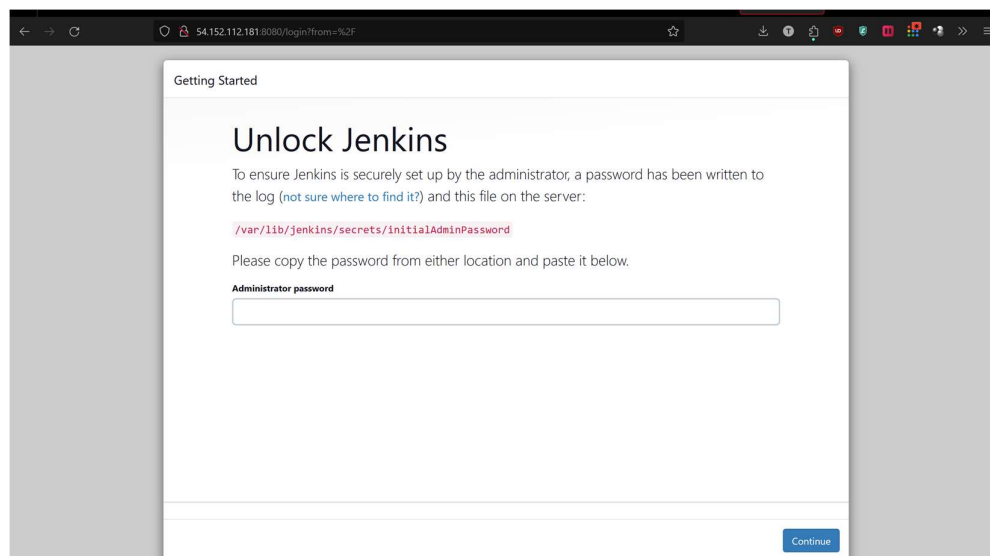
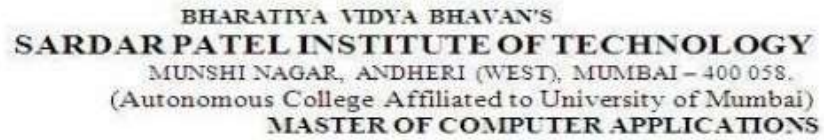**Subject In charge:** Nikhita Mangaonkar

