Don Bosco Institute of Technology(DBIT), Mumbai

Department of Information Technology


LAB JOURNAL

On

**I.T/T.E/Sem V/ITL503 : DevOps Lab**

By

**54 Jasmit Rathod**

Academic Year : Nov,2022

# INDEX

## EXPERIMENT A - Self Study

## Date of Experiment: 11/07/2022

### Prerequisite:
C, Python, Java, Software Engineering, Cloud

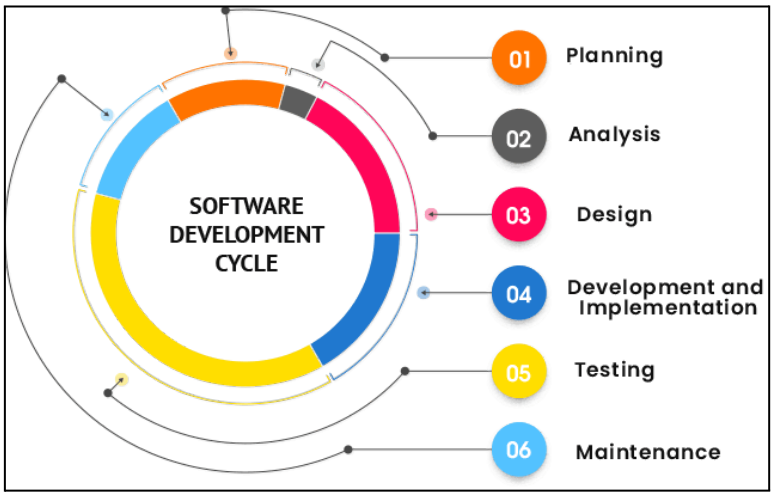
### Objective:
To make students understand DevOps, for what? Why? and by whom?

### Aim:
To do self-study on basics understanding of DevOps

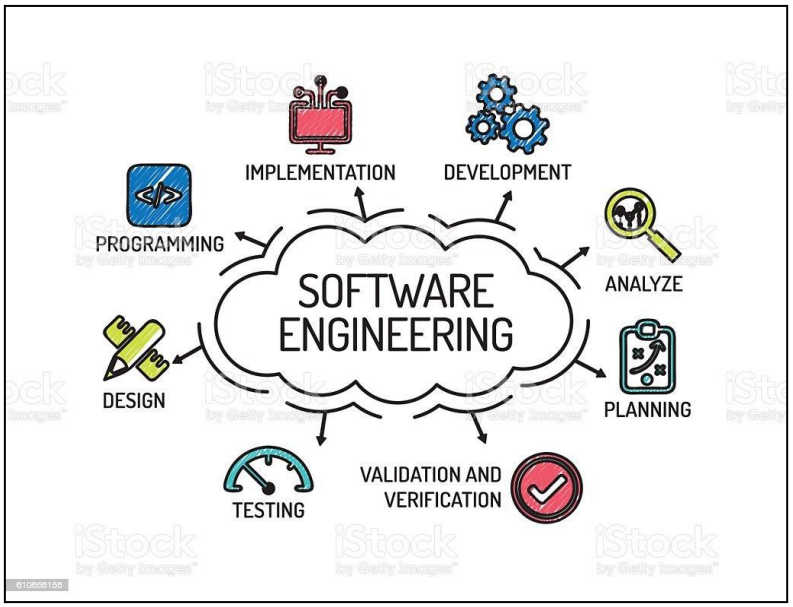
### Procedure:
Individual students will perform this self-study over internet resources and will submit a report on their study and give a viva voce on or before 18/07/2022, and they will be graded based on rubrics.

### The topics for self-study are :

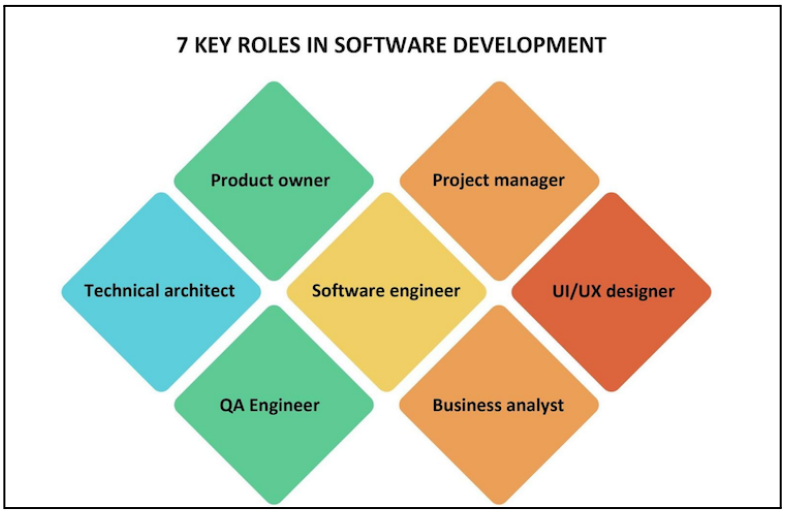
1. Development of Software



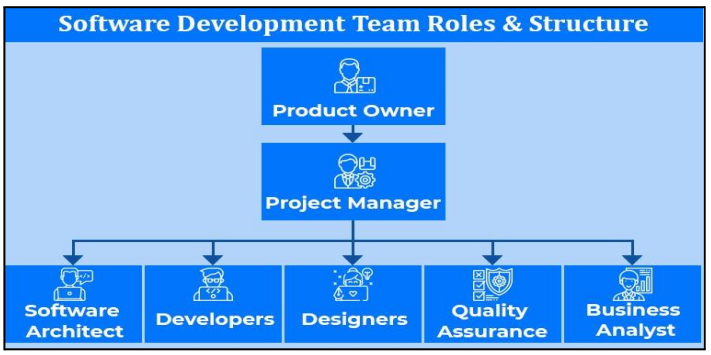
2. Software Engineering

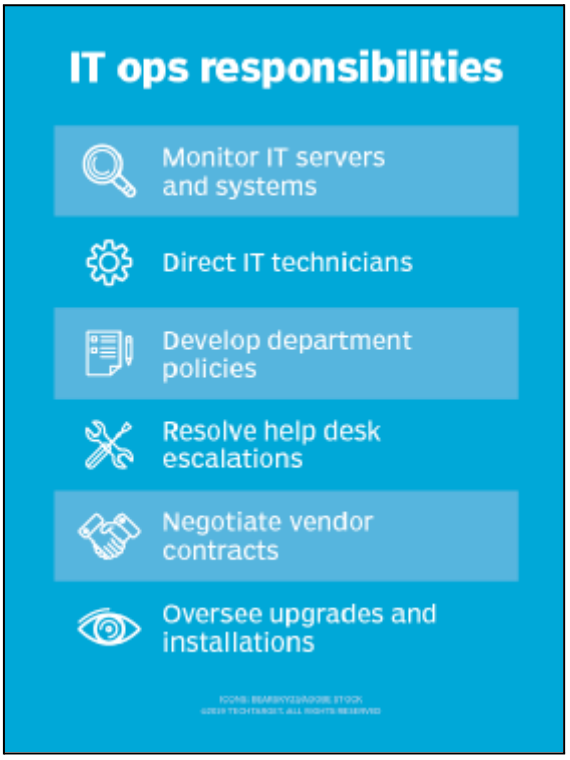



3. Development team




4. Operation team





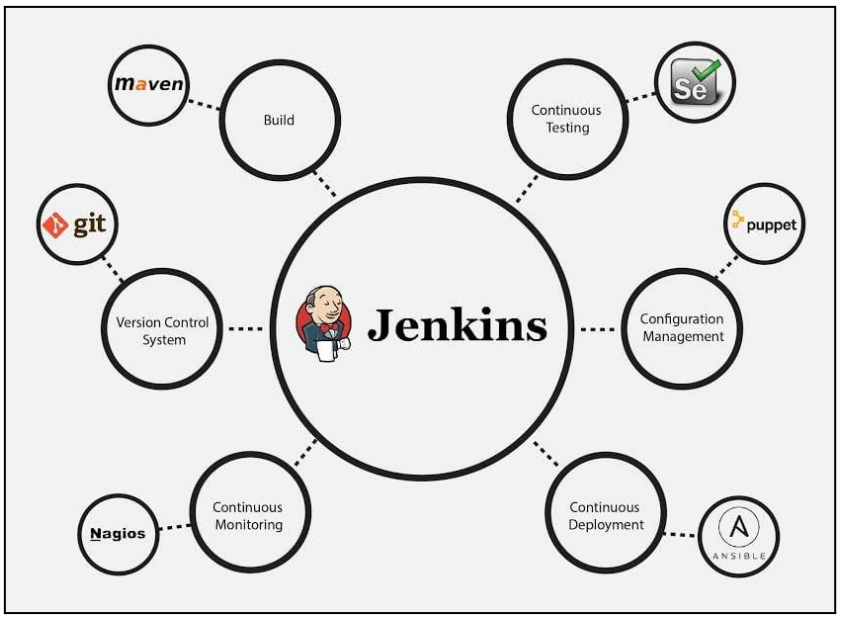

5. Operations Step

6. GitHub


7. Jenkins

Jenkins is an open source automation server. It helps automate the parts of software development related to building, testing, and deploying, facilitating continuous integration and continuous delivery.

It is a server-based system that runs in servlet containers such as Apache Tomcat.



8. Docker

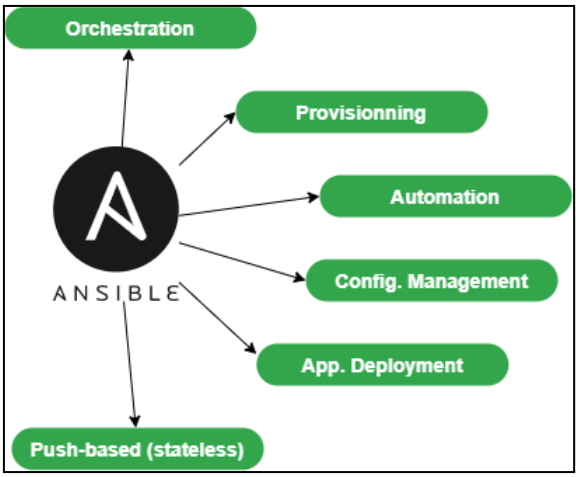
Docker is an open platform for developing, shipping, and running applications.

Docker enables you to separate your applications from your infrastructure so you can deliver software quickly. With Docker, you can manage your infrastructure in the same ways you manage your applications.

Features of Docker:

- Faster and easier configuration.
- Application isolation.
- Increase in productivity.
- Security Management.

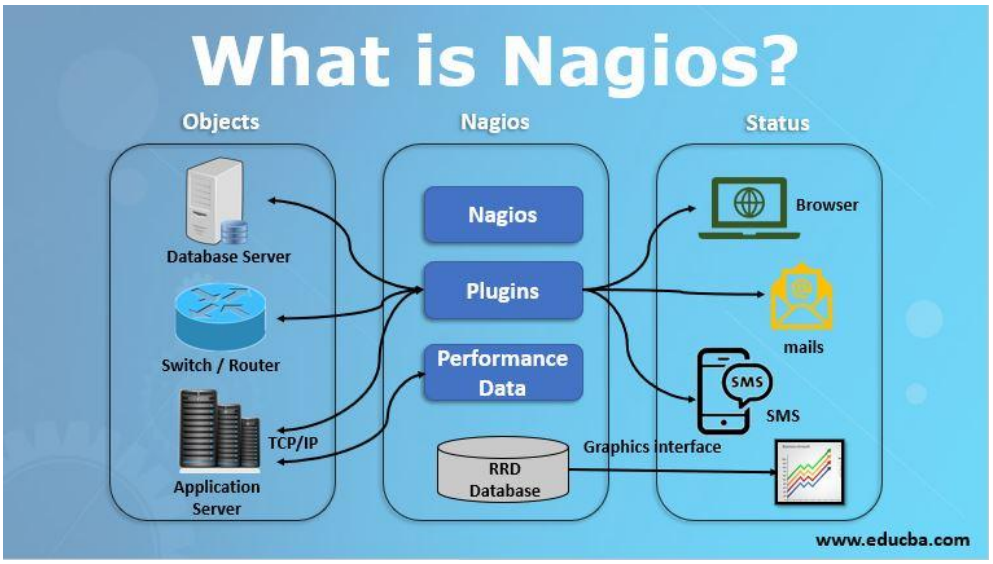
9. Ansible




Features:

- Open source
- Simple
- Versatile
- Powerful
- Agentless

10. NegiOs




Nagios is available as open-source software, and it is used to monitor computer systems. It can be executed on a Linux operating system to screen the devices which are executed on Windows, Unix, and Linux operating systems.

**Conclusion**: Thus, study was done and to come up with a set of question & answers that can help one to clear or understand basics understanding of DevOps.

## References:

What is Nagios? | Uses,Importance and Architecture of Nagios

Ansible tutorial | what is ansible? | advantages of ansible - tutorialsinhand.com

8 steps to developing an Ansible role in Linux | Enable Sysadmin..

What is Jenkins? | Jenkins For Continuous Integration | Edureka

What is GitHub - javatpoint

# EXPERIMENT B

## Case Study - “Github”

## Date of Experiment: 25/07/2022

### Aim :

To identify and analyze the latest open source DevOps tools in the market

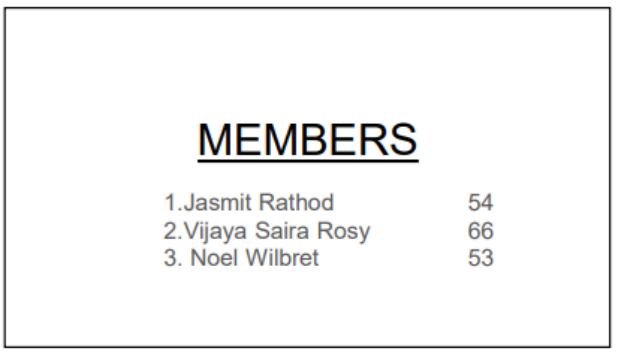
### Procedure :

A group of 3 members will perform case study over internet resources with the help of research papers by answering the questions What, Why, Where and How.

### Our team members are :

Jasmit Rathod
Rosy
Noel Wilbret

### Presentation:

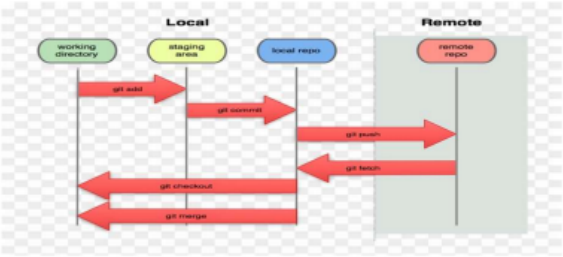
## What is Github?

1. GitHub was founded by **Tom Preston-Werner** and was launched in **April 2008**.
2. It is an Internet hosting service for software development and version control using Git.
3. It provides the distributed version control of Git plus access control, bug tracking, software feature requests, task management, continuous integration for every project.
4. It is commonly used to host open source software development projects.

## Why Github?

1. GitHub is a code hosting platform for version control and collaboration.
2. A community of over 30 million people helps you on your project and issues.
3. It is helpful for recruitment.
4. It also acts as a Social Network platform , different users can follow other user's profile and keep a track of their activities.

## How GitHub works?




## How GitHub works?


## References

1. https://ieeexplore.ieee.org/abstract/document/7887704
2. https://www.toolsqa.com/git/github/
3. https://en.wikipedia.org/wiki/GitHub

## Experiment 1: Version Control using Git
## Date of the Experiment: 01/08/2022

### Objective:
Is to experience version controlling using GITHUB by answering basic questions like what is Git, GitHub, Clone Repository, Forking and branching

### Aim:
Is to use, analyse and experience all version control commands of GIT tool and GitHub Service.

### Procedure / Steps to perform the Experiment:
1. Download and install Git tool
2. Create / Use GitHub Account with some directories/Repositories
3. Perform all the below mention commands of Git Local Repository and GitHub Service to reflect upon the version control.
    a. Create and fork repositories in GitHub
    b. Apply branching, merging and rebasing concepts.
    c. Implement different Git workflow strategies in real-time scenarios

Git is a free and open-source distributed version control system designed to handle everything from small to very large projects with speed and efficiency. Git is easy to learn and has a tiny footprint with lightning-fast performance. It outclasses SCM tools like Subversion, CVS, Perforce, and ClearCase with features like cheap local branching, convenient staging areas, and multiple workflows.

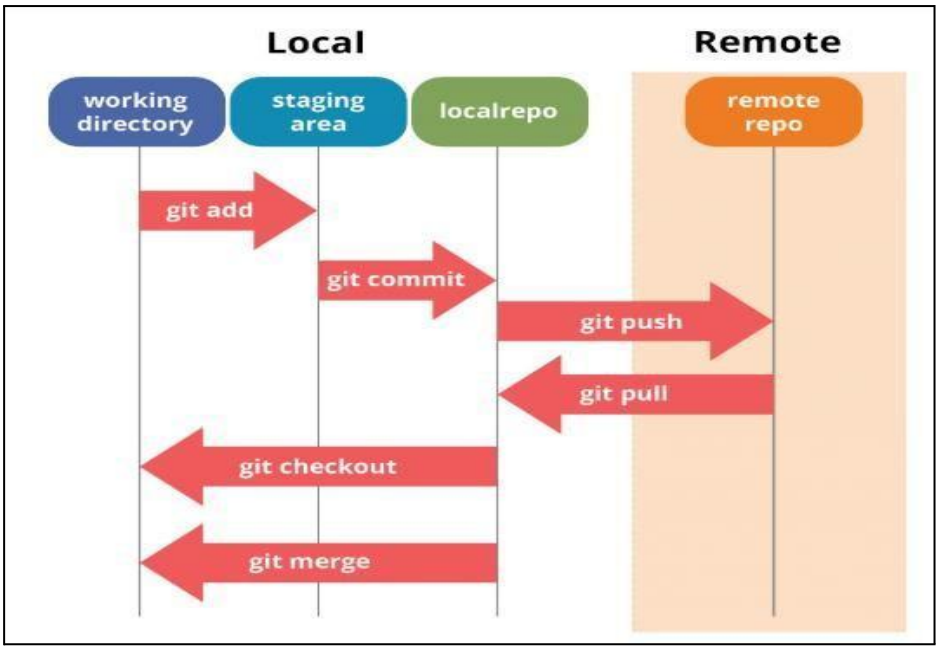
Some of the basic operations in Git are:

1. Initialize
2. Add
3. Commit
4. Pull
5. Push

Some advanced Git operations are:

1. Branching
2. Merging
3. Rebasing

The following diagram depict the all-supported operations in GIT




## Commands:

a. Basic Commands:

sudo apt-get install git
git –version
git init

//configuration details

git config --global user.name "sunanthag1998"
git config --global user.email "sunanthag1998@gmail.com"
git config –list

b. Staging Commands

git add .
git commit -m "v1 of file 1"

c. Push and pull the repository from and to GitHub

- Go to GitHub ->User accounts-> setting -> developers portal ->generate token
- And choose the duration for it validity to exchange the repo between Git & GitHub and use the token in the below command to set the authentication for push and pull.

git remote add origin https://github.com/sunanthag1998/test4.git //directing to the repository
git clone "https://github.com/sunanthag1998/test4.git // cloning remote repository to local

git remote set-url origin
http://sunanthag1998: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@github.com
/sunanthag1998/test4.git

(Syntax: git remote set-url origin https://userid:password@github.com/user/repo.git)

git add –all
git commit -m “v1” //Try to commit and then push or pull
git branch -u origin main  // branch a copy from main to reflect changes on the branch
git push -u origin main  // push from git to github
git pull -u origin main  //pull form github to git

d: Fork , Branch & Merge Commands

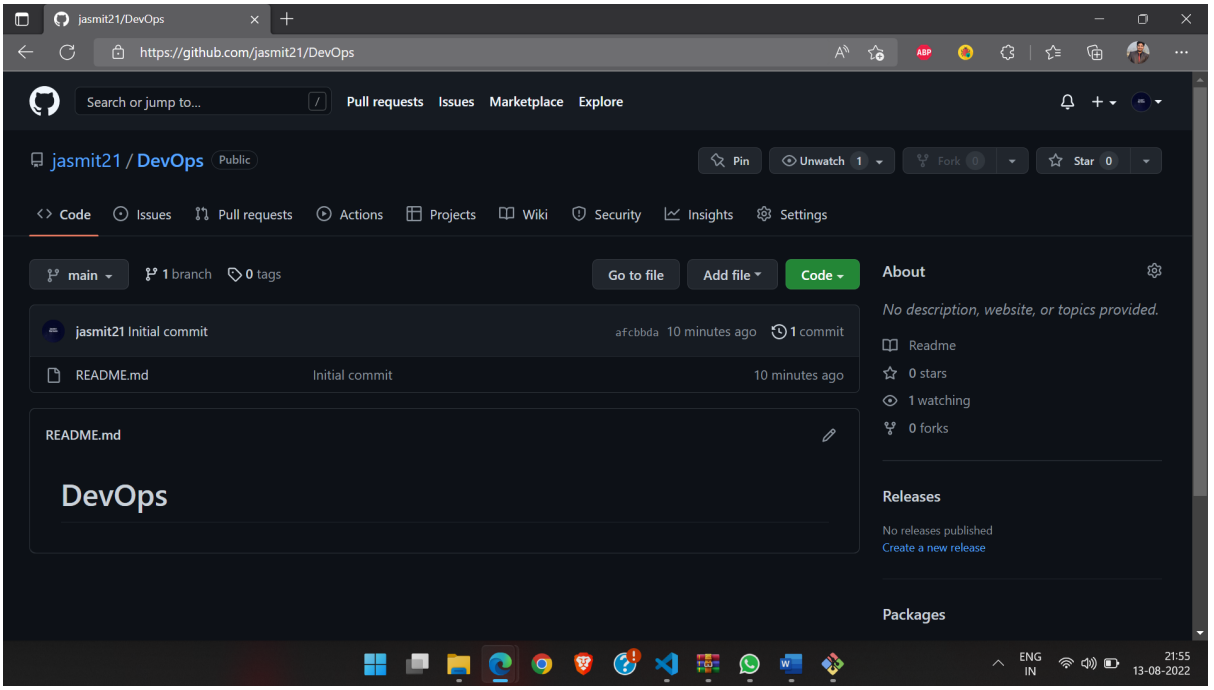
*next lab*

If you have existing repository, then simply delete .git file and reinitialize it.

*$ rm -rf .git/*

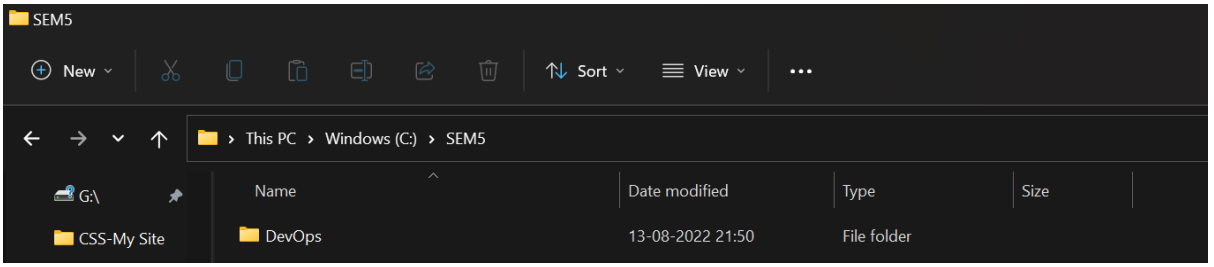
## Output:

- **Create a Github repository:**



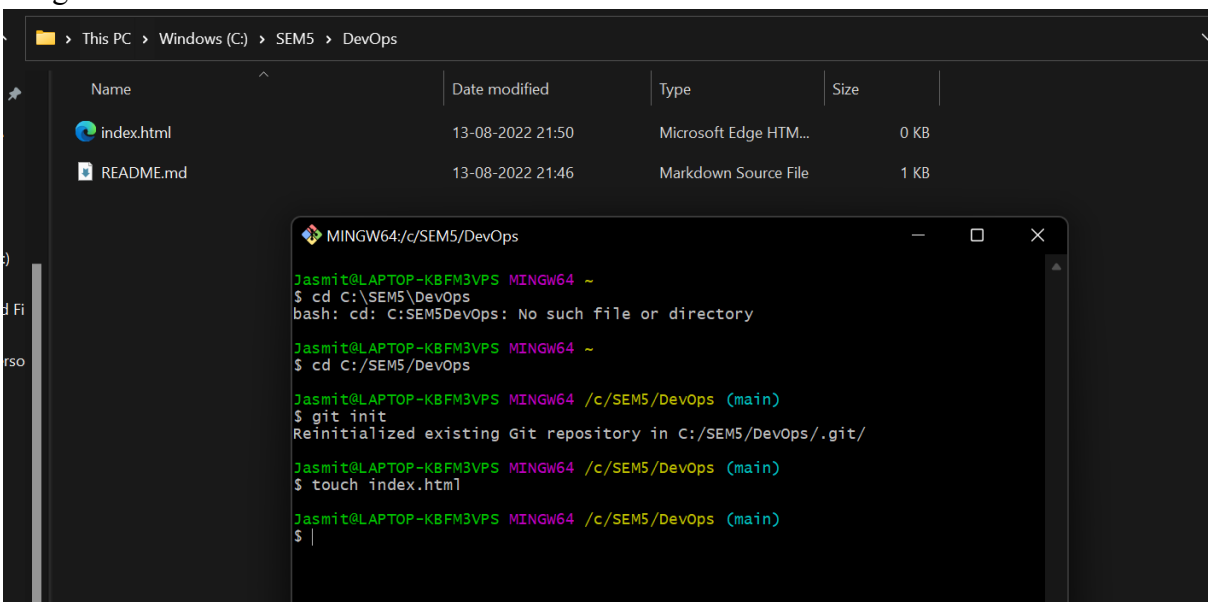
- **Clone the repository:**

  Run the command in terminal: **git clone repo-link**, this will create a copy of the repo locally in our pc


- **Open gitbash into the project folder (DevOps folder in my case):**

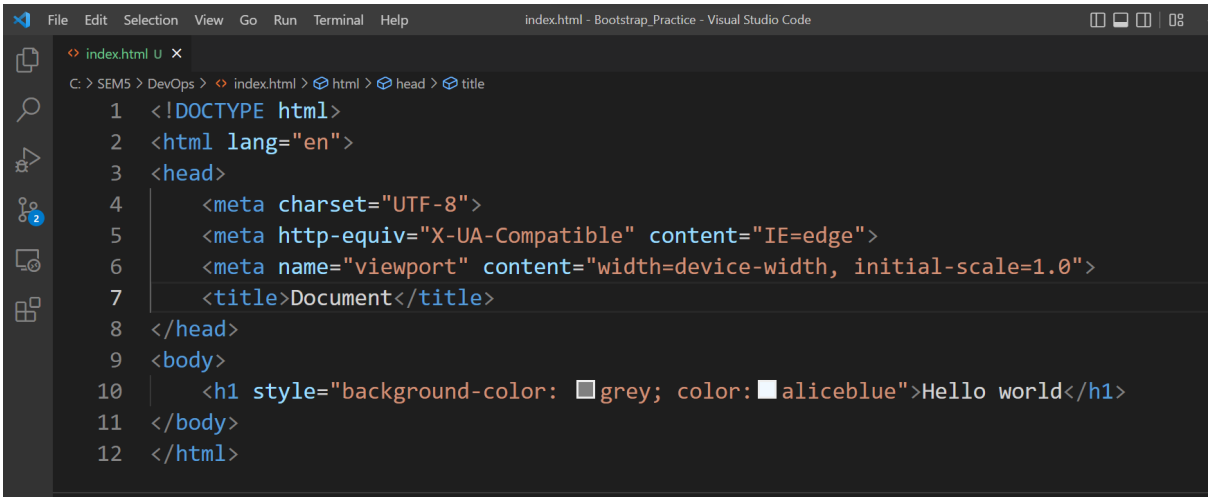
  Run command: **git init**, this will create a .git file and then create a file index.html using the command: **touch index.html**



- **Configure the git :**

```
MINGW64:/c/SEM5/DevOps

Jasmit@LAPTOP-KBFM3VPS MINGW64 /c/SEM5/DevOps (main)
$ git config --global user.name "jasmit21"

Jasmit@LAPTOP-KBFM3VPS MINGW64 /c/SEM5/DevOps (main)
$ git config --global user.email "jasmitrathod21@gmail.com"

Jasmit@LAPTOP-KBFM3VPS MINGW64 /c/SEM5/DevOps (main)
$
```

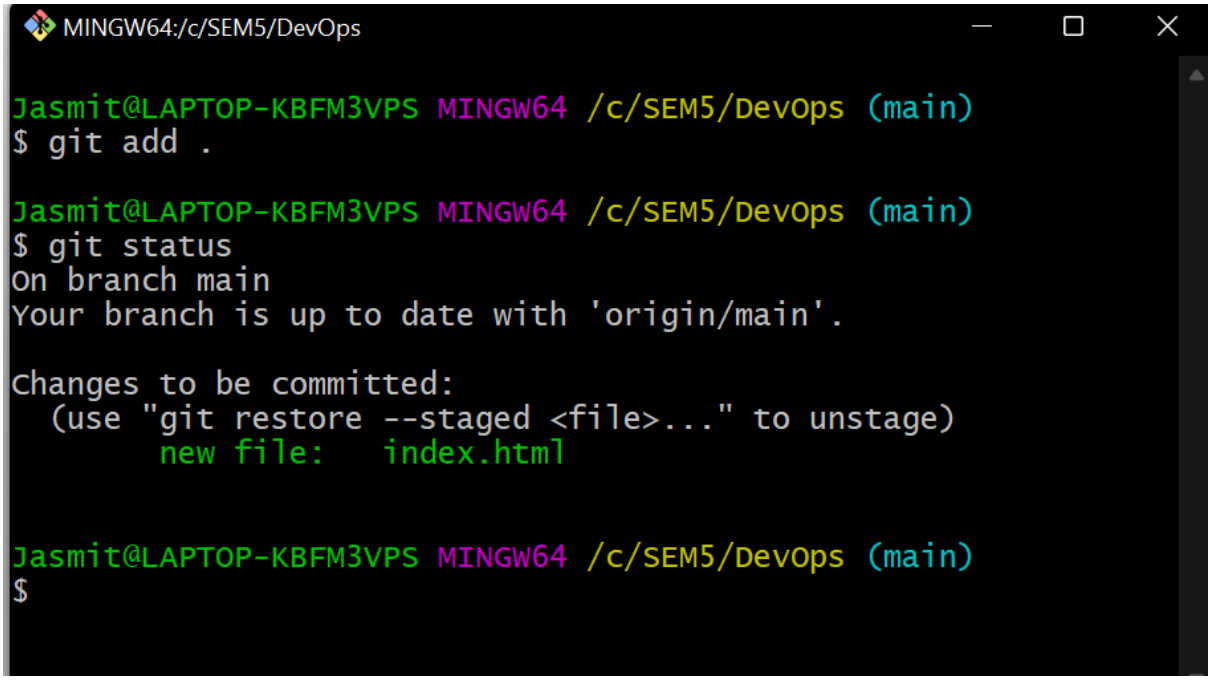
- **Edit the file:**




- **Check the status of the file:**

```
Jasmit@LAPTOP-KBFM3VPS MINGW64 /c/SEM5/DevOps (main)
$ git status
On branch main
Your branch is up to date with 'origin/main'.

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

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

Jasmit@LAPTOP-KBFM3VPS MINGW64 /c/SEM5/DevOps (main)
$
```

- **Bringing the untracked file to staging area:**




- **Commit the file in staging area:**

- **Check the commit history using “git log”:**

```
$ git add .

Jasmit@LAPTOP-KBFM3VPS MINGW64 /c/SEM5/DevOps (main)
$ git log
commit e652ce914f2e49f5edc0df538e2c3a13b0361447 (HEAD -> main)
Author: jasmit21 <jasmitrathod21@gmail.com>
Date:   Sat Aug 13 22:12:06 2022 +0530

    initial commit

commit afcbbdad846a529a0bb62ec68cef6f94ac283127 (origin/main,
origin/HEAD)
Author: Jasmit Rathod <89774786+jasmit21@users.noreply.github.
com>
Date:   Sat Aug 13 21:44:48 2022 +0530

    Initial commit

Jasmit@LAPTOP-KBFM3VPS MINGW64 /c/SEM5/DevOps (main)
$
```

- **Connect the github repo with the local folder:**

```
MINGW64:/c/SEM5/DevOps

Jasmit@LAPTOP-KBFM3VPS MINGW64 /c/SEM5/DevOps (main)
$ git remote add ORIGIN https://github.com/jasmit21/DevOps

Jasmit@LAPTOP-KBFM3VPS MINGW64 /c/SEM5/DevOps (main)
$
```

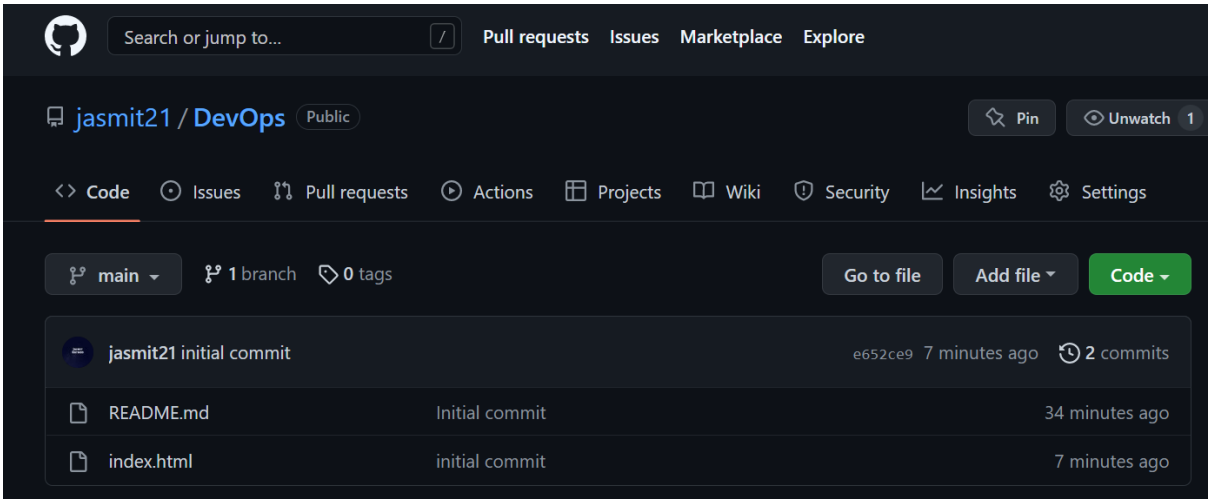
- **Run git remote -v to check the repo link:**

```
Jasmit@LAPTOP-KBFM3VPS MINGW64 /c/SEM5/DevOps (main)
$ git remote -v
ORIGIN  https://github.com/jasmit21/DevOps (fetch)
ORIGIN  https://github.com/jasmit21/DevOps (push)
```

- **Push the file into github**

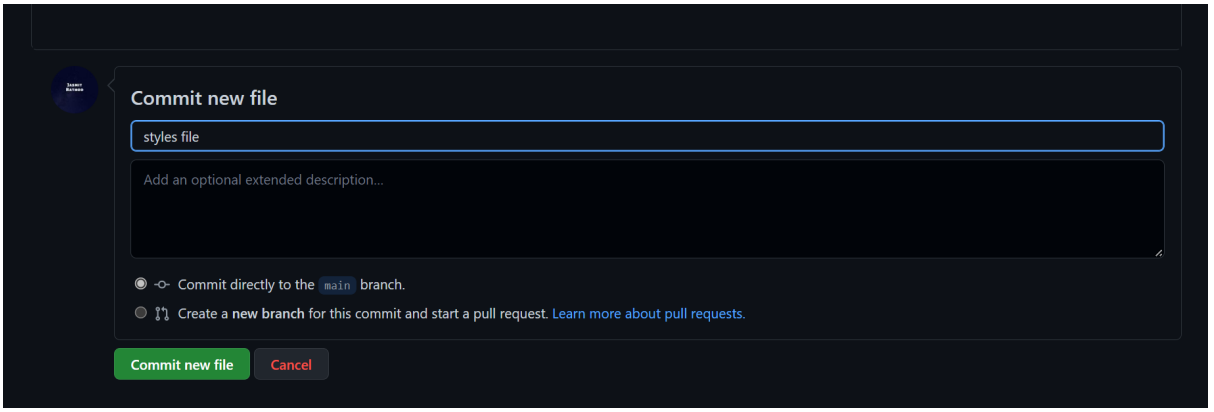
```
MINGW64:/c/SEM5/DevOps

Jasmit@LAPTOP-KBFM3VPS MINGW64 /c/SEM5/DevOps (main)
$ git push origin
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 8 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 499 bytes | 249.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0)
To https://github.com/jasmit21/DevOps.git
   afcbbda..e652ce9  main -> main

Jasmit@LAPTOP-KBFM3VPS MINGW64 /c/SEM5/DevOps (main)
$
```

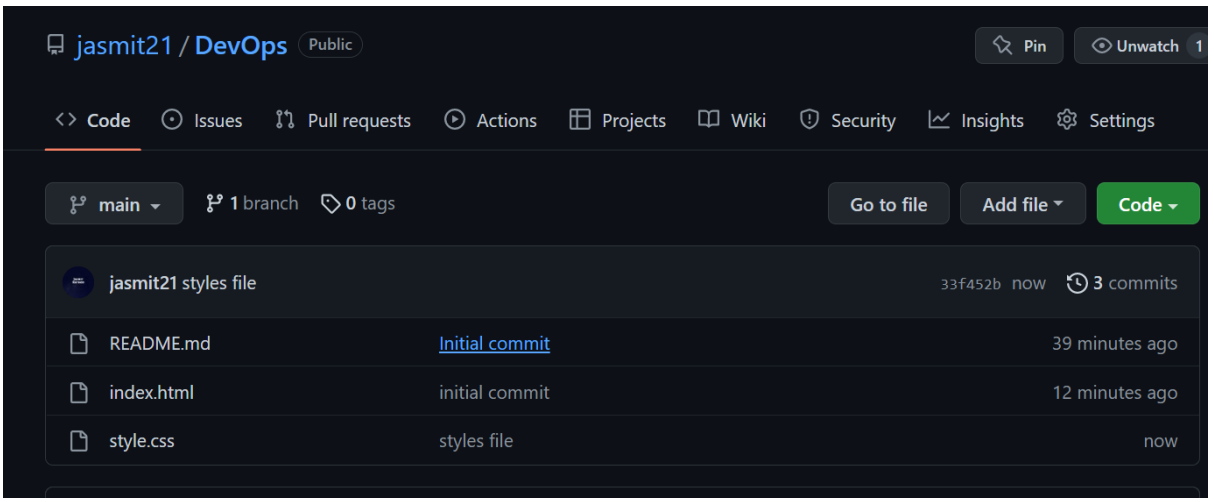
The file index.html is successfully pushed into github repo



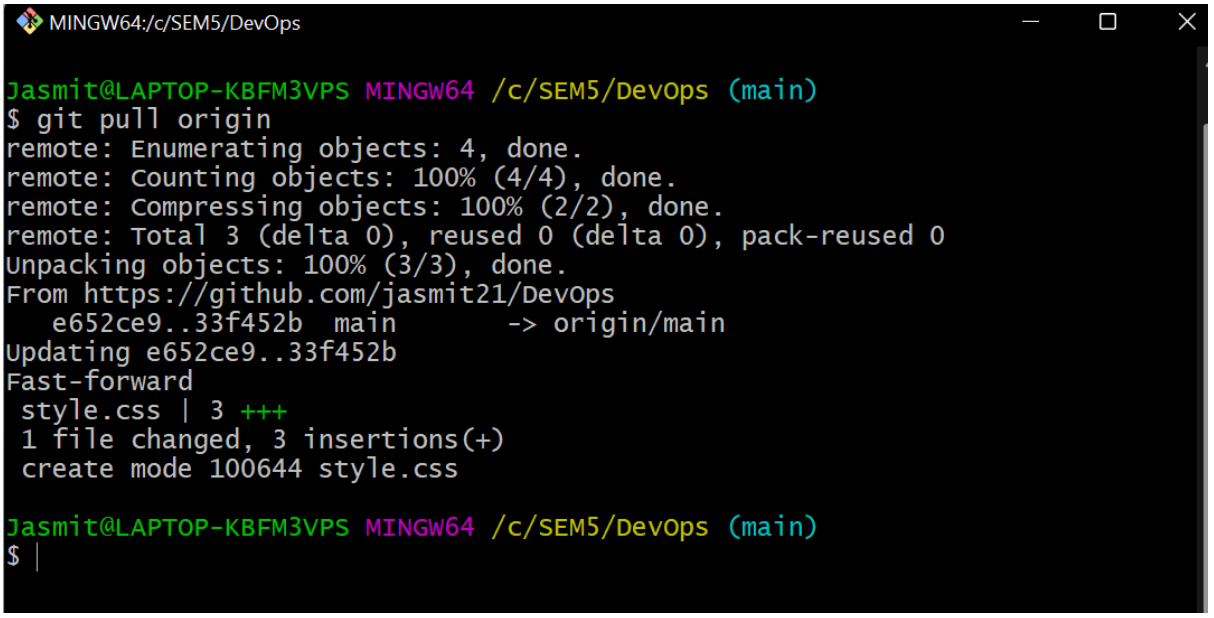

- **Pull the file from github repo:**

To use pull command , firstly create a file in github (styles.css in my case)

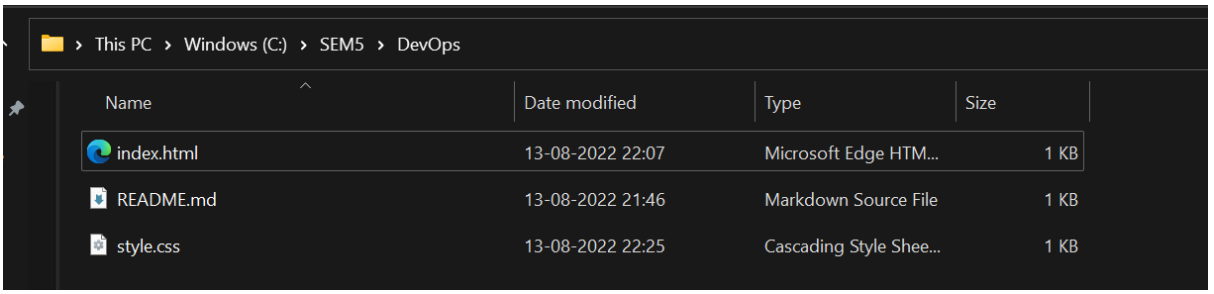


Now run command : **git pull origin**



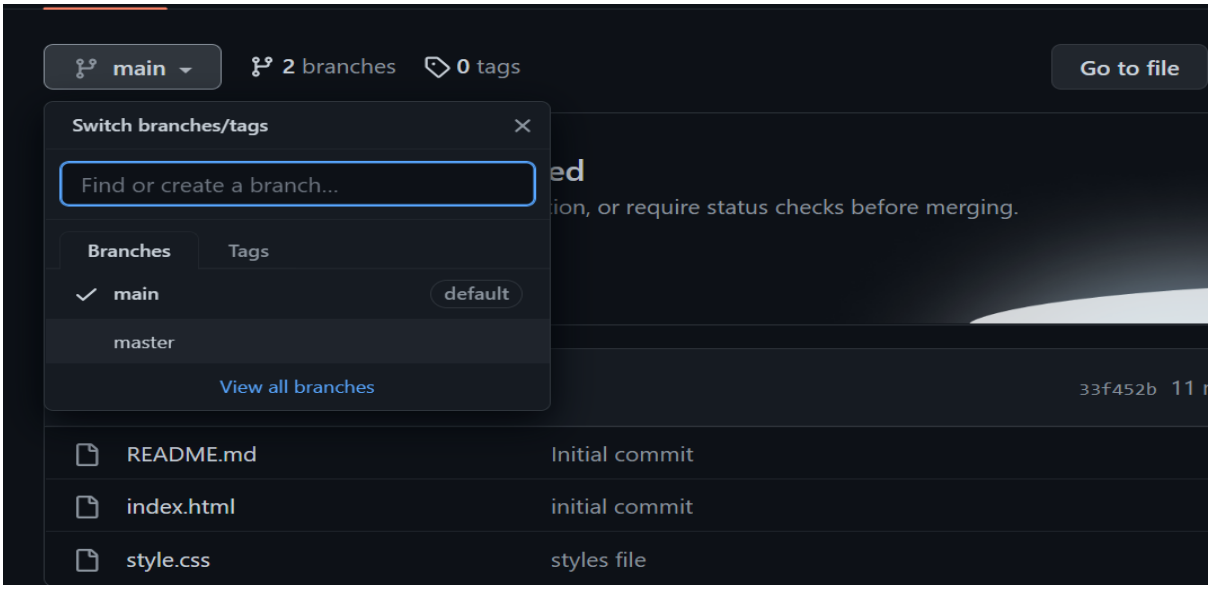

Checking for styles.css in local folder …




Styles.css pulled successfully.

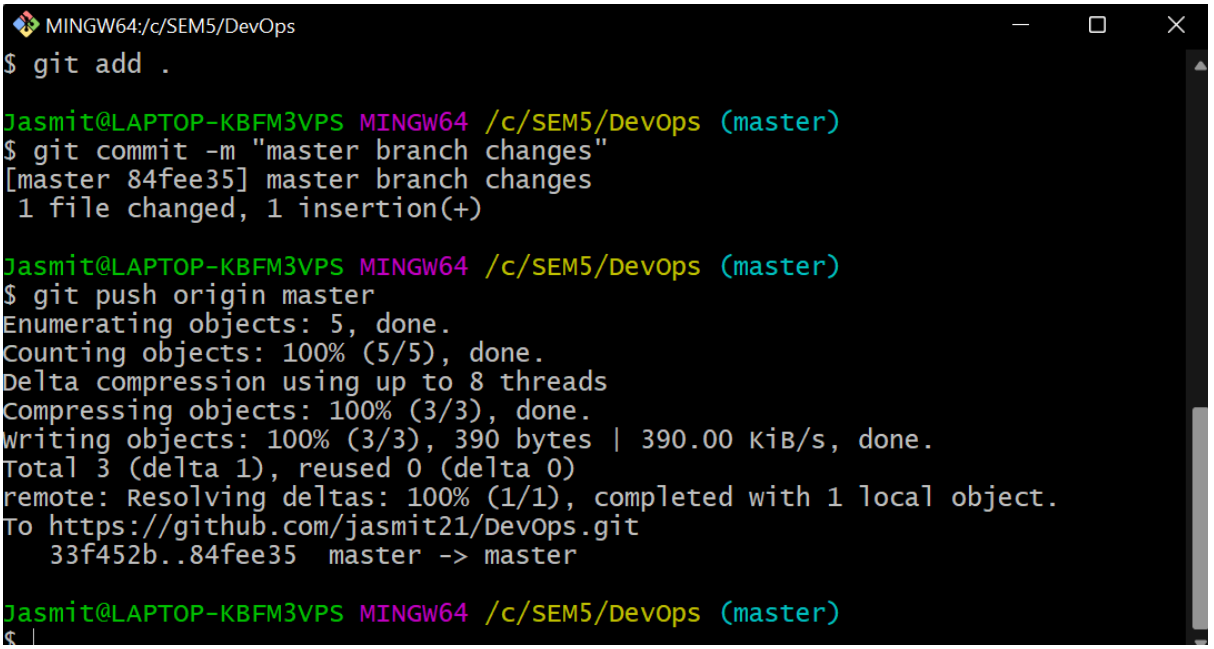
- **Create a branch**

Check in github



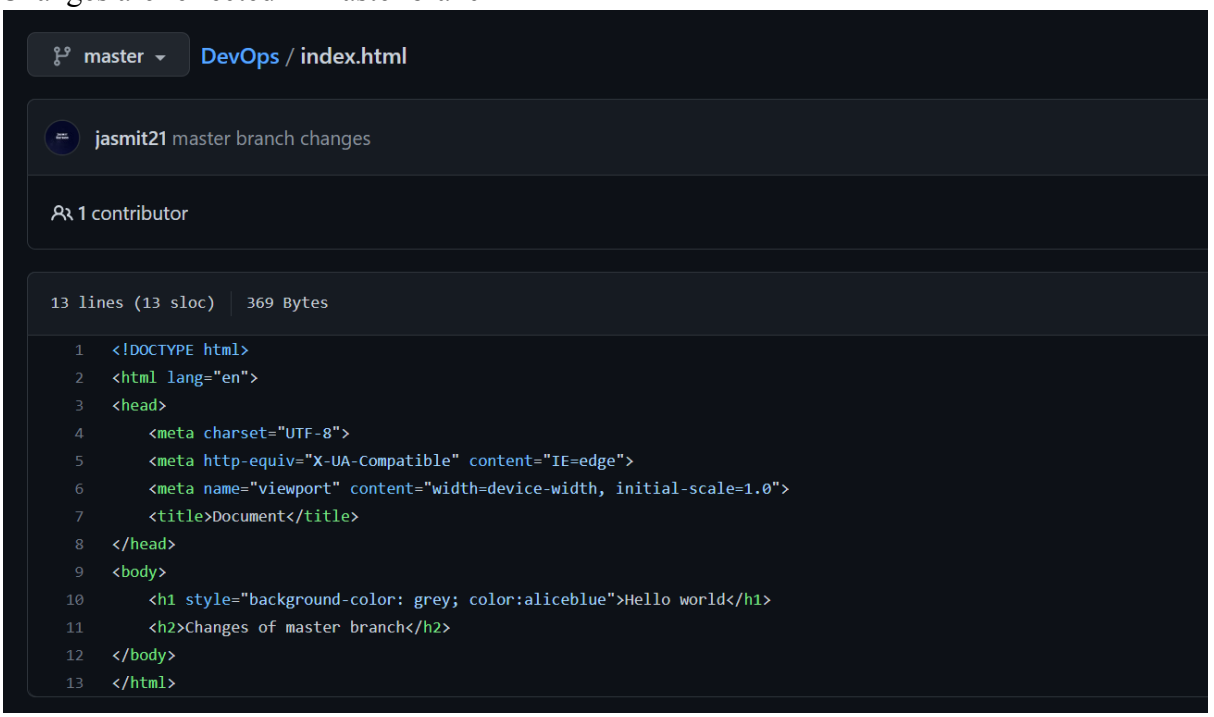

- **Make changes in index.html while in master branch:**

  Make changes in the file and then perform add , commit and push command in master branch

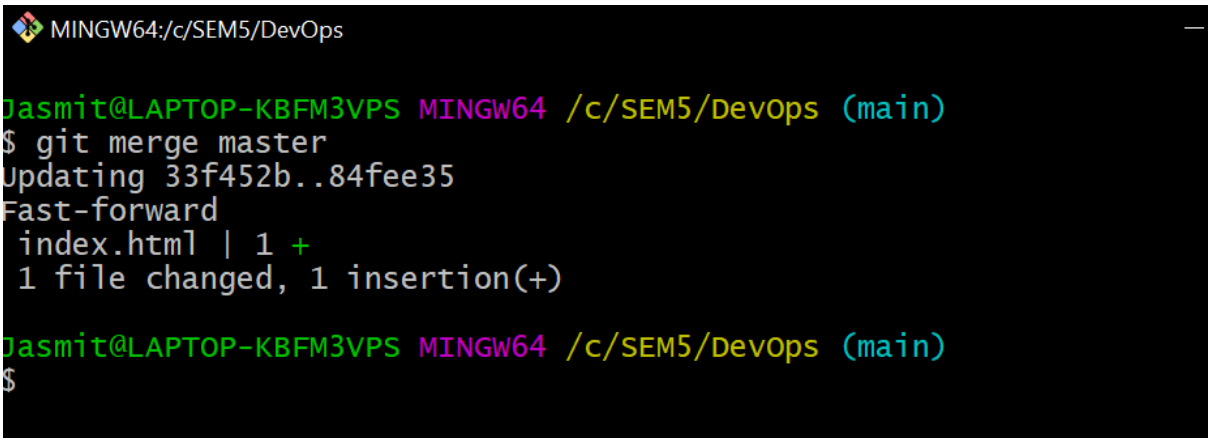


Check master branch in github

Changes are reflected in master branch




- **Merging branches**



Checking in GitHub.

Now the changes of the master branch are reflecting in the main branch .Hence merging is successful.


**Conclusion:**

Thus, the basic commands to access the GitHub version control were performed successfully.

# EXPERIMENT 2

## Jenkins

## Date of Experiment: 12/09/2022

### Output:

Add the repository key to the system:

```
jasmit21@jasmit21:~$ wget -q -O - https://pkg.jenkins.io/debian-stable/jenkins.io.key |sudo gpg --dea
rmor -o /usr/share/keyrings/jenkins.gpg
```

Next, let's append the Debian package repository address to the server's sources.list

```
jasmit21@jasmit21:~$ sudo sh -c 'echo deb [signed-by=/usr/share/keyrings/jenkins.gpg] http://pkg
.jenkins.io/debian-stable binary/ > /etc/apt/sources.list.d/jenkins.list'
```

After both commands have been entered, we'll run an update so that apt will use the new repository.

```
jasmit21@jasmit21:~$ sudo apt update
Hit:2 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Ign:1 https://pkg.jenkins.io/debian-stable binary/ InRelease
Get:3 https://pkg.jenkins.io/debian-stable binary/ Release [2,044 B]

Get:4 https://pkg.jenkins.io/debian-stable binary/ Release.gpg [833 B]
Hit:5 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease
Get:6 https://pkg.jenkins.io/debian-stable binary/ Packages [23.2 kB]
Hit:7 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease

Hit:8 http://security.ubuntu.com/ubuntu jammy-security InRelease
Fetched 26.1 kB in 1s (28.1 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
3 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

Finally, we'll install Jenkins and its dependencies.

```
jasmit21@jasmit21:~$ sudo apt install jenkins
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  chromium-codecs-ffmpeg-extra gstreamer1.0-vaapi i965-va-driver intel-media-va-driver libaacs0
  libaom3 libass9 libavcodec58 libavformat58 libavutil56 libbdplus0 libblas3 libbluray2 libbs2b0
  libchromaprint1 libcodec2-1.0 libdav1d5 libflite1 libgme0 libgsm1 libgstreamer-plugins-bad1.0-
0
  libigdgmm12 liblilv-0-0 libmfx1 libmysofa1 libnorm1 libopenmpt0 libpgm-5.3-0 libpostproc55
  librabbitmq4 librubberband2 libserd-0-0 libshine3 libsnappy1v5 libsord-0-0 libsratom-0-0
  libsrt1.4-gnutls libssh-gcrypt-4 libswresample3 libswscale5 libudfread0 libva-drm2 libva-wayla
nd2
  libva-x11-2 libva2 libvdpau1 libvidstab1.1 libx265-199 libxvidcore4 libzimg2 libzmq5
  libzvbi-common libzvbi0 mesa-va-drivers mesa-vdpau-drivers pocketsphinx-en-us va-driver-all
  vdpau-driver-all
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  net-tools
The following NEW packages will be installed:
  jenkins net-tools
```

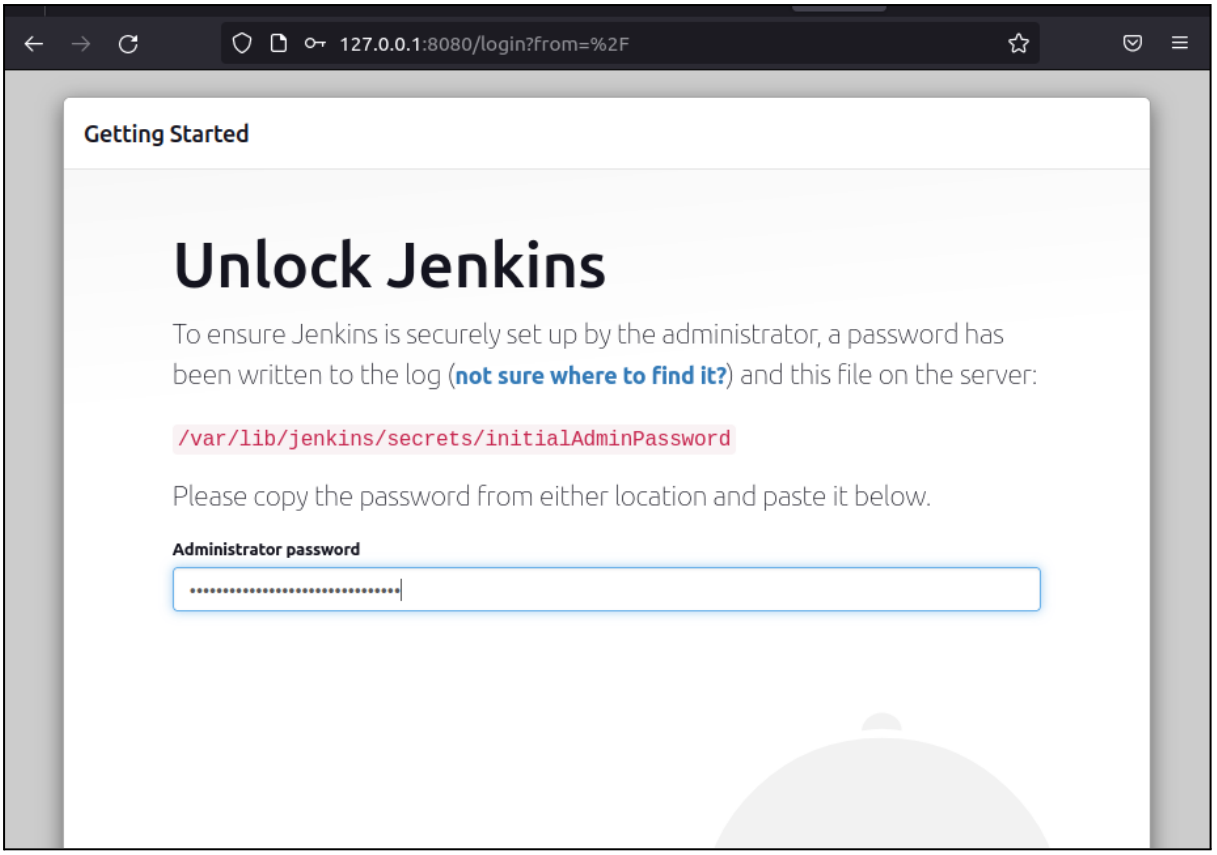
## Step 2 — Starting Jenkins

Let's start Jenkins by using systemctl

```
jasmit21@jasmit21:~$ sudo systemctl start jenkins.service
[sudo] password for jasmit21:
jasmit21@jasmit21:~$ 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 Thu 2022-10-27 20:50:38 IST; 22min ago
   Main PID: 43709 (java)
      Tasks: 49 (limit: 9175)
     Memory: 1.1G
        CPU: 1min 10.484s
     CGroup: /system.slice/jenkins.service
             └─43709 /usr/bin/java -Djava.awt.headless=true -jar /usr/share/java/jenkins.war --webro>

Oct 27 20:49:50 jasmit21 jenkins[43709]: This may also be found at: /var/lib/jenkins/secrets/initial>
Oct 27 20:49:50 jasmit21 jenkins[43709]: *************************************************************>
Oct 27 20:49:50 jasmit21 jenkins[43709]: *************************************************************>
Oct 27 20:49:50 jasmit21 jenkins[43709]: *************************************************************>
Oct 27 20:50:36 jasmit21 jenkins[43709]: 2022-10-27 15:20:36.010+0000 [id=60]        INFO        h.m>
Oct 27 20:50:36 jasmit21 jenkins[43709]: 2022-10-27 15:20:36.012+0000 [id=60]        INFO        hud>
Oct 27 20:50:36 jasmit21 jenkins[43709]: 2022-10-27 15:20:36.014+0000 [id=60]        INFO        hud>
Oct 27 20:50:38 jasmit21 jenkins[43709]: 2022-10-27 15:20:38.377+0000 [id=35]        INFO        jen>
Oct 27 20:50:38 jasmit21 jenkins[43709]: 2022-10-27 15:20:38.394+0000 [id=24]        INFO        hud>
Oct 27 20:50:38 jasmit21 systemd[1]: Started Jenkins Continuous Integration Server.
lines 1-20/20 (END)
```

Step 3 — Setting Up Jenkins

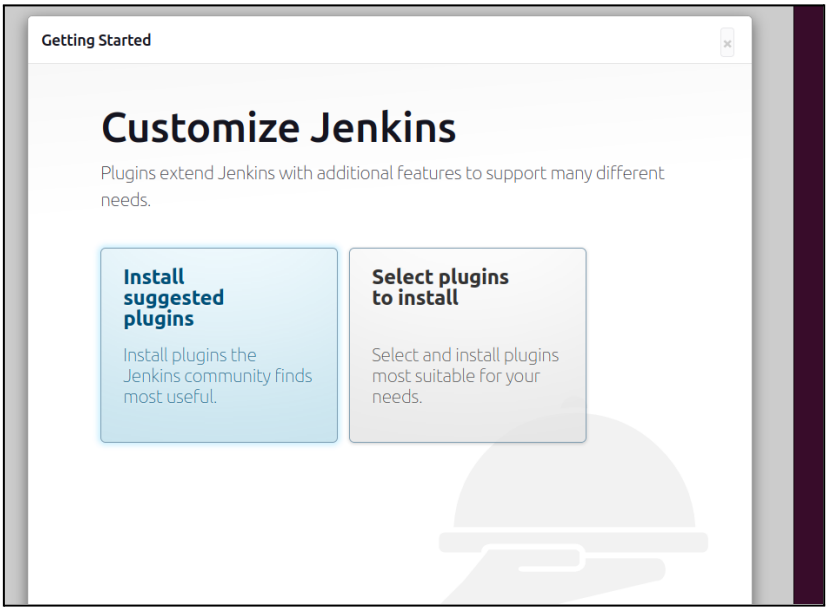
To set up your installation, visit Jenkins on its default port, 8080, using your server domain name or IP address: http://127.0.01:8080/



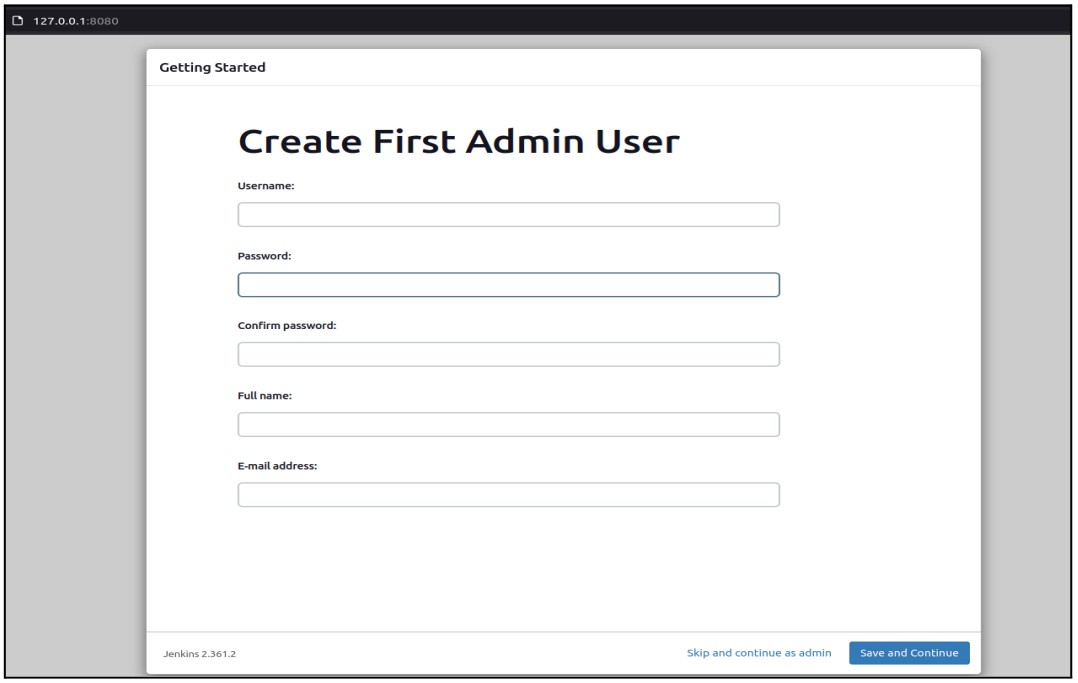

In the terminal window, use the cat command to display the password

```
jasmit21@jasmit21:~$ sudo cat /var/lib/jenkins/secrets/initialAdminPassword
3efbfd73078d403fa7aeaa3fcea9297b
jasmit21@jasmit21:~$
```

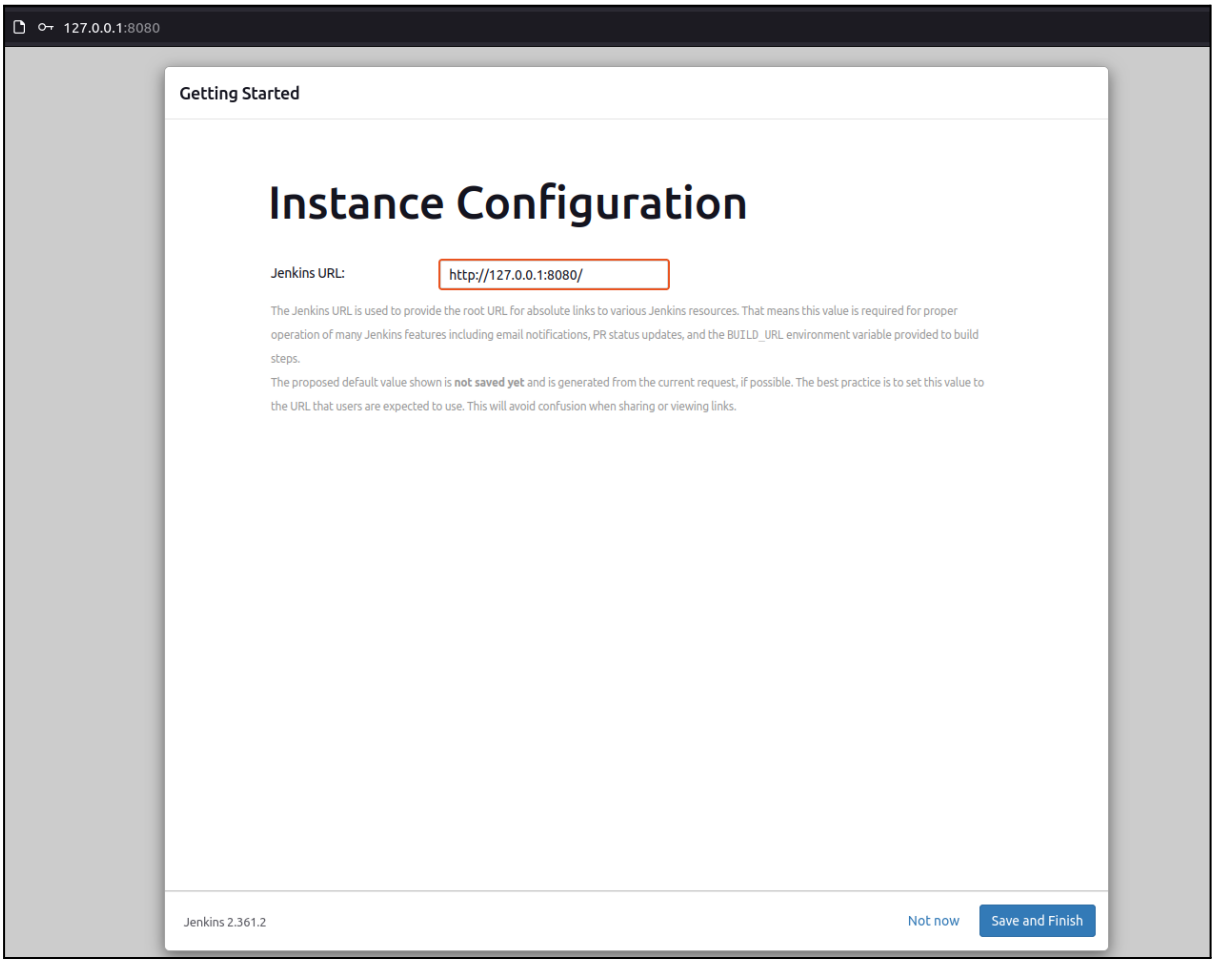
The next screen presents the option of installing suggested plugins



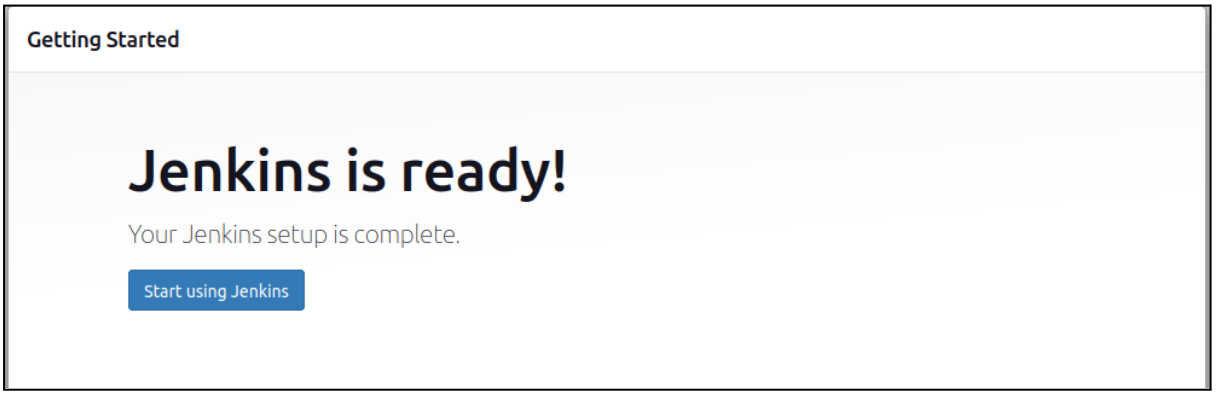

Enter the name and password for your user



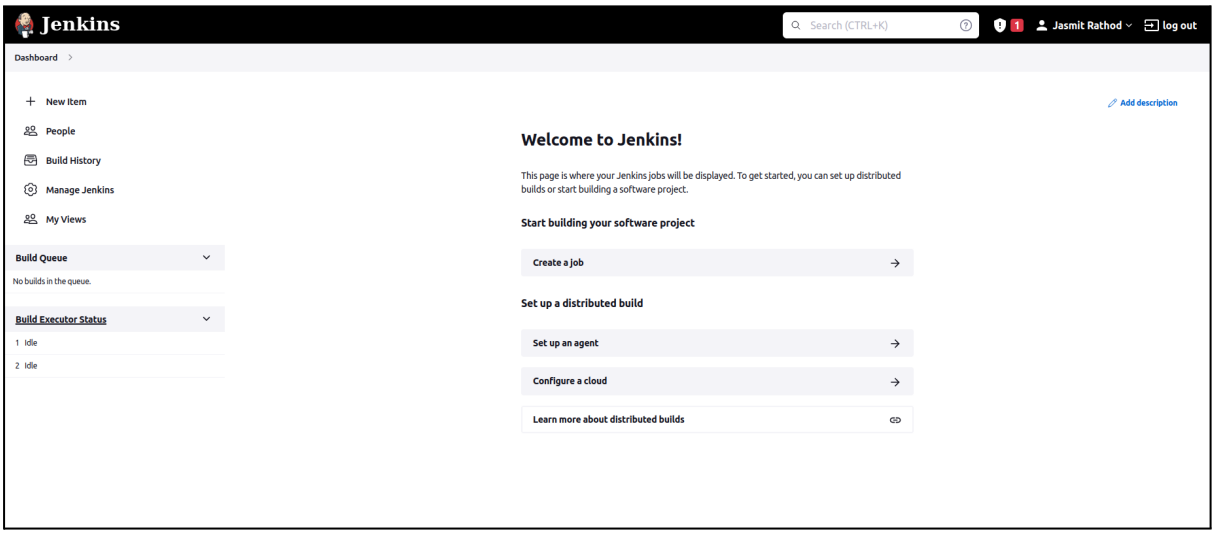
You'll receive an Instance Configuration page that will ask you to confirm the preferred URL for your Jenkins instance.



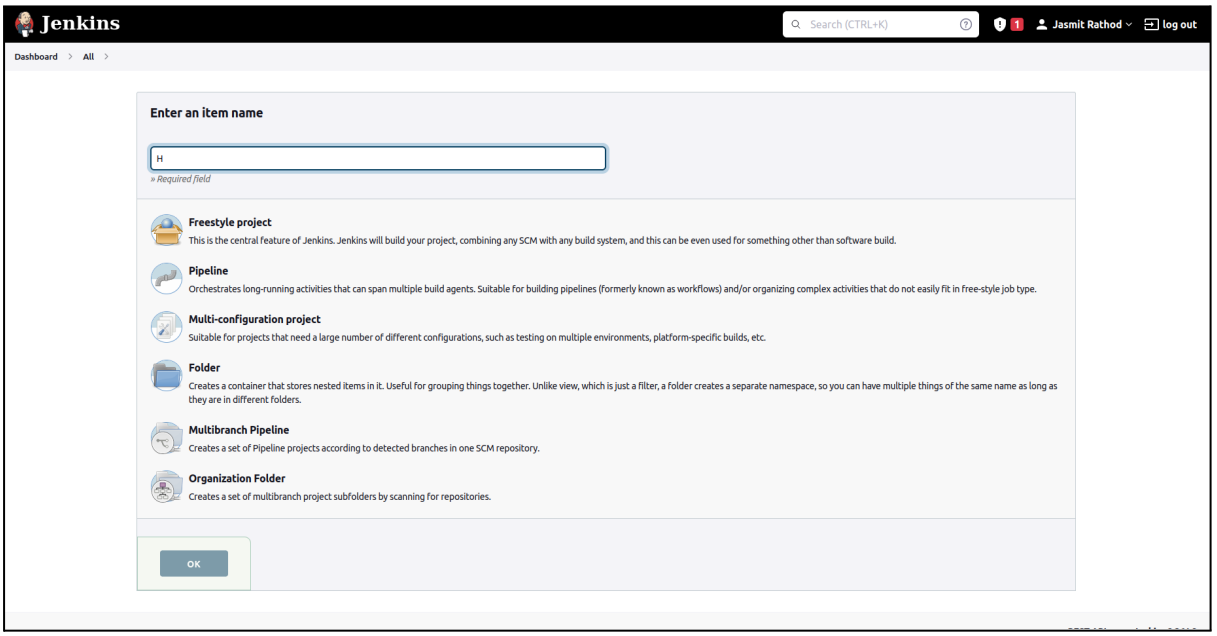

After confirming the appropriate information, click Save and Finish. You'll receive a confirmation page confirming that "Jenkins is Ready!"



Click Start using Jenkins to visit the main Jenkins dashboard

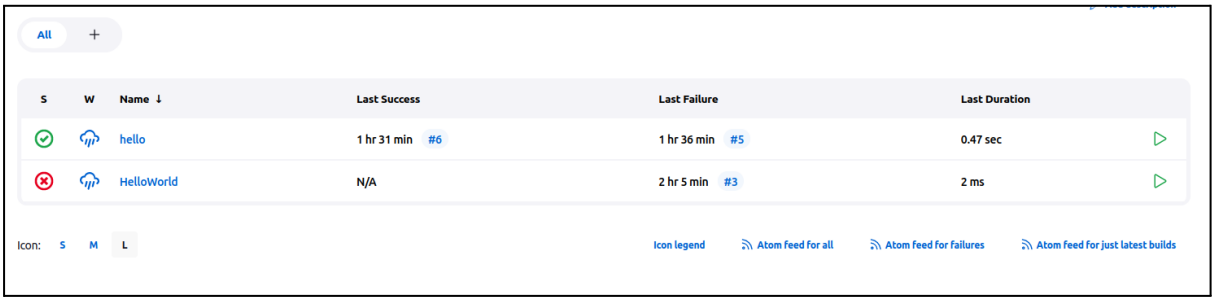



Click on new item and create a new project and use the freestyle project plugin

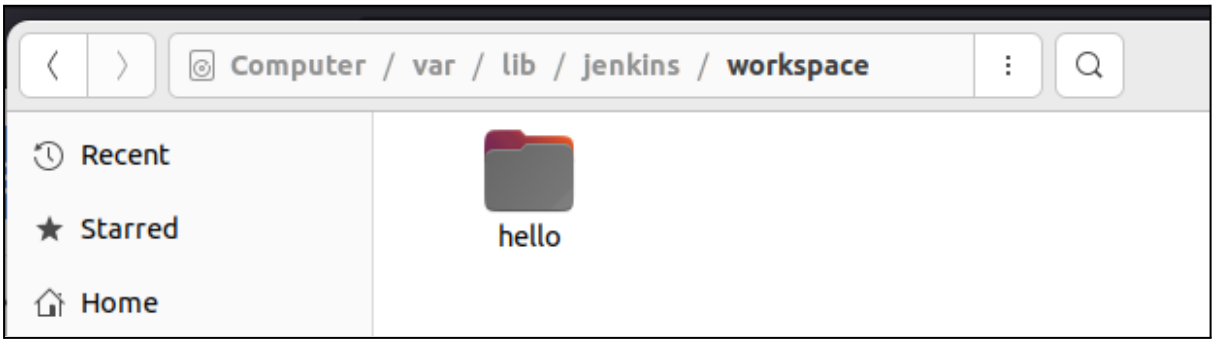


## Exercise to create and run a java program using terminal

Create a new freestyle project




Build it, and you will see that it is locally present



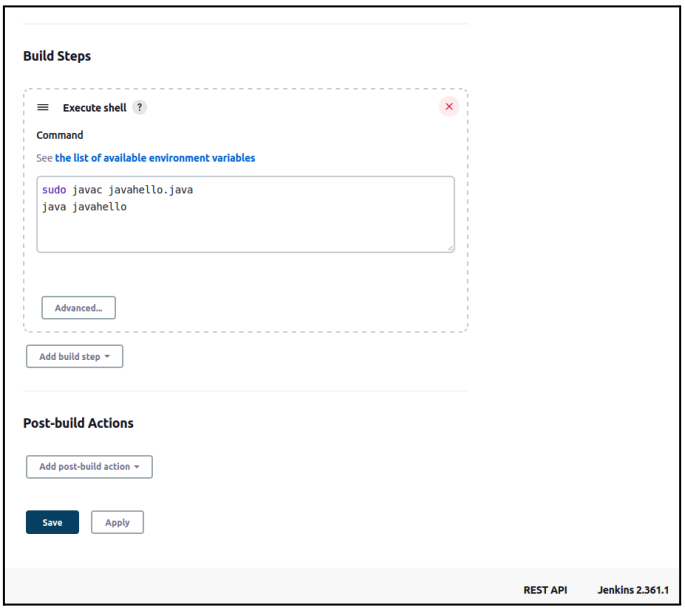

Write a java program

```
purpleven@purpleven:/var/lib/jenkins/workspace/javaprogram$ cat javahello.java
class javahello {
    public static void main(String[] args) {
        System.out.println("Hello!!!");
    }
}
purpleven@purpleven:/var/lib/jenkins/workspace/javaprogram$
```

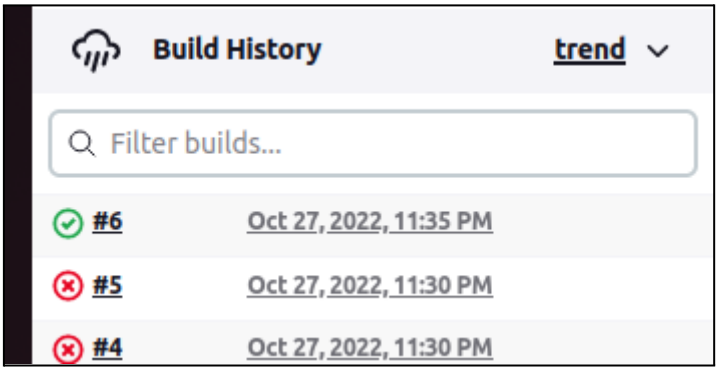
Compile the java program

```
purpleven@purpleven:/var/lib/jenkins/workspace/javaprogram$ sudo javac javahello
.java
purpleven@purpleven:/var/lib/jenkins/workspace/javaprogram$ sudo java javahello
Hello!!!
purpleven@purpleven:/var/lib/jenkins/workspace/javaprogram$
```

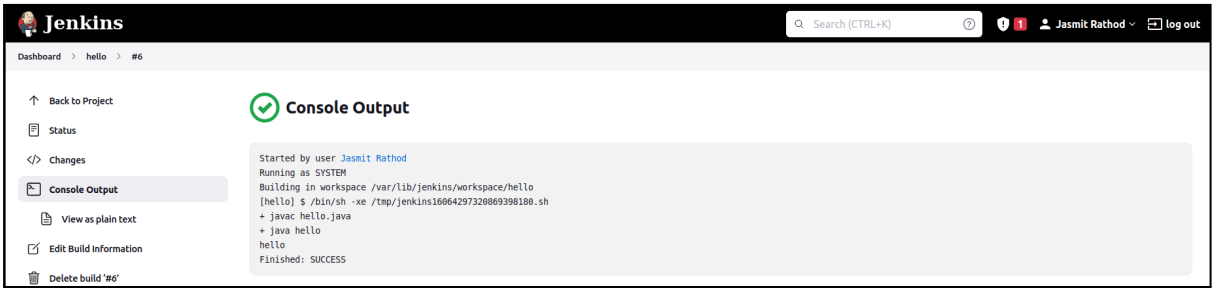
Configure the java program and add the two lines in the build step




Click on build now

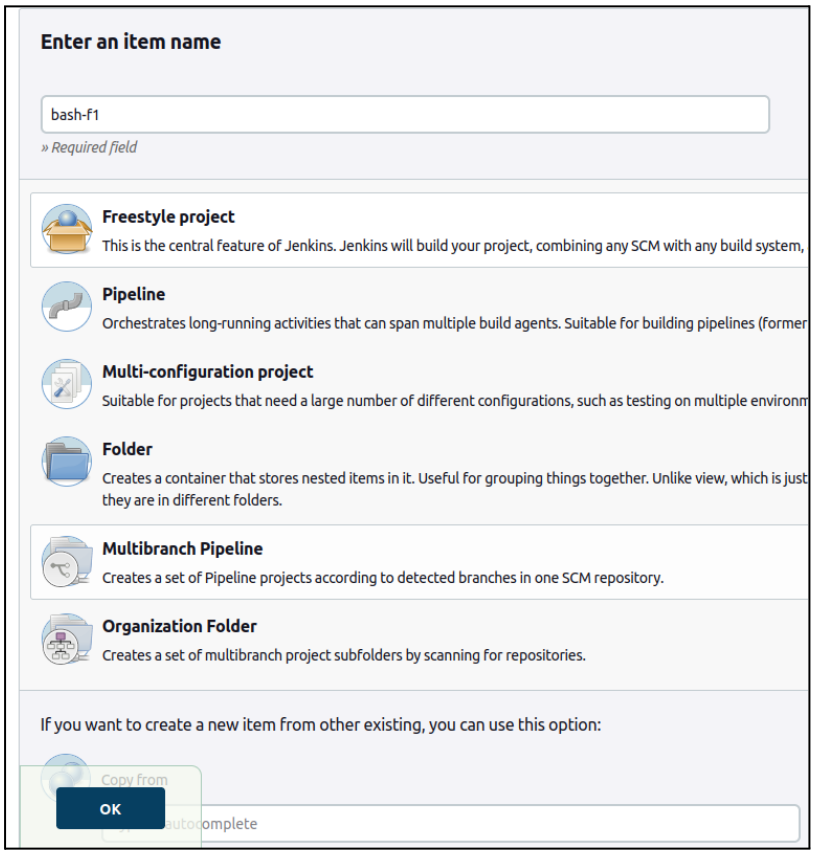


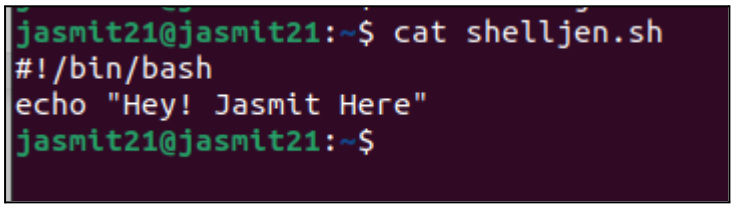

Check the output



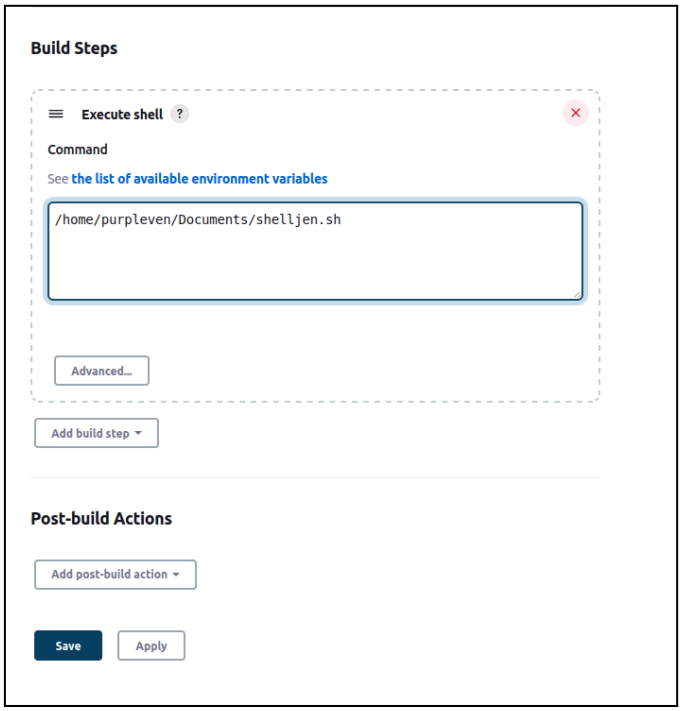
The java program is successfully demonstrated on jenkins

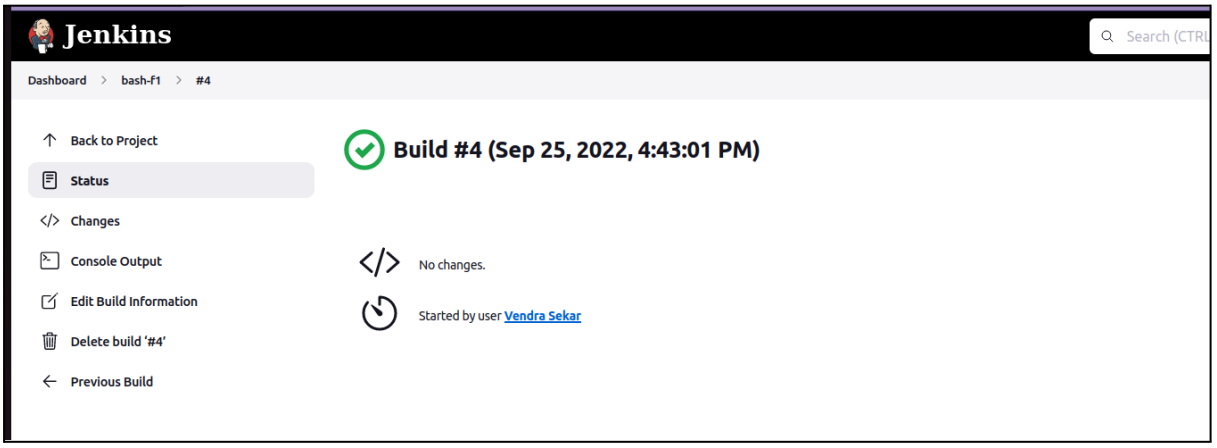

## Exercise to create a shell script and version it in Jenkins

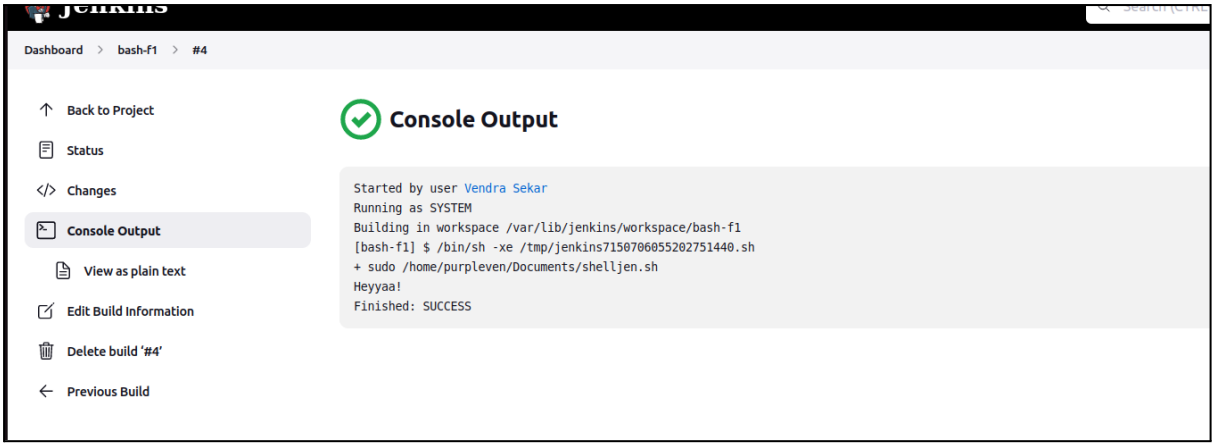


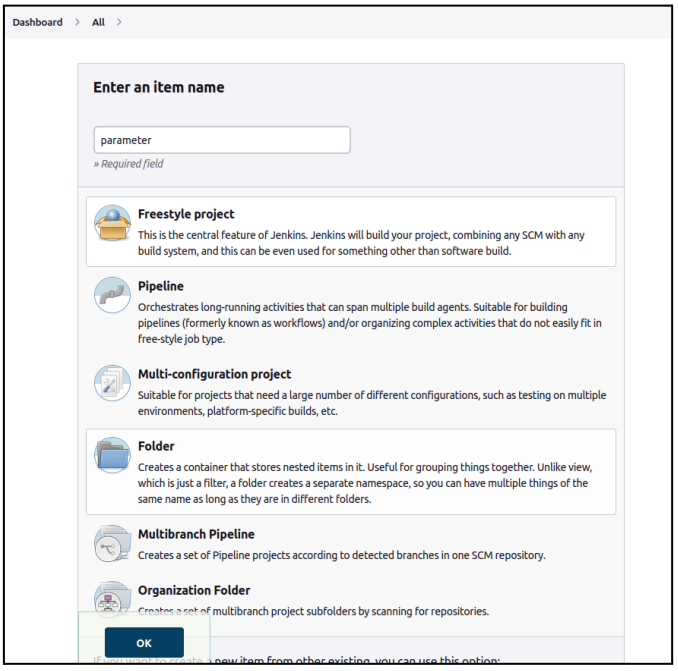
```
jasmit21@jasmit21:~$ sudo chmod 777 shelljen.sh
jasmit21@jasmit21:~$ ./shelljen.sh
Hey! Jasmit Here
jasmit21@jasmit21:~$
```



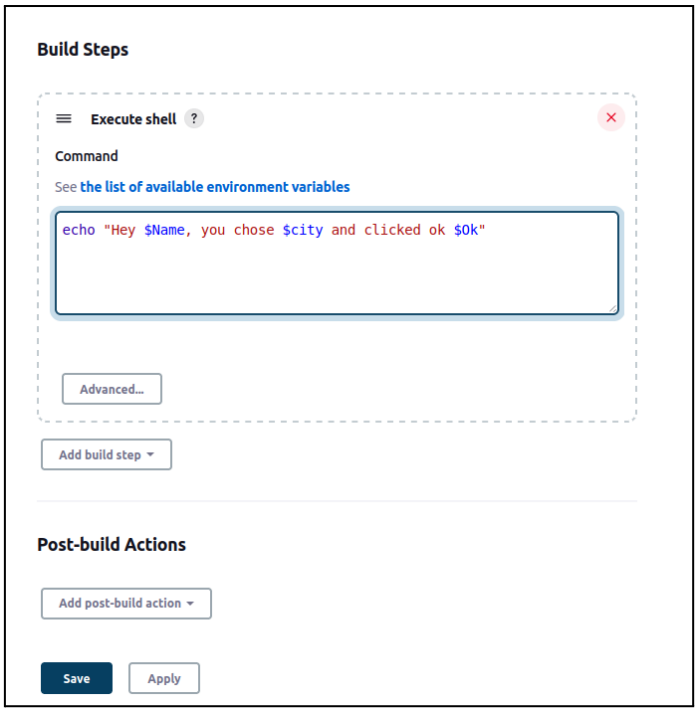



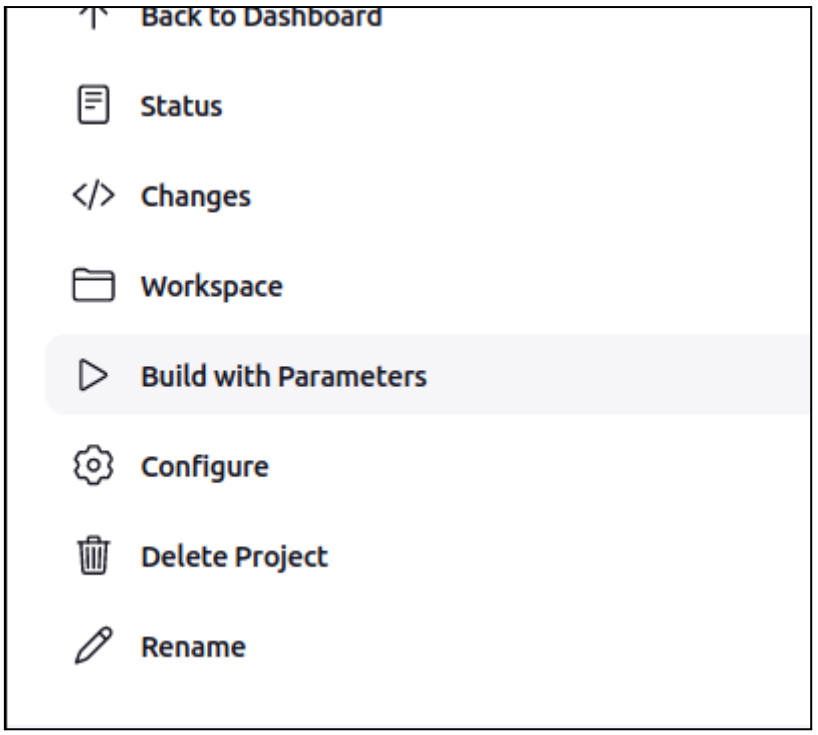


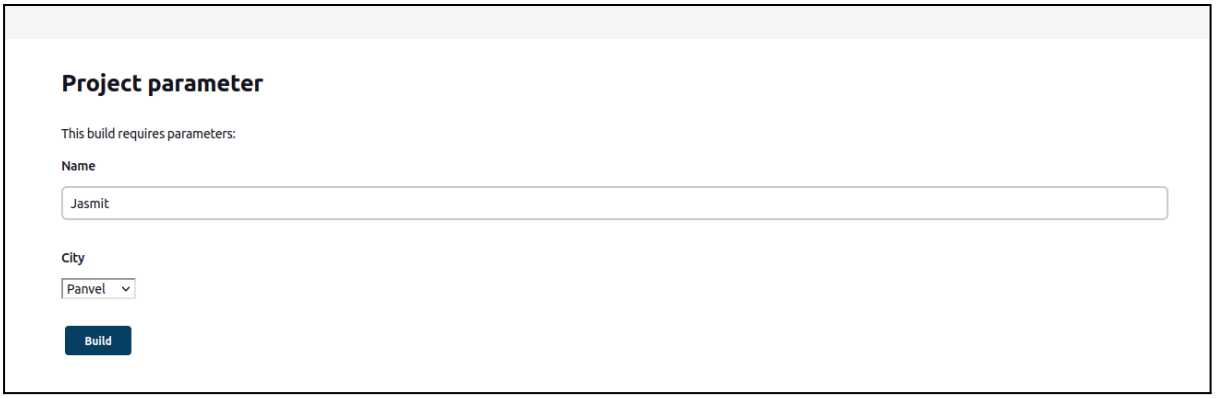

# Exercise to Create a parameterized project

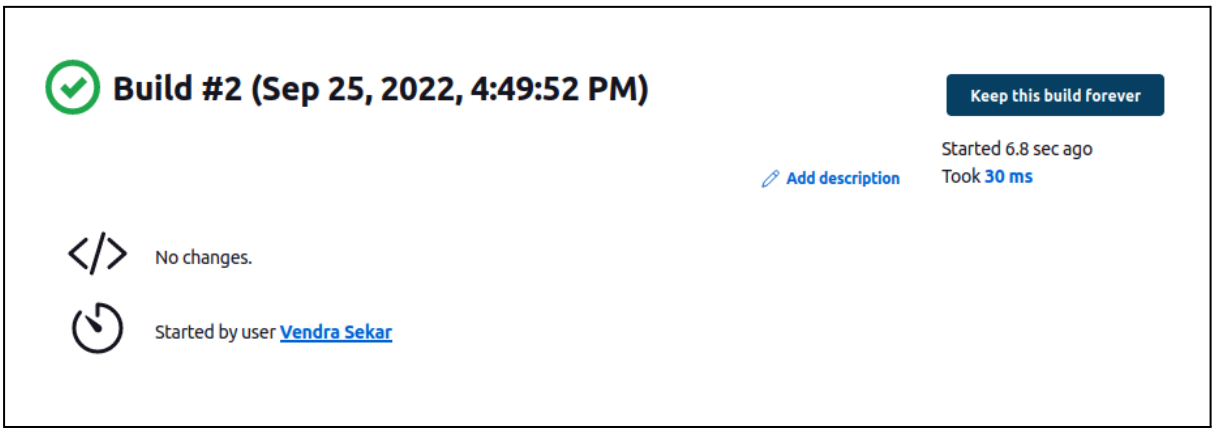



This project is parameterized
String Parameter
Name
Name
Default Value
Jasmit
Description
[Plain text] Preview
Trim the string
Choice Parameter
Name
City
Choices
Panvel
Pune
Mumbai
Save
Apply


Build Steps
Execute shell
Command
See the list of available environment variables
echo "Hey $Name, you chose $city and clicked ok $Ok"
Advanced...
Add build step
Post-build Actions
Add post-build action
Save
Apply


Back to Dashboard
Status
Changes
Workspace
Build with Parameters
Configure
Delete Project
Rename


Project parameter
This build requires parameters:
Name
Jasmit
City
Panvel
Build


Build #2 (Sep 25, 2022, 4:49:52 PM)
Keep this build forever
Started 6.8 sec ago
Took 30 ms
Add description
No changes.
Started by user Vendra Sekar


## Exercise: create a maven Project

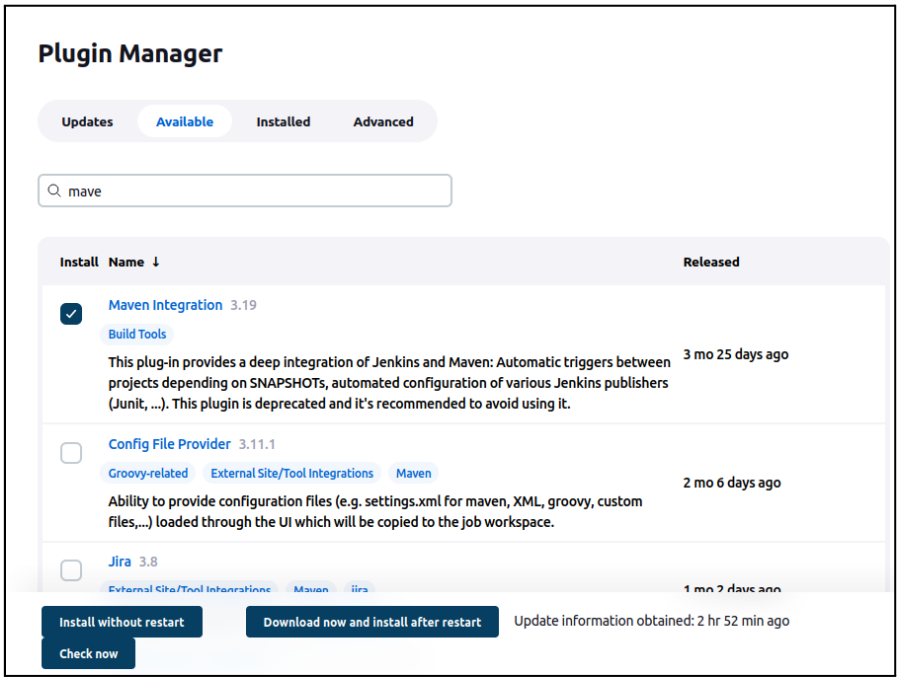
Install maven

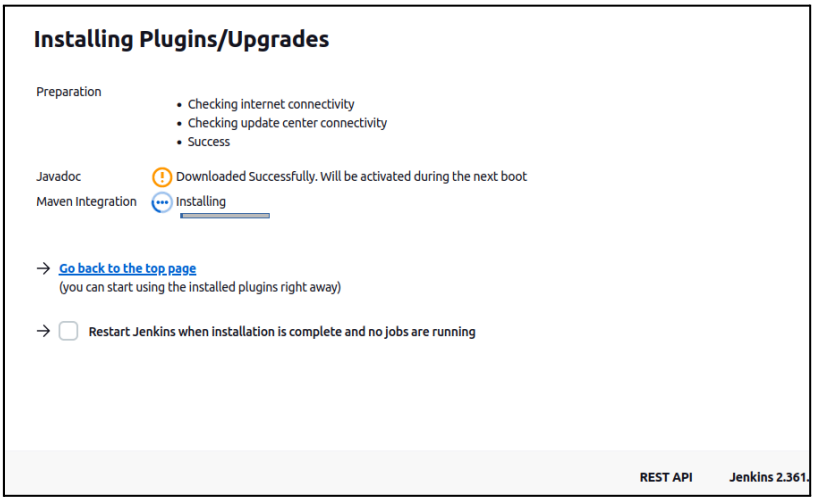
```
jasmit21@jasmit21:~$ sudo apt install maven
[sudo] password for jasmit21:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  chromium-codecs-ffmpeg-extra gstreamer1.0-vaapi i965-va-driver
  intel-media-va-driver libaacs0 libaom3 libass9 libavcodec58 libavformat58
  libavutil56 libbdplus0 libblas3 libbluray2 libbs2b0 libchromaprint1
  libcodec2-1.0 libdav1d5 libflite1 libgme0 libgsm1
  libgstreamer-plugins-bad1.0-0 libigdgmm12 liblilv-0-0 libmfx1 libmysofa1
  libnorm1 libopenmpt0 libpgm-5.3-0 libpostproc55 librabbitmq4 librubberband2
  libserd-0-0 libshine3 libsnappy1v5 libsord-0-0 libsratom-0-0
  libsrt1.4-gnutls libssh-gcrypt-4 libswresample3 libswscale5 libudfread0
  libva-drm2 libva-wayland2 libva-x11-2 libva2 libvdpau1 libvidstab1.1
  libx265-199 libxvidcore4 libzimg2 libzmq5 libzvbi-common libzvbi0
  mesa-va-drivers mesa-vdpau-drivers pocketsphinx-en-us va-driver-all
```

```
jasmit21@jasmit21:~$ mvn --version
Apache Maven 3.6.3
Maven home: /usr/share/maven
Java version: 11.0.16, vendor: Ubuntu, runtime: /usr/lib/jvm/java-11-openjdk-amd
64
Default locale: en_IN, platform encoding: UTF-8
OS name: "linux", version: "5.15.0-52-generic", arch: "amd64", family: "unix"
jasmit21@jasmit21:~$
```

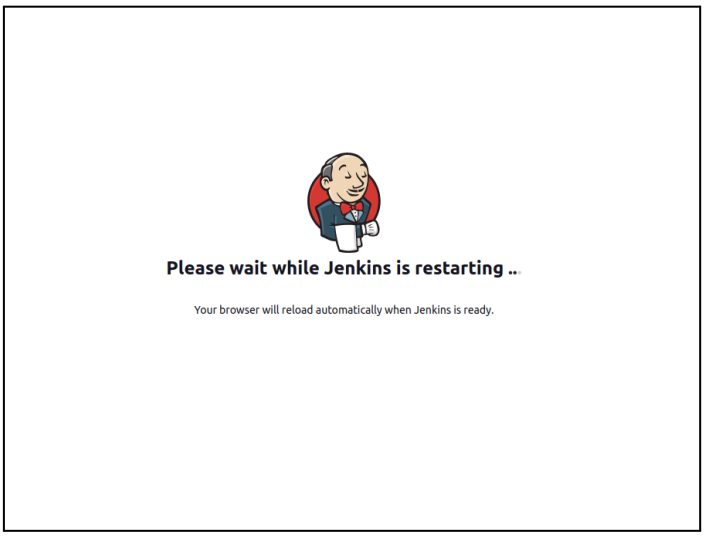
Create a maven project
Eg: https://github.com/devopshint/java-app-with-maven/tree/main/my-app

Install maven integration plugin from the plugin manager

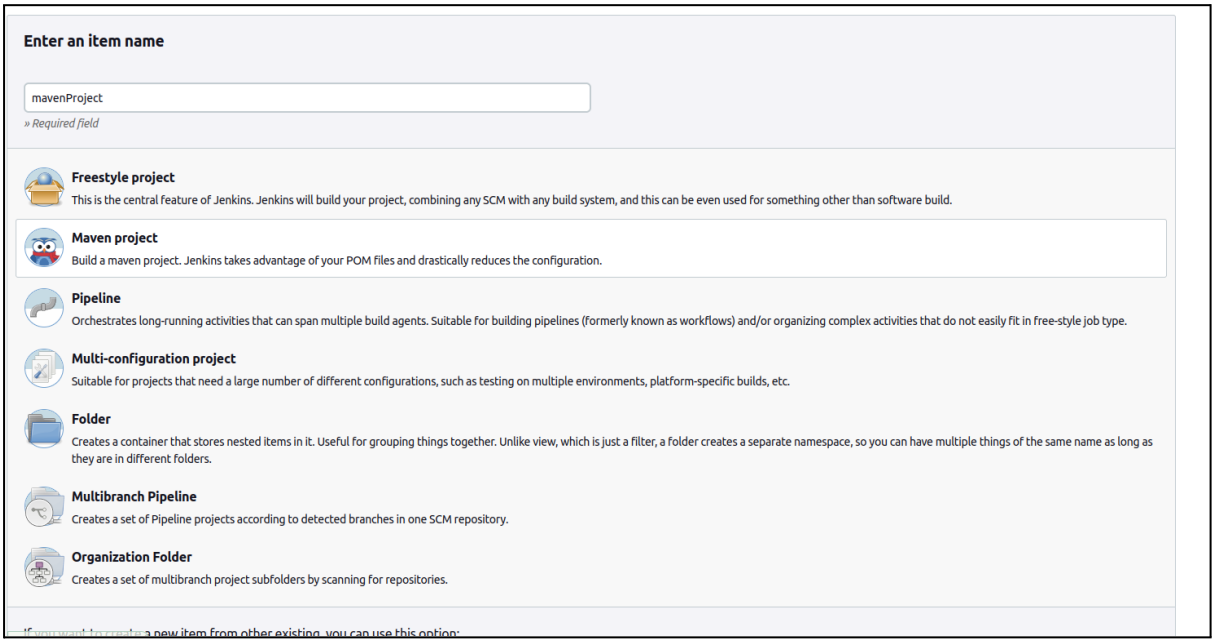


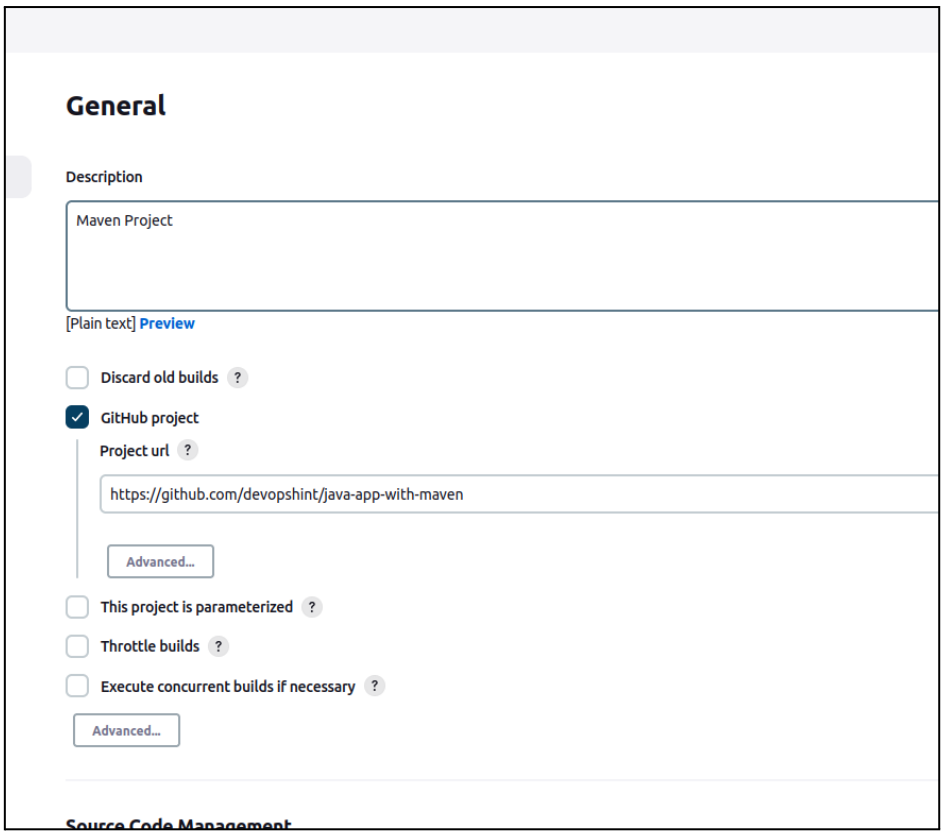



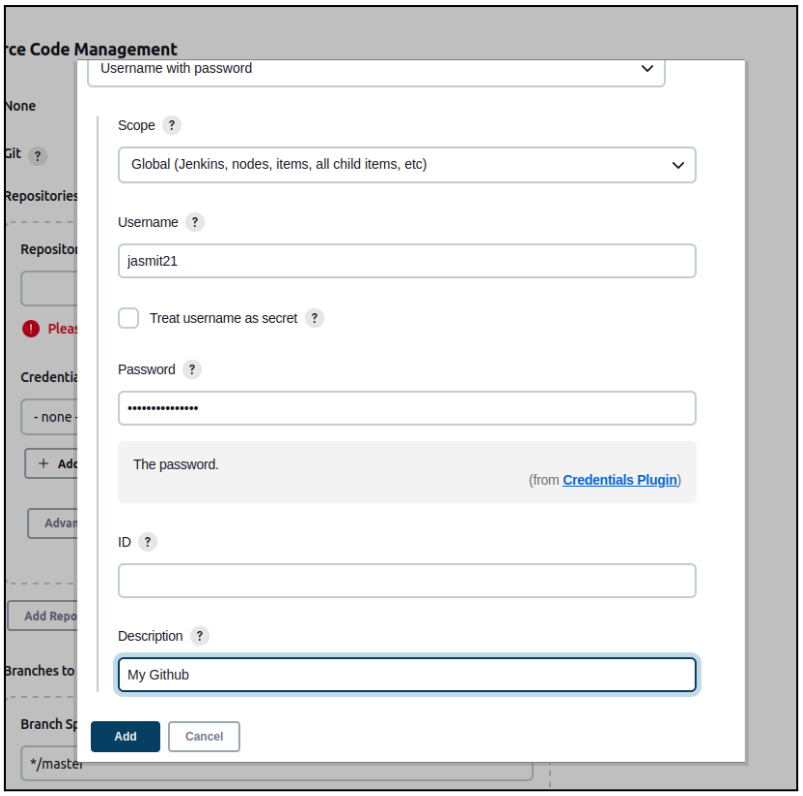
Restart jenkins

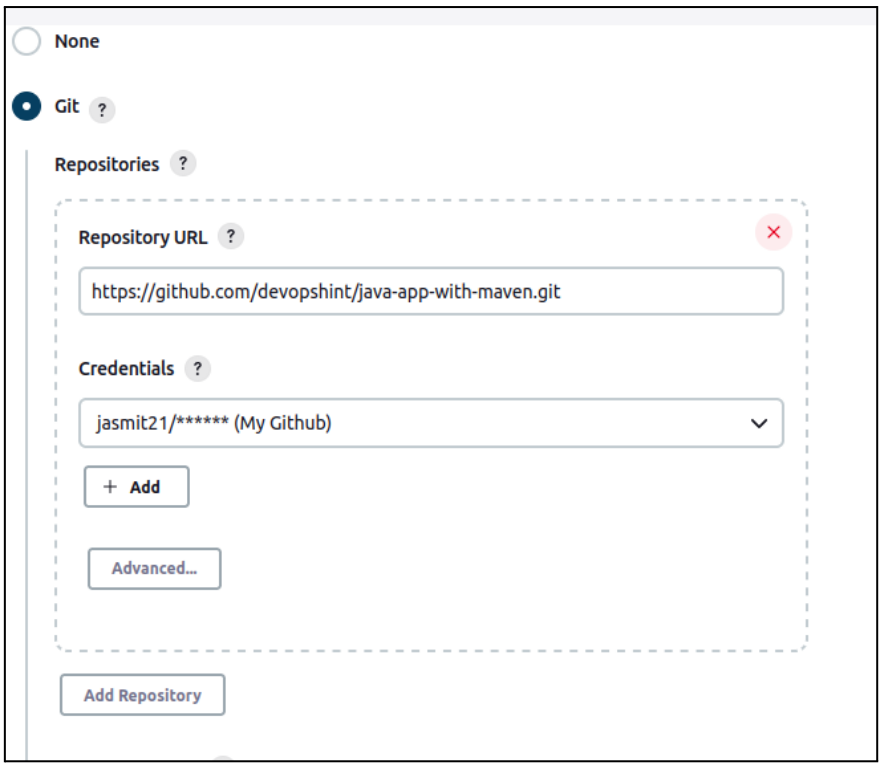


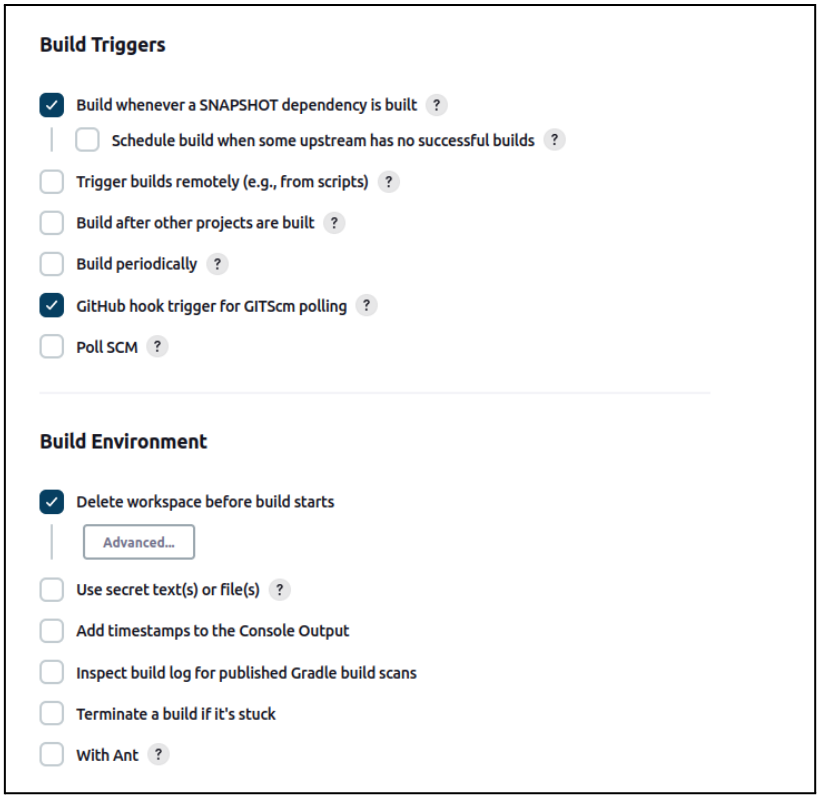

Create a new project

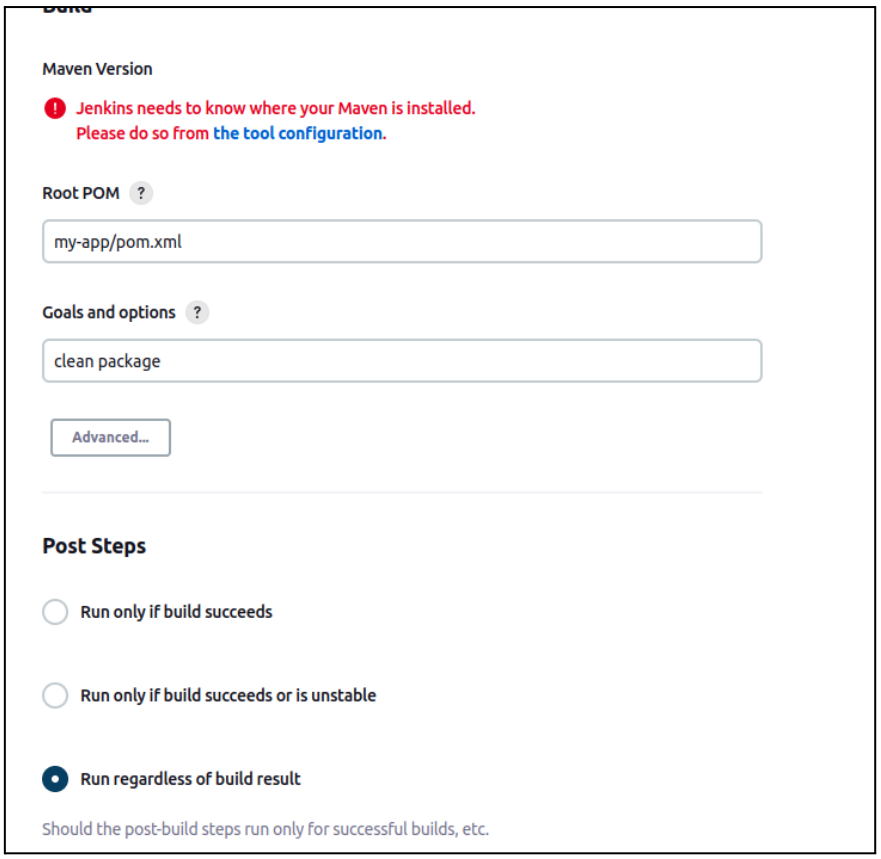


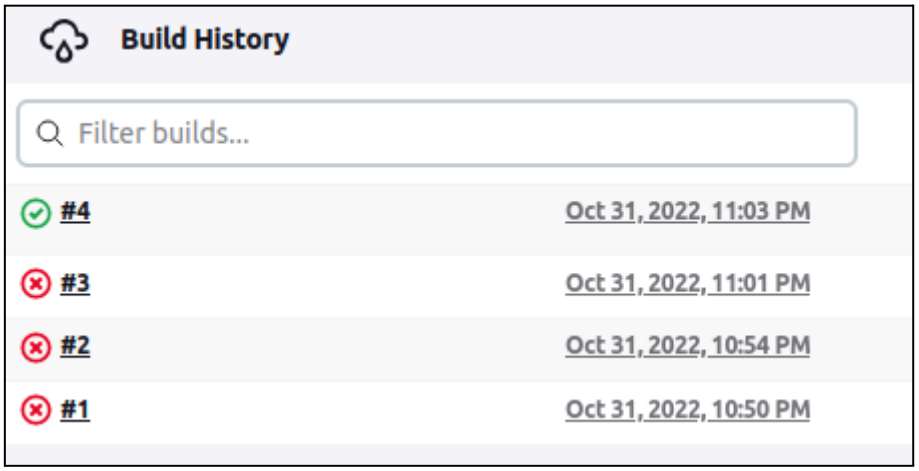

General
Description
Maven Project
[Plain text] Preview
Discard old builds
GitHub project
Project url
https://github.com/devopshint/java-app-with-maven
Advanced...
This project is parameterized
Throttle builds
Execute concurrent builds if necessary
Advanced...
Source Code Management


Username with password
Scope
Global (Jenkins, nodes, items, all child items, etc)
Username
jasmit21
Treat username as secret
Password
The password.
(from Credentials Plugin)
ID
Description
My Github
Add
Cancel


None
Git
Repositories
Repository URL
https://github.com/devopshint/java-app-with-maven.git
Credentials
jasmit21/****** (My Github)
Add
Advanced...
Add Repository


Build Triggers
Build whenever a SNAPSHOT dependency is built
Schedule build when some upstream has no successful builds
Trigger builds remotely (e.g., from scripts)
Build after other projects are built
Build periodically
GitHub hook trigger for GITScm polling
Poll SCM
Build Environment
Delete workspace before build starts
Advanced...
Use secret text(s) or file(s)
Add timestamps to the Console Output
Inspect build log for published Gradle build scans
Terminate a build if it's stuck
With Ant


Maven Version
Jenkins needs to know where your Maven is installed.
Please do so from the tool configuration.
Root POM
my-app/pom.xml
Goals and options
clean package
Advanced...
Post Steps
Run only if build succeeds
Run only if build succeeds or is unstable
Run regardless of build result
Should the post-build steps run only for successful builds, etc.


Build History
Filter builds...
#4
Oct 31, 2022, 11:03 PM
#3
Oct 31, 2022, 11:01 PM
#2
Oct 31, 2022, 10:54 PM
#1
Oct 31, 2022, 10:50 PM

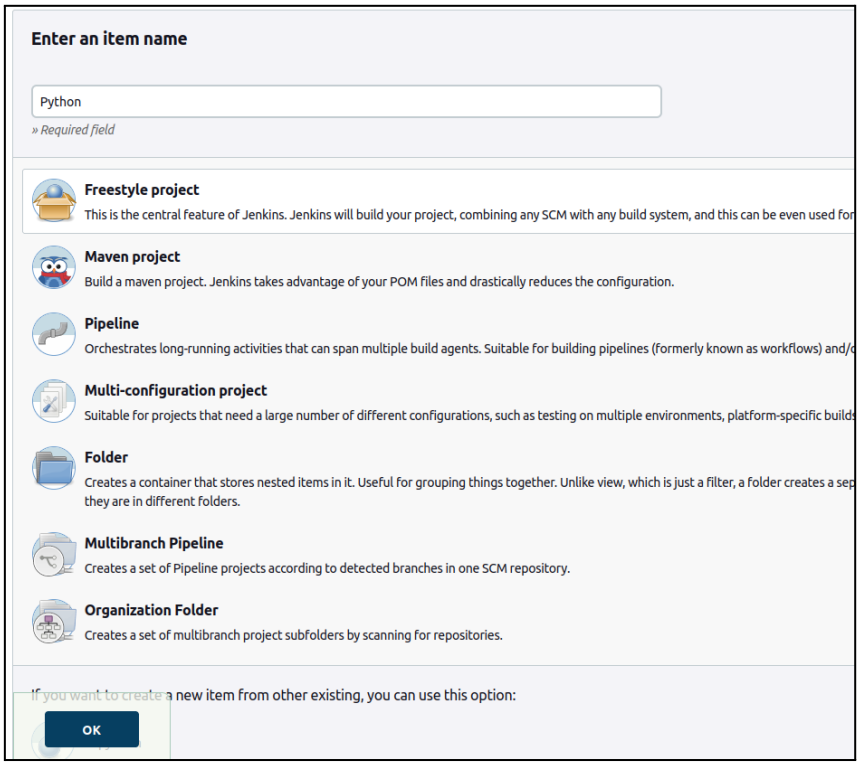
## Console Output

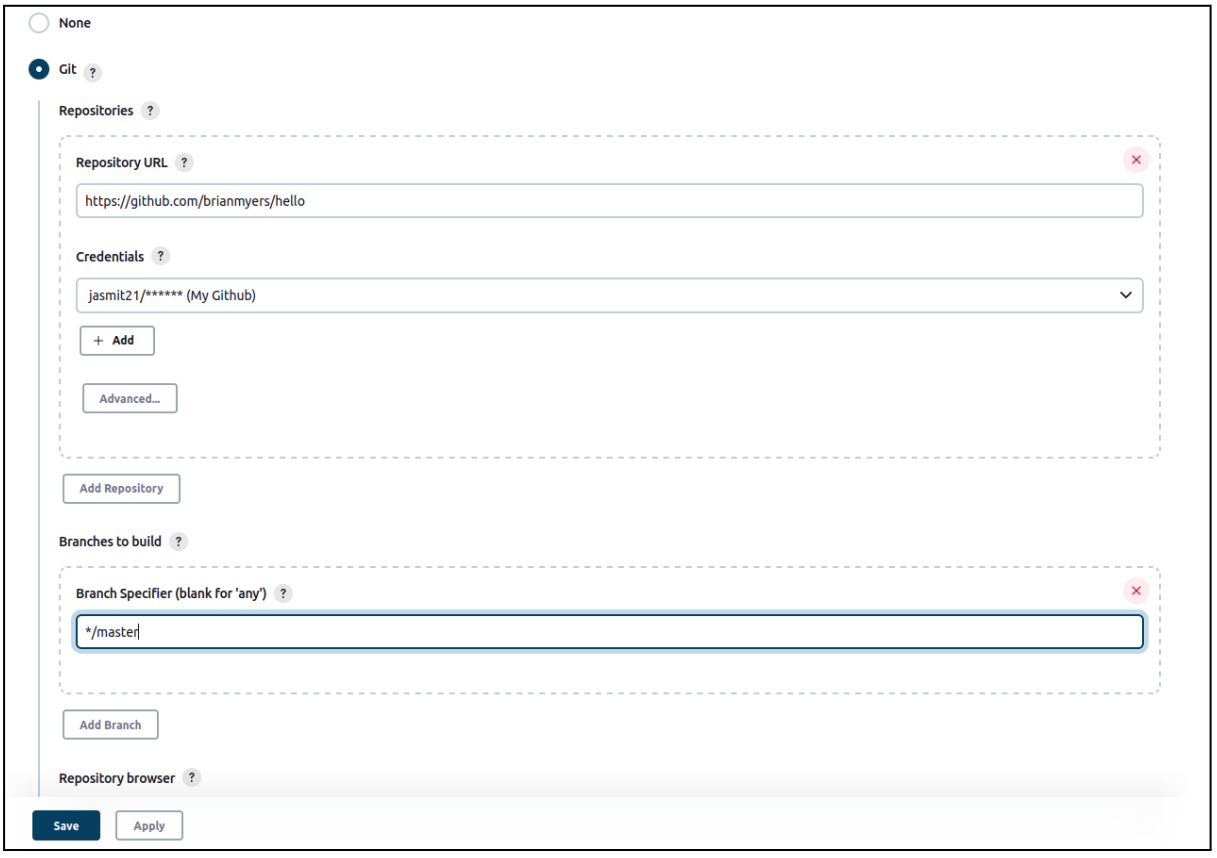
```
Started by user Jasmit Rathod
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/mavenProject
[WS-CLEANUP] Deleting project workspace...
[WS-CLEANUP] Deferred wipeout is used...
[WS-CLEANUP] Done
The recommended git tool is: NONE
using credential 1bf64179-2a77-44f3-ae58-d56f7292df4e
Cloning the remote Git repository
Cloning repository https://github.com/devopshint/java-app-with-maven.git
 > git init /var/lib/jenkins/workspace/mavenProject # timeout=10
Fetching upstream changes from https://github.com/devopshint/java-app-with-maven.git
 > git --version # timeout=10
 > git --version # 'git version 2.34.1'
using GIT_ASKPASS to set credentials My Github
 > git fetch --tags --force --progress -- https://github.com/devopshint/java-app-with-maven.git
+refs/heads/*:refs/remotes/origin/* # timeout=10
 > git config remote.origin.url https://github.com/devopshint/java-app-with-maven.git # timeout=10
 > git config --add remote.origin.fetch +refs/heads/*:refs/remotes/origin/* # timeout=10
Avoid second fetch
 > git rev-parse refs/remotes/origin/main^{commit} # timeout=10
Checking out Revision 620d5f39aaa3384e66672a6682d94fa62e2ce826 (refs/remotes/origin/main)
 > git config core.sparsecheckout # timeout=10
 > git checkout -f 620d5f39aaa3384e66672a6682d94fa62e2ce826 # timeout=10
```

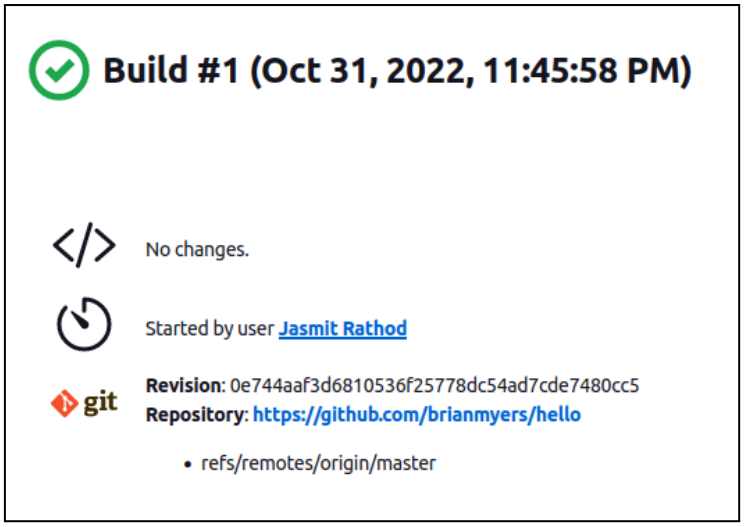
```
at 186 kB/s)
[INFO] Building jar: /var/lib/jenkins/workspace/mavenProject/my-app/target/my-app-1.0-SNAPSHOT.jar
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  01:15 min
[INFO] Finished at: 2022-10-31T23:04:51+05:30
[INFO] ------------------------------------------------------------------------
Waiting for Jenkins to finish collecting data
[JENKINS] Archiving /var/lib/jenkins/workspace/mavenProject/my-app/pom.xml to com.mycompany.app/my-
app/1.0-SNAPSHOT/my-app-1.0-SNAPSHOT.pom
[JENKINS] Archiving /var/lib/jenkins/workspace/mavenProject/my-app/target/my-app-1.0-SNAPSHOT.jar to
com.mycompany.app/my-app/1.0-SNAPSHOT/my-app-1.0-SNAPSHOT.jar
channel stopped
Finished: SUCCESS
```

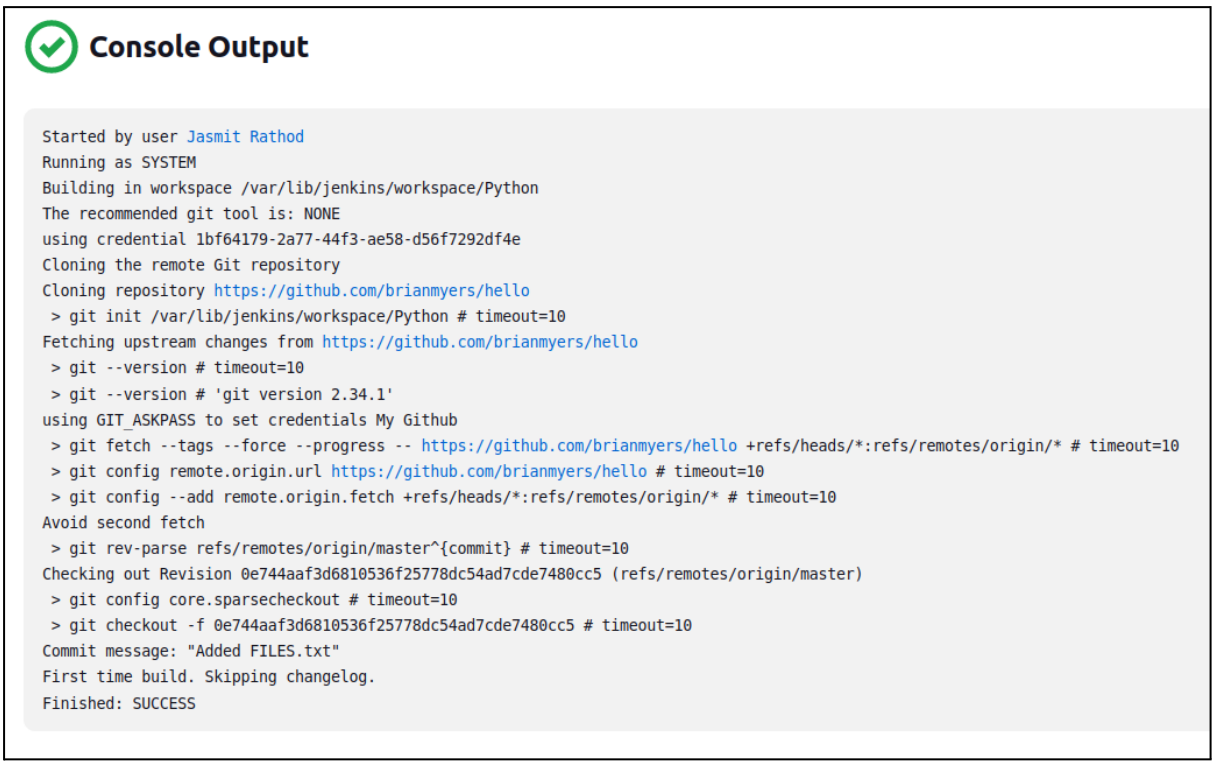
The maven project is created successfully

# Exercise: to run a python simple program using freestyle






Conclusion: Thus, installation and version controlling for various program was done successfully

References:

https://www.youtube.com/watch?v=-5tA3hZTVfA
https://github.com/devopshint/java-app-with-maven
https://www.youtube.com/watch?v=3S4FFwPqxRU&t=215s

# EXPERIMENT 3

## Docker

## Date of Experiment: 26/09/2022

Installation:

prerequisite:

```
jasmit21@jasmit21:~$ sudo apt install apt-transport-https ca-certificates curl software-pro
perties-common
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
ca-certificates is already the newest version (20211016).
ca-certificates set to manually installed.
curl is already the newest version (7.81.0-1ubuntu1.6).
software-properties-common is already the newest version (0.99.22.3).
software-properties-common set to manually installed.
The following packages were automatically installed and are no longer required:
  chromium-codecs-ffmpeg-extra gstreamer1.0-vaapi i965-va-driver intel-media-va-driver
  libaacs0 libaom3 libass9 libavcodec58 libavformat58 libavutil56 libbdplus0 libblas3
  libbluray2 libbs2b0 libchromaprint1 libcodec2-1.0 libdav1d5 libflashrom1 libflite1
  libftdi1-2 libgme0 libgsm1 libgstreamer-plugins-bad1.0-0 libigdgmm12 liblilv-0-0
  libmfx1 libmysofa1 libnorm1 libopenmpt0 libpgm-5.3-0 libpostproc55 librabbitmq4
  librubberband2 libserd-0-0 libshine3 libsnappy1v5 libsord-0-0 libsratom-0-0
  libsrt1.4-gnutls libssh-gcrypt-4 libswresample3 libswscale5 libudfread0 libva-drm2
  libva-wayland2 libva-x11-2 libva2 libvdpau1 libvidstab1.1 libx265-199 libxvidcore4
  libzimg2 libzmq5 libzvbi-common libzvbi0 mesa-va-drivers mesa-vdpau-drivers
  pocketsphinx-en-us va-driver-all vdpau-driver-all
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  apt-transport-https
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 1,506 B of archives.
After this operation, 169 kB of additional disk space will be used
```

Then add the GPG key for the official Docker repository to your system:

```
jasmit21@jasmit21:~$ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --d
earmor -o /usr/share/keyrings/docker-archive-keyring.gpg
jasmit21@jasmit21:~$
```

Add the Docker repository to APT sources:

```
jasmit21@jasmit21:~$ echo "deb [arch=$(dpkg --print-architecture) signed-by=/usr/share/keyr
ings/docker-archive-keyring.gpg] https://download.docker.com/linux/ubuntu $(lsb_release -cs
) stable" | sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
[sudo] password for jasmit21:
jasmit21@jasmit21:~$
```

Update your existing list of packages again for the addition to be recognized:

```
jasmit21@jasmit21:~$ sudo apt update
Get:1 https://download.docker.com/linux/ubuntu jammy InRelease [48.9 kB]
Get:3 https://download.docker.com/linux/ubuntu jammy/stable amd64 Packages [9,481 B]
Hit:4 https://dl.google.com/linux/chrome/deb stable InRelease
Ign:2 https://pkg.jenkins.io/debian-stable binary/ InRelease
Hit:5 https://pkg.jenkins.io/debian-stable binary/ Release
Get:6 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Hit:7 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Get:9 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease [114 kB]
Hit:10 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease
Fetched 283 kB in 1s (266 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
jasmit21@jasmit21:~$
```

Make sure you are about to install from the Docker repo instead of the default Ubuntu repo:

You'll see output like this,

```
jasmit21@jasmit21:~$ apt-cache policy docker-ce
docker-ce:
  Installed: (none)
  Candidate: 5:20.10.21~3-0~ubuntu-jammy
  Version table:
     5:20.10.21~3-0~ubuntu-jammy 500
        500 https://download.docker.com/linux/ubuntu jammy/stable amd64 Packages
     5:20.10.20~3-0~ubuntu-jammy 500
        500 https://download.docker.com/linux/ubuntu jammy/stable amd64 Packages
     5:20.10.19~3-0~ubuntu-jammy 500
        500 https://download.docker.com/linux/ubuntu jammy/stable amd64 Packages
     5:20.10.18~3-0~ubuntu-jammy 500
        500 https://download.docker.com/linux/ubuntu jammy/stable amd64 Packages
     5:20.10.17~3-0~ubuntu-jammy 500
        500 https://download.docker.com/linux/ubuntu jammy/stable amd64 Packages
     5:20.10.16~3-0~ubuntu-jammy 500
        500 https://download.docker.com/linux/ubuntu jammy/stable amd64 Packages
     5:20.10.15~3-0~ubuntu-jammy 500
        500 https://download.docker.com/linux/ubuntu jammy/stable amd64 Packages
     5:20.10.14~3-0~ubuntu-jammy 500
        500 https://download.docker.com/linux/ubuntu jammy/stable amd64 Packages
     5:20.10.13~3-0~ubuntu-jammy 500
        500 https://download.docker.com/linux/ubuntu jammy/stable amd64 Packages
jasmit21@jasmit21:~$
```

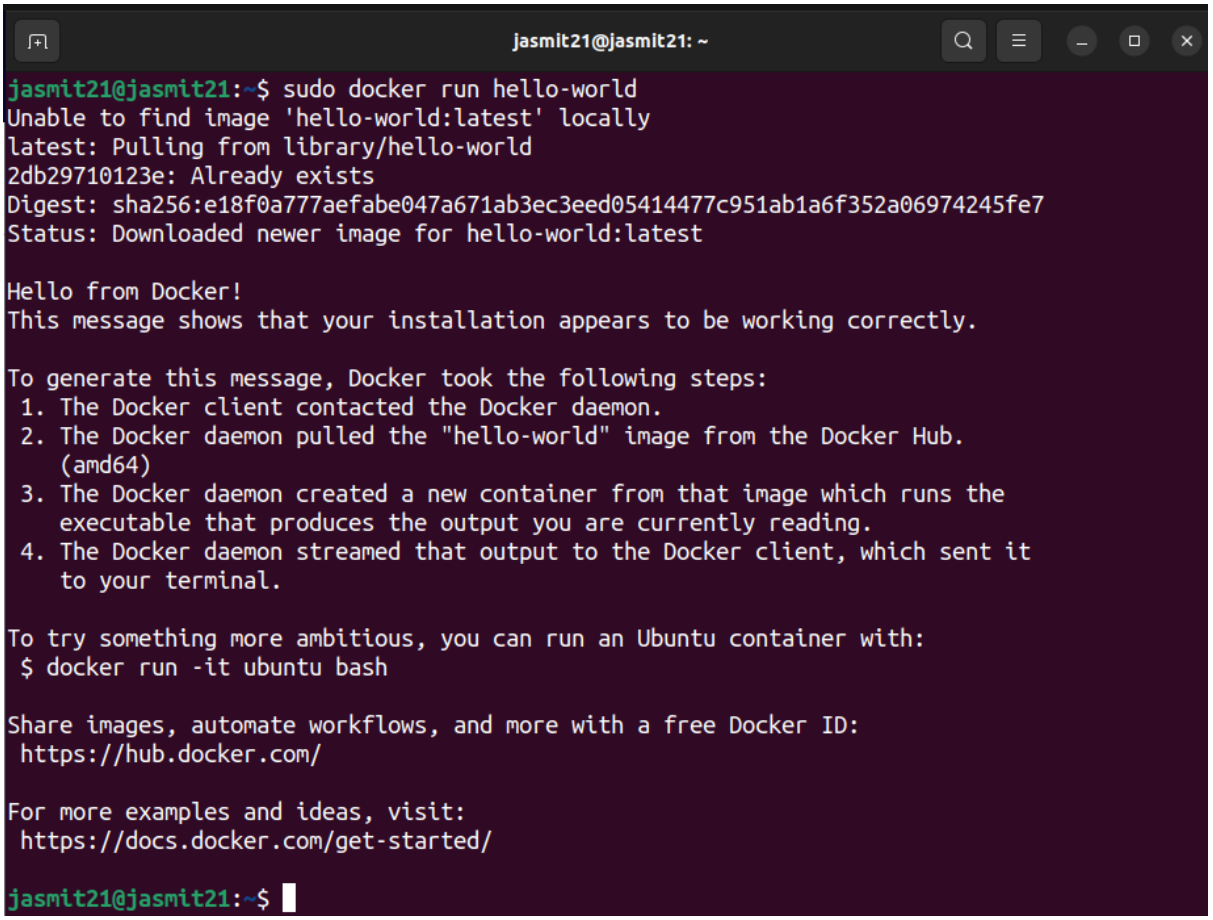
Finally, install Docker:

```
jasmit21@jasmit21:~$ sudo apt install docker-ce
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  chromium-codecs-ffmpeg-extra gstreamer1.0-vaapi i965-va-driver intel-media-va-driver
  libaacs0 libaom3 libass9 libavcodec58 libavformat58 libavutil56 libbdplus0 libblas3
  libbluray2 libbs2b0 libchromaprint1 libcodec2-1.0 libdav1d5 libflashrom1 libflite1
  libftdi1-2 libgme0 libgsm1 libgstreamer-plugins-bad1.0-0 libigdgmm12 liblilv-0-0
  libmfx1 libmysofa1 libnorm1 libopenmpt0 libpgm-5.3-0 libpostproc55 librabbitmq4
  librubberband2 libserd-0-0 libshine3 libsnappy1v5 libsord-0-0 libsratom-0-0
  libsrt1.4-gnutls libssh-gcrypt-4 libswresample3 libswscale5 libudfread0 libva-drm2
  libva-wayland2 libva-x11-2 libva2 libvdpau1 libvidstab1.1 libx265-199 libxvidcore4
  libzimg2 libzmq5 libzvbi-common libzvbi0 mesa-va-drivers mesa-vdpau-drivers
  pocketsphinx-en-us va-driver-all vdpau-driver-all
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  containerd.io docker-ce-cli docker-ce-rootless-extras docker-scan-plugin libslirp0 pigz
  slirp4netns
Suggested packages:
  aufs-tools cgroupfs-mount | cgroup-lite
The following NEW packages will be installed:
  containerd.io docker-ce docker-ce-cli docker-ce-rootless-extras docker-scan-plugin
  libslirp0 pigz slirp4netns
```

Check that it’s running:

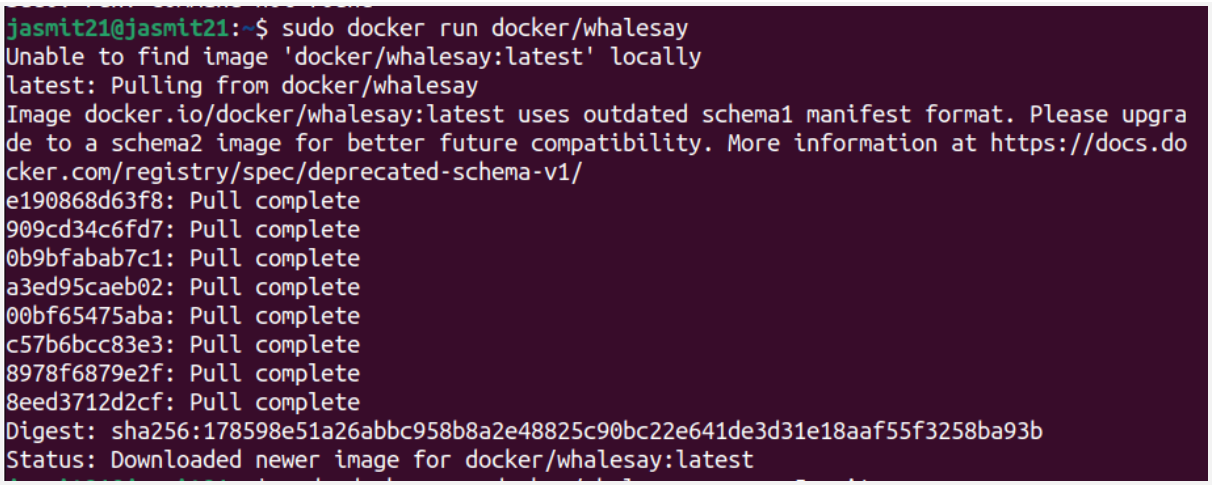
```
jasmit21@jasmit21:~$ sudo systemctl status docker
● docker.service - Docker Application Container Engine
     Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset: enabled)
     Active: active (running) since Fri 2022-10-28 22:08:23 IST; 12s ago
TriggeredBy: ● docker.socket
       Docs: https://docs.docker.com
   Main PID: 13660 (dockerd)
      Tasks: 10
     Memory: 26.2M
        CPU: 152ms
     CGroup: /system.slice/docker.service
             └─13660 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock

Oct 28 22:08:23 jasmit21 dockerd[13660]: time="2022-10-28T22:08:23.194414735+05:30" level=>
Oct 28 22:08:23 jasmit21 dockerd[13660]: time="2022-10-28T22:08:23.194423988+05:30" level=>
Oct 28 22:08:23 jasmit21 dockerd[13660]: time="2022-10-28T22:08:23.194428951+05:30" level=>
Oct 28 22:08:23 jasmit21 dockerd[13660]: time="2022-10-28T22:08:23.398635555+05:30" level=>
Oct 28 22:08:23 jasmit21 dockerd[13660]: time="2022-10-28T22:08:23.564534086+05:30" level=>
Oct 28 22:08:23 jasmit21 dockerd[13660]: time="2022-10-28T22:08:23.631962673+05:30" level=>
Oct 28 22:08:23 jasmit21 dockerd[13660]: time="2022-10-28T22:08:23.727007526+05:30" level=>
Oct 28 22:08:23 jasmit21 dockerd[13660]: time="2022-10-28T22:08:23.727118867+05:30" level=>
Oct 28 22:08:23 jasmit21 systemd[1]: Started Docker Application Container Engine.
Oct 28 22:08:23 jasmit21 dockerd[13660]: time="2022-10-28T22:08:23.748951826+05:30" level=>
lines 1-22/22 (END)
```

Pull an image from docker



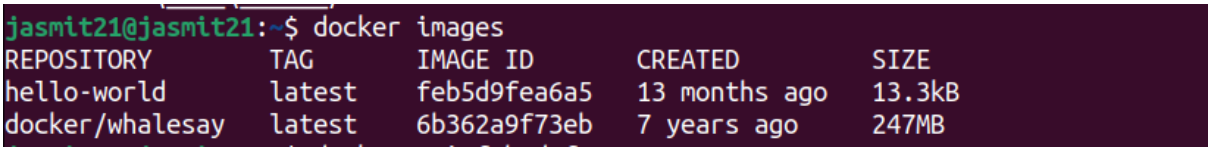

The actual Hello World command of docker is

```
$ docker run docker/whalesay cowsay boo
```



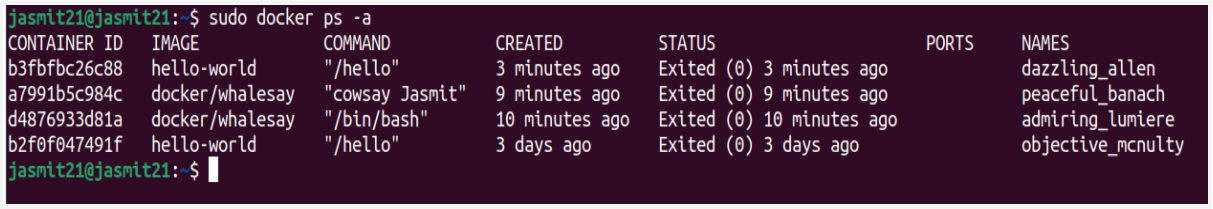
The default image of docker appears with the message boo.


Check if the docker image has been pulled and is present in your system using the following command:



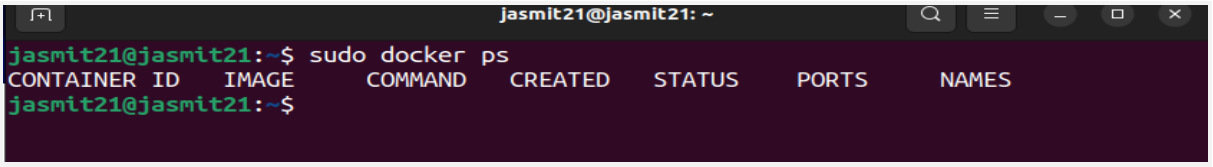

To display all the containers pulled, use the following command:

```
$ sudo docker ps -a
```




To check for containers in a running state, use the following command:

```
$ sudo docker ps
```




You've just successfully installed Docker on Ubuntu!

## Part B:

1. docker search

Use the command docker search to search for public images on the Docker hub. It will return information about the image name, description, stars, official and automated.

```
jasmit21@jasmit21:~$ docker search MySQL
NAME                            DESCRIPTION                                     STARS     OFFICIAL   AUTOMATED
mysql                           MySQL is a widely used, open-source relation…   13418     [OK]
mariadb                         MariaDB Server is a high performing open sou…   5117      [OK]
phpmyadmin                      phpMyAdmin - A web interface for MySQL and M…   672       [OK]
percona                         Percona Server is a fork of the MySQL relati…   592       [OK]
bitnami/mysql                   Bitnami MySQL Docker Image                      78                   [OK]
databack/mysql-backup           Back up mysql databases to... anywhere!         74
linuxserver/mysql-workbench                                                     45
ubuntu/mysql                    MySQL open source fast, stable, multi-thread…   38
linuxserver/mysql               A Mysql container, brought to you by LinuxSe…   37
circleci/mysql                  MySQL is a widely used, open-source relation…   28
google/mysql                    MySQL server for Google Compute Engine          21                   [OK]
rapidfort/mysql                 RapidFort optimized, hardened image for MySQL   13
bitnami/mysqld-exporter                                                         4
ibmcom/mysql-s390x              Docker image for mysql-s390x                    2
newrelic/mysql-plugin           New Relic Plugin for monitoring MySQL databa…   1                    [OK]
vitess/mysqlctld                vitess/mysqlctld                                1                    [OK]
hashicorp/mysql-portworx-demo                                                   0
docksal/mysql                   MySQL service images for Docksal - https://d…   0
mirantis/mysql                                                                  0
rapidfort/mysql8-ib             RapidFort optimized, hardened image for MySQ…   0
cimg/mysql                                                                      0
drud/mysql                                                                      0
silintl/mysql-backup-restore    Simple docker image to perform mysql backups…   0                    [OK]
corpusops/mysql                 https://github.com/corpusops/docker-images/     0
drud/mysql-local-57             ddev mysql local container                      0
jasmit21@jasmit21:~$
```

2. docker pull

Now that we know the name of the image, we can pull that from the Docker hub using the command docker pull. Here, we are setting the platform option as well.

```
docker pull --platform linux/x86_64 mysql
```

```
jasmit21@jasmit21:~$ docker pull --platform linux/x86_64 mysql
Using default tag: latest
latest: Pulling from library/mysql
d67a603b911a: Pull complete
0cf69c8f1492: Pull complete
a5ee239a0d3a: Pull complete
0f166cb3e327: Pull complete
882d294bf188: Pull complete
2649fc7eb806: Pull complete
bddb3394e2e3: Downloading [======>                                            ]  7.019MB/56.04MB

93c83d9a2206: Download complete
bddb3394e2e3: Pull complete
93c83d9a2206: Pull complete
99d7f45787c0: Pull complete
234663a2e3ee: Pull complete
74531487bb7b: Pull complete
Digest: sha256:d4055451e7f42869e64089a60d1abc9e66eccde2910629f0dd666b53a5f230d8
Status: Downloaded newer image for mysql:latest
docker.io/library/mysql:latest
jasmit21@jasmit21:~$
```

3. docker images

By this time, we should have some images in our local machine, and to confirm, let's run the following command to list all the local images.

```
docker images
```


4. docker run

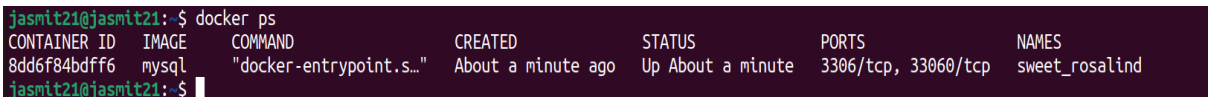
Alright, now that we have some images, we can try to create a container. Here we used the `--env` option to set a mandatory environment variable and `--detach` option to run the container in the background.

```
docker run --env MYSQL_ROOT_PASSWORD=my-secret-pw --detach mysql
```

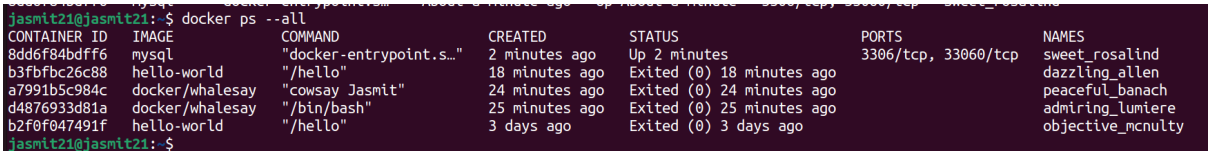

5. docker ps

We can list all the running containers by using the following command.

```
docker ps
```




To list all containers user docker ps –all



6. docker stop

To stop a container, use the `docker stop` command with either the container id or container name. We may stop a container if we want to change our docker run command.

```
docker stop 8dd6f84bdff6
```

```
jasmit21@jasmit21:~$ docker stop 8dd6f84bdff6
8dd6f84bdff6
jasmit21@jasmit21:~$
```

7. docker restart

Let's restart our stops by using the following command. We may want to use this after we reboot our machine.

```
docker restart 8dd6f84bdff6
```

```
jasmit21@jasmit21:~$ docker restart 8dd6f84bdff6
8dd6f84bdff6
jasmit21@jasmit21:~$
```

8. docker rename

Now, let's change the container name from `compassionate_fermi` to `test_db`. We may want to change the name to keep track of our containers more easily.

```
docker rename sweet_rosalind db_54
```

```
jasmit21@jasmit21:~$ docker rename sweet_rosalind db_54
jasmit21@jasmit21:~$ docker ps --all
CONTAINER ID   IMAGE             COMMAND                  CREATED             STATUS                      PORTS                  NAMES
8dd6f84bdff6   mysql             "docker-entrypoint.s…"   47 minutes ago      Up 18 minutes               3306/tcp, 33060/tcp    db_54
b3fbfbc26c88   hello-world       "/hello"                 About an hour ago   Exited (0) About an hour ago                       dazzling_allen
a7991b5c984c   docker/whalesay   "cowsay Jasmit"          About an hour ago   Exited (0) About an hour ago                       peaceful_banach
d4876933d81a   docker/whalesay   "/bin/bash"              About an hour ago   Exited (0) About an hour ago                       admiring_lumiere
b2f0f047491f   hello-world       "/hello"                 3 days ago          Exited (0) 3 days ago                              objective_mcnulty
jasmit21@jasmit21:~$
```

9. docker exec

Access the running container test_db by running the following command. It's helpful if we want to access the MySQL command line and execute MySQL queries.

```
docker exec -it db_54 bash

mysql -uroot -pmy-secret-pw

SHOW DATABASES;
```

```
bash-4.4# mysql -uroot -pjasmit
mysql: [Warning] Using a password on the command line interface can be insecure.
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 8.0.31 MySQL Community Server - GPL

Copyright (c) 2000, 2022, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> SHOW DATABASES
    -> ;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| sys                |
+--------------------+
4 rows in set (0.01 sec)

mysql>
```

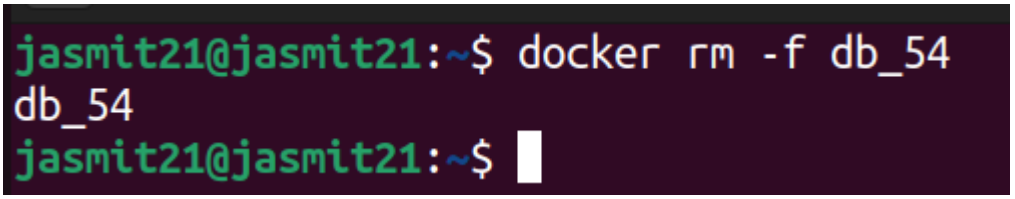
10. docker logs

```
jasmit21@jasmit21:~$ docker logs db_54
2022-11-01 08:28:01+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 8.0.31-1.el8 started.
2022-11-01 08:28:01+00:00 [Note] [Entrypoint]: Switching to dedicated user 'mysql'
2022-11-01 08:28:01+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 8.0.31-1.el8 started.
2022-11-01 08:28:01+00:00 [Note] [Entrypoint]: Initializing database files
2022-11-01T08:28:01.703548Z 0 [Warning] [MY-011068] [Server] The syntax '--skip-host-cache' is deprecated and will be removed in a future release. Pleas
e use SET GLOBAL host_cache_size=0 instead.
2022-11-01T08:28:01.703616Z 0 [System] [MY-013169] [Server] /usr/sbin/mysqld (mysqld 8.0.31) initializing of server in progress as process 79
2022-11-01T08:28:01.710599Z 1 [System] [MY-013576] [InnoDB] InnoDB initialization has started.
2022-11-01T08:28:02.447825Z 1 [System] [MY-013577] [InnoDB] InnoDB initialization has ended.
2022-11-01T08:28:03.813672Z 6 [Warning] [MY-010453] [Server] root@localhost is created with an empty password ! Please consider switching off the --init
ialize-insecure option.
2022-11-01 08:28:07+00:00 [Note] [Entrypoint]: Database files initialized
2022-11-01 08:28:07+00:00 [Note] [Entrypoint]: Starting temporary server
2022-11-01T08:28:07.898842Z 0 [Warning] [MY-011068] [Server] The syntax '--skip-host-cache' is deprecated and will be removed in a future release. Pleas
e use SET GLOBAL host_cache_size=0 instead.
2022-11-01T08:28:07.899959Z 0 [System] [MY-010116] [Server] /usr/sbin/mysqld (mysqld 8.0.31) starting as process 130
2022-11-01T08:28:07.912412Z 1 [System] [MY-013576] [InnoDB] InnoDB initialization has started.
2022-11-01T08:28:08.040563Z 1 [System] [MY-013577] [InnoDB] InnoDB initialization has ended.
2022-11-01T08:28:08.219219Z 0 [Warning] [MY-010068] [Server] CA certificate ca.pem is self signed.
2022-11-01T08:28:08.219246Z 0 [System] [MY-013602] [Server] Channel mysql_main configured to support TLS. Encrypted connections are now supported for th
is channel.
2022-11-01T08:28:08.222638Z 0 [Warning] [MY-011810] [Server] Insecure configuration for --pid-file: Location '/var/run/mysqld' in the path is accessible
 to all OS users. Consider choosing a different directory.
2022-11-01T08:28:08.236900Z 0 [System] [MY-010931] [Server] /usr/sbin/mysqld: ready for connections. Version: '8.0.31'  socket: '/var/run/mysqld/mysqld.
sock'  port: 0  MySQL Community Server - GPL.
2022-11-01T08:28:08.236896Z 0 [System] [MY-011323] [Server] X Plugin ready for connections. Socket: /var/run/mysqld/mysqlx.sock
2022-11-01 08:28:08+00:00 [Note] [Entrypoint]: Temporary server started.
'/var/lib/mysql/mysql.sock' -> '/var/run/mysqld/mysqld.sock'
Warning: Unable to load '/usr/share/zoneinfo/iso3166.tab' as time zone. Skipping it.
Warning: Unable to load '/usr/share/zoneinfo/leapseconds' as time zone. Skipping it.
Warning: Unable to load '/usr/share/zoneinfo/tzdata.zi' as time zone. Skipping it.
Warning: Unable to load '/usr/share/zoneinfo/zone.tab' as time zone. Skipping it.
Warning: Unable to load '/usr/share/zoneinfo/zone1970.tab' as time zone. Skipping it.

2022-11-01 08:28:09+00:00 [Note] [Entrypoint]: Stopping temporary server
2022-11-01T08:28:09.719353Z 10 [System] [MY-013172] [Server] Received SHUTDOWN from user root. Shutting down mysqld (Version: 8.0.31).
2022-11-01T08:28:11.251740Z 0 [System] [MY-010910] [Server] /usr/sbin/mysqld: Shutdown complete (mysqld 8.0.31)  MySQL Community Server - GPL.
```

11. docker rm

To remove a container, we can use the following command.

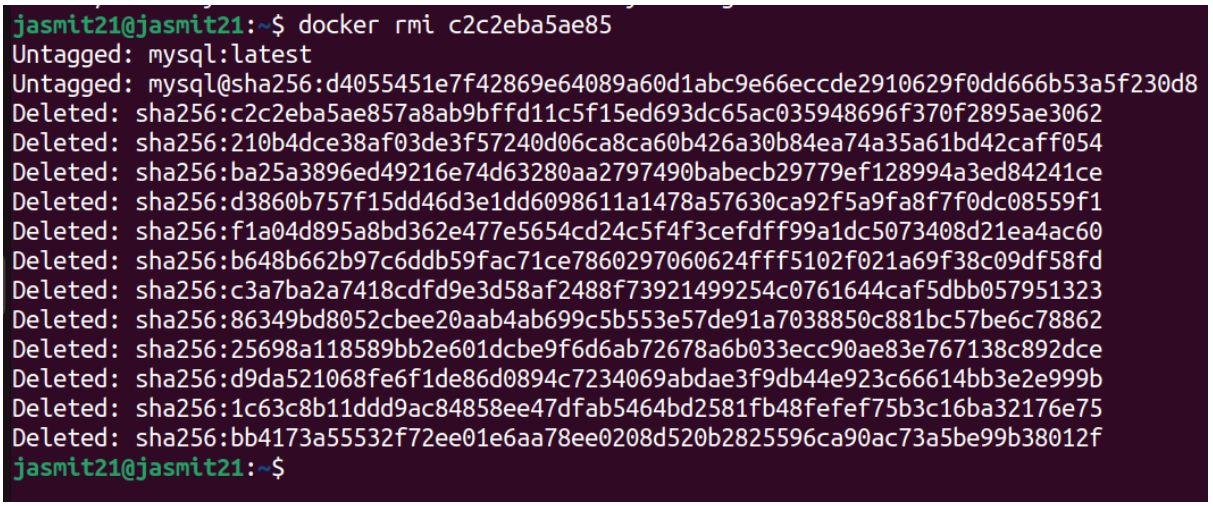
```
docker rm db_54
```



12. docker rmi

To free some disk space, we can use the `docker rmi` command with the image id to remove an image.

```
docker rmi eb0e825dc3cf
```




## Part C: Docker Container Commands:

Containers

Use `docker container my_command`

`create` — Create a container from an image.

`start` — Start an existing container.

`run` — Create a new container and start it.

`ls` — List running containers.

`inspect` — See lots of info about a container.

`logs` — Print logs.

`stop` — Gracefully stop running container.

kill —Stop main process in container abruptly.

rm— Delete a stopped container.

Images

Use docker image my_command

build — Build an image.

push — Push an image to a remote registry.

ls — List images.

history — See intermediate image info.

inspect — See lots of info about an image, including the layers.

rm — Delete an image.

Misc

docker version — List info about your Docker Client and Server versions.

docker login — Log in to a Docker registry.

docker system prune — Delete all unused containers, unused networks, and dangling images.

## Containers

Container Beginnings

The terms create, start, and run all have similar semantics in everyday life. But each is a separate Docker command that creates and/or starts a container. Let's look at creating a container first.

`docker container create hello-world` — Create a container from an image.

```
jasmit21@jasmit21:~$ docker container create hello-world
b4e15a9b7ee49399dbe49a9017da2d745d881876eb9d975f68bf2fdcd7951e25
jasmit21@jasmit21:~$
```

I'll shorten `my_repo/my_image:my_tag` to `my_image` for the rest of the article.

There are a lot of possible flags you could pass to `create`.

`docker container create -a STDIN my_image` - `docker container create -a STDIN hello-world`

```
jasmit21@jasmit21:~$ docker container create -a STDIN hello-world
41b0722ba3b227ba75daf0dd88c2eadacefff242d98220b0aaf71c034afd8aab
jasmit21@jasmit21:~$
```

`-a` is short for `--attach`. Attach the container to STDIN, STDOUT or STDERR.

Now that we've created a container let's start it.

`docker container start hello-world` — Start an existing container.

```
jasmit21@jasmit21:~$ docker container start hello-world
Error response from daemon: No such container: hello-world
Error: failed to start containers: hello-world
jasmit21@jasmit21:~$
```

Note that the container can be referred to by either the container's ID or the container's name.

`docker container start distracted_heisenberg`

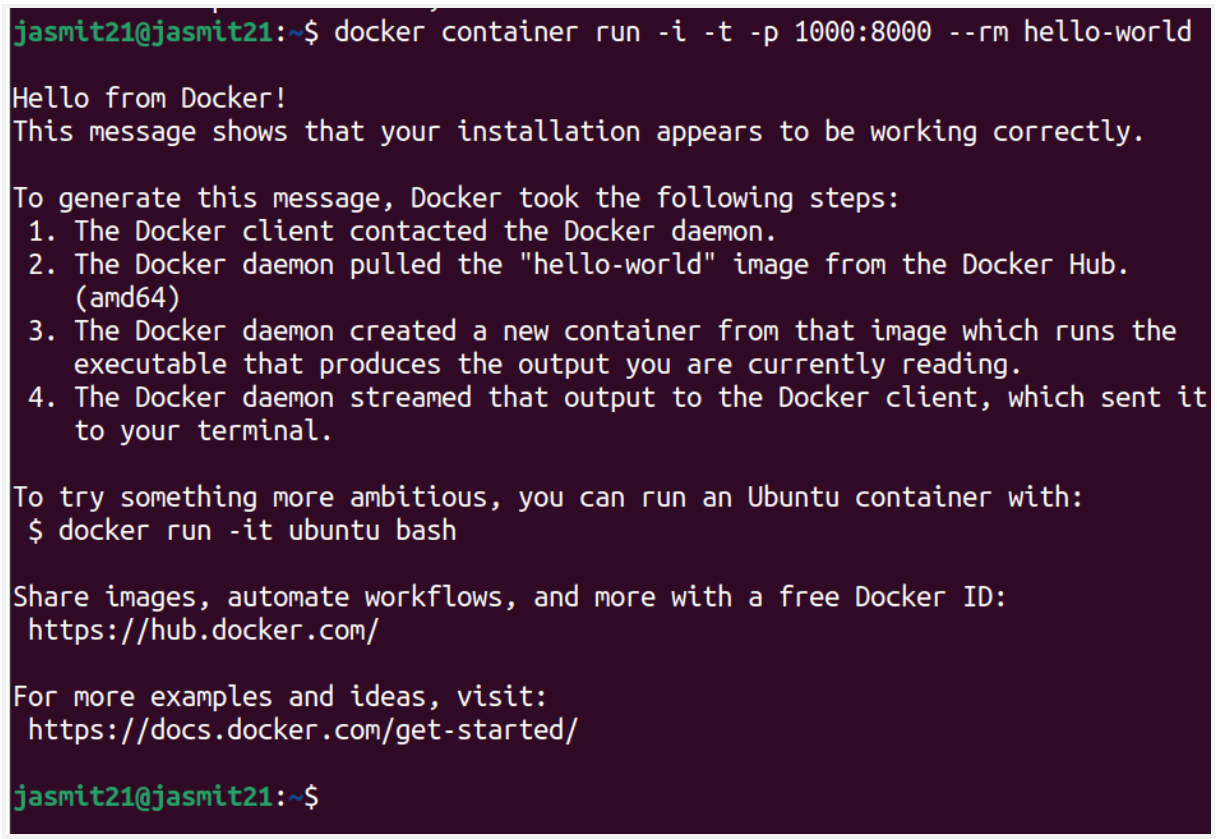
```
jasmit21@jasmit21:~$ docker ps -a
CONTAINER ID   IMAGE             COMMAND          CREATED             STATUS                     PORTS     NAMES
41b0722ba3b2   hello-world       "/hello"         About a minute ago  Created                              reverent_meninsky
b4e15a9b7ee4   hello-world       "/hello"         2 minutes ago       Created                              distracted_heisenberg
b3fbfbc26c88   hello-world       "/hello"         2 hours ago         Exited (0) 2 hours ago               dazzling_allen
a7991b5c984c   docker/whalesay   "cowsay Jasmit"  2 hours ago         Exited (0) 2 hours ago               peaceful_banach
d4876933d81a   docker/whalesay   "/bin/bash"      2 hours ago         Exited (0) 2 hours ago               admiring_lumiere
b2f0f047491f   hello-world       "/hello"         3 days ago          Exited (0) 3 days ago                objective_mcnulty
jasmit21@jasmit21:~$ docker container start distracted_heisenberg
distracted_heisenberg
jasmit21@jasmit21:~$
```

Now that you know how to create and start a container, let's turn to what's probably the most common Docker command. It combines both `create` and `start` into one command: `run`.

`docker container run my_image` — Create a new container and start it. It also has a lot of options. Let's look at a few.

```
jasmit21@jasmit21:~$ docker container run hello-world

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
 3. The Docker daemon created a new container from that image which runs th
e
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent
 it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
 $ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
 https://hub.docker.com/

For more examples and ideas, visit:
 https://docs.docker.com/get-started/

jasmit21@jasmit21:~$
```

`docker container run -i -t -p 1000:8000 --rm my_image`




`-i` is short for `--interactive`. Keep STDIN open even if unattached.

`-t`is short for`--tty`. Allocates a pseudo terminal that connects your terminal with the container's STDIN and STDOUT.

You need to specify both `-i` and `-t` to then interact with the container through your terminal shell.

`-p` is short for `--port`. The port is the interface with the outside world.`1000:8000` maps the Docker port 8000 to port 1000 on your machine. If you had an app that output something to the browser you could then navigate your browser to `localhost:1000` and see it.

`--rm` Automatically delete the container when it stops running.

Let’s look at some more examples of run.

docker container run -it my_image my_command

```
jasmit21@jasmit21:~$ docker container run -it hello-world jasmit
docker: Error response from daemon: failed to create shim task: OCI runtime create failed: runc create failed: unable to start container process: exec:
"jasmit": executable file not found in $PATH: unknown.
ERRO[0000] error waiting for container: context canceled
```

```
jasmit21@jasmit21:~$ docker container ls -a -s
CONTAINER ID   IMAGE             COMMAND          CREATED              STATUS                     PORTS     NAMES                  SIZE
21a209c026a3   hello-world       "jasmit"         About a minute ago   Created                              focused_meitner        0B (virtual 13.3kB)
73da64055d14   hello-world       "/hello"         3 minutes ago        Exited (0) 3 minutes ago             jovial_kirch           0B (virtual 13.3kB)
41b0722ba3b2   hello-world       "/hello"         7 minutes ago        Created                              reverent_meninsky      0B (virtual 13.3kB)
b4e15a9b7ee4   hello-world       "/hello"         8 minutes ago        Exited (0) 5 minutes ago             distracted_heisenberg  0B (virtual 13.3kB)
b3fbfbc26c88   hello-world       "/hello"         2 hours ago          Exited (0) 2 hours ago               dazzling_allen         0B (virtual 13.3kB)
a7991b5c984c   docker/whalesay   "cowsay Jasmit"  2 hours ago          Exited (0) 2 hours ago               peaceful_banach        0B (virtual 247MB)
d4876933d81a   docker/whalesay   "/bin/bash"      2 hours ago          Exited (0) 2 hours ago               admiring_lumiere       0B (virtual 247MB)
b2f0f047491f   hello-world       "/hello"         3 days ago           Exited (0) 3 days ago                objective_mcnulty      0B (virtual 13.3kB)
jasmit21@jasmit21:~$
```

sh is a command you could specify at run time.sh will start a shell session inside your container that you can interact with through your terminal. sh is preferable to bash for Alpine images because Alpine images don’t come with bash installed. Type exit to end the interactive shell session.

Notice that we combined -i and -t into -it.

docker container run -d my_image

```
jasmit21@jasmit21:~$ docker container run -d hello-world
1a998bed21ef4d2f34f936be1c619c6dea591cfa061a4b139a3990ff872de155
jasmit21@jasmit21:~$
```

-d is short for --detach. Run the container in the background. Allows you to use the terminal for other commands while your container runs.

Checking Container Status

If you have running Docker containers and want to find out which one to interact with, then you need to list them.

`docker container ls` — List running containers. Also provides useful information about the containers.

`docker container ls -a -s`

```
jasmit21@jasmit21:~$ docker container ls
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
jasmit21@jasmit21:~$ docker container ls -a -s
CONTAINER ID   IMAGE             COMMAND           CREATED              STATUS                          PORTS     NAMES                 SIZE
1a998bed21ef   hello-world       "/hello"          About a minute ago   Exited (0) About a minute ago             nifty_brattain        0B (virtual 13
.3kB)
21a209c026a3   hello-world       "jasmit"          3 minutes ago        Created                                   focused_meitner       0B (virtual 13
.3kB)
73da64055d14   hello-world       "/hello"          5 minutes ago        Exited (0) 5 minutes ago                  jovial_kirch          0B (virtual 13
.3kB)
41b0722ba3b2   hello-world       "/hello"          9 minutes ago        Created                                   reverent_meninsky     0B (virtual 13
.3kB)
b4e15a9b7ee4   hello-world       "/hello"          10 minutes ago       Exited (0) 7 minutes ago                  distracted_heisenberg 0B (virtual 13
.3kB)
b3fbfbc26c88   hello-world       "/hello"          2 hours ago          Exited (0) 2 hours ago                    dazzling_allen        0B (virtual 13
.3kB)
a7991b5c984c   docker/whalesay   "cowsay Jasmit"   2 hours ago          Exited (0) 2 hours ago                    peaceful_banach       0B (virtual 24
7MB)
d4876933d81a   docker/whalesay   "/bin/bash"       2 hours ago          Exited (0) 2 hours ago                    admiring_lumiere      0B (virtual 24
7MB)
b2f0f047491f   hello-world       "/hello"          3 days ago           Exited (0) 3 days ago                     objective_mcnulty     0B (virtual 13
.3kB)
jasmit21@jasmit21:~$
```

`-a` is short for `-all`. List all containers (not just running ones).

`-s` is short for `--size`. List the size for each container.

`docker container inspect nifty_brattain` — See lots of info about a container.

```
jasmit21@jasmit21:~$ docker container inspect nifty_brattain
[
    {
        "Id": "1a998bed21ef4d2f34f936be1c619c6dea591cfa061a4b139a3990ff872de155",
        "Created": "2022-11-01T09:54:38.312460429Z",
        "Path": "/hello",
        "Args": [],
        "State": {
            "Status": "exited",
            "Running": false,
            "Paused": false,
            "Restarting": false,
            "OOMKilled": false,
            "Dead": false,
            "Pid": 0,
            "ExitCode": 0,
            "Error": "",
            "StartedAt": "2022-11-01T09:54:38.650222129Z",
            "FinishedAt": "2022-11-01T09:54:38.649918926Z"
        },
        "Image": "sha256:feb5d9fea6a5e9606aa995e879d862b825965ba48de054caab5ef356dc6b3412",
        "ResolvConfPath": "/var/lib/docker/containers/1a998bed21ef4d2f34f936be1c619c6dea591cfa061a4b139a3990ff872de155/resolv.conf",
        "HostnamePath": "/var/lib/docker/containers/1a998bed21ef4d2f34f936be1c619c6dea591cfa061a4b139a3990ff872de155/hostname",
        "HostsPath": "/var/lib/docker/containers/1a998bed21ef4d2f34f936be1c619c6dea591cfa061a4b139a3990ff872de155/hosts",
        "LogPath": "/var/lib/docker/containers/1a998bed21ef4d2f34f936be1c619c6dea591cfa061a4b139a3990ff872de155/1a998bed21ef4d2f34f936be1c619c6dea591cfa
061a4b139a3990ff872de155-json.log",
        "Name": "/nifty_brattain",
        "RestartCount": 0,
        "Driver": "overlay2",
        "Platform": "linux",
        "MountLabel": "",
        "ProcessLabel": "",
        "AppArmorProfile": "docker-default",
        "ExecIDs": null,
        "HostConfig": {
            "Binds": null,
            "ContainerIDFile": "",
            "LogConfig": {
```

`docker container logs nifty_brattain` — Print a container's logs.

```
jasmit21@jasmit21:~$ docker container logs nifty_brattain

Hello from Docker!
This message shows that your installation appears to be working correctl
y.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub
.
    (amd64)
 3. The Docker daemon created a new container from that image which runs
 the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which s
ent it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
 $ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
 https://hub.docker.com/

For more examples and ideas, visit:
 https://docs.docker.com/get-started/

jasmit21@jasmit21:~$
```

Container Endings

Sometimes you need to stop a running container.

`docker container stop nifty_brattain` — Stop one or more running containers gracefully. Gives a default of 10 seconds before container shutdown to finish any processes.

```
jasmit21@jasmit21:~$ docker container stop nifty_brattain
nifty_brattain
jasmit21@jasmit21:~$
```

```
jasmit21@jasmit21:~$ docker container stop nifty_brattain
nifty_brattain
jasmit21@jasmit21:~$ docker ps -a
CONTAINER ID   IMAGE             COMMAND          CREATED          STATUS                      PORTS     NAMES
1a998bed21ef   hello-world       "/hello"         5 minutes ago    Exited (0) 5 minutes ago              nifty_brattain
21a209c026a3   hello-world       "jasmit"         7 minutes ago    Created                               focused_meitner
73da64055d14   hello-world       "/hello"         10 minutes ago   Exited (0) 10 minutes ago             jovial_kirch
41b0722ba3b2   hello-world       "/hello"         14 minutes ago   Created                               reverent_meninsky
b4e15a9b7ee4   hello-world       "/hello"         15 minutes ago   Exited (0) 12 minutes ago             distracted_heisenberg
b3fbfbc26c88   hello-world       "/hello"         2 hours ago      Exited (0) 2 hours ago                dazzling_allen
a7991b5c984c   docker/whalesay   "cowsay Jasmit"  2 hours ago      Exited (0) 2 hours ago                peaceful_banach
d4876933d81a   docker/whalesay   "/bin/bash"      2 hours ago      Exited (0) 2 hours ago                admiring_lumiere
b2f0f047491f   hello-world       "/hello"         3 days ago       Exited (0) 3 days ago                 objective_mcnulty
jasmit21@jasmit21:~$
```

Or if you are impatient:

`docker container kill exciting_fermat`— Stop one or more running containers abruptly. It's like pulling the plug on the TV. Prefer `stop` in most situations.

`docker container kill $(docker ps -q)` — Kill all running containers.

Then you delete the container with:

`docker container rm nifty_brattain` — Delete one or more containers.

```
jasmit21@jasmit21:~$ docker container rm nifty_brattain
nifty_brattain
jasmit21@jasmit21:~$ docker ps -a
CONTAINER ID   IMAGE             COMMAND          CREATED          STATUS                      PORTS     NAMES
21a209c026a3   hello-world       "jasmit"         9 minutes ago    Created                               focused_meitner
73da64055d14   hello-world       "/hello"         12 minutes ago   Exited (0) 12 minutes ago             jovial_kirch
41b0722ba3b2   hello-world       "/hello"         16 minutes ago   Created                               reverent_meninsky
b4e15a9b7ee4   hello-world       "/hello"         17 minutes ago   Exited (0) 14 minutes ago             distracted_heisenberg
b3fbfbc26c88   hello-world       "/hello"         2 hours ago      Exited (0) 2 hours ago                dazzling_allen
a7991b5c984c   docker/whalesay   "cowsay Jasmit"  2 hours ago      Exited (0) 2 hours ago                peaceful_banach
d4876933d81a   docker/whalesay   "/bin/bash"      2 hours ago      Exited (0) 2 hours ago                admiring_lumiere
b2f0f047491f   hello-world       "/hello"         3 days ago       Exited (0) 3 days ago                 objective_mcnulty
jasmit21@jasmit21:~$
```

`docker container rm $(docker ps -a -q)` — Delete all containers that are not running.

Those are the eight essential commands for Docker containers.

To recap, you first create a container. Then, you start the container. Or combine those steps with `docker run my_container`. Then, your app runs. Yippee!

Then, you stop a container with `docker stop my_container`. Eventually you delete the container with `docker rm my_container`.

**Conclusion:** Thus, the docker installation on ubuntu was done successfully and the basic commands of docker has been

**Reference:**


1. https://www.simplilearn.com/tutorials/docker-tutorial/how-to-install-docker-on-ubuntu

2. https://towardsdatascience.com/12-essential-docker-commands-you-should-know-c2d5a7751bb5

3. https://docs.docker.com/engine/reference/commandline/container/

4. https://towardsdatascience.com/15-docker-commands-you-should-know-970ea5203421

# ASSIGNMENT 1 : DOCKER VOLUME

## Docker volumes

## How To Share Data Between the Docker Container and the Host

In general, Docker containers are ephemeral, running just as long as it takes for the command issued in the container to complete. By default, any data created inside the container is only available from within the container and only while the container is running.

Docker volumes can be used to share files between a host system and the Docker container. For example, let's say you wanted to use the official Docker Nginx image and keep a permanent copy of Nginx's log files to analyze later. By default, the nginx Docker image will log to the /var/log/nginx directory inside the Docker Nginx container. Normally it's not reachable from the host filesystem.

In this tutorial, we'll explore how to make data from inside the container accessible on the host machine.

## Step 1 — Bind Mounting a Volume

The following command will create a directory called nginx logs in your current user's home directory and bind mount it to /var/log/nginx in the container:

**$docker run --name=nginx -d -v ~/nginxlogs:/var/log/nginx -p 5000:80 nginx**

```
jasmit21@jasmit21:~$ sudo su
[sudo] password for jasmit21:
root@jasmit21:/home/jasmit21# cd
root@jasmit21:~# cd /home/jasmit21
root@jasmit21:/home/jasmit21# docker run --name=nginx -d -v ~/nginxlogs:/var/log/nginx -p 5000:80 nginx
Unable to find image 'nginx:latest' locally
latest: Pulling from library/nginx
e9995326b091: Pull complete
71689475aec2: Pull complete
f88a23025338: Pull complete
0df440342e26: Pull complete
eef26ceb3309: Pull complete
8e3ed6a9e43a: Pull complete
Digest: sha256:943c25b4b66b332184d5ba6bb18234273551593016c0e0ae906bab111548239f
Status: Downloaded newer image for nginx:latest
4e45f8cce6b5b641c2cac1a48cc0ac0f4098892e1630cbfefc7fdadc0434e752
root@jasmit21:/home/jasmit21#
```

Let's take a moment to examine this command in detail:

- --name=nginx names the container so we can refer to it more easily.

- -d detaches the process and runs it in the background. Otherwise, we would just be watching an empty Nginx prompt and wouldn't be able to use this terminal until we killed Nginx.
- -v ~/nginxlogs:/var/log/nginx sets up a bind mount volume that links the /var/log/nginx directory from inside the Nginx container to the ~/nginxlogs directory on the host machine. Docker uses a : to split the host's path from the container path, and the host path always comes first.
- -p 5000:80 sets up a port forward. The Nginx container is listening on port 80 by default. This flag maps the container's port 80 to port 5000 on the host system.
- nginx specifies that the container should be built from the Nginx image, which issues the command nginx -g "daemon off" to start Nginx.

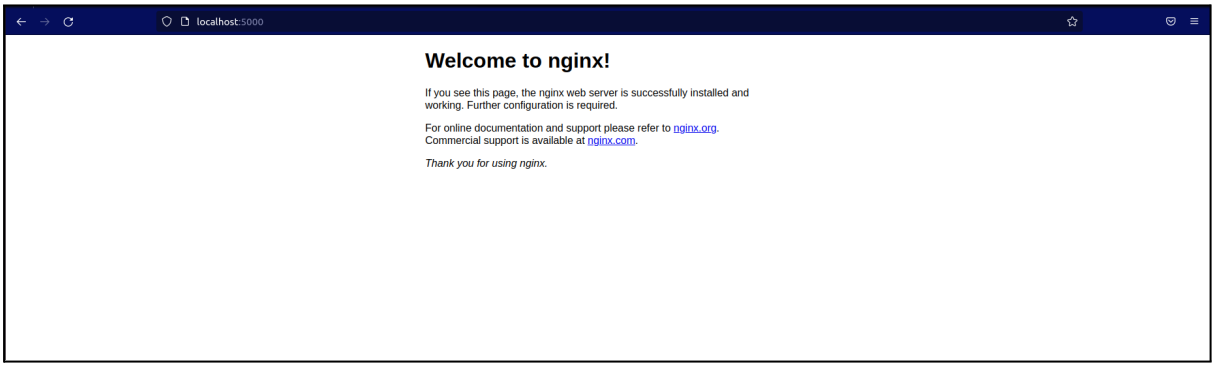
Note: The -v flag is very flexible . It can bindmount or name a volume with just a slight adjustment in syntax. If the first argument begins with a / or ~/, you're creating a bindmount. Remove that, and you're naming the volume.

- -v /path:/path/in/container mounts the host directory, /path at the /path/in /container
- -v path:/path/in/container creates a volume named path with no relations hip to the host.

## Step 2 — Accessing Data on the Host

We now have a copy of Nginx running inside a Docker container on our machine, and our host machine's port 5000 maps directly to that copy of Nginx's port 80.

Load the address in a web browser, using the IP address or hostname of your server and the port number: http://your_server_ip:5000. You should see:



More interestingly, if we look in the ~/nginxlogs directory on the host, we'll see the access.log created by the container's nginx which will show our request:

$cat ~/nginxlogs/access.log

```
root@jasmit21:/home/jasmit21# cat ~/nginxlogs/access.log
172.17.0.1 - - [01/Nov/2022:10:23:46 +0000] "GET / HTTP/1.1" 200 615 "-" "Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:106.0) Gecko/20100101 Firefox/106.0
" "-"
root@jasmit21:/home/jasmit21#
```

This should display something like:

Output

203.0.113.0 - - [11/Jul/2018:00:5 9:11 +0000] "GET / HTTP/1.1" 200 612 "-"

"Mozilla/5.0 (Windows NT 10.0; WOW64) AppleWebKit/537.36

(KHTML, like Gecko) Chrome/54 .0.2840.99 Safari/537.36" "-"

If you make any changes to the ~/nginxlogs folder, you'll be able to see them from inside the Docker container in real time as well.

## How To Share Data between Docker Containers

## Step 1 — Creating an Independent Volume

Introduced in Docker's 1.9 release, the docker volume create command allows you to create a volume without relating it to any particular container. We'll use this command to add a volume named DataVolume1:

**#docker volume create --name DataVolume1**

The name is displayed, indicating that the command was successful:

```
root@jasmit21:/home/jasmit21# docker volume create --name DataVolume1
DataVolume1
root@jasmit21:/home/jasmit21#
```

Output
DataVolume1

To make use of the volume, we'll create a new container from the Ubuntu image, using the --rm flag to automatically delete it when we exit. We'll also use -v to mount the new volume. -v requires the name of the volume, a colon, then the absolute path to where the volume should appear inside the container. If the directories in the path don't exist as part of

the image, they'll be created when the command runs. If they do exist, the mounted volume will hide the existing content:

```
#docker run -ti --rm -v DataVolume1:/datavolume1 ubuntu
```

```
root@jasmit21:/home/jasmit21# docker run -ti --rm -v DataVolume1:/datavolume1 ubuntu
Unable to find image 'ubuntu:latest' locally
latest: Pulling from library/ubuntu
301a8b74f71f: Pull complete
Digest: sha256:7cfe75438fc77c9d7235ae502bf229b15ca86647ac01c844b272b56326d56184
Status: Downloaded newer image for ubuntu:latest
root@fc27537e05b0:/#
```

While in the container, let's write some data to the volume:

```
$echo "Example1" > /datavolume1/Example1.txt
```

Because we used the --rm flag, our container will be automatically deleted when we exit. Our volume, however, will still be accessible.

```
$exit
```

```
root@fc27537e05b0:/# echo "Example1" > datavolume1/Example1.txt
root@fc27537e05b0:/# exit
exit
root@jasmit21:/home/jasmit21#
```

We can verify that the volume is present on our system with docker volume inspect:

```
#docker volume inspect DataVolume1
```

```
root@jasmit21:/home/jasmit21# docker volume inspect DataVolume1
[
    {
        "CreatedAt": "2022-11-01T15:59:18+05:30",
        "Driver": "local",
        "Labels": {},
        "Mountpoint": "/var/lib/docker/volumes/DataVolume1/_data",
        "Name": "DataVolume1",
        "Options": {},
        "Scope": "local"
    }
]
root@jasmit21:/home/jasmit21#
```

Output

```
[
    {
        "CreatedAt": "2018-07-11T16:57:54Z",
        "Driver": "local",
        "Labels": {},
        "Mountpoint": "/var/lib/docker/volumes/DataVolume1/_data",
        "Name": "DataVolume1",
        "Options": {},
        "Scope": "local"
    }
]
```

Note: We can even look at the data on the host at the path listed as the Mountpoint. We should avoid altering it, however, as it can cause data corruption if applications or containers are unaware of changes.

Next, let's start a new container and attach DataVolume1:

```
#docker run --rm -ti -v DataVolume1:/datavolume1 ubuntu
```

Verify the contents:

```
$cat /datavolume1/Example1.txt
```

```
root@jasmit21:/home/jasmit21# docker run --rm -ti -v DataVolume1:/datavolume1 ubuntu
root@6976dbe88b1e:/# cat /datavolume1/Example1.txt
Example1
root@6976dbe88b1e:/#
```

Output
Example1

Exit the container:

```
$exit
```

```
root@jasmit21:/home/jasmit21# docker run --rm -ti -v DataVolume1:/datavolume1 ubuntu
root@6976dbe88b1e:/# cat /datavolume1/Example1.txt
Example1
root@6976dbe88b1e:/# exit
exit
root@jasmit21:/home/jasmit21#
```

In this example, we created a volume, attached it to a container, and verified its persistence.

## Step 2 — Creating a Volume that Persists when the Container is Removed

In our next example, we'll create a volume at the same time as the container, delete the container, then attach the volume to a new container.

We'll use the docker run command to create a new container using the base Ubuntu image. -t will give us a terminal, and -i will allow us to interact with it. For clarity, we'll use --name to identify the container.

The -v flag will allow us to create a new volume, which we'll call DataVolume2. We'll use a colon to separate this name from the path where the volume should be mounted in the container. Finally, we will specify the base Ubuntu image and rely on the default command in the Ubuntu base image's Docker file, bash, to drop us into a shell:

$docker run -ti --name=Container2 -v DataVolume2:/datavolume2 ubuntu

Note: The -v flag is very flexible. It can bindmount or name a volume with just a slight adjustment in syntax. If the first argument begins with a / or ~/ you're creating a bindmount. Remove that, and you're naming the volume. For example:

- -v /path:/path/in/container mounts the host directory, /path at the /path/in/container
- -v path:/path/in/container creates a volume named path with no relationship to the host.

While in the container, we'll write some data to the volume:

$echo "Example2" > /datavolume2/Example2.txt
$cat /datavolume2/Example2.txt
Output
Example2

```
root@jasmit21:/home/jasmit21# docker run -ti --name=Container2 -v DataVolume2:/datavolume2 ubuntu
root@5273b1ec5179:/# echo "Example2" > /datavolume2/Example2.txt
root@5273b1ec5179:/# cat /datavolume2/Example2.txt
Example2
root@5273b1ec5179:/# exit
exit
root@jasmit21:/home/jasmit21#
```

Let's exit the container:

$exit
When we restart the container, the volume will mount automatically:

#docker start -ai Container2

Let’s verify that the volume has indeed mounted and our data is still in place:

```
$cat /datavolume2/Example2.txt
```

Output
Example2

```
root@jasmit21:/home/jasmit21# docker start -ai Container2
root@5273b1ec5179:/# cat /datavolume2/Example2.txt
Example2
root@5273b1ec5179:/# exit
exit
root@jasmit21:/home/jasmit21#
```

Finally, let’s exit and clean up:

```
$exit
```

Docker won’t let us remove a volume if it’s referenced by a container. Let’s see what happens when we try:

```
#docker volume rm DataVolume2
```

The message tells us that the volume is still in use and supplies the long version of the container ID:

```
root@jasmit21:/home/jasmit21# docker volume rm DataVolume2
Error response from daemon: remove DataVolume2: volume is in use - [5273b1ec5179a8b91cbb015e0cc9226780b332baccefd7
36426ceec7196e6091]
root@jasmit21:/home/jasmit21#
```

Output
Error response from daemon: unable to remove volume: remove DataVolume2: volume is in use - [5273b1ec5179a8b91cbb015e0cc9226780b332baccefd736426ceec7196e6091]

We can use this ID to remove the container:

```
#docker rm 5273b1ec5179a8b91cbb015e0cc9226780b332baccefd736426ceec7196e6091
```

Output

```
root@jasmit21:/home/jasmit21# docker rm 5273b1ec5179a8b91cbb015e0cc9226780b332baccefd736426ceec7196e6091
5273b1ec5179a8b91cbb015e0cc9226780b332baccefd736426ceec7196e6091
root@jasmit21:/home/jasmit21#
```

Removing the container won't affect the volume. We can see it's still present on the system by listing the volumes with docker volume ls:

```
#docker volume ls
```

Output

| DRIVER | VOLUME NAME |
|---|---|
| local | DataVolume2 |

```
root@jasmit21:/home/jasmit21# docker rm 5273b1ec5179a8b91cbb015e0cc9226780b332baccefd736426ceec7196e6091
5273b1ec5179a8b91cbb015e0cc9226780b332baccefd736426ceec7196e6091
root@jasmit21:/home/jasmit21#
root@jasmit21:/home/jasmit21# docker volume ls
DRIVER    VOLUME NAME
local     7af2bb204bae47ed0ae86c99f120af21b6f30e56d7e8f4d80f366fe9fb92cda9
local     DataVolume1
local     DataVolume2
root@jasmit21:/home/jasmit21#
```

And we can use docker volume rm to remove it:

```
#docker volume rm DataVolume2
```

```
root@jasmit21:/home/jasmit21# docker volume rm DataVolume2
DataVolume2
root@jasmit21:/home/jasmit21#
```

In this example, we created an empty data volume at the same time that we created a container. In our next example, we'll explore what happens when we create a volume with a container directory that already contains data.

## Step 3 — Creating a Volume from an Existing Directory with Data

Generally, creating a volume independently with docker volume create and creating one while creating a container are equivalent, with one exception. If we create a volume at the same time that we create a container and we provide the path to a directory that contains data in the base image, that data will be copied into the volume.

As an example, we'll create a container and add the data volume at /var, a directory which contains data in the base image:

```
#docker run -ti --rm -v DataVolume3:/var ubuntu
```

```
root@jasmit21:/home/jasmit21# docker run -ti --rm -v DataVolume3:/var ubun
root@7b322bf52cdb:/# exit
exit
root@jasmit21:/home/jasmit21#
```

All the content from the base image's /var directory is copied into the volume, and we can mount that volume in a new container.

Exit the current container:

$exit

This time, rather than relying on the base image's default bash command, we'll issue our own ls command, which will show the contents of the volume without entering the shell:

```
#docker run --rm -v DataVolume3:/datavolume3 ubuntu ls datavolume3
```

The directory datavolume3 now has a copy of the contents of the base image's /var directory:

Output
backups
cache
lib
local
lock
log
mail
opt
run
spool
tmp

```
root@jasmit21:/home/jasmit21# docker run --rm -v DataVolume3:/datavolume3 ubuntu ls datavolume3
backups
cache
lib
local
lock
log
mail
opt
run
spool
tmp
root@jasmit21:/home/jasmit21#
```

It's unlikely that we would want to mount /var/ in this way, but this can be helpful if we've crafted our own image and want an easy way to preserve data. In our next example, we'll demonstrate how a volume can be shared between multiple containers.

## Step 4 — Sharing Data Between Multiple Docker Containers

So far, we've attached a volume to one container at a time. Often, we'll want multiple containers to attach to the same data volume. This is relatively straightforward to accomplish, but there's one critical caveat: at this time, Docker doesn't handle file locking. If you need multiple containers writing to the volume, the applications running in those containers must be designed to write to shared data stores in order to prevent data corruption.

Create Container4 and DataVolume4

Use docker run to create a new container named Container4 with a data volume attached:

```
#docker run -ti --name=Container4 -v DataVolume4:/datavolume4 ubuntu
```

Next we'll create a file and add some text:

```
$echo "This file is shared between containers" > /datavolume4/Example4.txt
```

Then, we'll exit the container:

```
$exit
```

```
root@jasmit21:/home/jasmit21# docker run -ti --name=Container4 -v DataVolume4:/datavolume4 ubuntu
root@d605be7b9d07:/# echo "This file is shared between containers" > /datavolume4/Example4.txt
root@d605be7b9d07:/# exit
exit
root@jasmit21:/home/jasmit21#
```

This returns us to the host command prompt, where we'll make a new container that mounts the data volume from Container4.

Create Container5 and Mount Volumes from Container4

We're going to create Container5, and mount the volumes from Container4: #docker run -ti --name=Container5 --volumes-from Container4 ubuntu Let's check the data persistence:

```
$cat /datavolume4/Example4.txt
```

Output

```
root@jasmit21:/home/jasmit21# docker run -ti --name=Container5 --volumes-from Container4 ubuntu
root@e69ab967d662:/# cat /datavolume4/Example4.txt
This file is shared between containers
root@e69ab967d662:/#
```

This file is shared between containers

Now let's append some text from Container5:

$echo "Both containers can write to DataVolume4" >> /datavolume4/Example4.txt

```
root@e69ab967d662:/# echo "Both containers can write to DataVolume4" >> /datavolume4/Example4.txt
root@e69ab967d662:/# exit
exit
root@jasmit21:/home/jasmit21#
```

Finally, we'll exit the container:

$exit

Next, we'll check that our data is still present to Container4.

View Changes Made in Container5

Let's check for the changes that were written to the data volume by Container5 by restarting Container4:

#docker start -ai Container4

Check for the changes:

$cat /datavolume4/Example4.txt

Output

This file is shared between containers

Both containers can write to DataVolume4

```
root@d605be7b9d07:/# cat /datavolume4/Example4.txt
This file is shared between containers
Both containers can write to DataVolume4
root@d605be7b9d07:/# exit
exit
root@jasmit21:/home/jasmit21#
```

Now that we've verified that both containers were able to read and write from the data volume, we'll exit the container:

```
$exit
```

Again, Docker doesn't handle any file locking, so applications must account for the file locking themselves. It is possible to mount a Docker volume as read-only to ensure that data corruption won't happen by accident when a container requires read-only access by adding :ro. Let's look at how this works.

Start Container 6 and Mount the Volume Read-Only

Once a volume has been mounted in a container, rather than unmounting it like we would with a typical Linux file system, we can instead create a new container mounted the way we want and,

if needed, remove the previous container. To make the volume read-only, we append :ro to the end of the container name:

```
#docker run -ti --name=Container6 --volumes-from Container4:ro ubuntu
```

We'll check the read-only status by trying to remove our example file:

```
$rm /datavolume4/Example4.txt
```

Output

rm: cannot remove '/datavolume4/Example4.txt': Read-only file system

```
root@jasmit21:/home/jasmit21# docker run -ti --name=Container6 --volumes-from
Container4:ro ubuntu
root@07f674a6343e:/# rm /datavolume4/Example4.txt
rm: cannot remove '/datavolume4/Example4.txt': Read-only file system
root@07f674a6343e:/# exit
exit
root@jasmit21:/home/jasmit21#
```

Finally, we'll exit the container and clean up our test containers and volumes:

```
$exit
```

Now that we're done, let's clean up our containers and volume:

```
#docker rm Container4 Container5 Container6
```

```
#docker volume rm DataVolume4
```

In this example, we've shown how to share data between two containers using a data volume and how to mount a data volume as read-only.

```
root@jasmit21:/home/jasmit21# docker rm Container4 Container5 Container6
Container4
Container5
Container6
root@jasmit21:/home/jasmit21# docker rm DataVolume4
Error: No such container: DataVolume4
root@jasmit21:/home/jasmit21# docker volume rm DataVolume4
DataVolume4
root@jasmit21:/home/jasmit21#
```

Delete all volumes at once

Using docker rm command, we can remove one volume at a time. If we have multiple volumes and want to delete all volumes then we have to use prune command.

Let us create a few volumes:

```
root@jasmit21:/home/jasmit21# docker volume create volume1
volume1
root@jasmit21:/home/jasmit21# docker volume create volume2
volume2
root@jasmit21:/home/jasmit21# docker volume create volume3
volume3
root@jasmit21:/home/jasmit21# docker volume ls
DRIVER    VOLUME NAME
local     7af2bb204bae47ed0ae86c99f120af21b6f30e56d7e8f4d80f366fe9fb92cda9
local     DataVolume1
local     DataVolume3
local     volume1
local     volume2
local     volume3
```

Now delete all docker volumes at once using command:

```
# docker volume prune
```

```
root@jasmit21:/home/jasmit21# docker volume prune
WARNING! This will remove all local volumes not used by at least one container
.
Are you sure you want to continue? [y/N] y
Deleted Volumes:
DataVolume1
DataVolume3
volume1
volume2
volume3
7af2bb204bae47ed0ae86c99f120af21b6f30e56d7e8f4d80f366fe9fb92cda9

Total reclaimed space: 212.7MB
root@jasmit21:/home/jasmit21# docker volume ls
DRIVER    VOLUME NAME
root@jasmit21:/home/jasmit21#
```

Conclusion

In this tutorial, we created a data volume which allowed data to persist through the deletion of a container. We shared data volumes between containers, with the caveat that applications will need to be designed to handle file locking to prevent data corruption. Finally, we showed how to mount a shared volume in read-only mode. If you're interested in learning about sharing data between containers and the host system,

REFERENCES :

https://www.digitalocean.com/community/tutorials/how-to-share-data-between-docker-containers
https://www.digitalocean.com/community/tutorials/how-to-share-data-between-docker-containers

# Assignment 02

## To Download & Install Selenium WebDriver on Ubuntu

Selenium installation is a 3 step process:

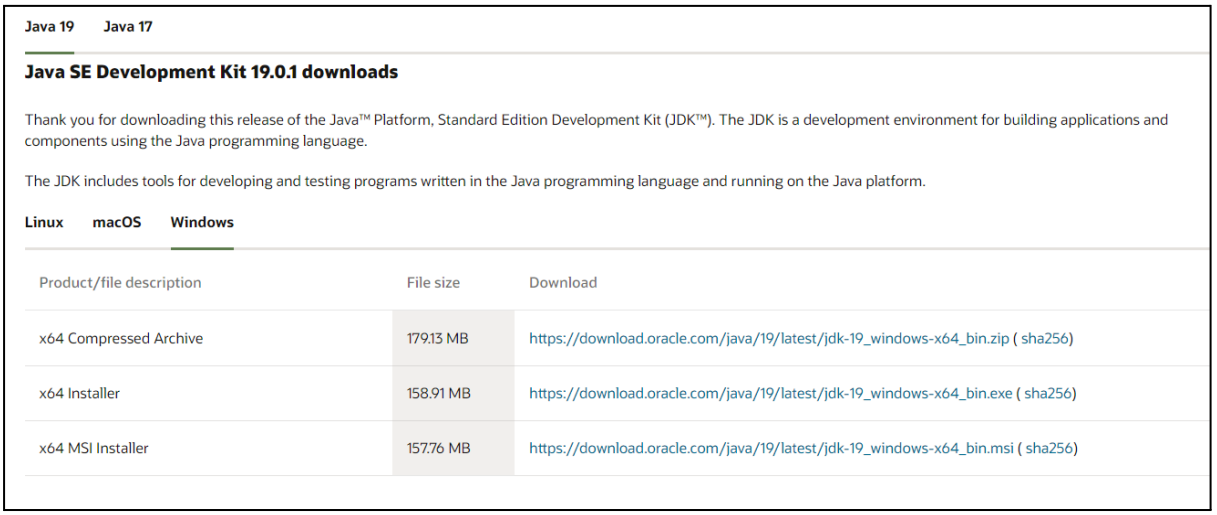
1. Install Java SDK - https://www.oracle.com/java/technologies/javase-downloads.html
2. Install Eclipse - http://www.eclipse.org/downloads/
3. Install Selenium Webdriver Files - https://www.selenium.dev/downloads/

In this tutorial, we will learn how to install Selenium Webdriver . Below is the detailed process

NOTE: The versions of Java, Eclipse, Selenium will keep updating with time. But the installation steps will remain the same. Please select the latest version and continue the installation steps below-

### Step 1 – Install Java on your computer

Download and install the **Java Software Development Kit (JDK)** here.



Java 19 Java 17

**Java SE Development Kit 19.0.1 downloads**

Thank you for downloading this release of the Java™ Platform, Standard Edition Development Kit (JDK™). The JDK is a development environment for building applications and components using the Java programming language.

The JDK includes tools for developing and testing programs written in the Java programming language and running on the Java platform.

Linux macOS Windows

| Product/file description | File size | Download |
|---|---|---|
| x64 Compressed Archive | 179.13 MB | https://download.oracle.com/java/19/latest/jdk-19_windows-x64_bin.zip ( sha256) |
| x64 Installer | 158.91 MB | https://download.oracle.com/java/19/latest/jdk-19_windows-x64_bin.exe ( sha256) |
| x64 MSI Installer | 157.76 MB | https://download.oracle.com/java/19/latest/jdk-19_windows-x64_bin.msi ( sha256) |

Next –

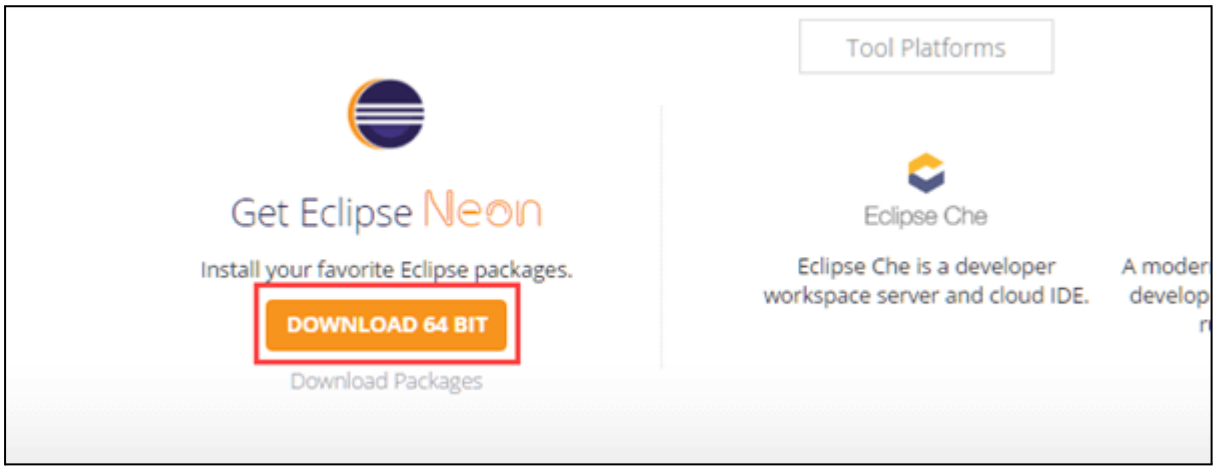
This JDK version comes bundled with Java Runtime Environment (JRE), so you do not need to download and install the JRE separately.

Once installation is complete, open command prompt and type “java”. If you see the following screen you are good to move to the next step

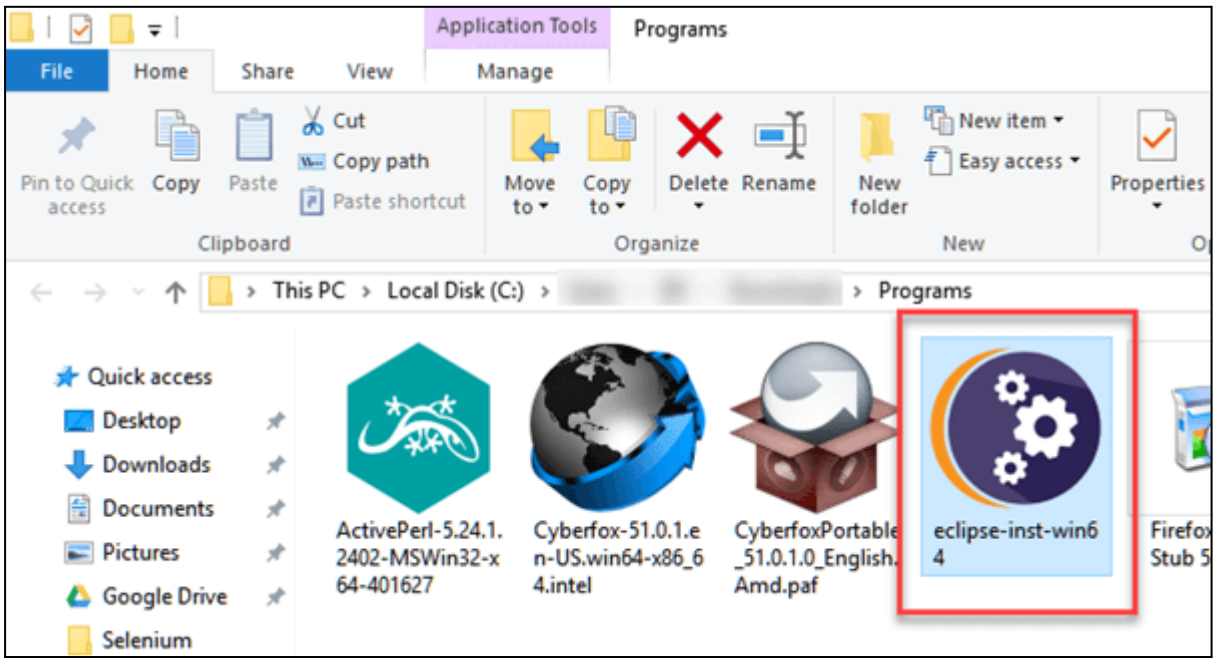
```
jasmit21@jasmit21:~$ java --version
openjdk 11.0.16 2022-07-19
OpenJDK Runtime Environment (build 11.0.16+8-post-Ubuntu-0ubuntu122.04)
OpenJDK 64-Bit Server VM (build 11.0.16+8-post-Ubuntu-0ubuntu122.04, mixed mode,
 sharing)
jasmit21@jasmit21:~$
```

**Step 2 – Install Eclipse IDE**

Download latest version of **"Eclipse IDE for Java Developers"** here. Be sure to choose correctly between Windows 32 Bit and 64 Bit versions.

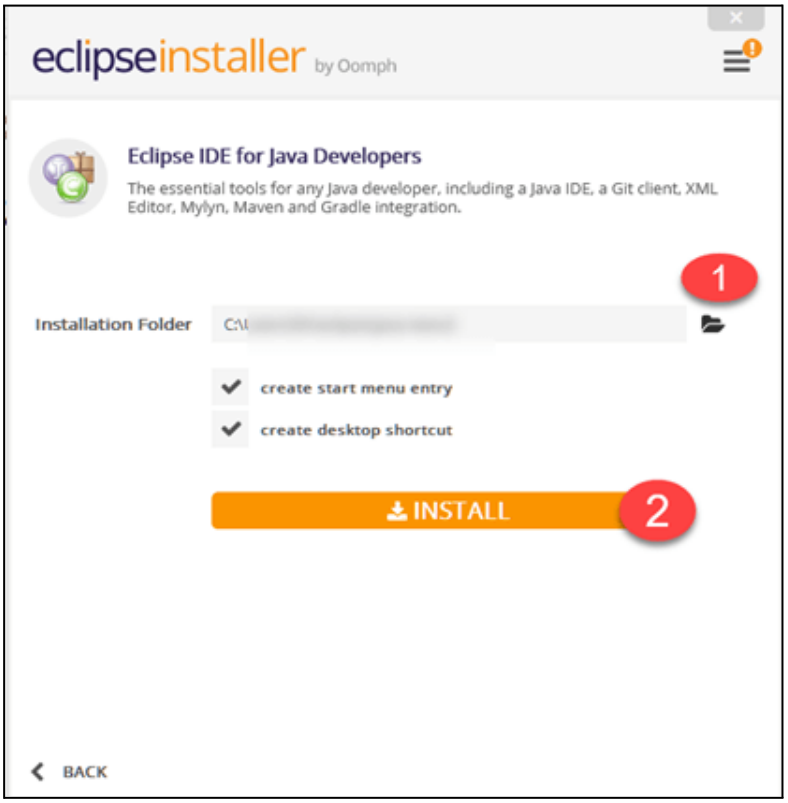



You should be able to download an exe file named "eclipse-inst-win64" for Setup.

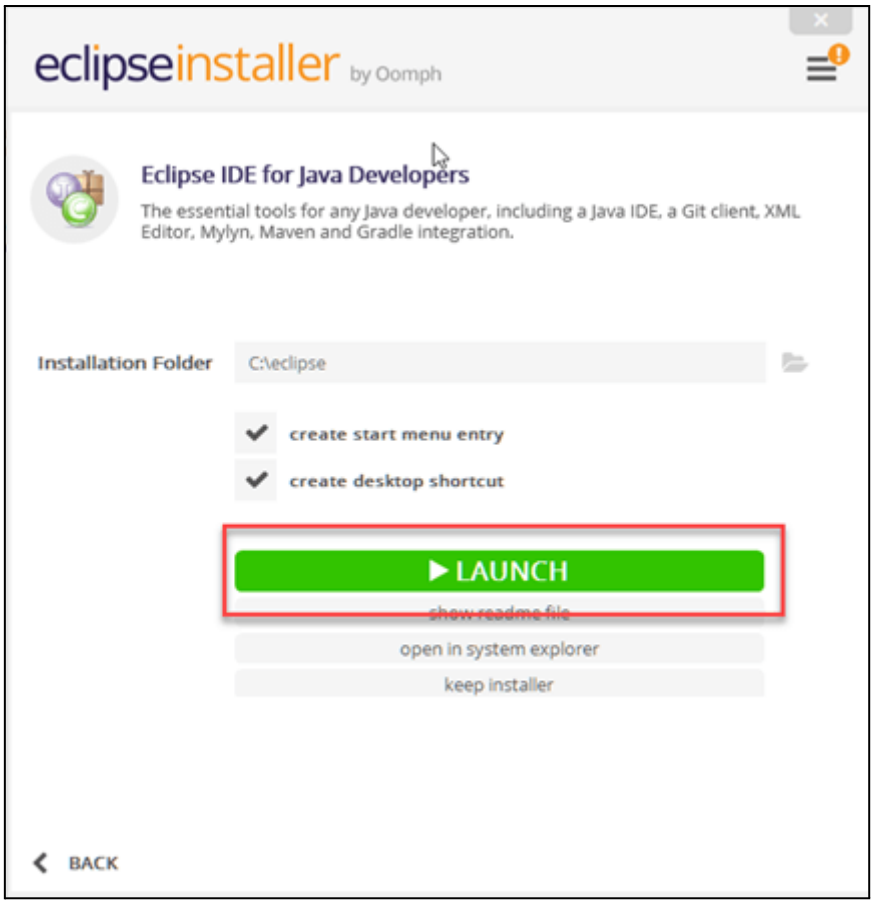



Double-click on file to Install the Eclipse. A new window will open. Click Eclipse IDE for Java Developers.


After that, a new window will open which click button marked 1 and change path to "C:\eclipse". Post that Click on Install button marked 2



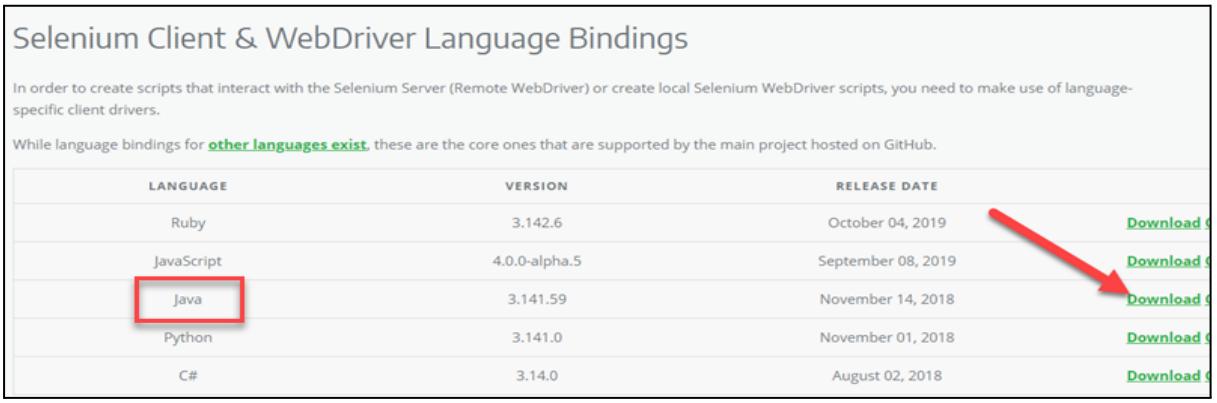
After successful completion of the installation procedure, a window will appear. On that window click on Launch




This will start eclipse neon IDE for you.

### Step 3 – Download the Selenium Java Client Driver

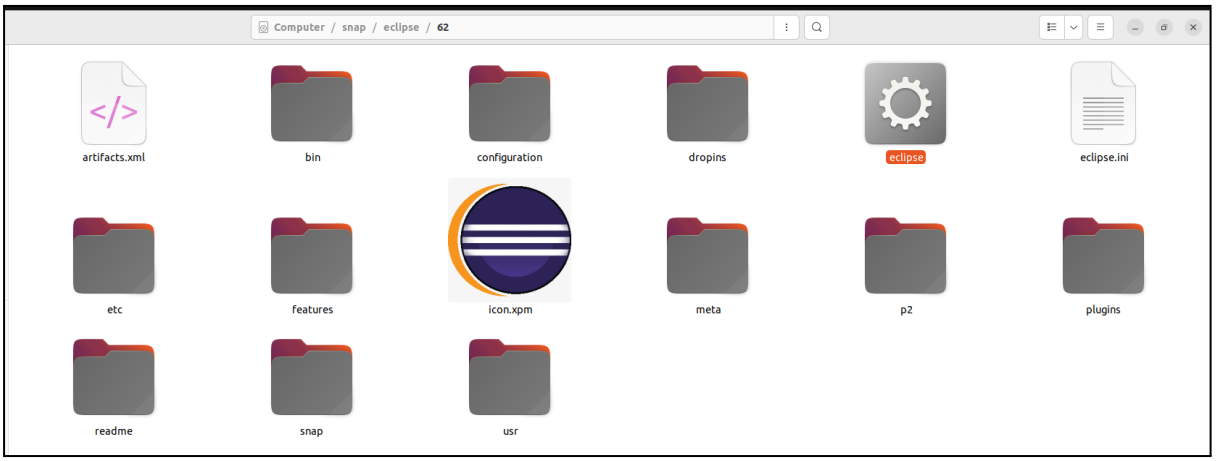
You can download **Selenium Webdriver for Java Client Driver** here. You will find client drivers for other languages there, but only choose the one for Java.



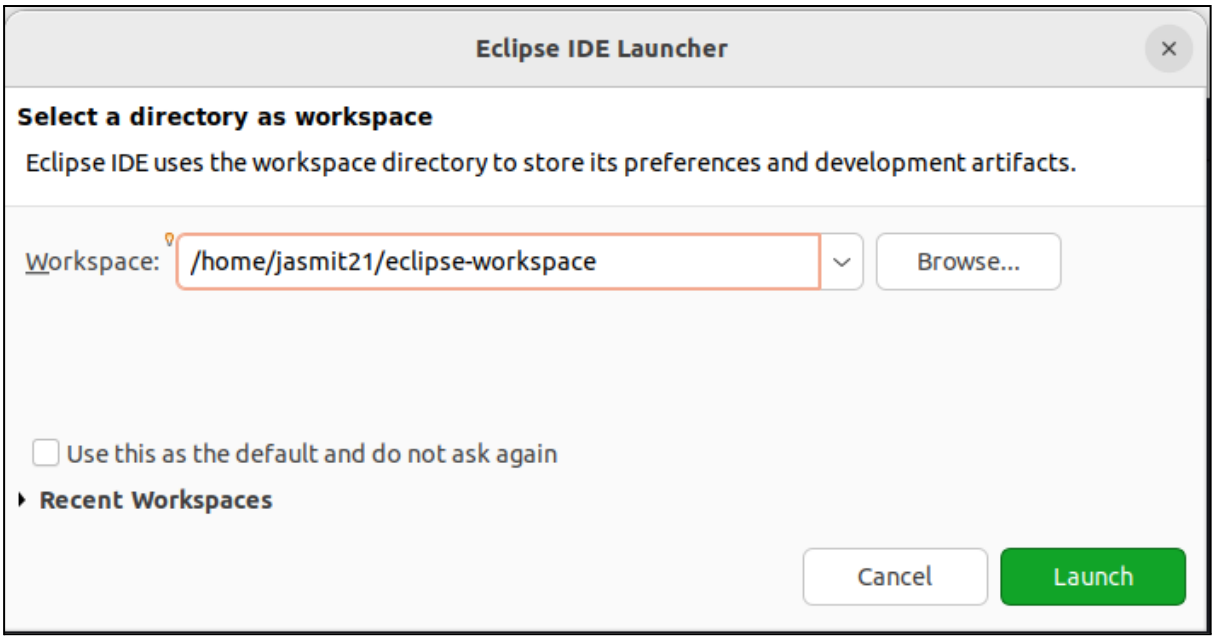

This download comes as a ZIP file named “selenium-3.14.0.zip”. For simplicity of Selenium installation on Windows 10, extract the contents of this ZIP file on your C drive so that you would have the directory “C:\selenium-3.14.0\”. This directory contains all the JAR files that we would later import on Eclipse for Selenium setup.

### Step 4 – Configure Eclipse IDE with WebDriver

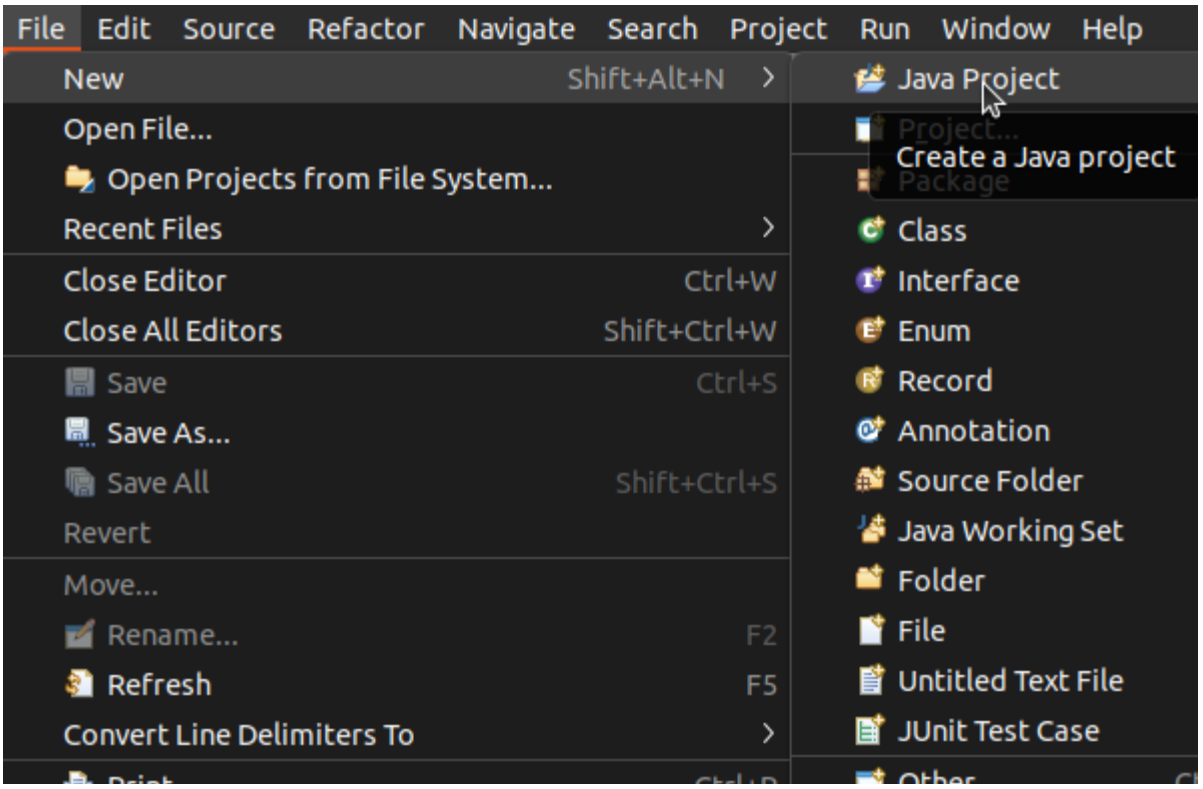
1. Locate the eclipse folder and search for executable file , then launch the eclipse



2. When asked to select a workspace, just accept the default location.

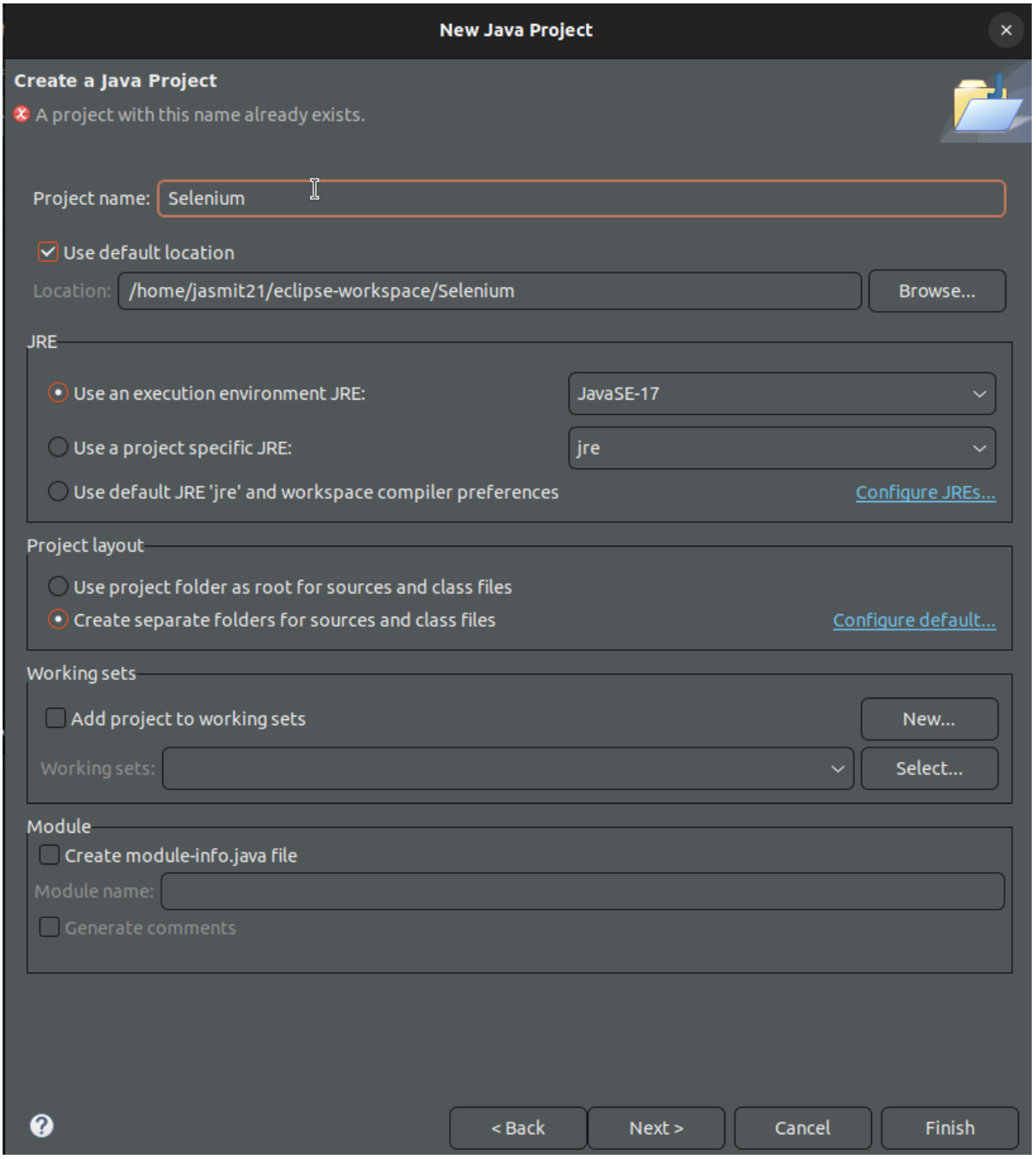



3. Create a new project through File > New > Java Project. Name the project as "Selenium_Demo".



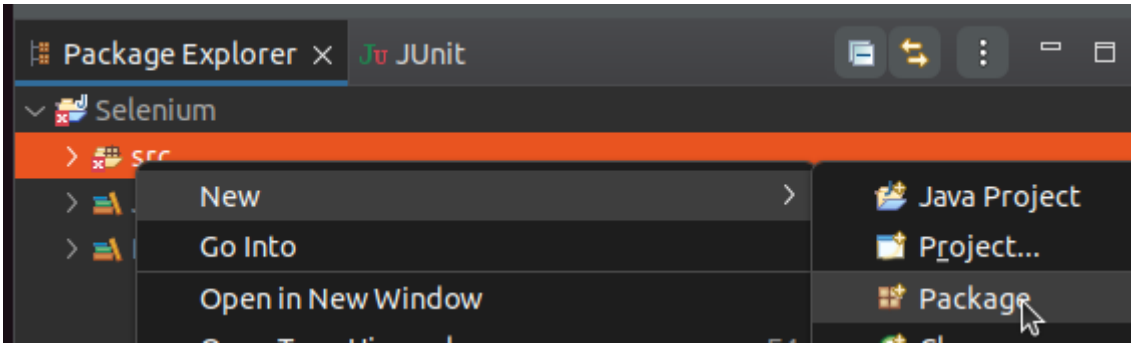
A new pop-up window will open enter details as follow

1. Project Name
2. Location to save project
3. Select an execution JRE
4. Select layout project option
5. Click on Finish button



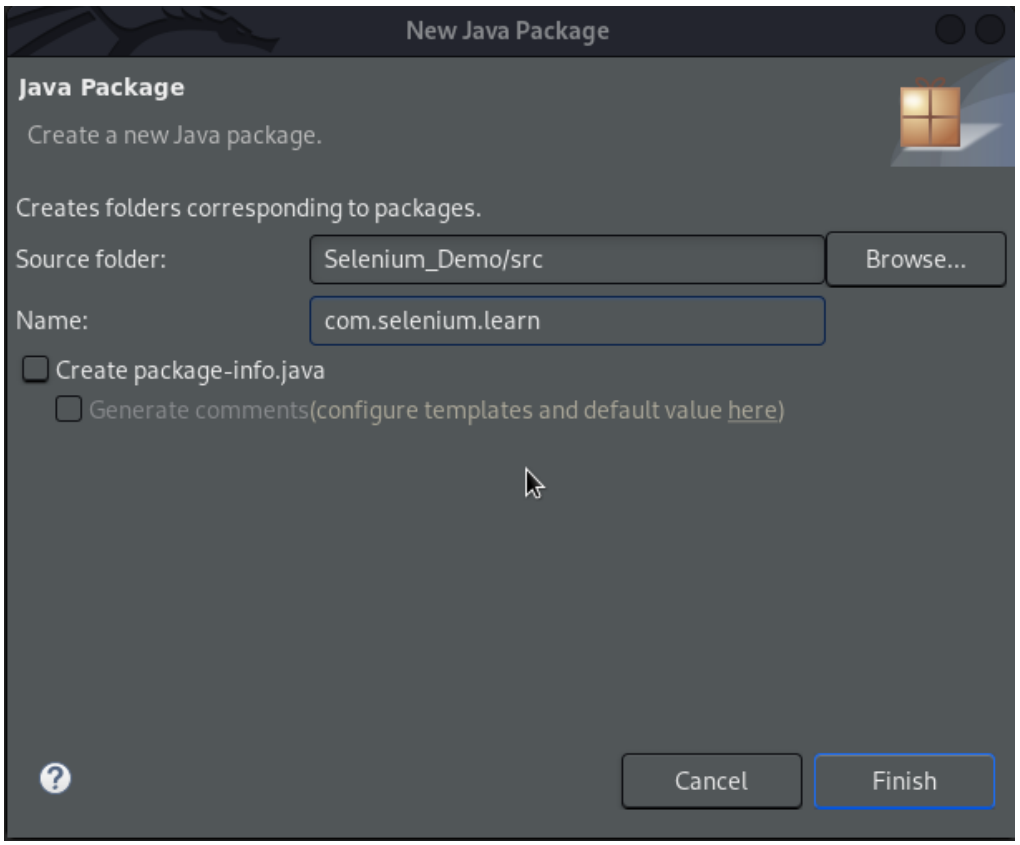
4. In this step,

1. Right-click on the newly created project and
2. Select New > Package, and name that package as “com.selenium.learn”.

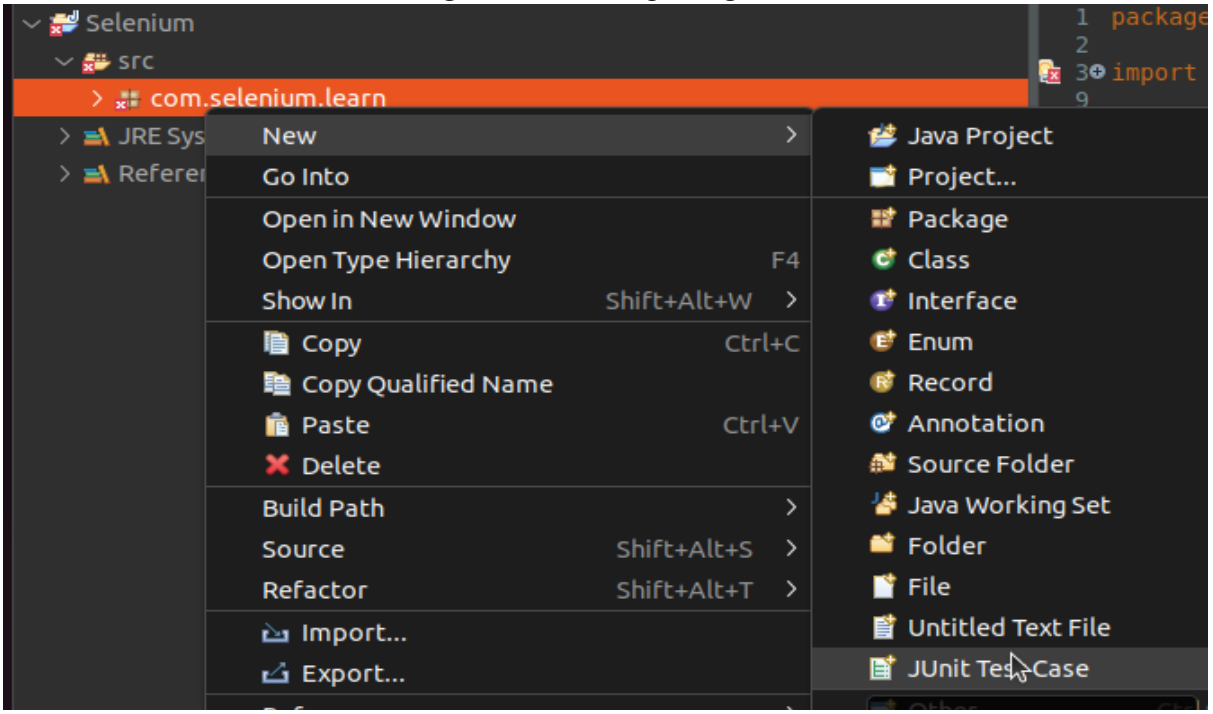



A pop-up window will open to name the package,

1. Enter the name of the package
2. Click on Finish button

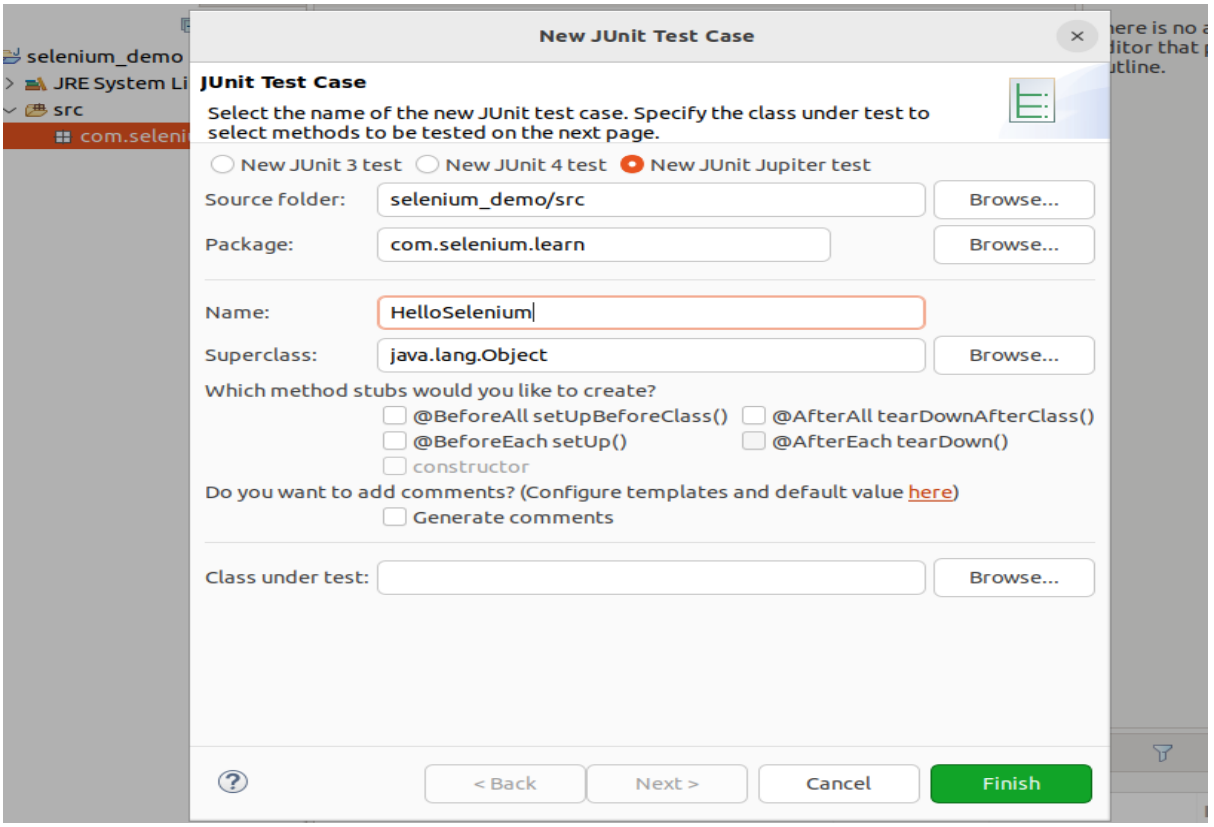


5. Create a new Junit Test Case , right click on the package → new → Junit test case

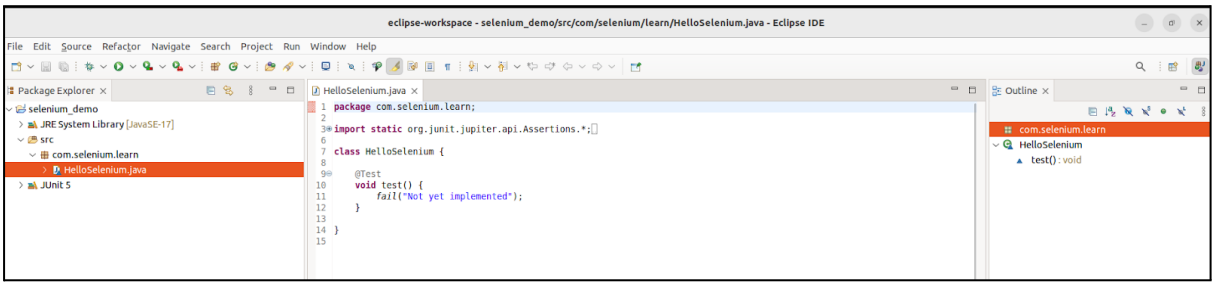



When you click on Junit Test Case, a pop-up window will open, enter details as

1. Name (Put name as HelloSelenium )
2. Click on Finish button



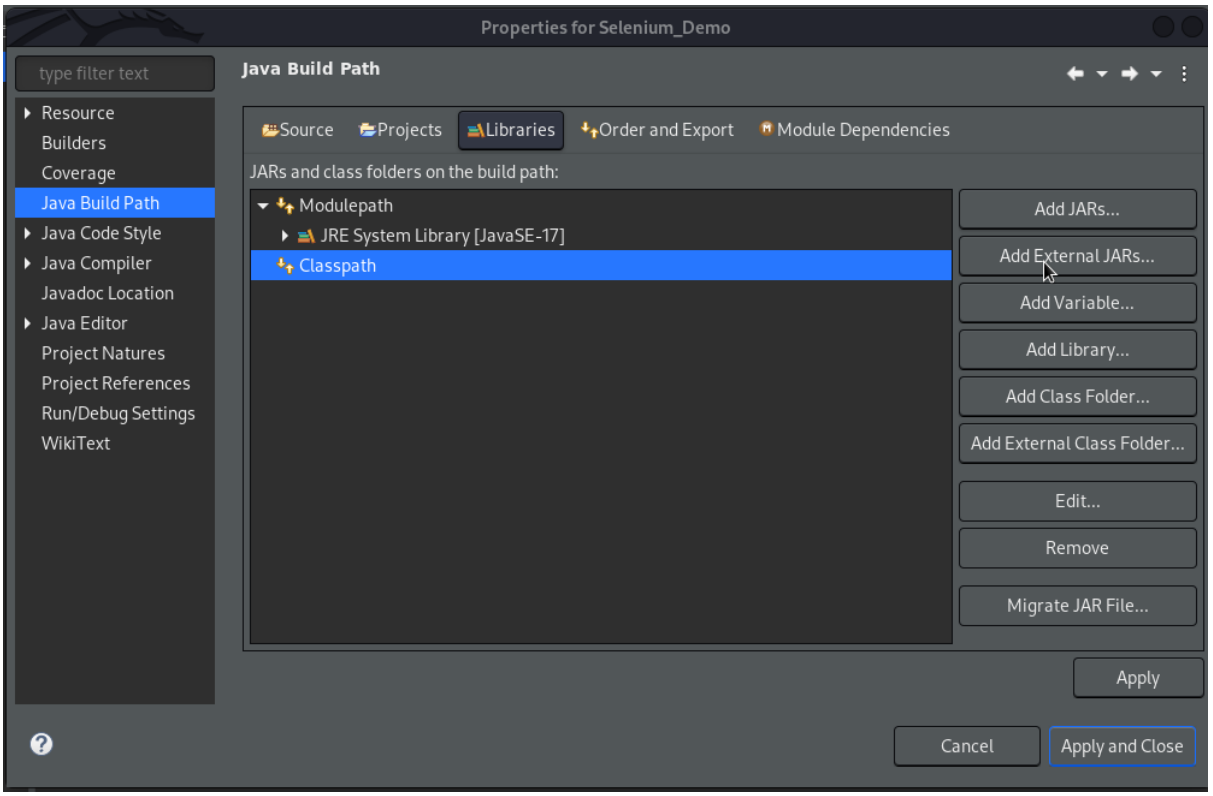
This is how it looks like after creating Junit



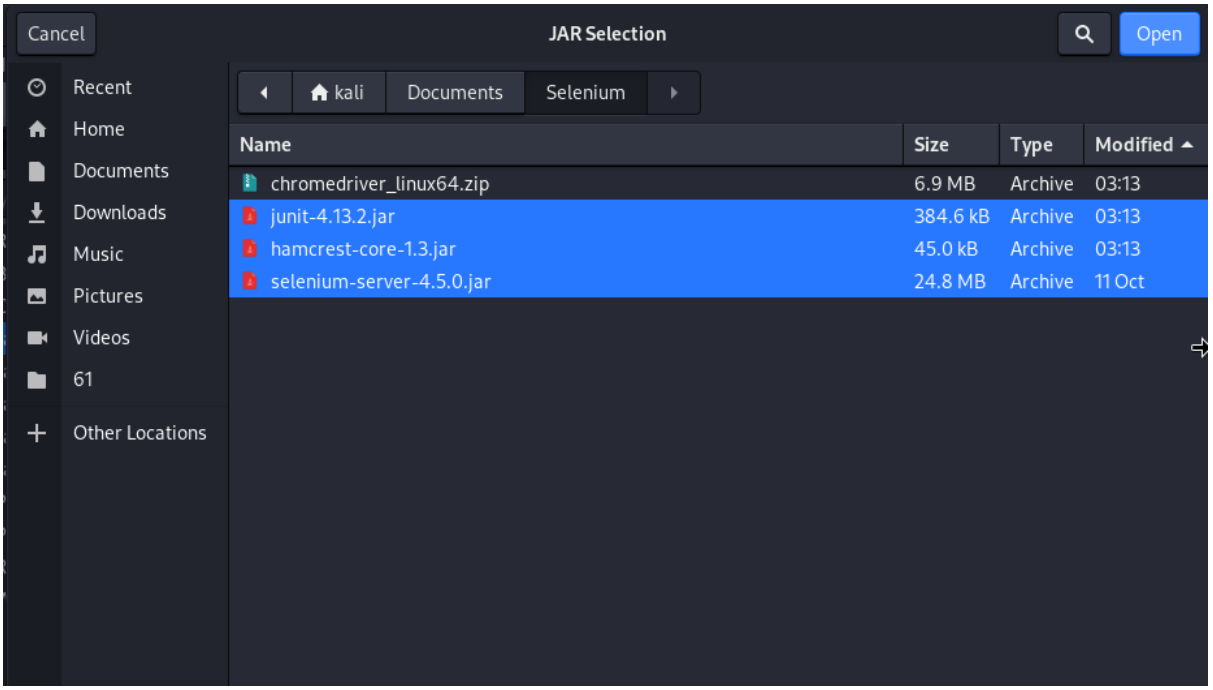

Now selenium WebDriver's into Java Build Path

In this step,

1. Right-click on your project and select **Properties**.
2. On the Properties dialog, click on "Java Build Path".
3. Click on the **Libraries** tab, and then classpath
4. Click on "Add External JARs.."

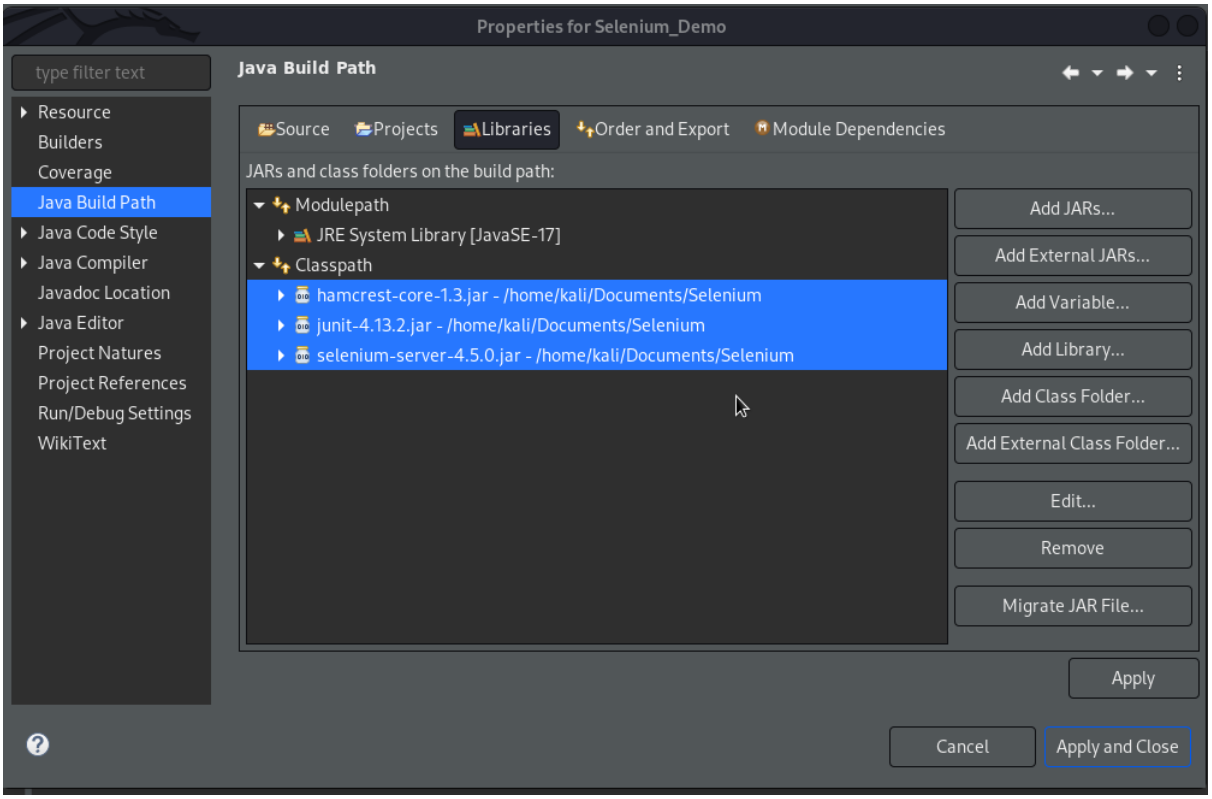


When you click on “Add External JARs..” It will open a pop-up window. Select the JAR files you want to add. ( Make sure you select all three jar files including junit , hamcrest , selenium-server




After selecting jar files, click on the OK button.

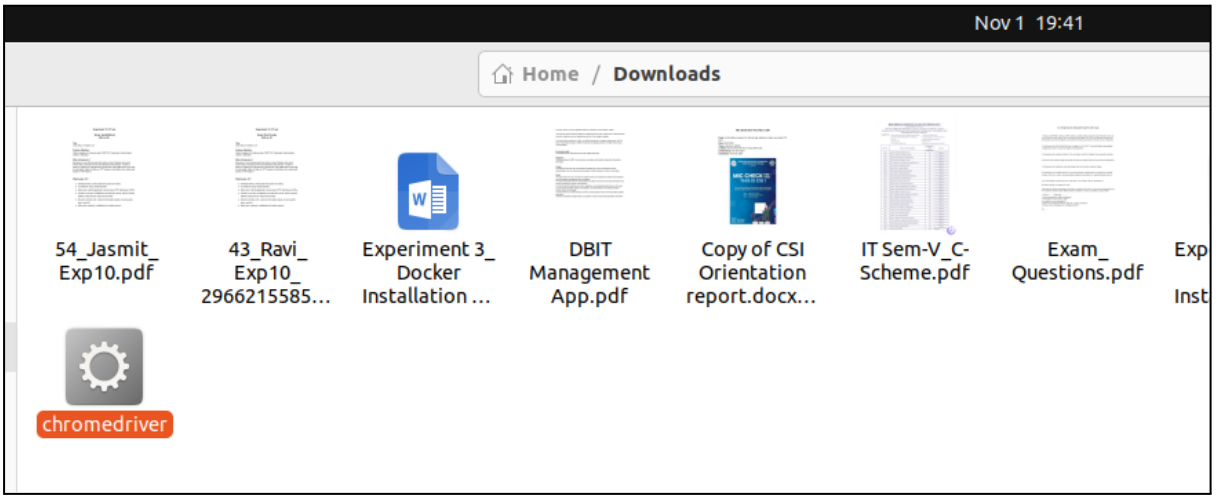
6. Add all the JAR files inside and outside the “libs” folder. Your Properties dialog should now look similar to the image below.



HelloSelenium.java

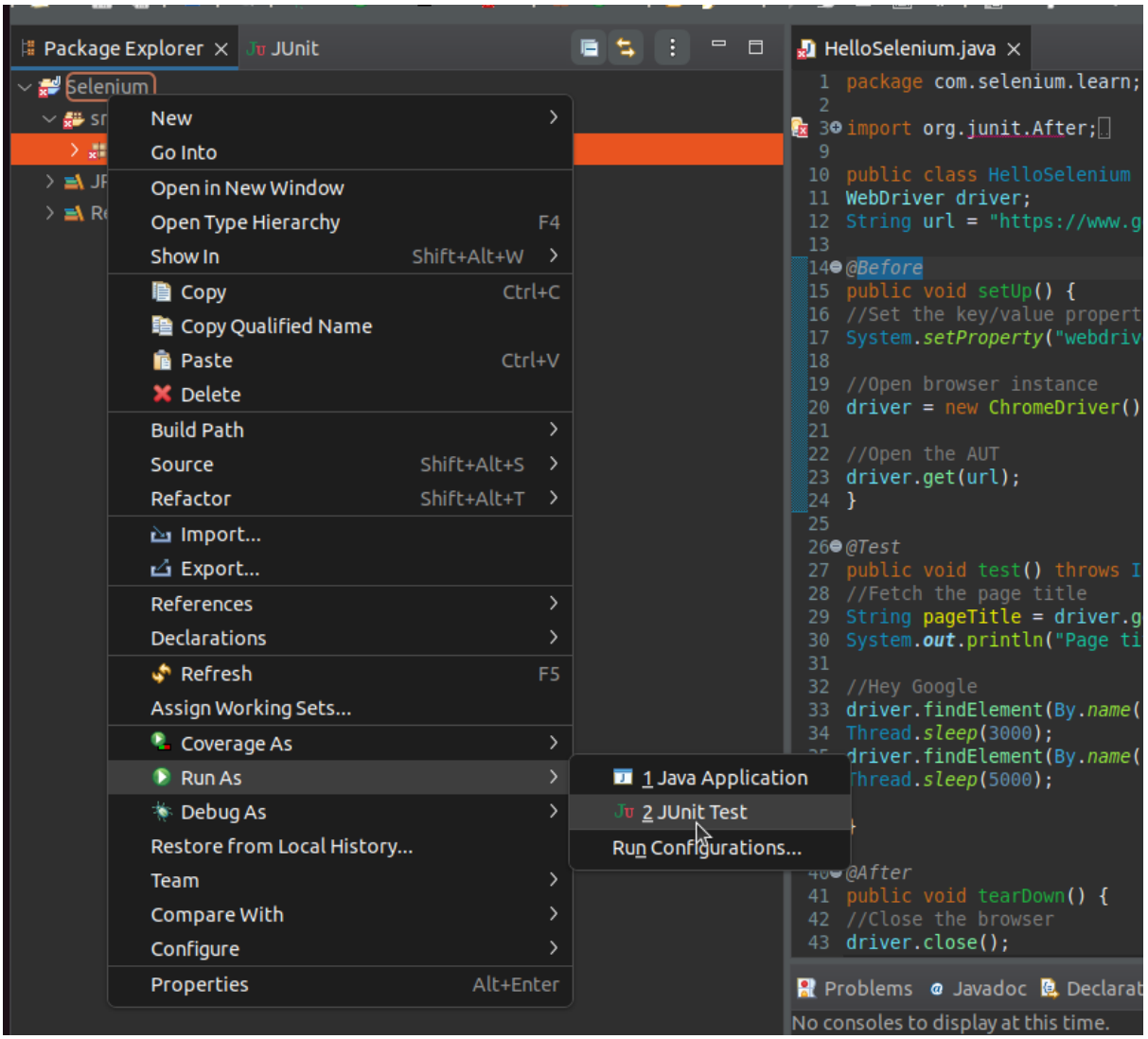
```java
package com.selenium.learn; // Your package structure may be different or if using default package remove this.


import org.junit.After;
import org.junit.Before;
import org.junit.Test;
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.chrome.ChromeDriver;

public class HelloSelenium {
WebDriver driver;
String url = "https://www.google.com/";

@Before
public void setUp() {
//Set the key/value property according to the browser you are using.
System.setProperty("webdriver.chrome.driver","/home/ruthra/Selenium_Setup/chromedriver");

//Open browser instance
driver = new ChromeDriver();

//Open the AUT
driver.get(url);
}

@Test
public void test() throws InterruptedException {
//Fetch the page title
String pageTitle = driver.getTitle();
System.out.println("Page title: " + pageTitle);

//Hey Google
driver.findElement(By.name("q")).sendKeys("Hey World");
Thread.sleep(3000);
driver.findElement(By.name("btnK")).click();
Thread.sleep(5000);

}
```

8. Change the chromedriver path , remove the given path and add from your system

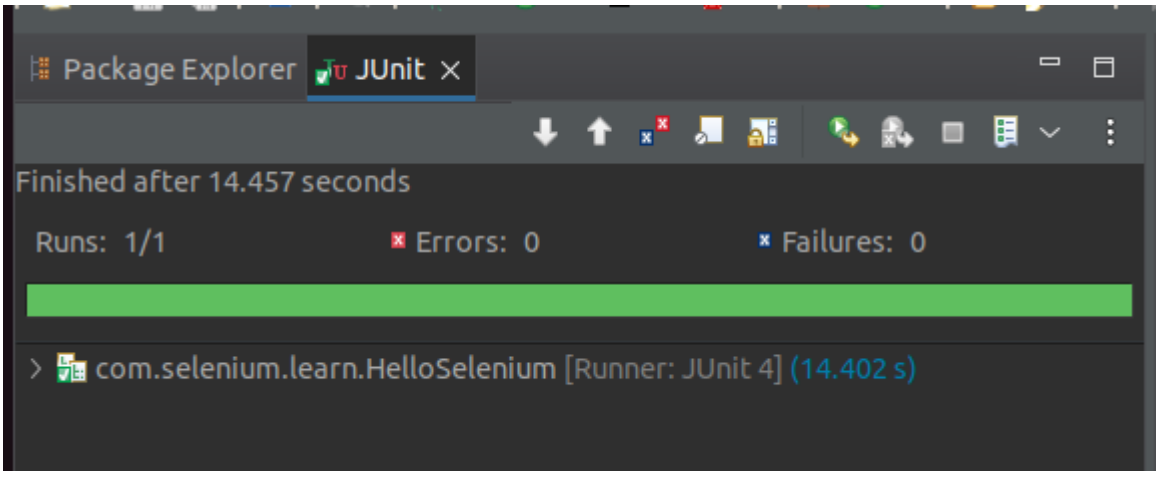


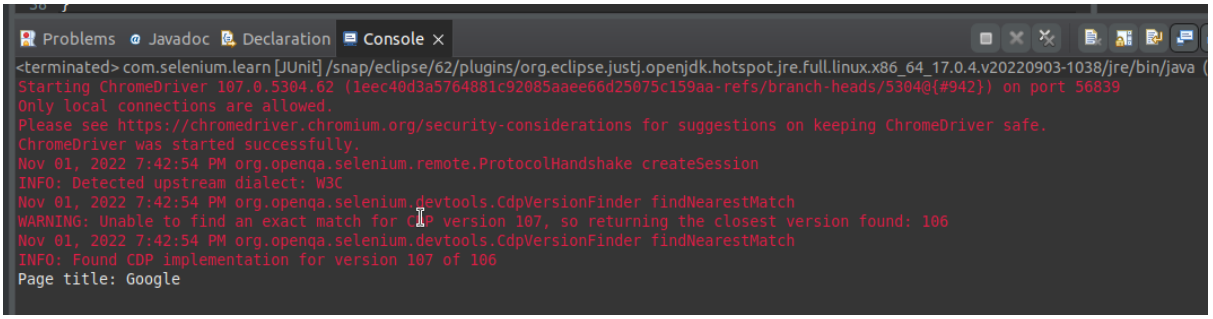

```java
@Before
public void setUp() {
//Set the key/value property according to the browser you are using.
System.setProperty("webdriver.chrome.driver","/home/jasmit21/Downloads/chromedriver");

//Open browser instance
driver = new ChromeDriver();

```

9. Right click on the project and run as Junit Test




**Output:**






**Conclusion:** Thus installation and first program on Selenium was run successfully

**References :**

1. https://drive.google.com/drive/folders/113WPhiDvpeLb7lm3goo7vtNT0kTAjXIH?usp=sharing
2. https://www.youtube.com/watch?v=MUTBV1RJBiQ&t=511s
3. https://www.guru99.com/installing-selenium-webdriver.html