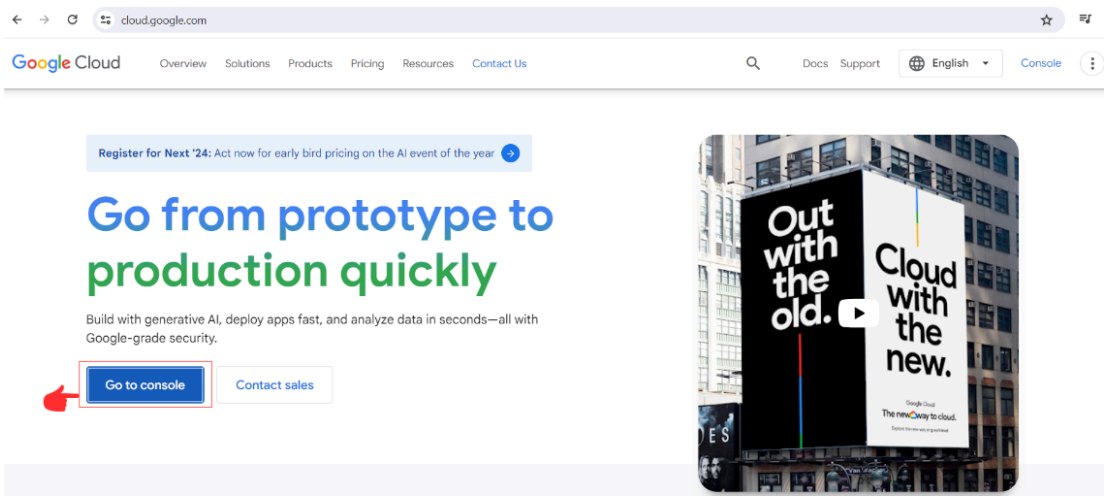
Deploying and Configuring Jenkins Server

(Usually these activities are performed by DevOps Engineers)

Go to cloud.google.com

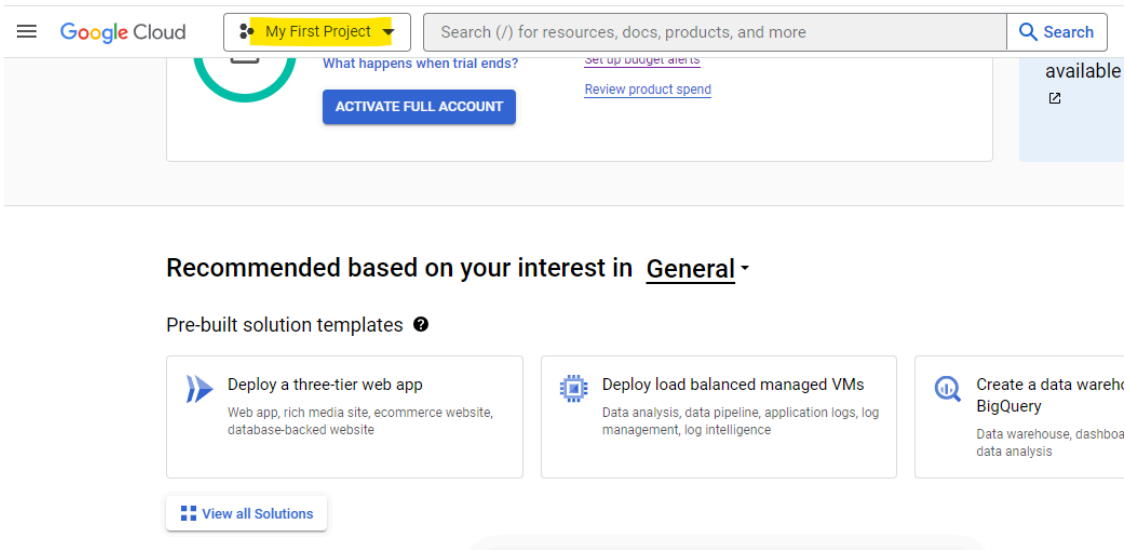
Create a GCP account (provides 300$ free credits that would be valid for 3 months)

Once you create an account -> Go to Console => **https://console.cloud.google.com**



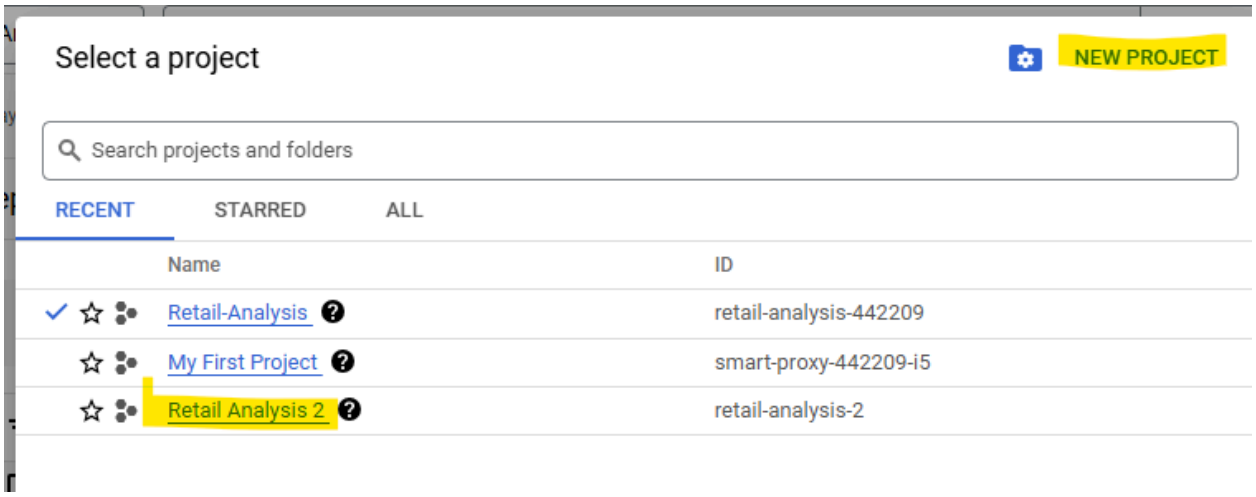
Create a new Project and Deploy Resources (Like - Jenkins)

To create the new project name as shown in the screenshot:

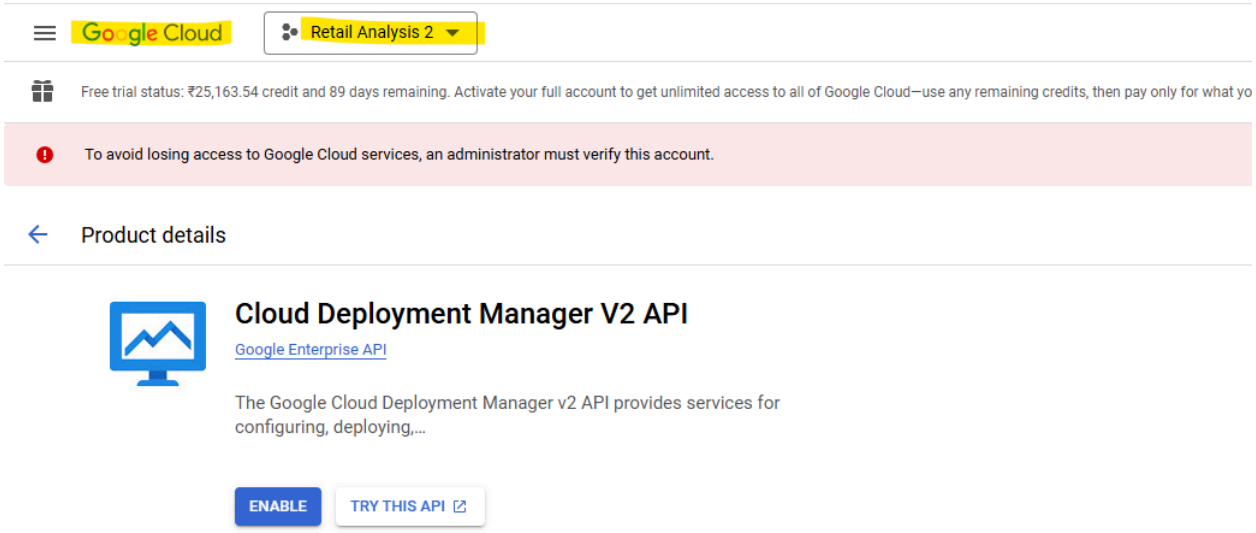


Now, the screen below will be visible. To initiate the creation of a new project, select the **"NEW PROJECT"** option highlighted in the screenshot below.

Now create the new project ex: Retail Analysis 2



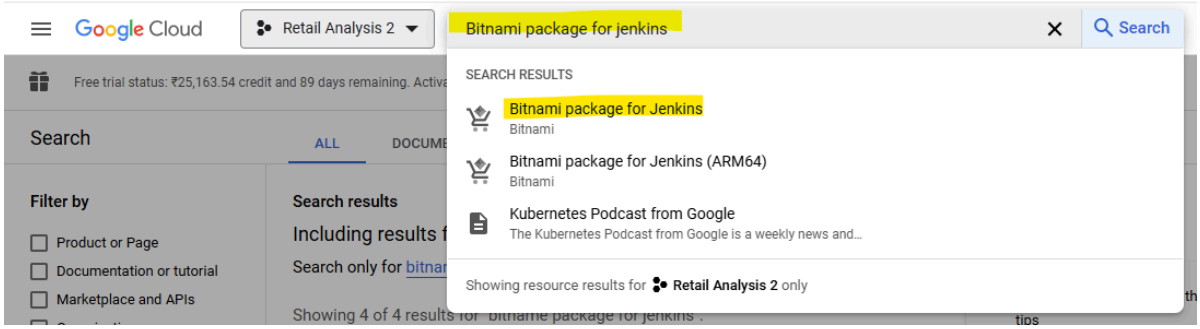
And now select this project as shown below.

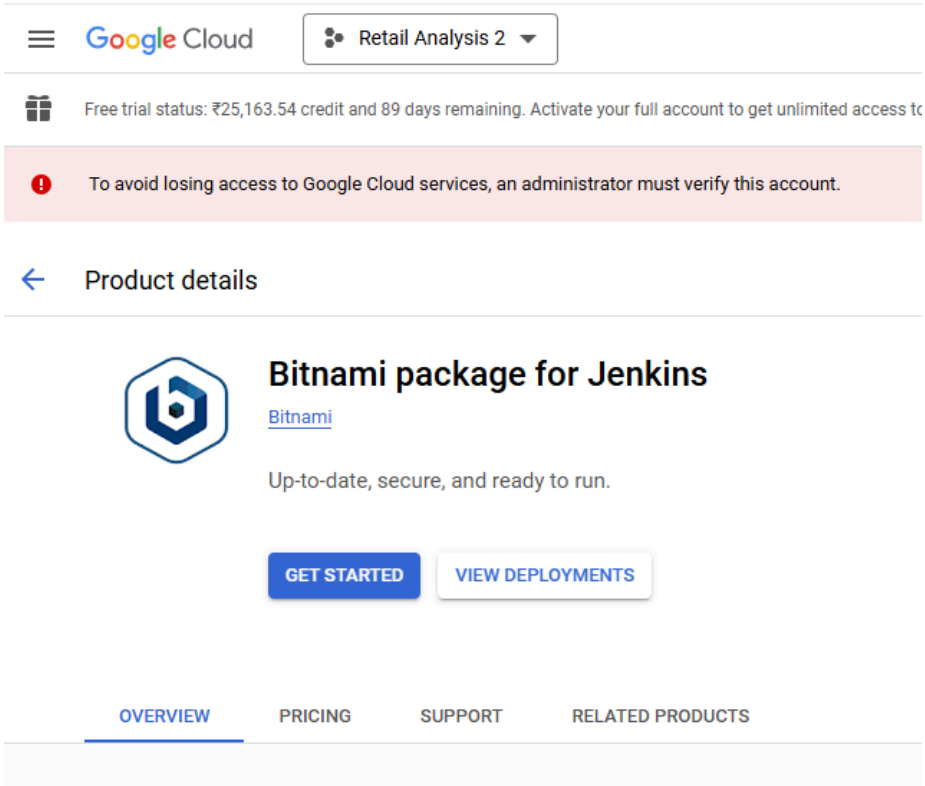


Deploy the necessary resources - Like Jenkins:

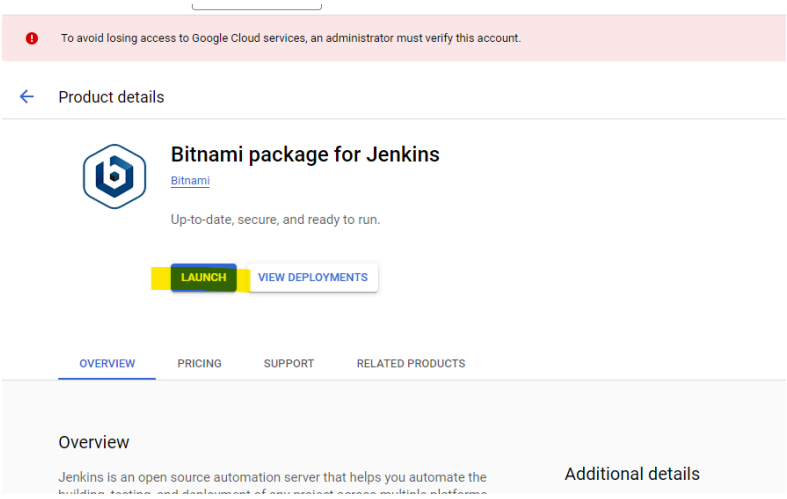
To deploy the jenkins follow below steps:

Search for **“jenkin”** in and in the marketplace you will get the option of **“Bitnami package for Jenkins”** refer attached screenshot.



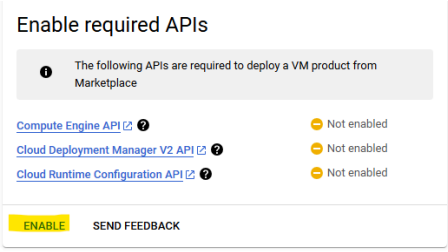


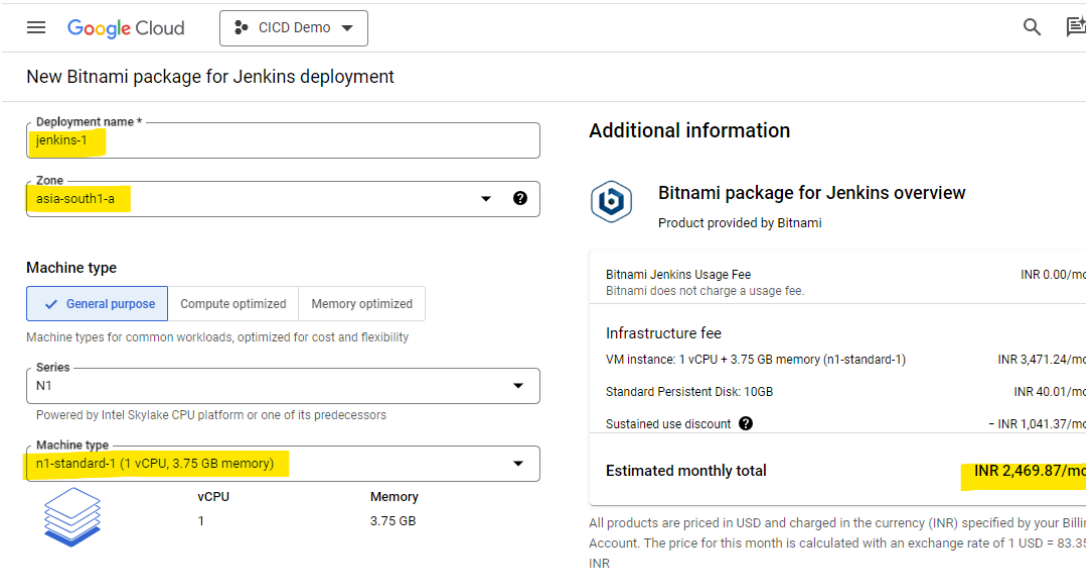
Allow the installation that it will ask for. Then you will get the option to launch the package as shown in the screenshot below.



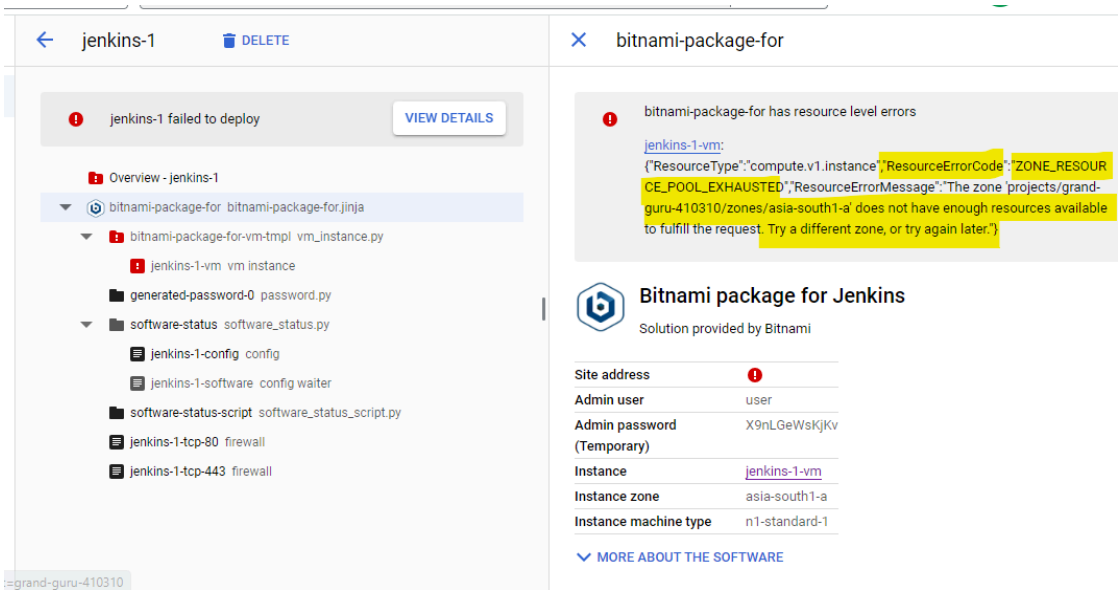
For package deployment, specify the zone and machine type as highlighted in the screenshot. Leave other configurations unchanged, and proceed to click on "Deploy."

Also click on “Enable” as shown below

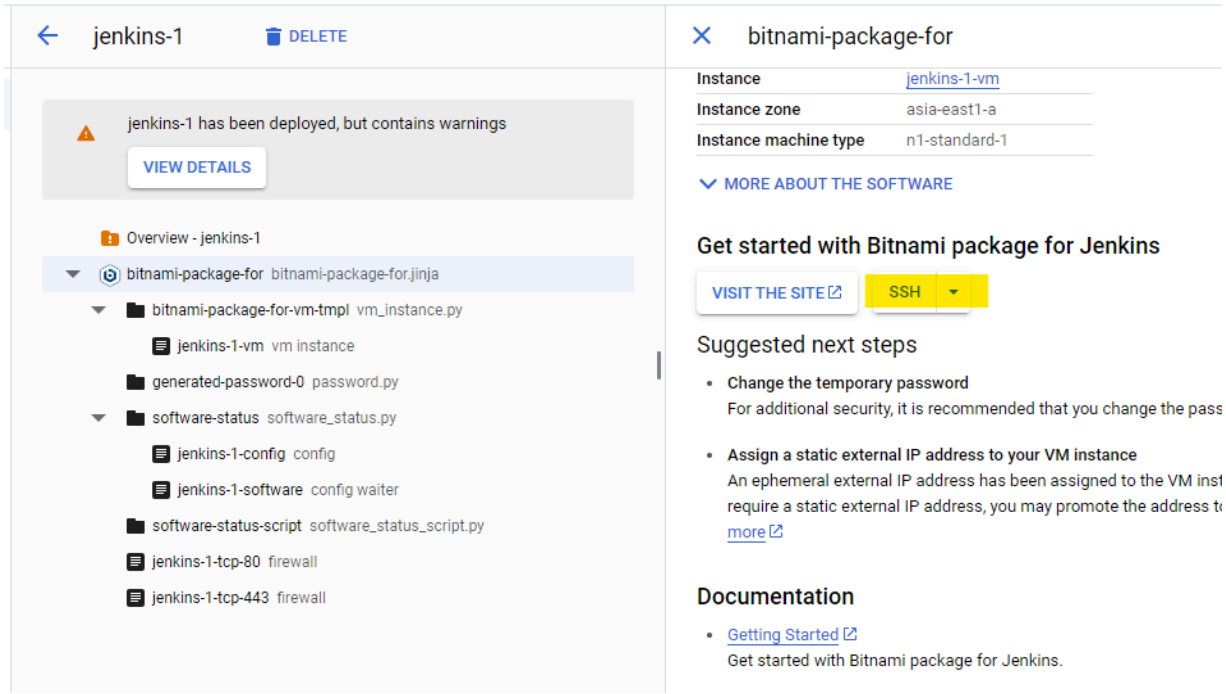




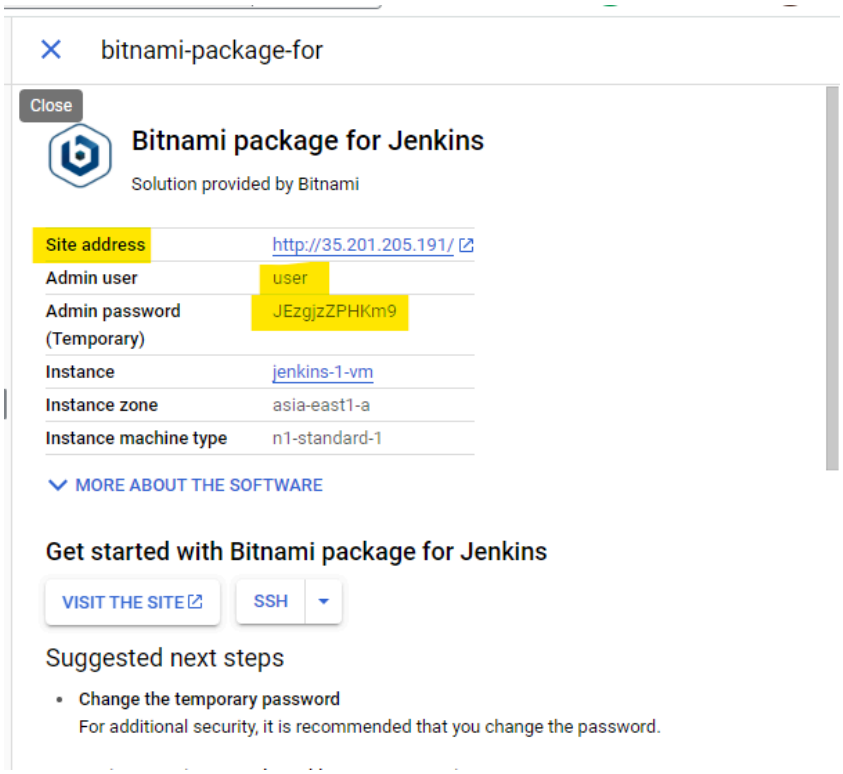
Note: If you face this issue please try to deploy it again with a different zone.



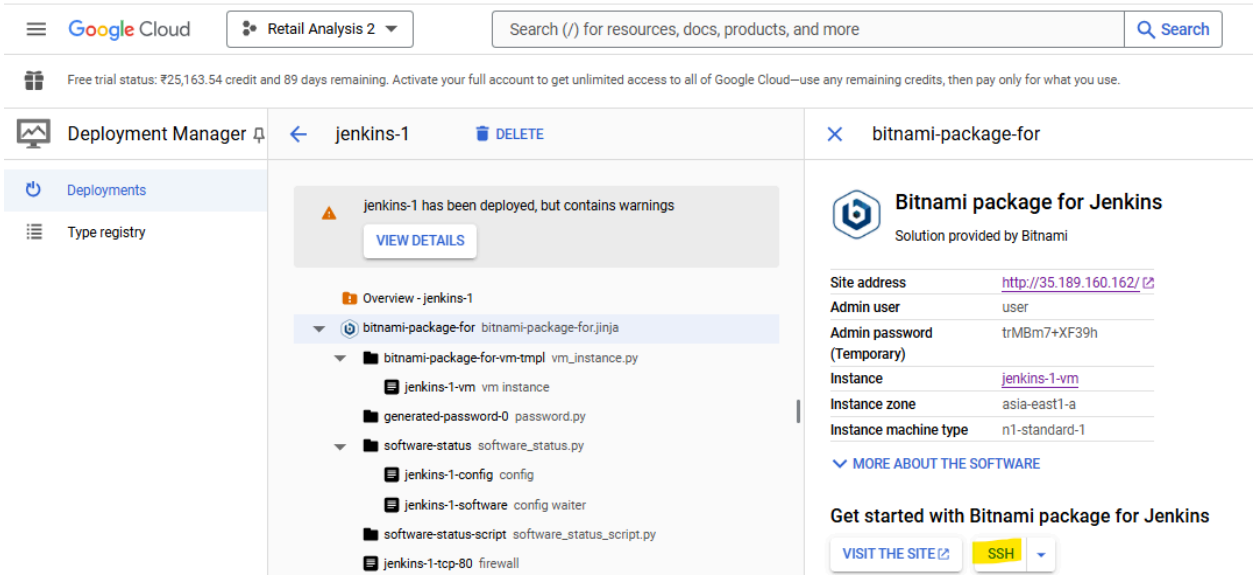
Once it is deployed you will get below screen. Now log into SSH.

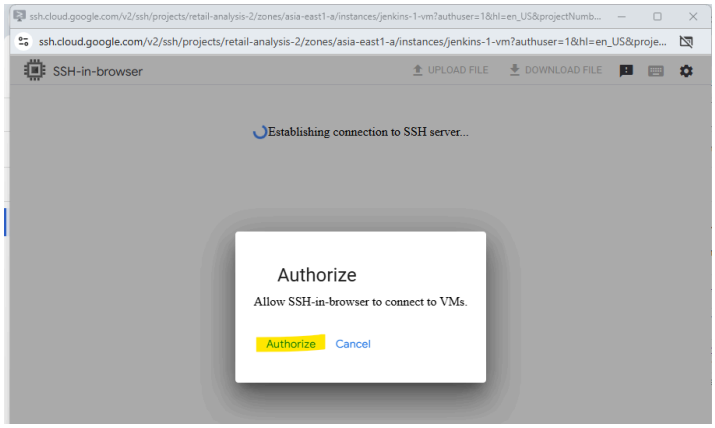


Click on Site Address and username and password log into the site. Refer attached screenshot.



Note: In order to ssh into the cluster first click on SSH and it will ask you to "Authorize" and then you can access the cluster. Refer below command for more clarity.

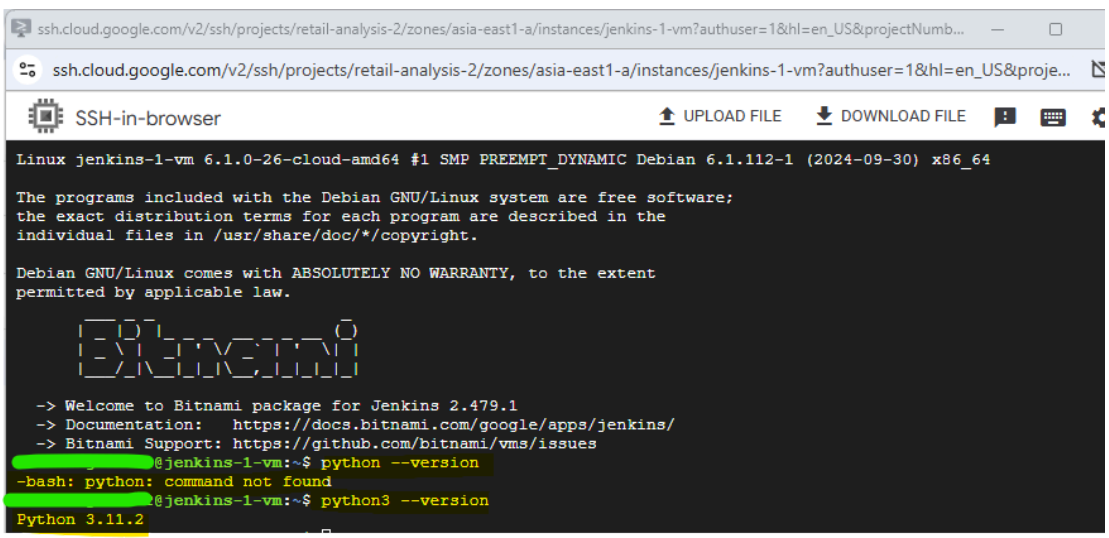




Follow below steps before proceeding ahead.

=> First check the version of Python that is present in the jenkins cluster. Note down this version of Python as later on this version we have to install using "pyenv" in the local system (i.e Windows) and in the virtual environment also in VS Code.

Use command python3 –version (Note normal python –version command will give error)



Here the Python version is 3.11.2.

=> Using the commands "sudo apt-get install python3-pip", "sudo apt-get install sshpass" install pip and sshpass respectively in SSH.

sudo apt-get install python3-pip

ssh.cloud.google.com/v2/ssh/projects/retail-analysis-442209/zones/asia-east1-a/instances/jenkins-1-vm?authuser=1&hl=en_US...

SSH-in-browser UPLOAD FILE DOWNLOAD FILE

```
dhruthigowda12@jenkins-1-vm:~$ pip --version
-bash: pip: command not found
dhruthigowda12@jenkins-1-vm:~$ sudo apt-get install python3-pip
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  build-essential bzip2 cpp cpp-12 dpkg-dev fakeroot g++ g++-12 gcc gcc-12 javascript-common libabsl20220623
  libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libaom3 libasan8 libatomic1
  libavif15 libc-dev-bin libc-devtools libc6-dev libcc1-0 libcrypt-dev libdav1d6 libde265-0 libdeflate0
  libdpkg-perl libexpat1-dev libfakeroot libfile-fcntllock-perl libgav1-1 libgcc-12-dev libgd3 libgomp1
  libheif1 libisl23 libitm1 libjbig0 libjpeg62-turbo libjs-jquery libjs-sphinxdoc libjs-underscore liblerc4
  liblocale-gettext-perl liblsan0 libmpc3 libmpfr6 libnsl-dev libnuma1 libpython3-dev libpython3.11
  libpython3.11-dev libquadmath0 librav1e0 libstdc++-12-dev libsvtav1enc1 libtiff6 libtirpc-dev libtsan2
  libubsan1 libwebp7 libx11-6 libx11-data libx265-199 libxau6 libxcb1 libxdmcp6 libxpm4 libyuv0 linux-libc-dev
  make manpages-dev patch python3-dev python3-distutils python3-lib2to3 python3-setuptools python3-wheel
  python3.11-dev rpcsvc-proto zlib1g-dev
Suggested packages:
  bzip2-doc cpp-doc gcc-12-locales cpp-12-doc debian-keyring g++-multilib g++-12-multilib gcc-12-doc
  gcc-multilib autoconf automake libtool flex bison gdb gcc-doc gcc-12-multilib apache2 | lighttpd | httpd
  glibc-doc bzr libgd-tools libstdc++-12-doc make-doc ed diffutils-doc python-setuptools-doc
The following NEW packages will be installed:
  build-essential bzip2 cpp cpp-12 dpkg-dev fakeroot g++ g++-12 gcc gcc-12 javascript-common libabsl20220623
  libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libaom3 libasan8 libatomic1
  libavif15 libc-dev-bin libc-devtools libc6-dev libcc1-0 libcrypt-dev libdav1d6 libde265-0 libdeflate0
  libdpkg-perl libexpat1-dev libfakeroot libfile-fcntllock-perl libgav1-1 libgcc-12-dev libgd3 libgomp1
  libheif1 libisl23 libitm1 libjbig0 libjpeg62-turbo libjs-jquery libjs-sphinxdoc libjs-underscore liblerc4
  liblocale-gettext-perl liblsan0 libmpc3 libmpfr6 libnsl-dev libnuma1 libpython3-dev libpython3.11
  libpython3.11-dev libquadmath0 librav1e0 libstdc++-12-dev libsvtav1enc1 libtiff6 libtirpc-dev libtsan2
  libubsan1 libwebp7 libx11-6 libx11-data libx265-199 libxau6 libxcb1 libxdmcp6 libxpm4 libyuv0 linux-libc-dev
  make manpages-dev patch python3-dev python3-distutils python3-lib2to3 python3-pip python3-setuptools
  python3-wheel python3.11-dev rpcsvc-proto zlib1g-dev
0 upgraded, 83 newly installed, 0 to remove and 3 not upgraded.
Need to get 11.4 MB/82.9 MB of archives.
After this operation, 329 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 file:/etc/apt/mirrors/debian.list Mirrorlist [30 B]
Get:2 https://deb.debian.org/debian bookworm/main amd64 libc-dev-bin amd64 2.36-9+deb12u9 [46.7 kB]
Get:3 https://deb.debian.org/debian bookworm/main amd64 linux-libc-dev amd64 6.1.115-1 [2,066 kB]
```

sudo apt-get install sshpass

SSH-in-browser UPLOAD FILE DOWNLOAD

```
Preparing to unpack .../14-python3-pip_20.3.4-4+deb11u1_all.deb ...
Unpacking python3-pip (20.3.4-4+deb11u1) ...
Setting up javascript-common (11+nmu1) ...
Setting up python3-wheel (0.34.2-1) ...
Setting up libexpat1-dev:amd64 (2.2.10-2+deb11u5) ...
Setting up python-pip-whl (20.3.4-4+deb11u1) ...
Setting up libjs-jquery (3.5.1+dfsg+~3.5.5-7) ...
Setting up python3-lib2to3 (3.9.2-1) ...
Setting up libjs-underscore (1.9.1~dfsg-3) ...
Setting up python3-distutils (3.9.2-1) ...
Setting up python3-setuptools (52.0.0-4) ...
Setting up libpython3.9-dev:amd64 (3.9.2-1) ...
Setting up python3-pip (20.3.4-4+deb11u1) ...
Setting up libjs-sphinxdoc (3.4.3-2) ...
Setting up python3.9-dev (3.9.2-1) ...
Setting up libpython3-dev:amd64 (3.9.2-3) ...
Setting up python3-dev (3.9.2-3) ...
Processing triggers for man-db (2.9.4-2) ...
aratishatti15@jenkins-1-vm:~$ sudo apt-get install sshpass
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libevent-2.1-7 libgnutls-dane0 libunbound8
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  sshpass
```

=> Install zip manually in jenkins using below command:

sudo apt-get install -y zip

Verify Installation using the command “ zip --version”. This should output the installed version of zip. Refer below command for more clarity:

```
[redacted]@jenkins-1-vm:~$ sudo apt-get install -y zip
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  unzip
The following NEW packages will be installed:
  unzip zip
0 upgraded, 2 newly installed, 0 to remove and 3 not upgraded.
Need to get 396 kB of archives.
After this operation, 1,019 kB of additional disk space will be used.
Get:1 file:/etc/apt/mirrors/debian.list Mirrorlist [30 B]
Get:2 https://deb.debian.org/debian bookworm/main amd64 unzip amd64 6.0-28 [166 kB]
Get:3 https://deb.debian.org/debian bookworm/main amd64 zip amd64 3.0-13 [230 kB]
Fetched 396 kB in 0s (801 kB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package unzip.
(Reading database ... 89166 files and directories currently installed.)
Preparing to unpack .../unzip_6.0-28_amd64.deb ...
Unpacking unzip (6.0-28) ...
Selecting previously unselected package zip.
Preparing to unpack .../archives/zip_3.0-13_amd64.deb ...
Unpacking zip (3.0-13) ...
Setting up unzip (6.0-28) ...
Setting up zip (3.0-13) ...
Processing triggers for man-db (2.11.2-2) ...
[redacted]@jenkins-1-vm:~$ zip --version
Copyright (c) 1990-2008 Info-ZIP - Type 'zip "-L"' for software license.
This is Zip 3.0 (July 5th 2008), by Info-ZIP.
Currently maintained by E. Gordon.  Please send bug reports to
the authors using the web page at www.info-zip.org; see README for details.
```

In UI, install the following plugins:

Dashboard view -

This plugin allows you to create a customized dashboard view, providing a summary of information from various jobs or builds. It helps in creating a visual representation of the overall build health and status.

Github branch Source -

The GitHub plugin in Jenkins enables integration with GitHub repositories. It allows Jenkins to trigger builds automatically when changes are pushed to a GitHub repository, and it provides the ability to specify branches for building.

pipeline declarative -

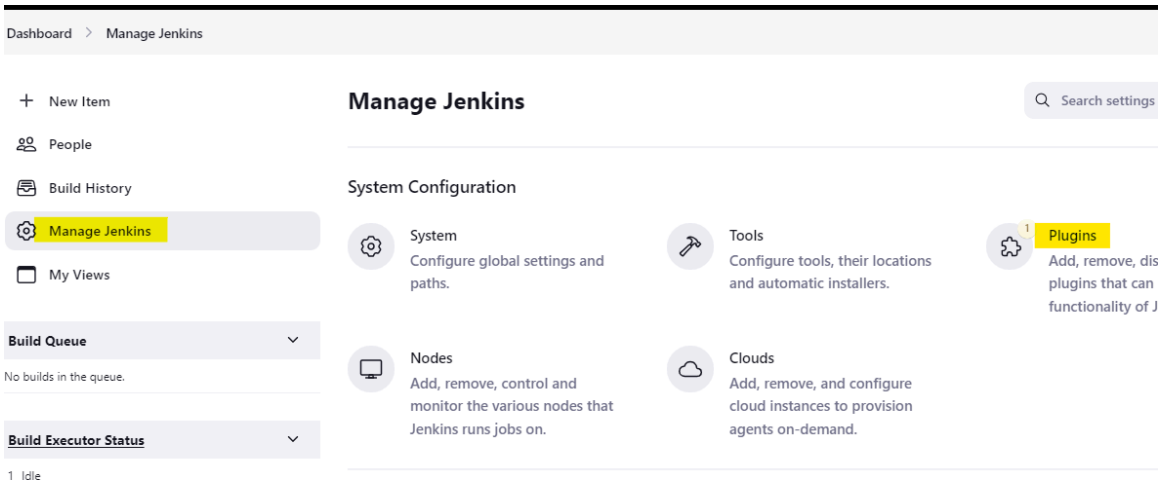
Declarative Pipeline is a feature within the Pipeline plugin that provides a simplified and opinionated syntax for defining build pipelines. It allows you to express pipelines in a more structured and readable format.

pipeline stage view -

The Stage View plugin enhances the visualization of Jenkins Pipelines. It provides a graphical representation of the stages in your pipeline, showing the progress and status of each stage.

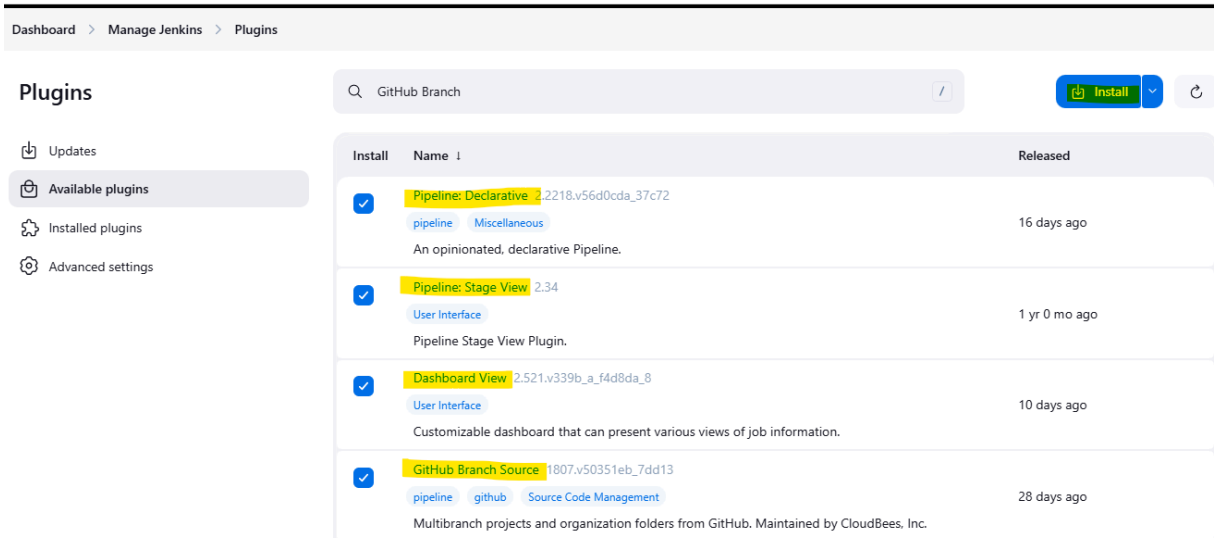
To install the plugins follow below steps:

In dashboard select “manage jenkins” => Plugins



Now, go to **Available plugins => select mentioned plugin => click on install**

Refer attached screenshot.



Steps for creating a project Retail Analysis, initializing Git, and establishing branches on GitHub are as follows:

Prerequisites:

=> In the jenkins cluster please check the version of python using the below command.

Ex: python 3.11.2 in this Jenkins Cluster

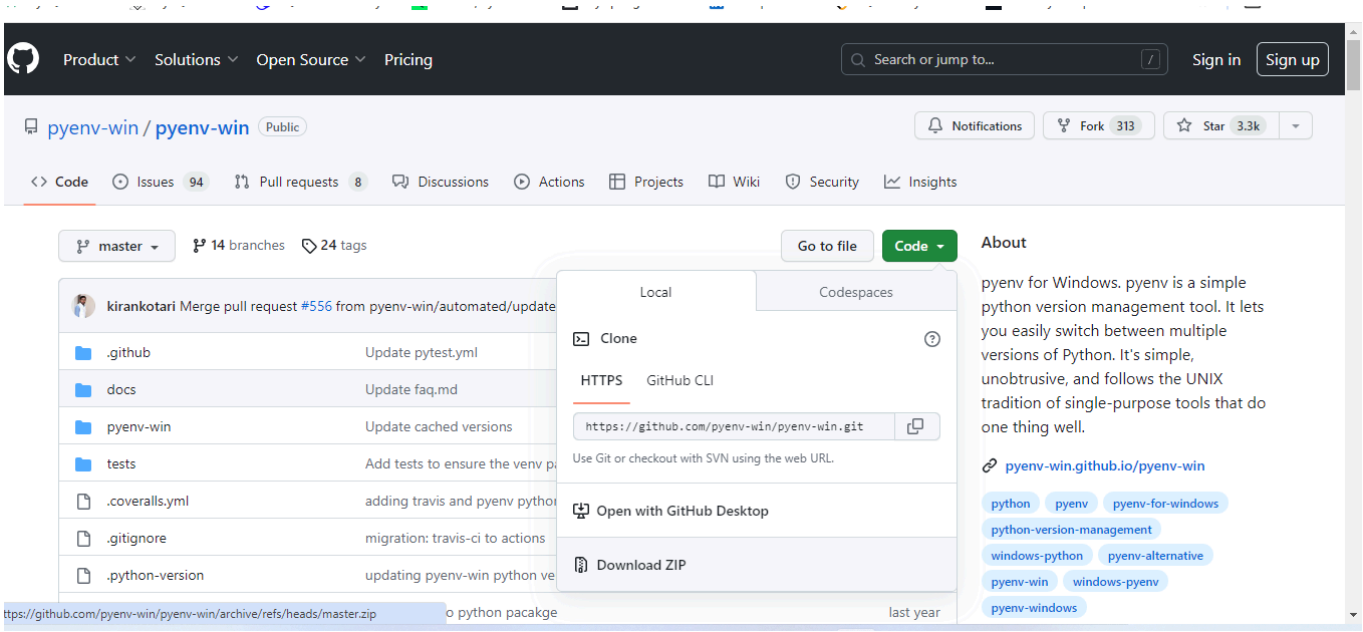
=> Now using pyenv install same version

Follow below steps for installing Pyenv in your system(Local):

Please check the below link to download the pyenv

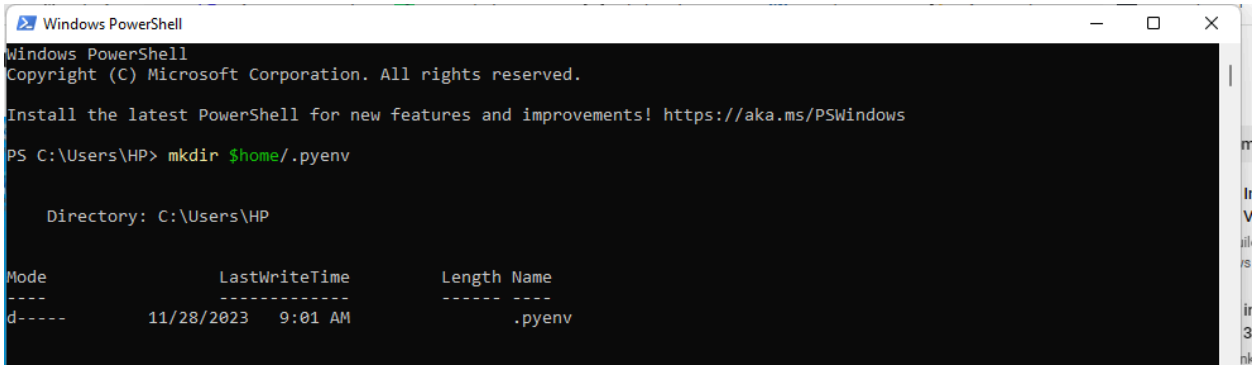
https://github.com/pyenv-win/pyenv-win

Now click on code and download the zip file



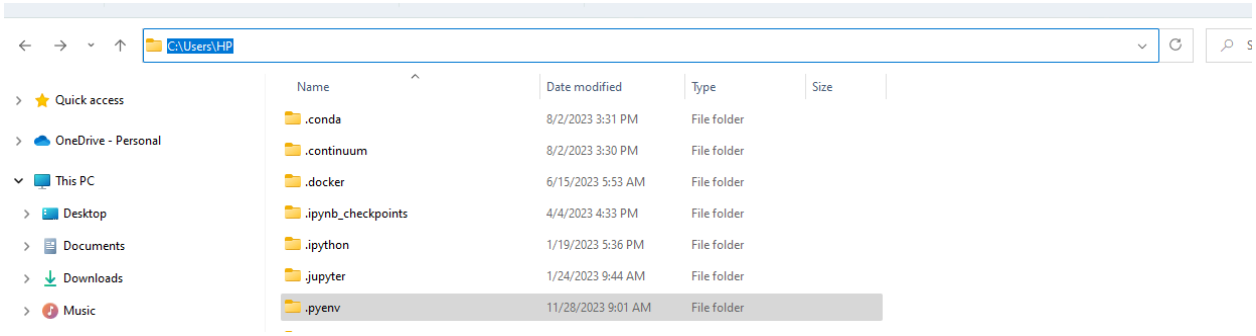
Go to powershell and run the following command to create pyenv directory in user directory

mkdir $home/.pyenv

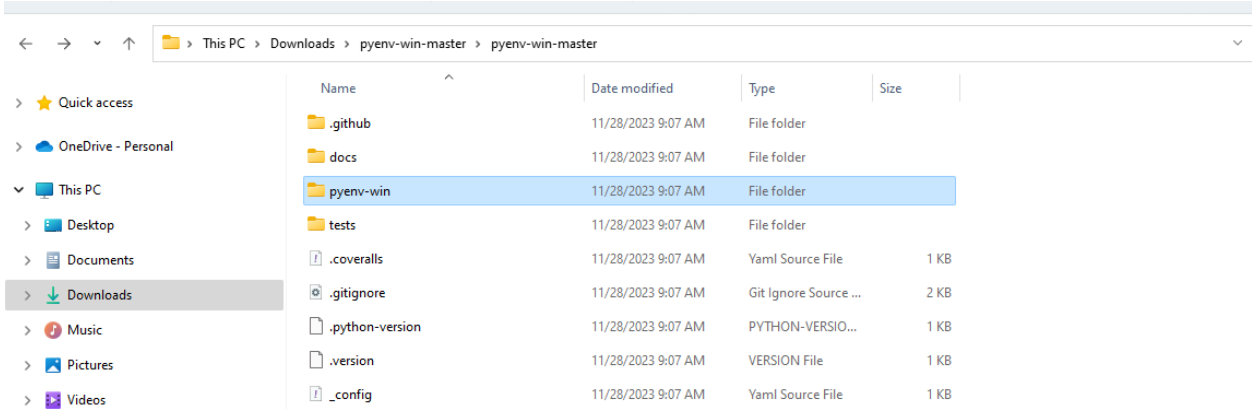


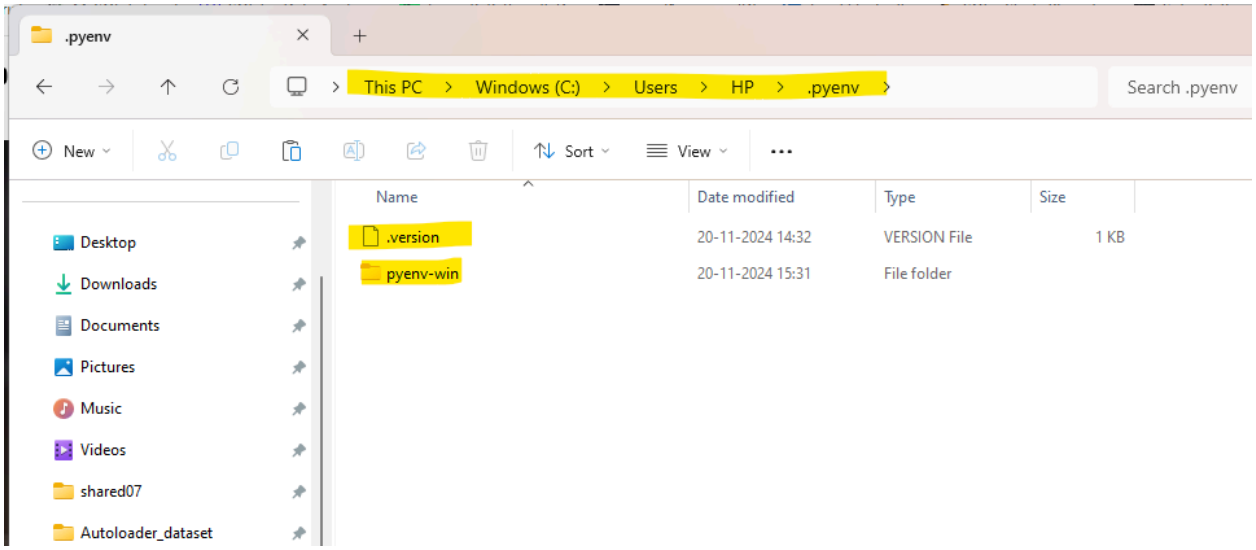
Now go to C => user => <username> and you can see .pyenv folder created.

For below ss username is HP check for your system using above this



And copy files pyenv-win from the extracted files to .pyenv folder refer attached screenshots





Set the environment variables PYENV and PYENV_HOME that point to the installation folder:

PYENV =>

[System.Environment]::SetEnvironmentVariable('PYENV',$env:USERPROFILE + "\.pyenv\pyenv-win\","User")

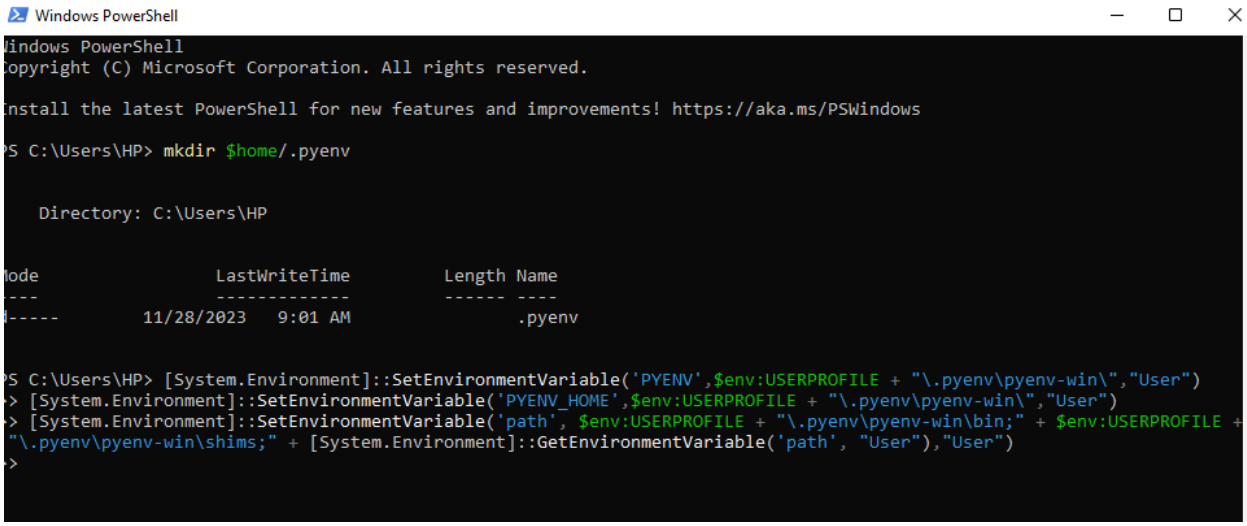
PYENV_HOME =>

[System.Environment]::SetEnvironmentVariable('PYENV_HOME',$env:USERPROFILE + "\.pyenv\pyenv-win\","User")

Add the bin folder to the PATH variable. Such that pyenv can be found when using the command line.

[System.Environment]::SetEnvironmentVariable('path', $env:USERPROFILE + "\.pyenv\pyenv-win\bin;" + $env:USERPROFILE + "\.pyenv\pyenv-win\shims;" + [System.Environment]::GetEnvironmentVariable('path', "User"),"User")

Refer the below screenshot



Close the currently open powershell, start a new PowerShell with admin privileges by right-clicking on the PowerShell icon in the start menu and choose Run as administrator.

Enter the following command into the PowerShell to enable the execution of scripts:

Set-ExecutionPolicy unrestricted

pyenv install --list

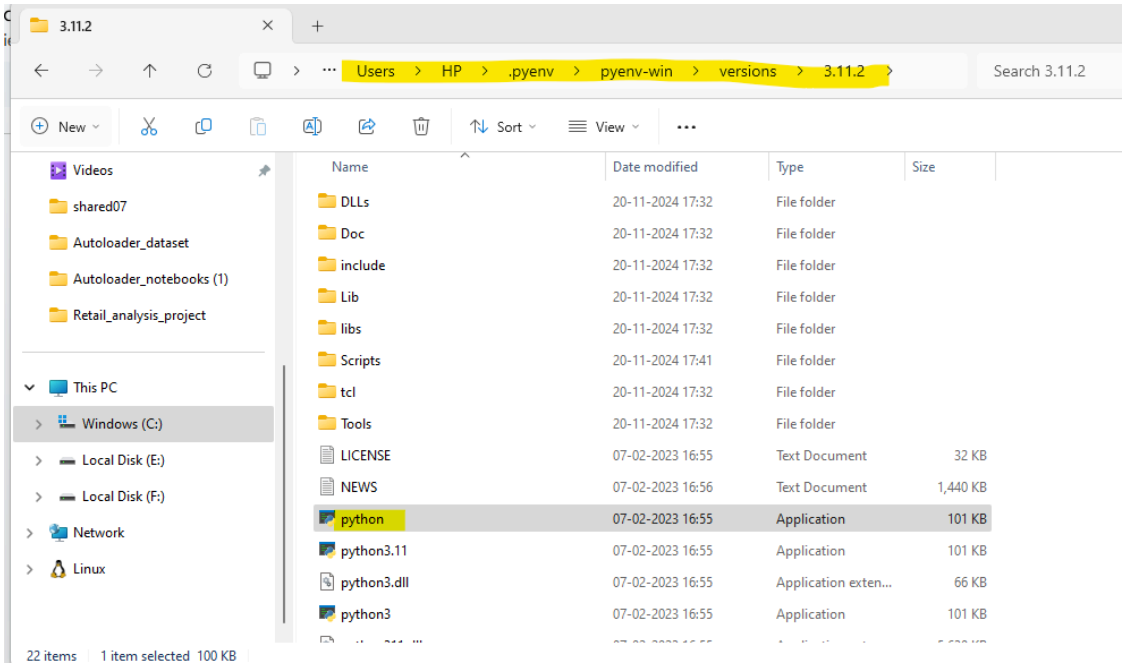
pyenv install 3.11.2

To install the python 3.11.2 version using pyenv use the below command.

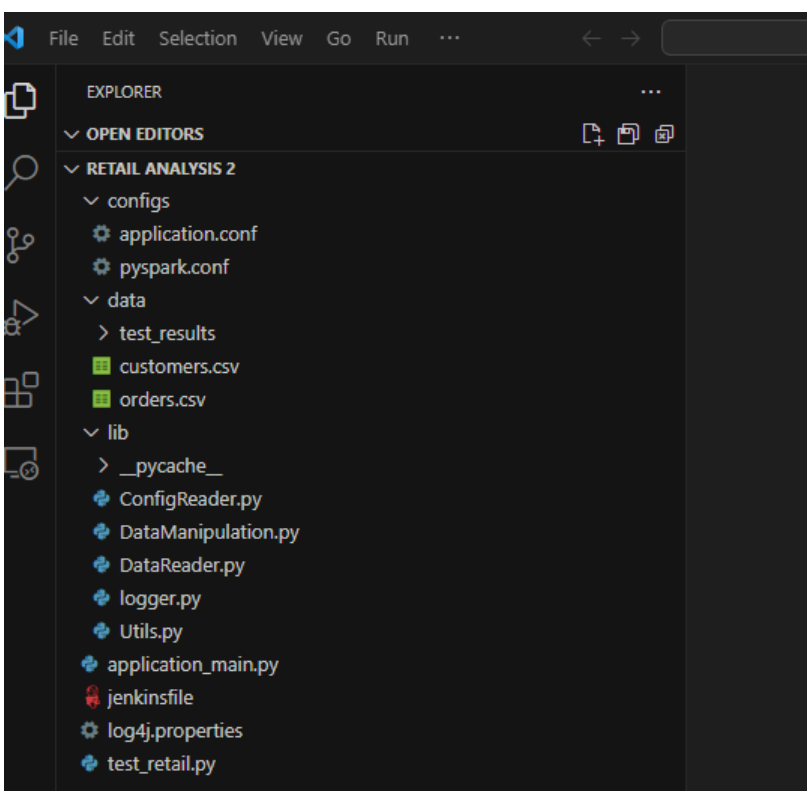
pyenv install 3.11.2

This will be installed in user => <username> (here HP) => .pyenv => pyenv-win => versions =>

Ex: "C:\Users\HP\.pyenv\pyenv-win\versions\3.11.2\python.exe"



Create a project Retail Analysis in VS code if you do not have

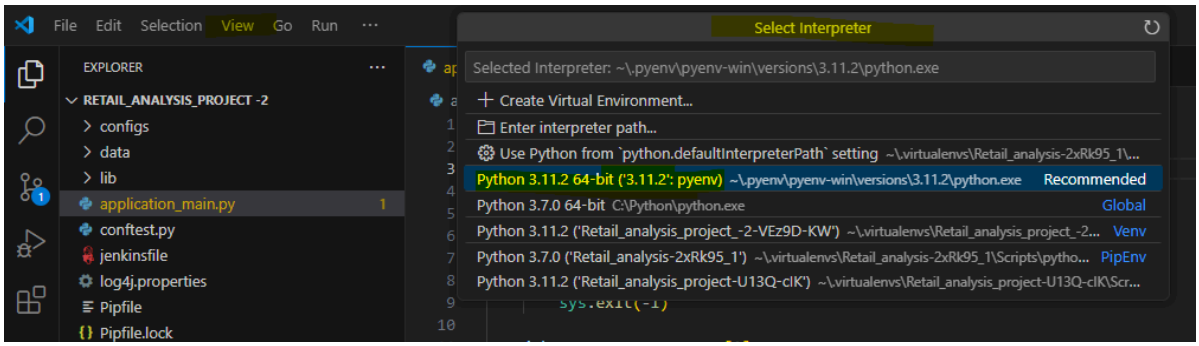


Sample Code for jenkins file:

```
pipeline {
    agent any

    stages {
        stage('Build') {
            steps {
                echo "build completed successfully"
            }
        }

        stage('Test') {
            steps {
                echo "test completed successfully"
            }
        }

        stage('Package') {
            steps {
                echo "package completed successfully"
            }
        }

        stage('Deploy') {
            steps {
                echo "deploy completed successfully"
            }
        }
    }
}
```

Follow below steps to set path of virtual environment in VS code:

Now in vs code set path of this python.exe file as interpreter To set the virtual interpreter follow below steps:
Click on "View" > select "Command Palette" > Type "Select Interpreter"
Refer below screenshot for more clarity

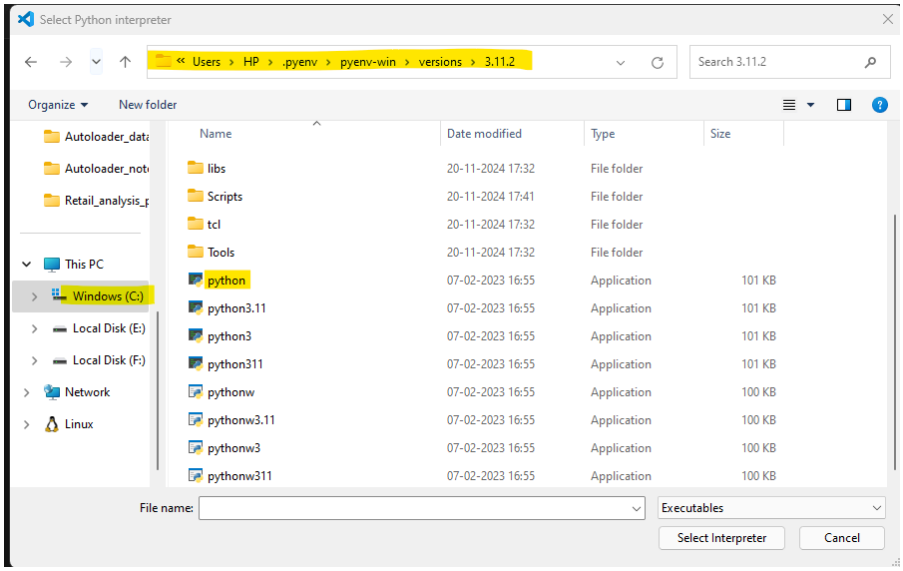


In the list of available interpreters, you should see the Python interpreter.
Select the desired Python interpreter from the list (Here pyenv 3.11.2)

If it is not listed you can browse that path refer below steps for more clarity.

Click on "Enter Interpreter path" => Find =>
Using browse option go to C drive => Users => HP => .pyenv => pyenv-win => versions => 3.11.2 => python.exe (select file)

Refer below screenshot for more clarity.



Now first update the “**pip**” and install “**pipenv**” using below commands:

pip => python -m pip install --upgrade pip

pipenv => pip install pipenv

Refer below screenshot for more clarity.

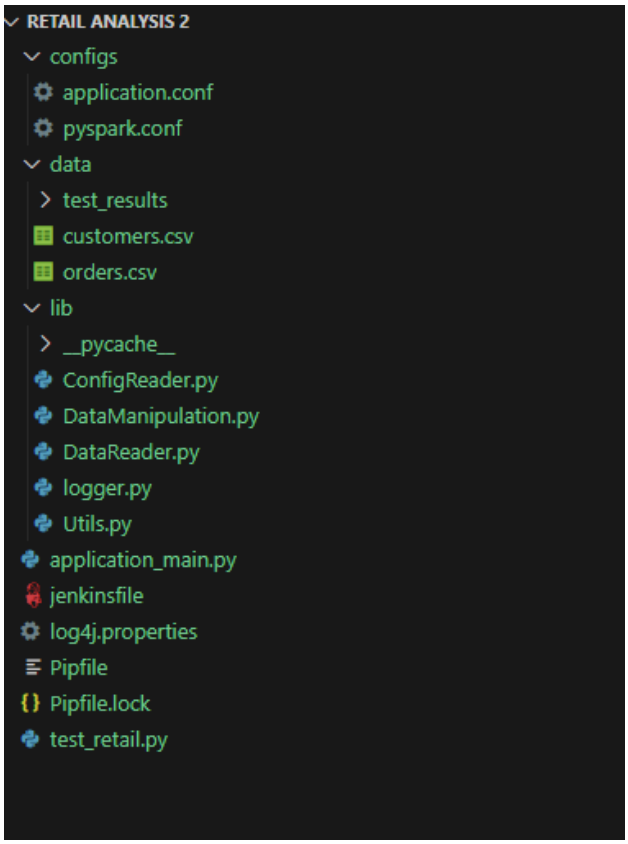
```
You should consider upgrading via the 'python -m pip install --upgrade pip' command.
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project-2> python -m pip install --upgrade pip
Requirement already satisfied: pip in c:\users\hp\.pyenv\pyenv-win\versions\3.11.2\lib\site-packages (22.3.1)
Collecting pip
  Downloading pip-24.3.1-py3-none-any.whl (1.8 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 1.8/1.8 MB 276.1 kB/s eta 0:00:00
Installing collected packages: pip
  Attempting uninstall: pip
    Found existing installation: pip 22.3.1
    Uninstalling pip-22.3.1:
      Successfully uninstalled pip-22.3.1
  WARNING: The scripts pip.exe, pip3.11.exe and pip3.exe are installed in 'C:\Users\HP\.pyenv\pyenv-win\versions\3.11.2\Scripts' which is not
 on PATH.
  Consider adding this directory to PATH or, if you prefer to suppress this warning, use --no-warn-script-location.
Successfully installed pip-24.3.1
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project-2> pip install pipenv
Requirement already satisfied: pipenv in c:\python\lib\site-packages (2023.10.3)
Requirement already satisfied: setuptools>=67 in c:\python\lib\site-packages (from pipenv) (68.0.0)
Requirement already satisfied: certifi in c:\python\lib\site-packages (from pipenv) (2024.8.30)
Requirement already satisfied: virtualenv>=20.24.2 in c:\python\lib\site-packages (from pipenv) (20.26.6)
Requirement already satisfied: importlib-metadata>=6.6; python_version < "3.8" in c:\python\lib\site-packages (from virtualenv>=20.24.2->pipe
nv) (6.7.0)
Requirement already satisfied: distlib<1,>=0.3.7 in c:\python\lib\site-packages (from virtualenv>=20.24.2->pipenv) (0.3.9)
Requirement already satisfied: filelock<4,>=3.12.2 in c:\python\lib\site-packages (from virtualenv>=20.24.2->pipenv) (3.12.2)
Requirement already satisfied: platformdirs<5,>=3.9.1 in c:\python\lib\site-packages (from virtualenv>=20.24.2->pipenv) (4.0.0)
Requirement already satisfied: typing-extensions>=3.6.4; python_version < "3.8" in c:\python\lib\site-packages (from importlib-metadata>=6.6;
 python_version < "3.8"->virtualenv>=20.24.2->pipenv) (4.7.1)
Requirement already satisfied: zipp>=0.5 in c:\python\lib\site-packages (from importlib-metadata>=6.6; python_version < "3.8"->virtualenv>=20
.24.2->pipenv) (3.15.0)
```

Now **create virtual environment** in it using command : **“pipenv install”**

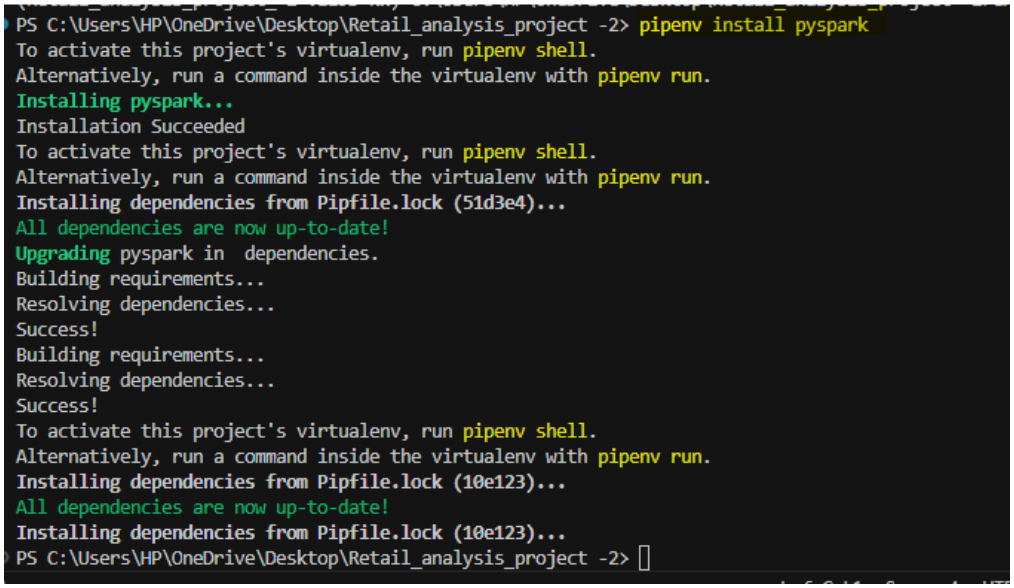
Note: Here as we have to set python version as 3.11.2 so while creating virtual environment python 3.11.2 will be considered as base interpreter.

```
PROBLEMS 1   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS                                   pwsh

PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> pipenv install
Creating a virtualenv for this project
Pipfile: C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2\Pipfile
Using default python from C:\Users\HP\.pyenv\pyenv-win\versions\3.11.2\python.exe3.11.2 to create virtualenv...
[  ==] Creating virtual environment...created virtual environment CPython3.11.2.final.0-64 in 2292ms
  creator CPython3Windows(dest=C:\Users\HP\.virtualenvs\Retail_analysis_project_-2-VEz9D-KW, clear=False, no_vcs_ignore=False, global=False)
  seeder FromAppData(download=False, pip=bundle, setuptools=bundle, wheel=bundle, via=copy,
app_data_dir=C:\Users\HP\AppData\Local\pypa\virtualenv)
    added seed packages: pip==24.3.1, setuptools==75.2.0, wheel==0.44.0
  activators BashActivator,BatchActivator,FishActivator,NushellActivator,PowerShellActivator,PythonActivator

Successfully created virtual environment!
Virtualenv location: C:\Users\HP\.virtualenvs\Retail_analysis_project_-2-VEz9D-KW
Creating a Pipfile for this project...
Pipfile.lock not found, creating...
Locking [packages] dependencies...
Locking [dev-packages] dependencies...
Updated Pipfile.lock (ed6d5d614626ae28e274e453164affb26694755170ccab3aa5866f093d51d3e4)!
To activate this project's virtualenv, run pipenv shell.
Alternatively, run a command inside the virtualenv with pipenv run.
Installing dependencies from Pipfile.lock (51d3e4)...
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2>
```

Note : It will create pipfile and pipfile.lock



Install **pyspark** using the command: pipenv install pyspark



```
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> pipenv install pyspark
To activate this project's virtualenv, run pipenv shell.
Alternatively, run a command inside the virtualenv with pipenv run.
Installing pyspark...
Installation Succeeded
To activate this project's virtualenv, run pipenv shell.
Alternatively, run a command inside the virtualenv with pipenv run.
Installing dependencies from Pipfile.lock (51d3e4)...
All dependencies are now up-to-date!
Upgrading pyspark in  dependencies.
Building requirements...
Resolving dependencies...
Success!
Building requirements...
Resolving dependencies...
Success!
To activate this project's virtualenv, run pipenv shell.
Alternatively, run a command inside the virtualenv with pipenv run.
Installing dependencies from Pipfile.lock (10e123)...
All dependencies are now up-to-date!
Installing dependencies from Pipfile.lock (10e123)...
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2>
```

Also install **pytest** using command : **“pipenv install pytest”**

```
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> pipenv install pytest
To activate this project's virtualenv, run pipenv shell.
Alternatively, run a command inside the virtualenv with pipenv run.
Installing pytest...
Installation Succeeded
To activate this project's virtualenv, run pipenv shell.
Alternatively, run a command inside the virtualenv with pipenv run.
Installing dependencies from Pipfile.lock (10e123)...
All dependencies are now up-to-date!
Upgrading pytest in  dependencies.
Building requirements...
Resolving dependencies...
Success!
Building requirements...
Resolving dependencies...
Success!
To activate this project's virtualenv, run pipenv shell.
Alternatively, run a command inside the virtualenv with pipenv run.
Installing dependencies from Pipfile.lock (1fc039)...
All dependencies are now up-to-date!
Installing dependencies from Pipfile.lock (1fc039)...
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2>
```

If your existing project is not under version control, use **"git init"** to start tracking changes.

```
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> git init
Reinitialized existing Git repository in C:/Users/HP/OneDrive/Desktop/Retail_analysis_project -2/.git/
```

To **rename** branch **master to main** use command : **“git branch -M main”**

Using the commands “git add .” add all the changes

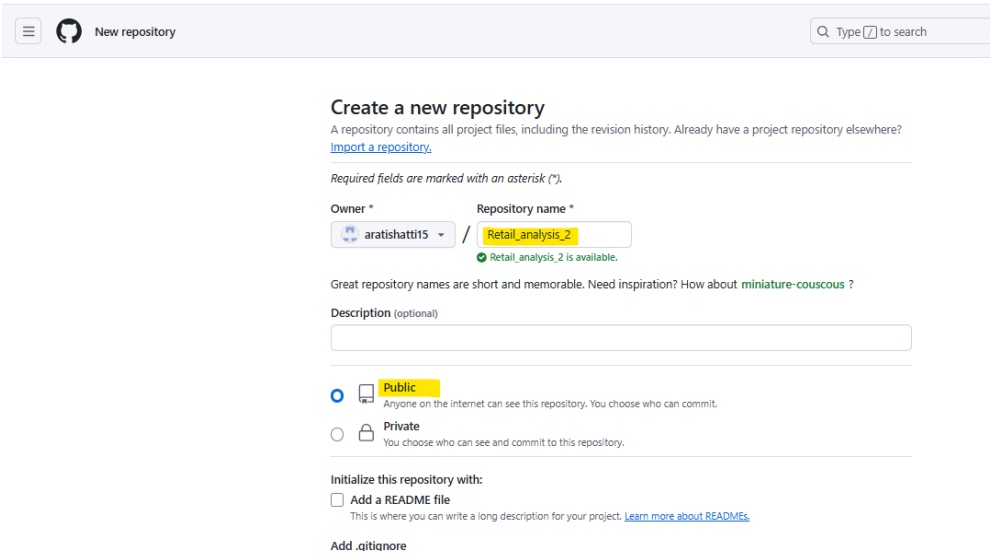
```
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> git branch -M main
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> git add .
warning: in the working copy of 'Pipfile', LF will be replaced by CRLF the next time Git touches it
warning: in the working copy of 'Pipfile.lock', LF will be replaced by CRLF the next time Git touches it
warning: in the working copy of 'data/customers.csv', LF will be replaced by CRLF the next time Git touches it
warning: in the working copy of 'data/orders.csv', LF will be replaced by CRLF the next time Git touches it
warning: adding embedded git repository: Retail_analysis_project
hint: You've added another git repository inside your current repository.
hint: Clones of the outer repository will not contain the contents of
hint: the embedded repository and will not know how to obtain it.
hint: If you meant to add a submodule, use:
hint:
hint:   git submodule add <url> Retail_analysis_project
hint:
hint: If you added this path by mistake, you can remove it from the
hint: index with:
hint:
hint:   git rm --cached Retail_analysis_project
hint:
hint: See "git help submodule" for more information.
hint: Disable this message with "git config advice.addEmbeddedRepo false"
```

And using command “git commit -m “performing initial commit”” commit all the changes

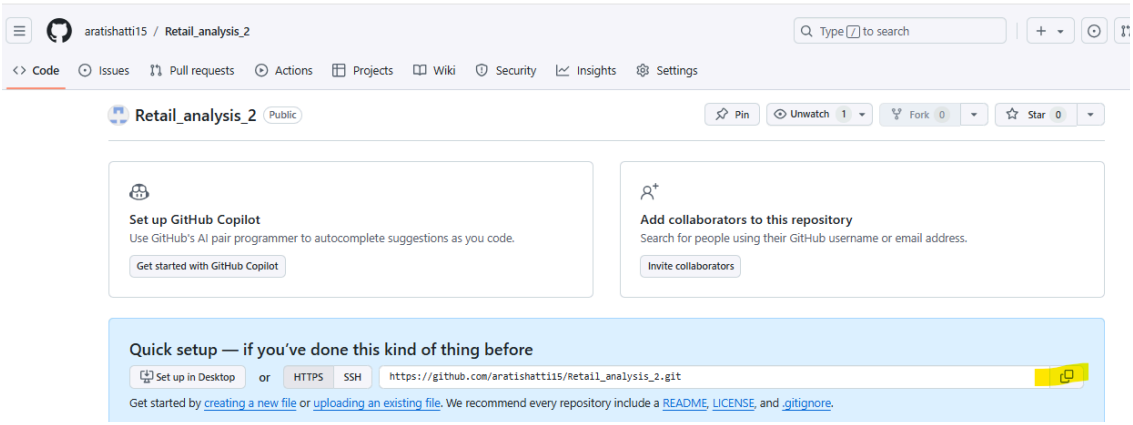
```
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> git commit -m “performing initial commit”
[main 73d2b12] performing initial commit
 6 files changed, 4 insertions(+), 3 deletions(-)
 create mode 160000 Retail_analysis_project
 delete mode 100644 __pycache__/conftest.cpython-311-pytest-8.3.3.pyc
 delete mode 100644 __pycache__/conftest.cpython-37-pytest-7.4.4.pyc
 delete mode 100644 __pycache__/test_retail.cpython-311-pytest-8.3.3.pyc
 delete mode 100644 __pycache__/test_retail.cpython-37-pytest-7.4.4.pyc
```

Go to github and create a repo with the name Retail_analysis_2

Refer attached screenshot.



Also copy the ssh link as highlighted in the screenshot.



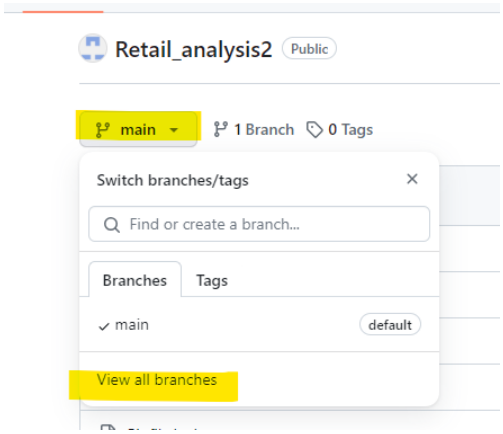
git remote add origin <url of project>

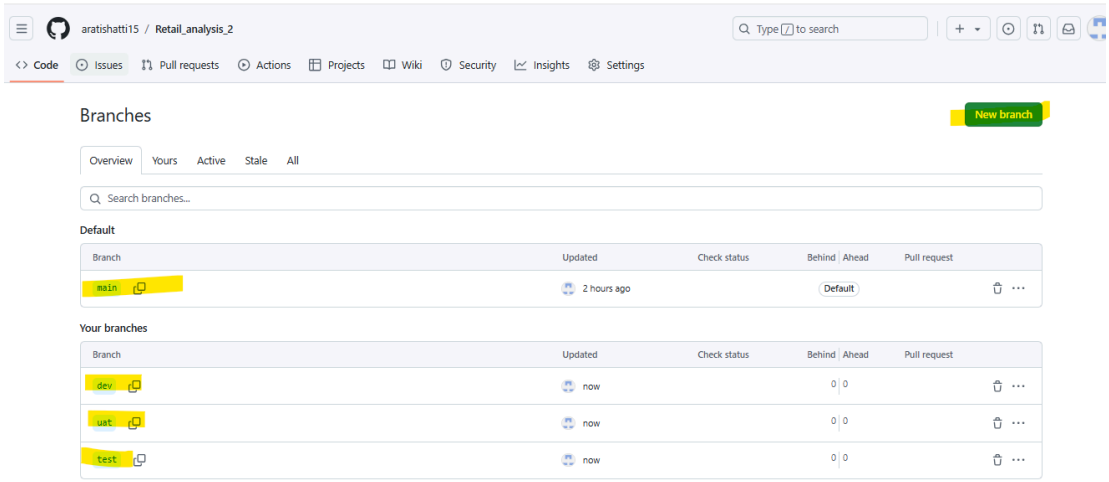
```
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> git remote add origin https://github.com/aratishatti15/Retail_analysis_2.git
```

To push the code to the origin main run the command: **“git push origin main”**

```
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> git push origin main
Enumerating objects: 100, done.
Counting objects: 100% (100/100), done.
Delta compression using up to 8 threads
Compressing objects: 100% (99/99), done.
Writing objects: 100% (100/100), 729.85 KiB | 3.82 MiB/s, done.
Total 100 (delta 41), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (41/41), done.
To https://github.com/aratishatti15/Retail_analysis_2.git
 * [new branch]      main -> main
```

Click on view all branches and create the new branches : **main, dev, uat, test**





All have the same code

Create and switch to a new branch in a Git repository on your local machine using the command :

git checkout -b feature-rp-50001

```
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> git checkout -b feature-rp-50001
Switched to a new branch 'feature-rp-50001'
```

After making modifications, commit all the changes, and then push the changes to the remote repository using the command

git push origin feature-rp-50001

```
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> git add .
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> git commit -m "performing initial commit in feature"
[feature-rp-50001 a80fe5e] performing initial commit in feature
 1 file changed, 1 deletion(-)
 delete mode 160000 Retail_analysis_project
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2> git push origin feature-rp-50001
Enumerating objects: 3, done.
Counting objects: 100% (3/3), done.
Delta compression using up to 8 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (2/2), 237 bytes | 237.00 KiB/s, done.
Total 2 (delta 1), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
remote:
remote: Create a pull request for 'feature-rp-50001' on GitHub by visiting:
remote:      https://github.com/aratishatti15/Retail_analysis_2/pull/new/feature-rp-50001
remote:
To https://github.com/aratishatti15/Retail_analysis_2.git
 * [new branch]      feature-rp-50001 -> feature-rp-50001
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project -2>
```

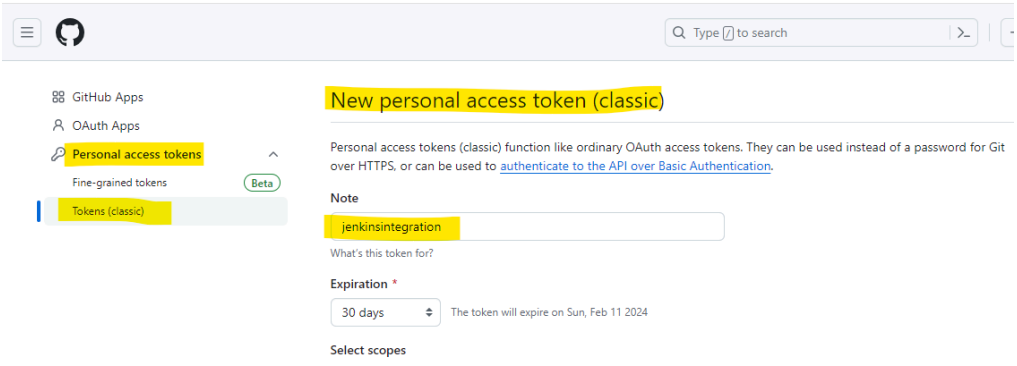
when you execute the above a new feature branch will be created in github

Configuring Jenkins to interpret GitHub events.

Making configurations in jenkins so that it can read the github events like branch creation, git push, pull request ..etc To establish the connection between github and jenkins, it has to be done from both ways.

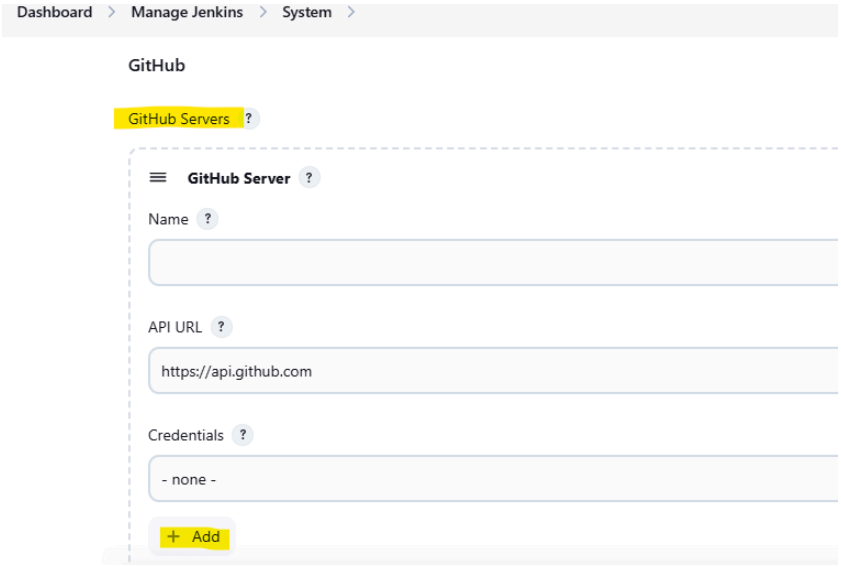
Pre-step: For creation of token in Github:

Go to Github => Settings => Developer Settings => Personal Access token => Tokens (Classic) => select all the scopes => generate token => Copy the token

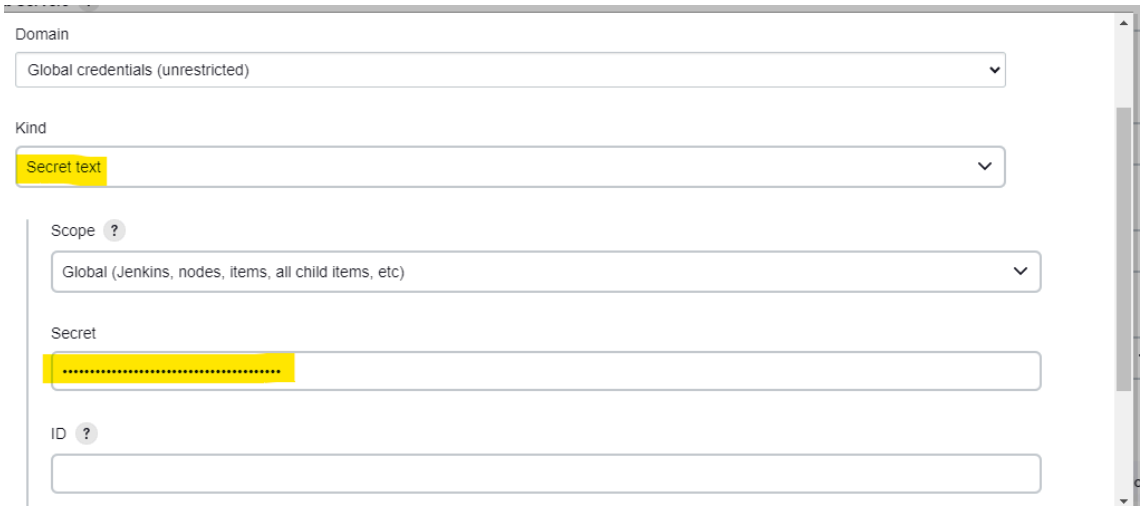


Steps to follow in Jenkins:

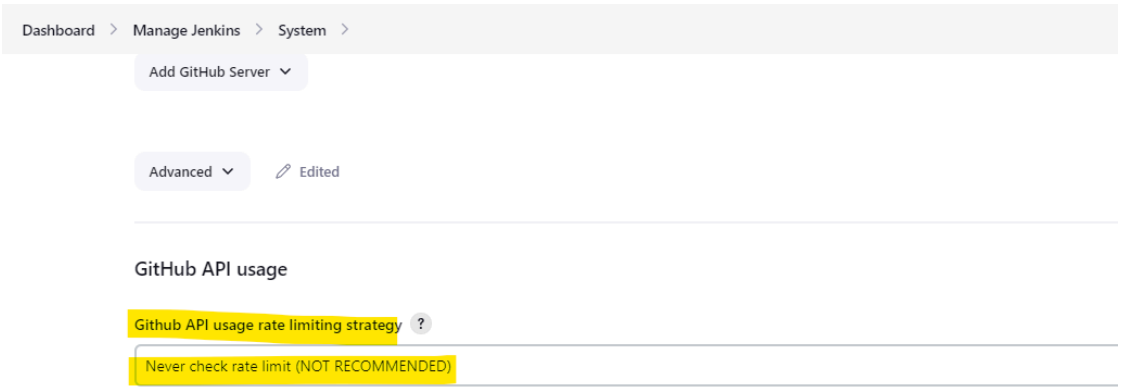
Go to Jenkins => Dashboard => Manage Jenkins => System



Mention the github token while creating secret text.



Also set Github Api usage limit strategy as shown below and then save it.

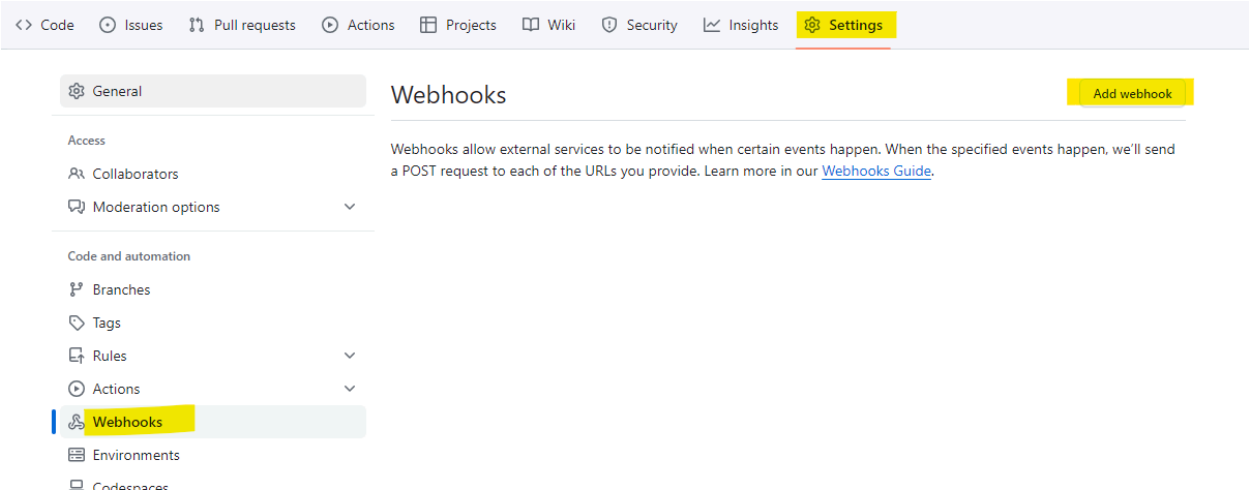


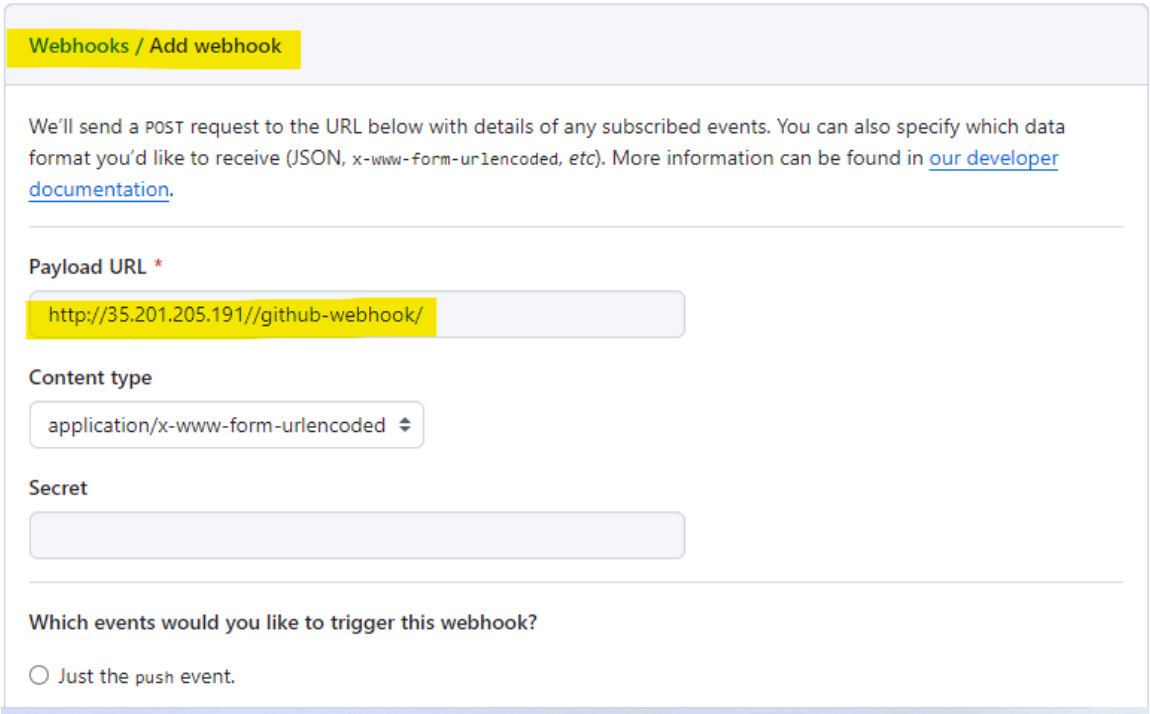
In Github:

Go to the Repository for Retail Analysis that you created in github => Setting => Webhooks

Now create a new webhook in which you have to mention jenkins URL and "/github-webhook/" as shown below.

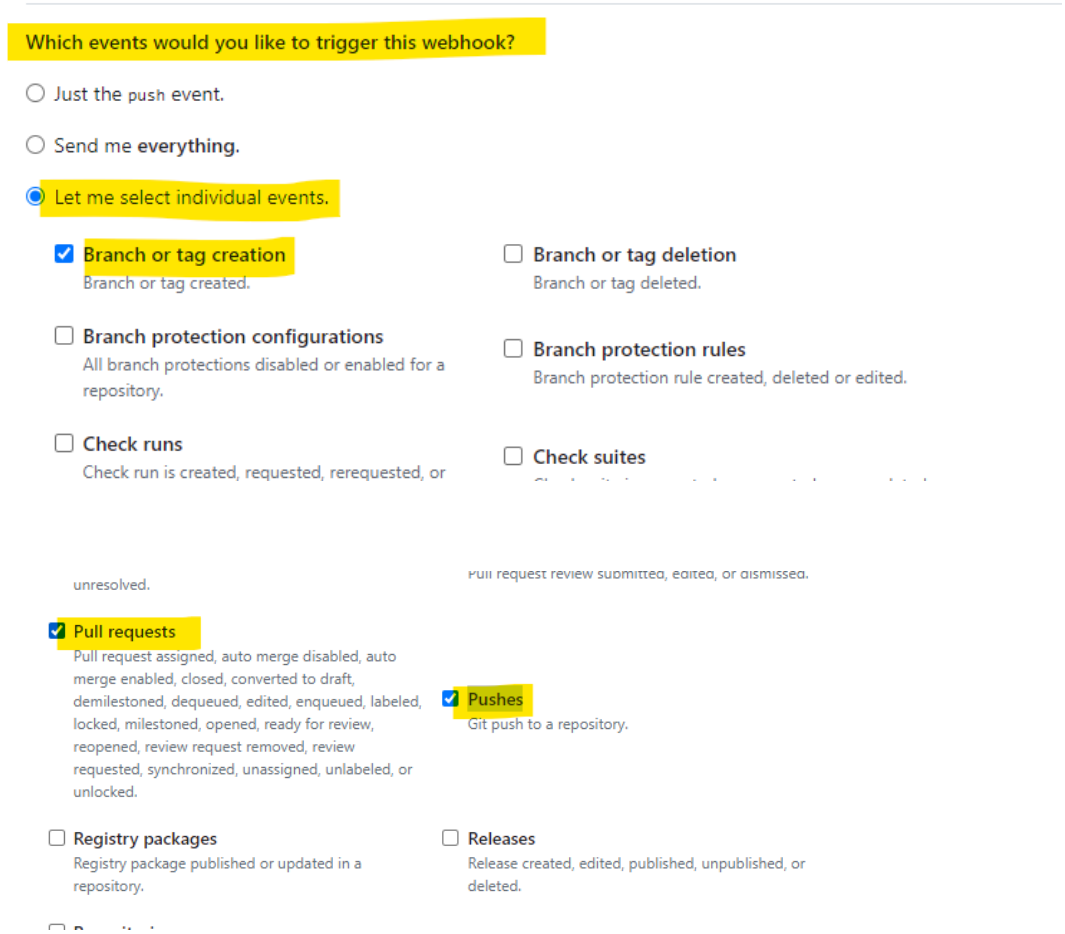
<jenkinsurl>/github-webhook/



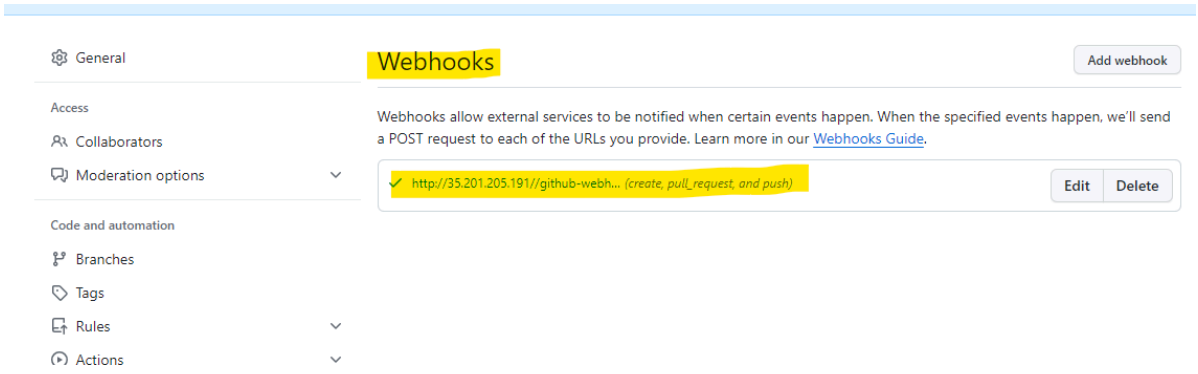


Which events would you like to trigger this webhook? => Let me select individual events.
=> Branch or tag creation, Pull requests, Pushes

Refer attached screenshot.



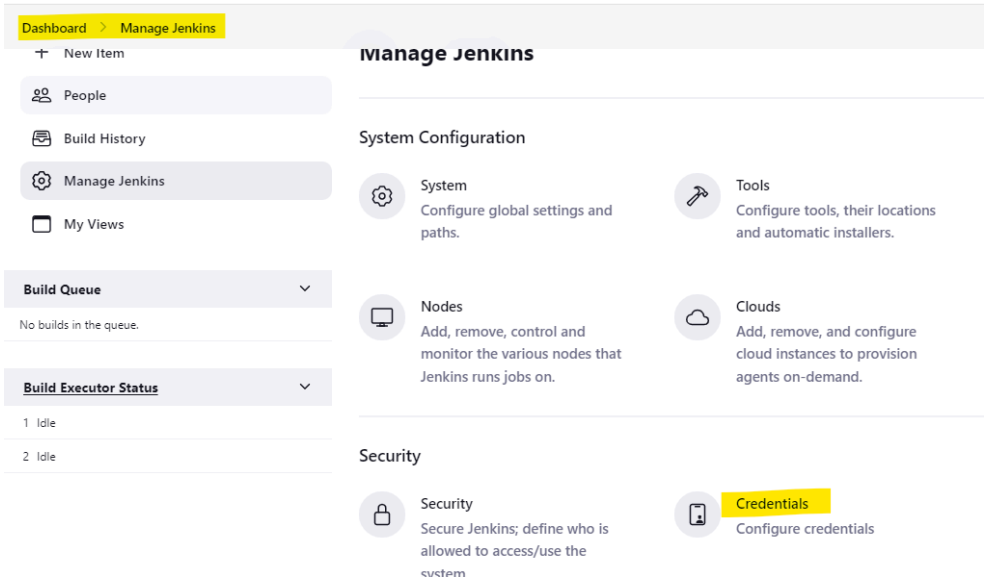
And click on “Add Webhook”. The webhook will be listed as shown below.

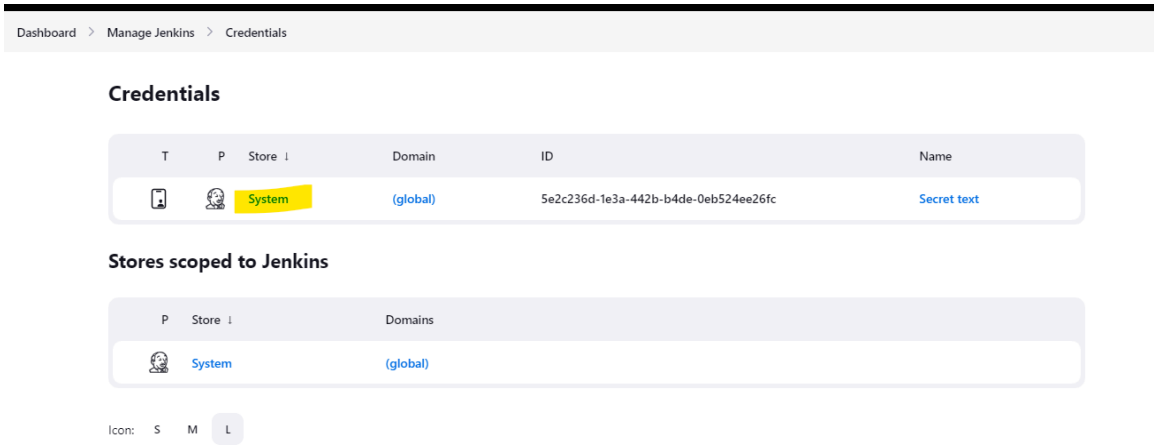


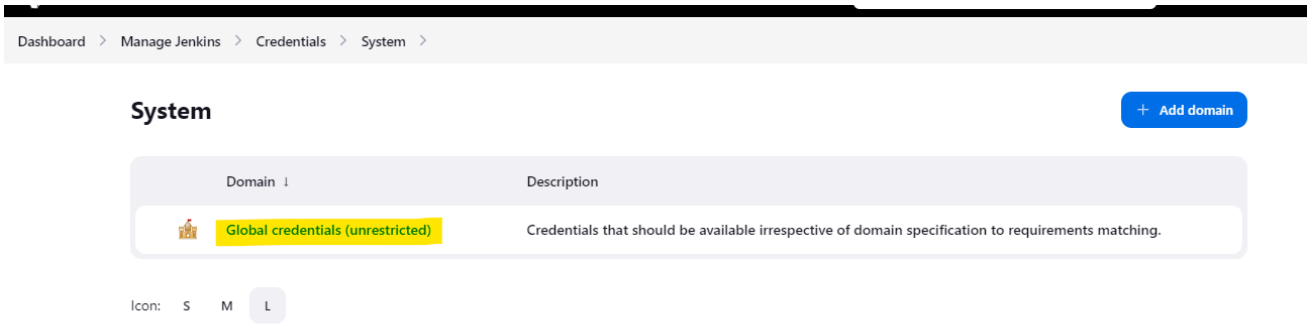
With these steps Both ways connectivity has been done.

Also set the credentials for your multi lab cluster in Jenkins.

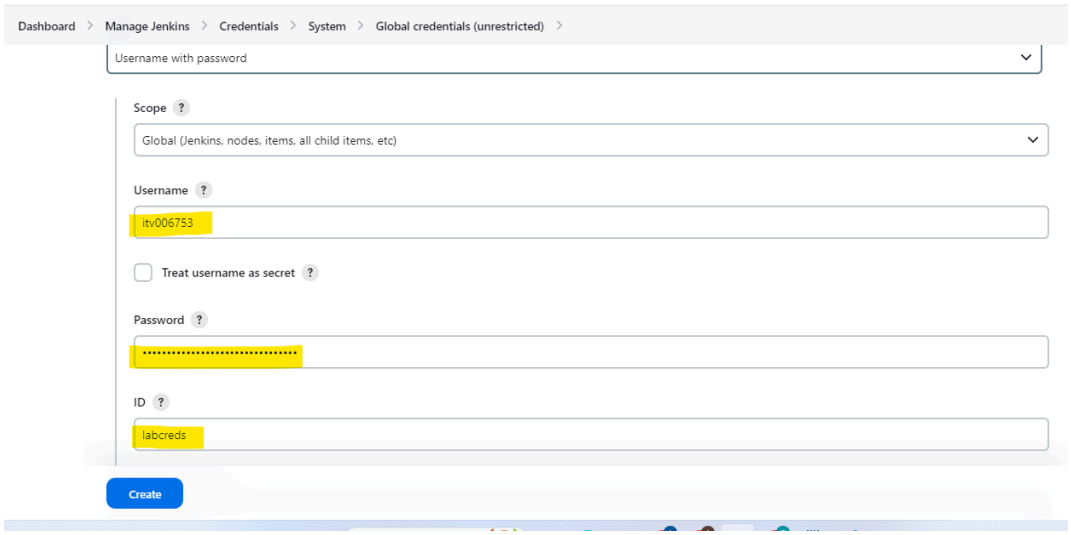
Go to jenkins => Manage jenkins => Credentials => System => Global Credentials => Add Credentials

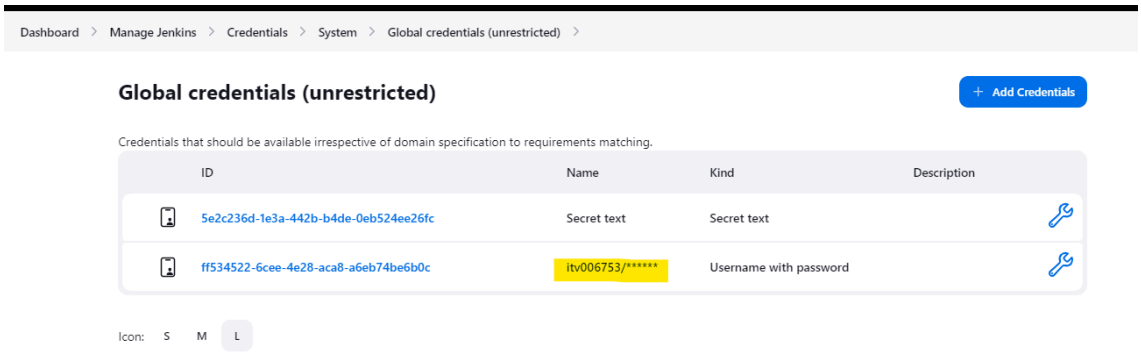






Provide the username, password and id for your "Multi Lab Cluster," and the system will generate the corresponding credentials as depicted below.



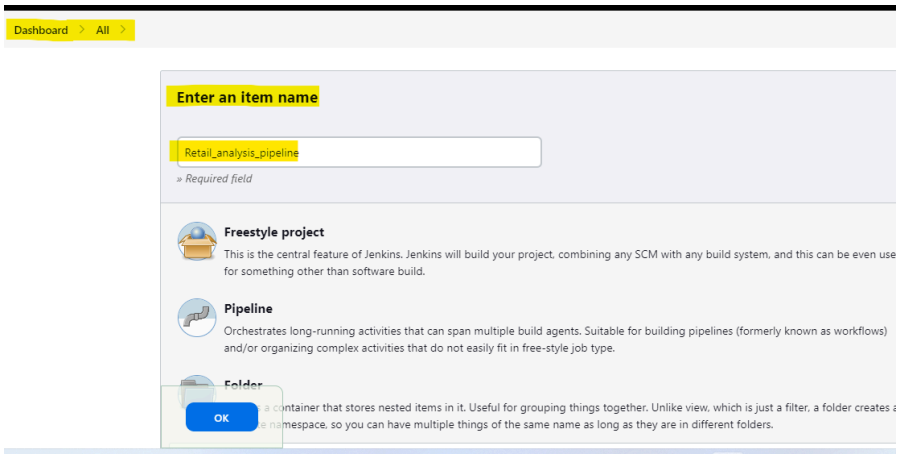


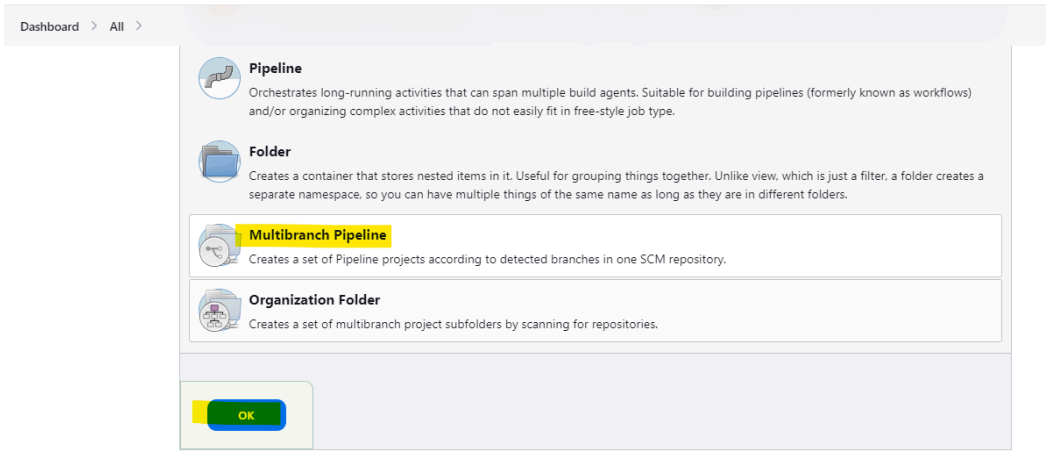
Note: Modify the Jenkinsfile with the provided code, and proceed to add, commit and push the changes.

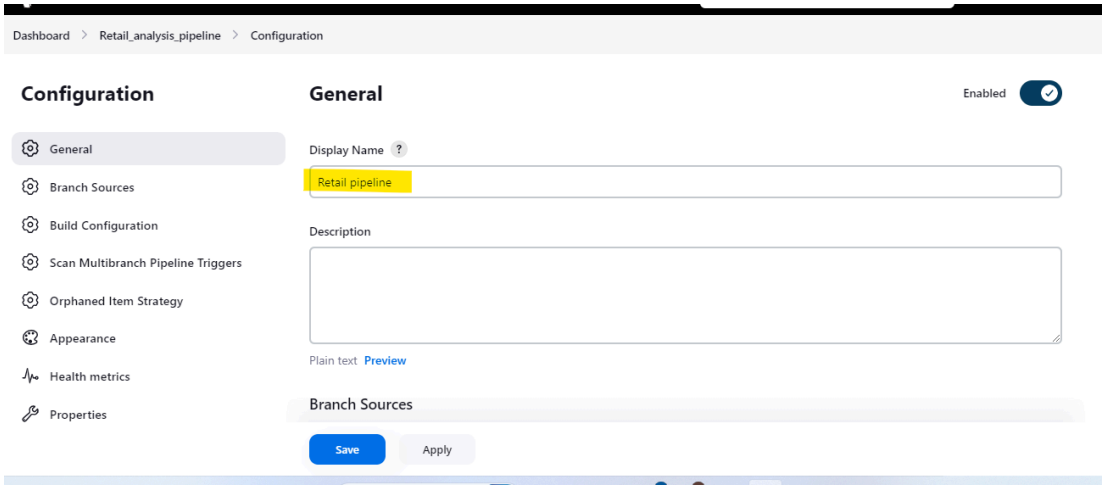
```
C:\Users\HP\Desktop\Retail Analysis 2>git add .

C:\Users\HP\Desktop\Retail Analysis 2>git commit -m "Edited jenkins file"
[feature-rp-50001 ba153a1] Edited jenkins file
 1 file changed, 27 insertions(+)

C:\Users\HP\Desktop\Retail Analysis 2>git push origin feature-rp-50001
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 2 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 395 bytes | 395.00 KiB/s, done.
Total 3 (delta 1), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
To https://github.com/aratishatti15/Retail_analysis2.git
   b499b8b..ba153a1  feature-rp-50001 -> feature-rp-50001
```

Steps for creation of Multibranch pipeline in Jenkins:

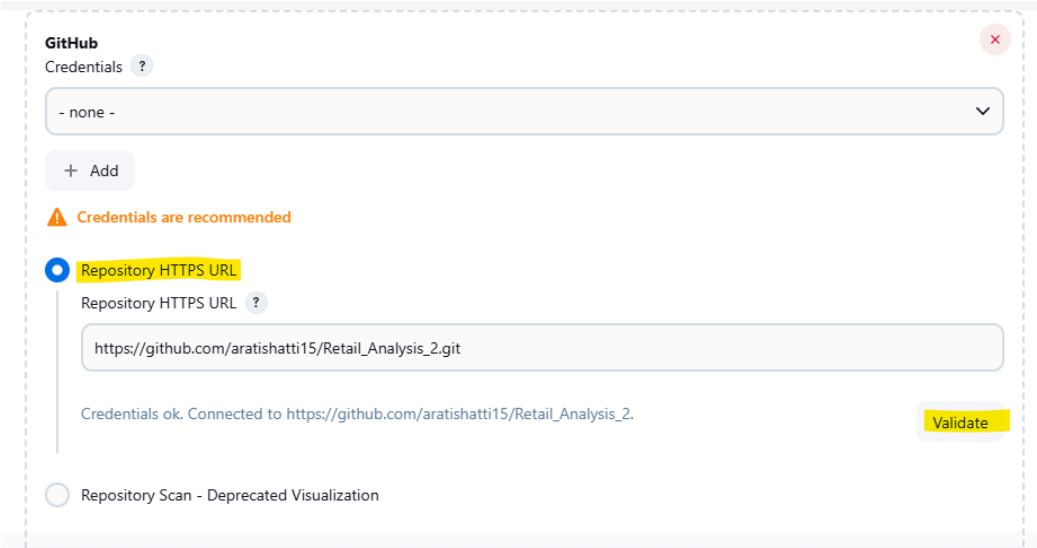
Go to the Jenkins UI (Dashboard) => New items => Create the multibranch pipeline

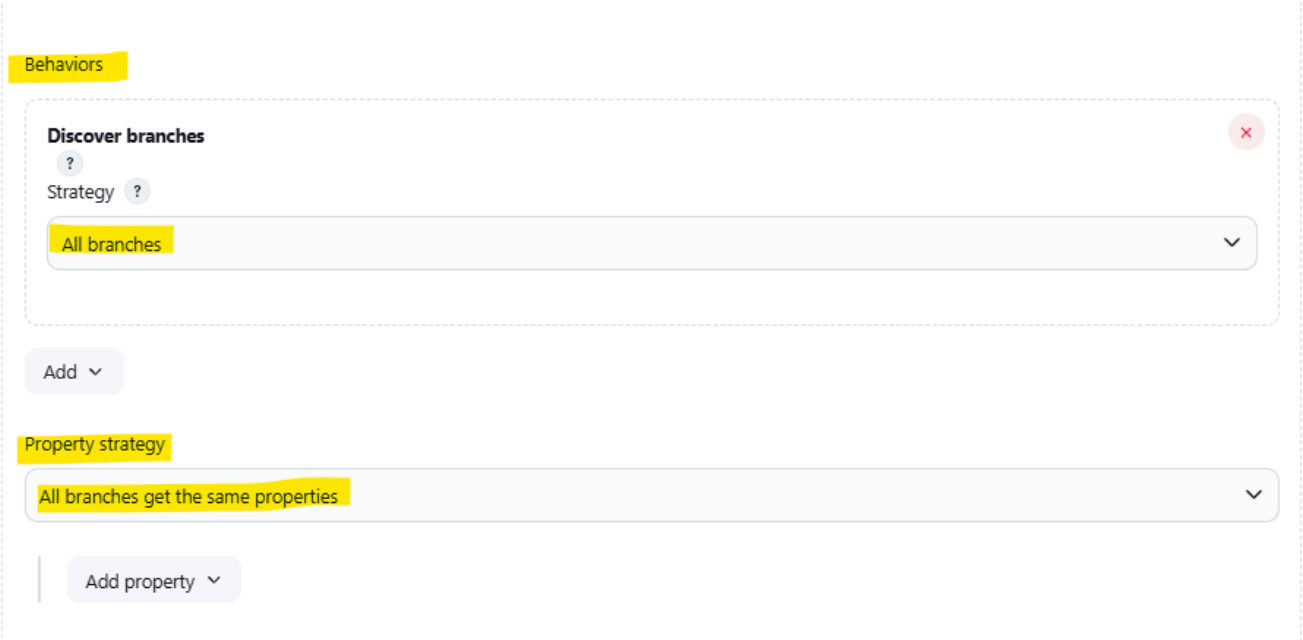




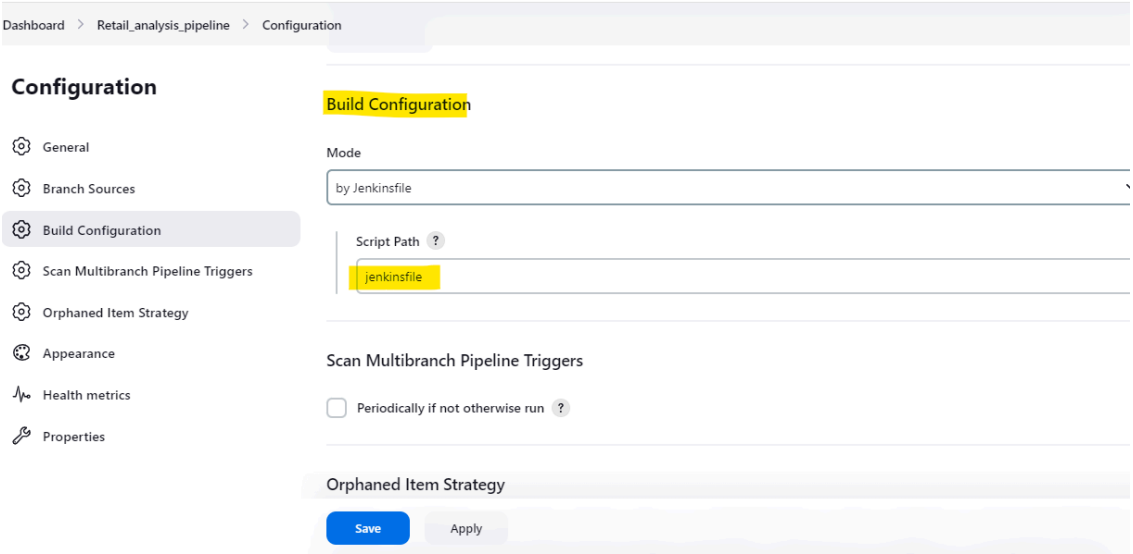


Add the URL of Retail Analysis repository and in discover branches option mention “All branches”

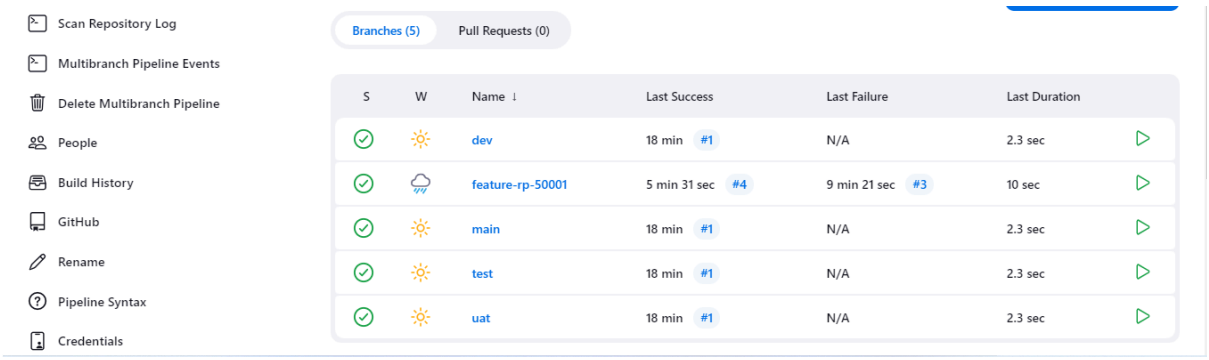




Note: Mention the name of jenkins file as you have created as it is case sensitive



After the pipeline is triggered and successfully executed, you'll observe the following output in the Jenkins UI.



This indicates that the pipeline is successfully triggered upon the git push.

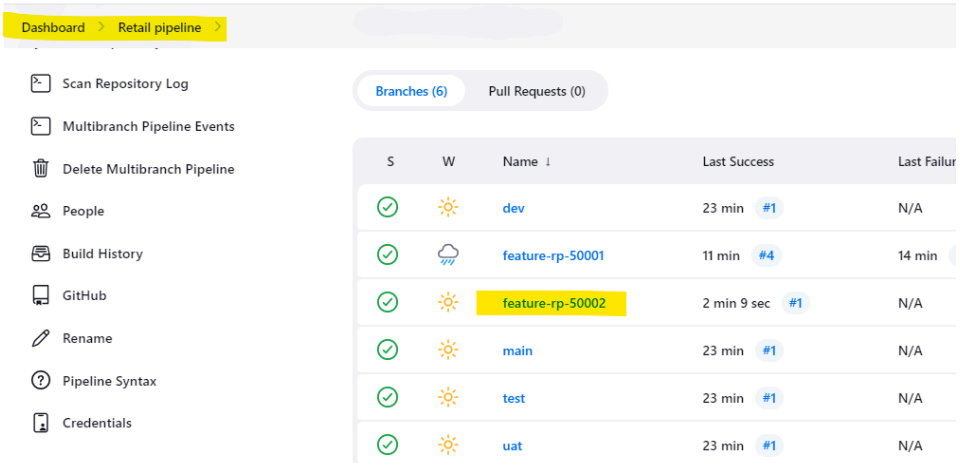
Now create the new branch "**git checkout -b feature-rp-50002** "

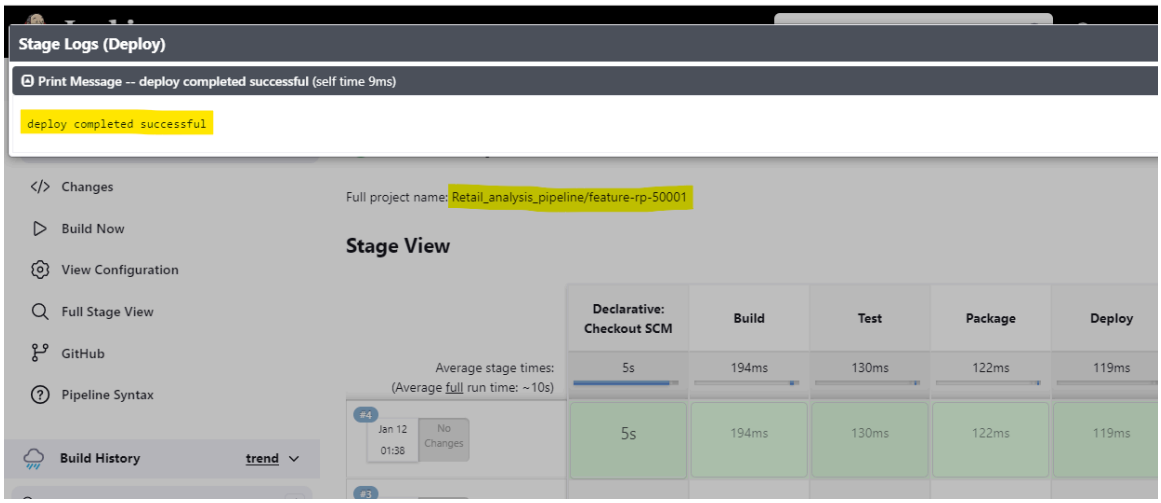
```
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project-2> git checkout -b feature-rp-50002
Switched to a new branch 'feature-rp-50002'
```

And push changes to remote using the command "**git push origin feature-rp-50002**".

```
PS C:\Users\HP\OneDrive\Desktop\Retail_analysis_project-2> git push origin feature-rp-50002
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 8 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 945 bytes | 945.00 KiB/s, done.
Total 3 (delta 1), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
remote:
remote: Create a pull request for 'feature-rp-50002' on GitHub by visiting:
remote:      https://github.com/aratishatti15/Retail_Analysis__2/pull/new/feature-rp-50002
remote:
To https://github.com/aratishatti15/Retail_Analysis__2.git
 * [new branch]      feature-rp-50002 -> feature-rp-50002
```

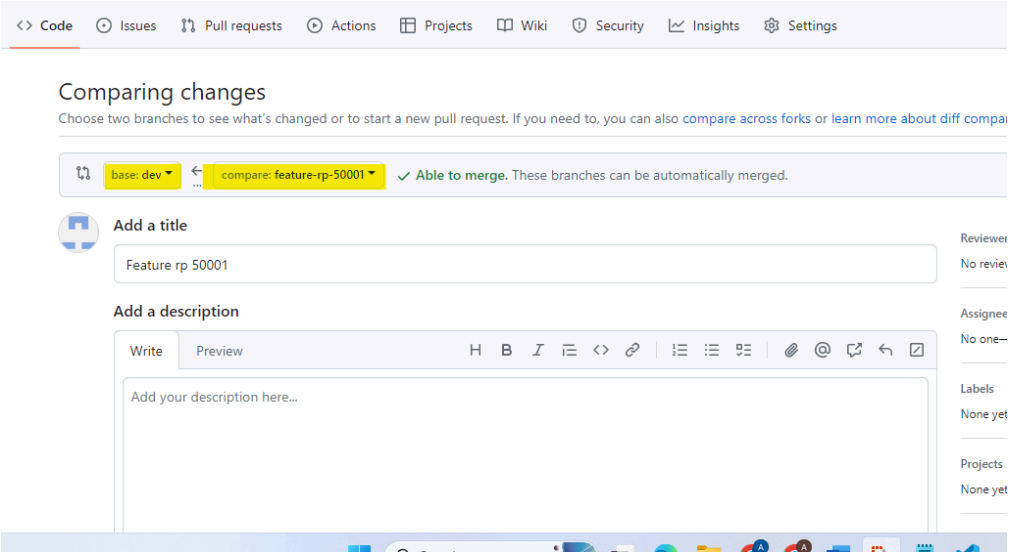
After the pipeline is triggered and successfully executed, you'll observe the following output in the Jenkins UI.

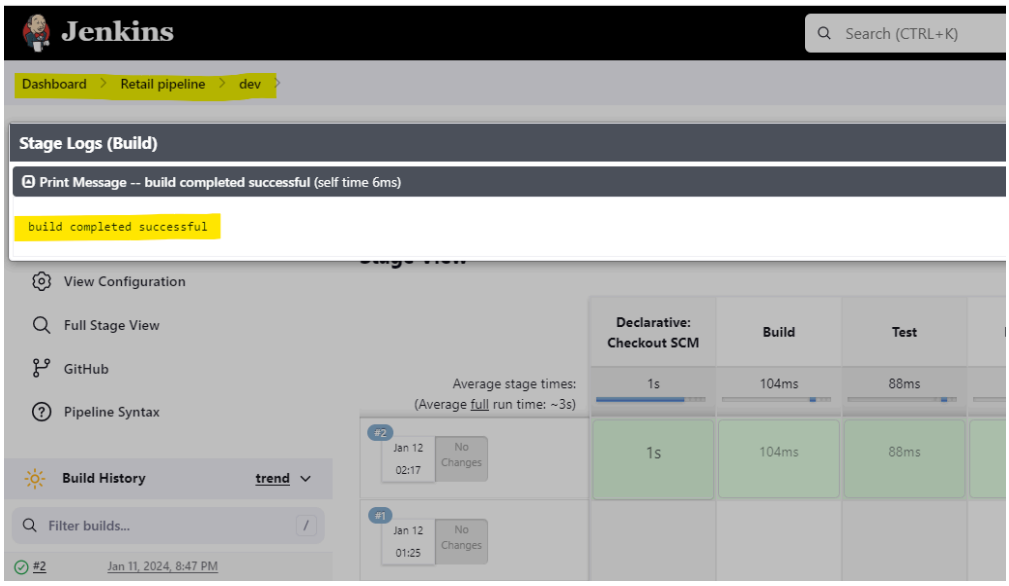




This indicates that the pipeline is successfully triggered upon the creation of a new branch.

Now create and approve the pull request for merging changes of branch "**feature-rp-50001" into "dev" branch.**





This indicates that the pipeline is successfully triggered upon the creation of a new branch.

To deploy the Retail Project code from our local system to the edge node (In Multi node lab), We will create a Jenkins file for this use case.

Code:

```
pipeline {
   agent any

   environment {
      LABS = credentials('labcreds')
      JAVA_HOME = '/opt/bitnami/java'  // Set your JAVA_HOME path here.
      PATH = "${env.JAVA_HOME}/bin:${env.PATH}"  // Add Java binaries to PATH
   }

   stages {
      stage('Setup Virtual Environment') {
         steps {
            script {
               // Create a virtual environment with the project name (Retail pipeline)
               sh 'python3 -m venv retail_pipeline_venv'
               // Upgrade pip and install pipenv in the virtual environment
               sh './retail_pipeline_venv/bin/pip install --upgrade pip'
               sh './retail_pipeline_venv/bin/pip install pipenv'
            }
         }
      }
      stage('Install Dependencies') {
         steps {
            script {
               // Install your project dependencies (e.g., requirements.txt or Pipfile)
               sh './retail_pipeline_venv/bin/pipenv install'
            }
         }
      }
      stage('Test') {
         steps {
            script {
               // Ensure JAVA_HOME is set for PySpark to work
               sh 'echo $JAVA_HOME'
               sh 'echo $PATH'

               // Run tests (assuming you are using pytest for tests)
               sh './retail_pipeline_venv/bin/pipenv run pytest'
            }
         }
      }
      stage('Package') {
         steps {
            // Create the zip file but exclude the venv directory
            sh 'zip -r retailproject.zip . -x "retail_pipeline_venv/*"'
```

```
        }
    }
    stage('Deploy') {
        steps {
            // Add deployment steps here (e.g., deploy to a server or cloud)
            sh 'sshpass -p $LABS_PSW scp -o StrictHostKeyChecking=no -r
retailproject.zip $LABS_USR@g02.itversity.com:/home/itv012419/retailproject'
        }
    }
  }
}
```

Note: We have updated this code as compared to "Sumit" Sir's Code as there were some issues with Jenkins cluster creation so based on requirement we have created this Jenkins file.

Modify the Jenkinsfile with the provided code in feature-rp-50002, and proceed to add, commit and push the changes.

```
PS C:\Users\HP\Desktop\Retail Analysis 2> git add .
PS C:\Users\HP\Desktop\Retail Analysis 2> git commit -m "Modified jenkins file"
[feature-rp-50002 9934cfd] Modified jenkins file
 1 file changed, 14 insertions(+), 9 deletions(-)
PS C:\Users\HP\Desktop\Retail Analysis 2> git push origin feature-rp-50002
Enumerating objects: 5, done.
Counting objects: 100% (5/5), done.
Delta compression using up to 2 threads
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 579 bytes | 13.00 KiB/s, done.
Total 3 (delta 1), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
To https://github.com/aratishatti15/Retail_analysis2.git
   e462ae2..9934cfd  feature-rp-50002 -> feature-rp-50002
PS C:\Users\HP\Desktop\Retail Analysis 2>
```

Now your pipeline will run and it will zip all the files in the Retail project folder and using scp command it will copy those files to the mentioned path in edge node and you can see the retail project folder in edge node of our multi node lab.

Note: If you face below error after updating code of Jenkins file then run the command "sudo apt install python3.11-venv" and again scan your pipeline:

S	W	Name ↓	Last Success	Last Failure	Last Duration
✓	☼	dev	1 hr 3 min #1	N/A	3.1 sec
✓	☼	feature-rp-50001	1 hr 6 min #1	N/A	9.9 sec
✗	⛈	feature-rp-50002	N/A	5 min 30 sec #1	4 sec
✓	☁	**main**	1 hr 4 min #2	1 hr 6 min #1	6.1 sec
✓	☼	test	1 hr 2 min #1	N/A	3 sec
✓	☼	uat	14 min #2	N/A	8 min 53 sec

Stage Logs (Setup Virtual Environment)

Shell Script -- python3 -m venv retail_pipeline_venv (self time 301ms)

```
+ python3 -m venv retail_pipeline_venv
The virtual environment was not created successfully because ensurepip is not
available.  On Debian/Ubuntu systems, you need to install the python3-venv
package using the following command.

    apt install python3.11-venv

You may need to use sudo with that command.  After installing the python3-venv
package, recreate your virtual environment.

Failing command: /bitnami/jenkins/home/workspace/Retail_pipeline_feature-rp-50002/retail_pipeline_venv/bin/python3
```

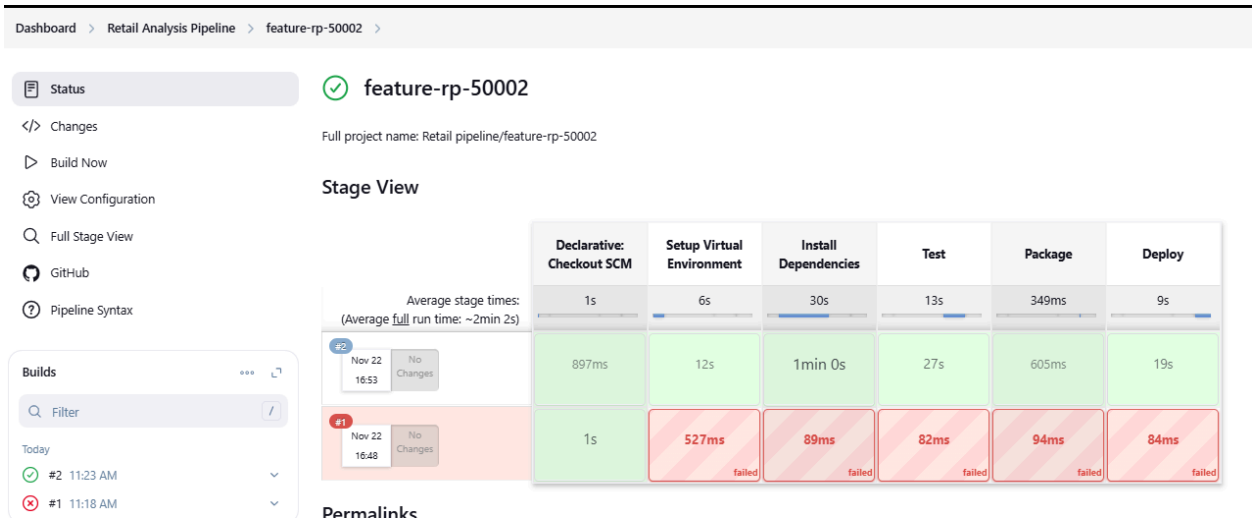
Follow below steps to resolve it:

On your Jenkins server, install the missing package:

sudo apt update
sudo apt install python3.11-venv

```
[redacted]-1-vm:~$ sudo apt install python3.11-venv
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libpython3.11-minimal libpython3.11-stdlib python3-distutils python3-lib2to3 python3-pip-whl
  python3-setuptools-whl python3.11 python3.11-minimal
Suggested packages:
  python3.11-doc binfmt-support
The following NEW packages will be installed:
  python3-distutils python3-lib2to3 python3-pip-whl python3-setuptools-whl python3.11-venv
The following packages will be upgraded:
  libpython3.11-minimal libpython3.11-stdlib python3.11 python3.11-minimal
4 upgraded, 5 newly installed, 0 to remove and 45 not upgraded.
```

After successfully running the pipeline it will be reflected as shown below in Jenkins ui.



And the zipped file will be copied to your external lab.