16. Now copy the IP address mentioned under the ec2 connect tab

17. Append the port 8080 to the IP address as we had previously defined:
    - 54.152.112.181:8080, and paste the IP address in your browser.
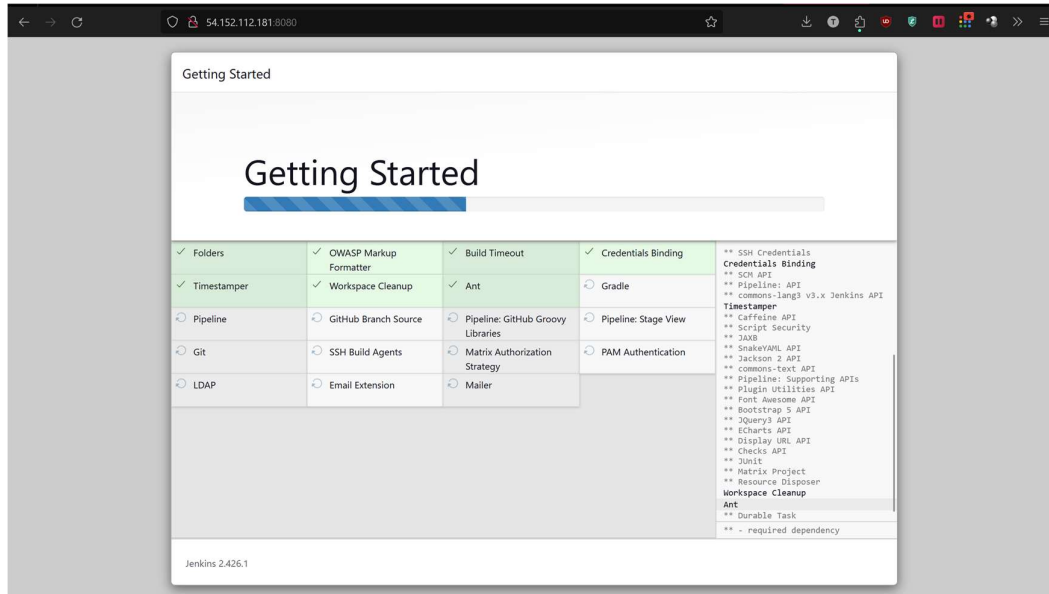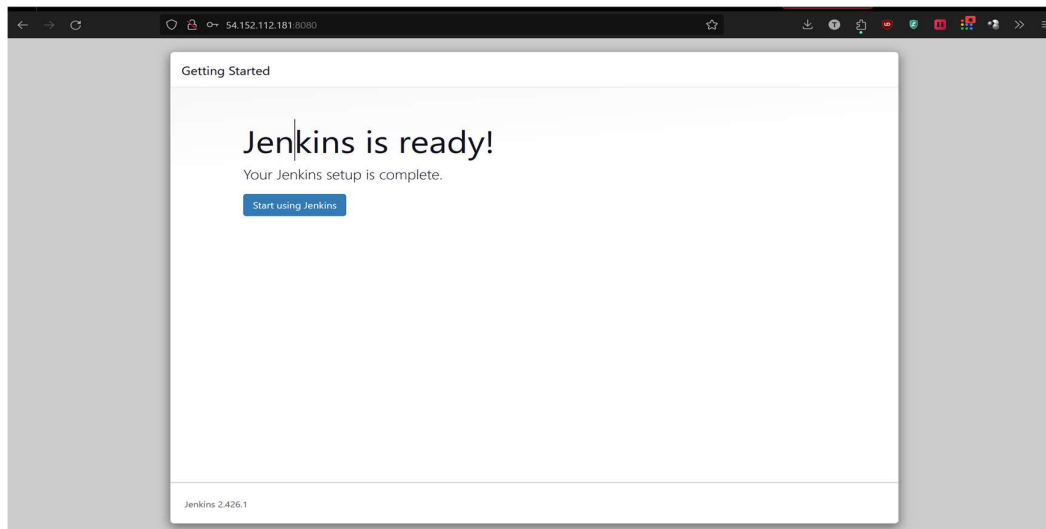   - The browser should load unlock Jenkins page as below.

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18. Copy the path:

Getting Started

Unlock Jenkins

To ensure Jenkins is securely set up by the administrator, a password has been written to the log (not sure where to find it?) and this file on the server:

`/var/lib/jenkins/secrets/initialAdminPassword`

Please copy the password from either location and paste it below.

Administrator password

19. Run the command 'sudo cat <path>'. This command will return a password.

```
ubuntu@ip-172-31-34-8:~$ sudo cat /var/lib/jenkins/secrets/initialAdminPassword
                              J4
ubuntu@ip-172-31-34-8:~$
```

20. After entering the password, select install suggested plugins:

Getting Started   ✕

Customize Jenkins

Plugins extend Jenkins with additional features to support many different needs.

Install suggested plugins	Select plugins to install
Install plugins the Jenkins community finds most useful.	Select and install plugins most suitable for your needs.

Jenkins 2.426.1

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21. Now create an admin user:

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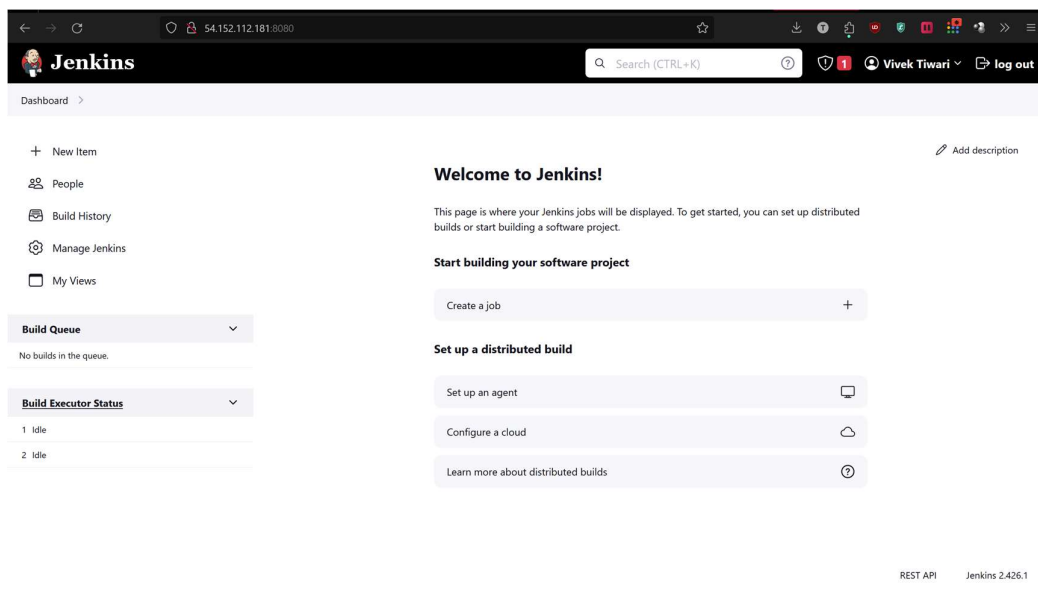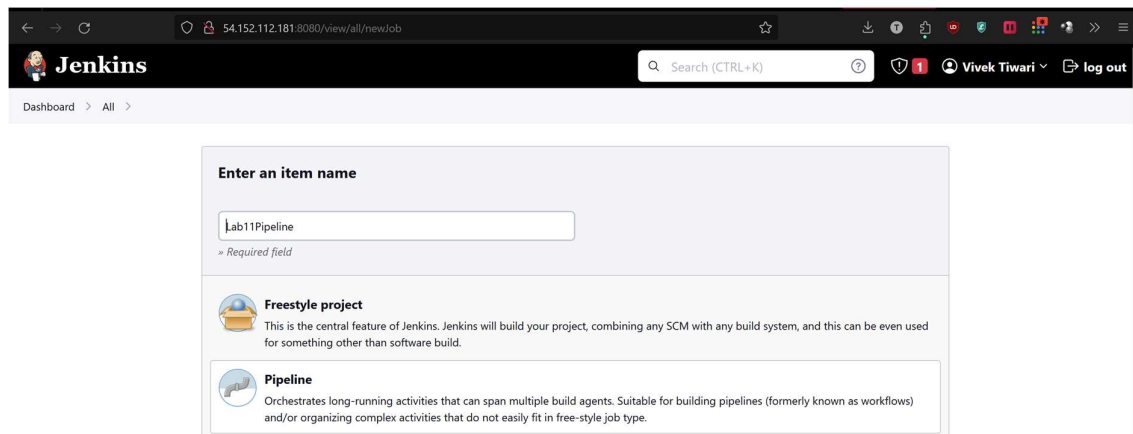**Class:** F.Y.MCA   **Semester: I**   **Subject:** Software Engineering   **Course Code:** MC503

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Make sure to copy your Jenkins URL on the next step after saving the user details.
22. Once done, you'll be greeted with the following message.

Now Jenkins is ready to use:

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23. Click on new item:
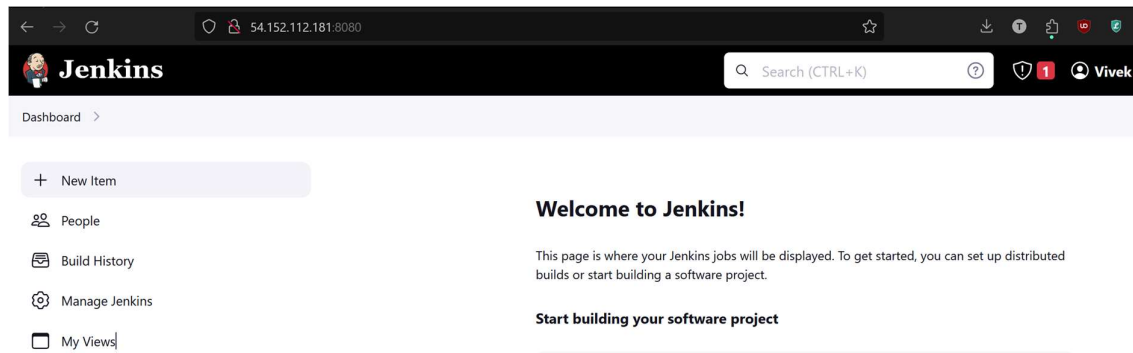
24. Now enter any suitable name for your pipeline and select the pipeline options from below:

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25. On the next page, scroll down to Pipeline, and select 'hello world' from the top right drop
    down menu.

26. After saving it, go back to your dashboard and schedule a build:

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27. Now you can check if your pipeline is functional or not: