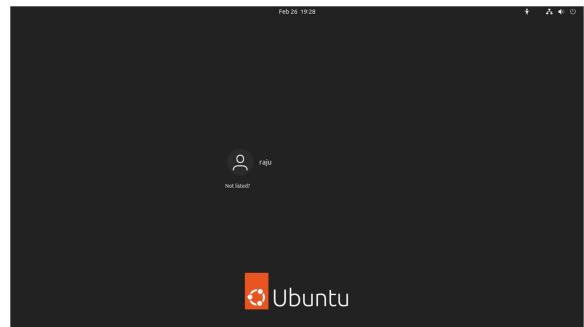
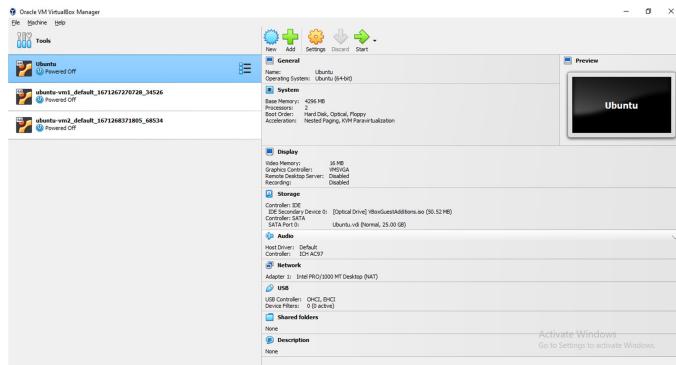


IMPLEMENTING MICRO SERVICE USING FLASK FRAMEWORK ON UBUNTU VIRTUAL MACHINE

STEP 1:

HOST AN UBUNTU VIRTUAL MACHINE USING ORACLE VM VIRTUAL BOX



STEP 2

SETUP VISUAL STUDIO ON UBUNTU VM

Download Visual Studio

The screenshot shows the Visual Studio Code download page on a web browser. The top navigation bar includes links for Visual Studio Code, Docs, Updates, Blog, API, Extensions, FAQ, Learn, Search Docs, and Download. A banner at the top states "Free and built on Open Source. Integrated Git, debugging and extensions." Below the navigation, there are three main download sections:

- Windows:** Shows the Windows logo. Download links: User Installer (x64, x86, Arm64), System Installer (x64, x86, Arm64), .zip (x64, x86, Arm64), and CLI (x64, x86, Arm64).
- Linux:** Shows the Tux logo. Download links: .deb (x64, Arm32, Arm64), .rpm (x64, Arm32, Arm64), .tar.gz (x64, Arm32, Arm64), and Snap (Snap Store).
- Mac:** Shows the Apple logo. Download links: .zip (Intel chip, Apple silicon, Universal), CLI (Intel chip, Apple silicon), and .tar.gz (x64, Arm32, Arm64).

At the bottom of the page, there is a note: "By downloading and using Visual Studio Code, you agree to the [license terms](#) and [privacy statement](#)". There are also promotional sections for the Insiders build and vscode.dev.

Activities Firefox Web Browser Feb 25 16:33

Motion - Transit Viewer Documentation for Visual Studio Code

Visual Studio Code Docs Updates Blog API Extensions F... code_1.75.1-1675893397_amd64.deb Completed — 93.7 MB

Overview SETUP GET STARTED USER GUIDE SOURCE CONTROL TERMINAL LANGUAGES NODE.JS / JAVASCRIPT TYPESCRIPT PYTHON JAVA C++ DOCKER DATA SCIENCE AZURE REMOTE

Thanks for downloading!

Download not starting? Try this [direct download link](#).
Please take a few seconds and help us improve ... [click to take survey](#).

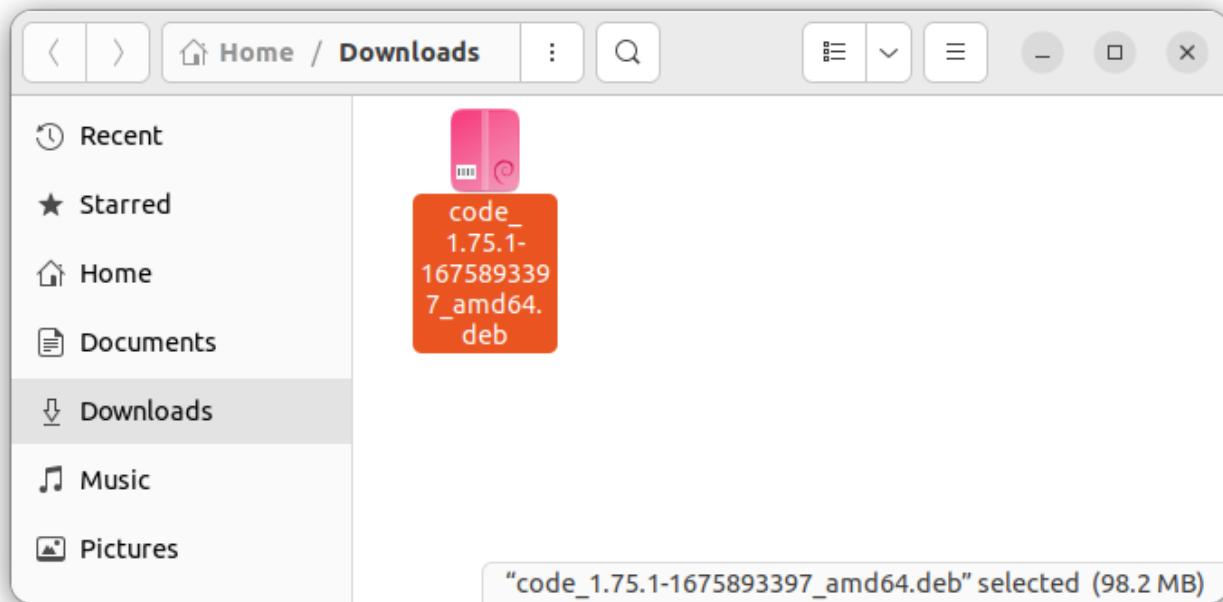
VS Code in Action
Top Extensions
First Steps
Keyboard Shortcuts
Downloads
Privacy

[Tweet this link](#)
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[Watch videos](#)

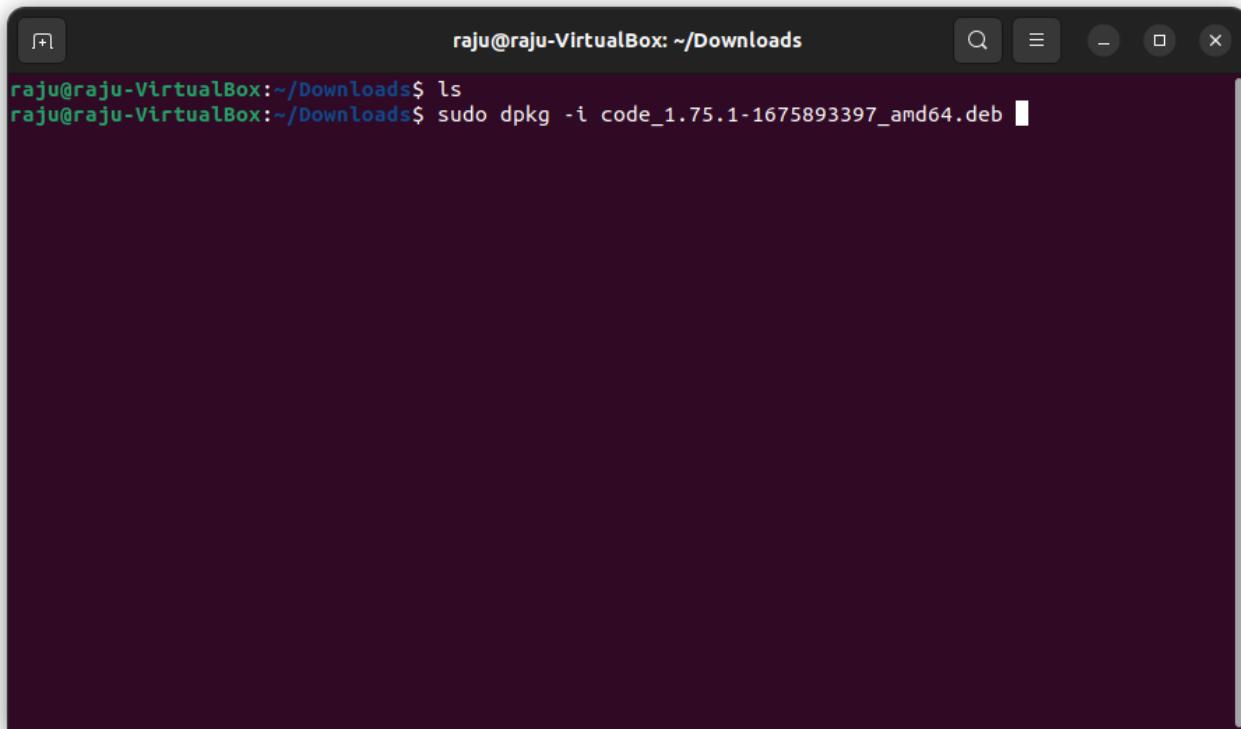
Getting Started

Visual Studio Code is a lightweight but powerful source code editor which runs on your desktop and is available for Windows, macOS and Linux. It comes with built-in support for JavaScript, TypeScript and Node.js and has a rich ecosystem of extensions for other languages and runtimes (such as C++, C#, Java, Python, PHP, Go, .NET). Begin your journey with VS Code with these [introductory videos](#).

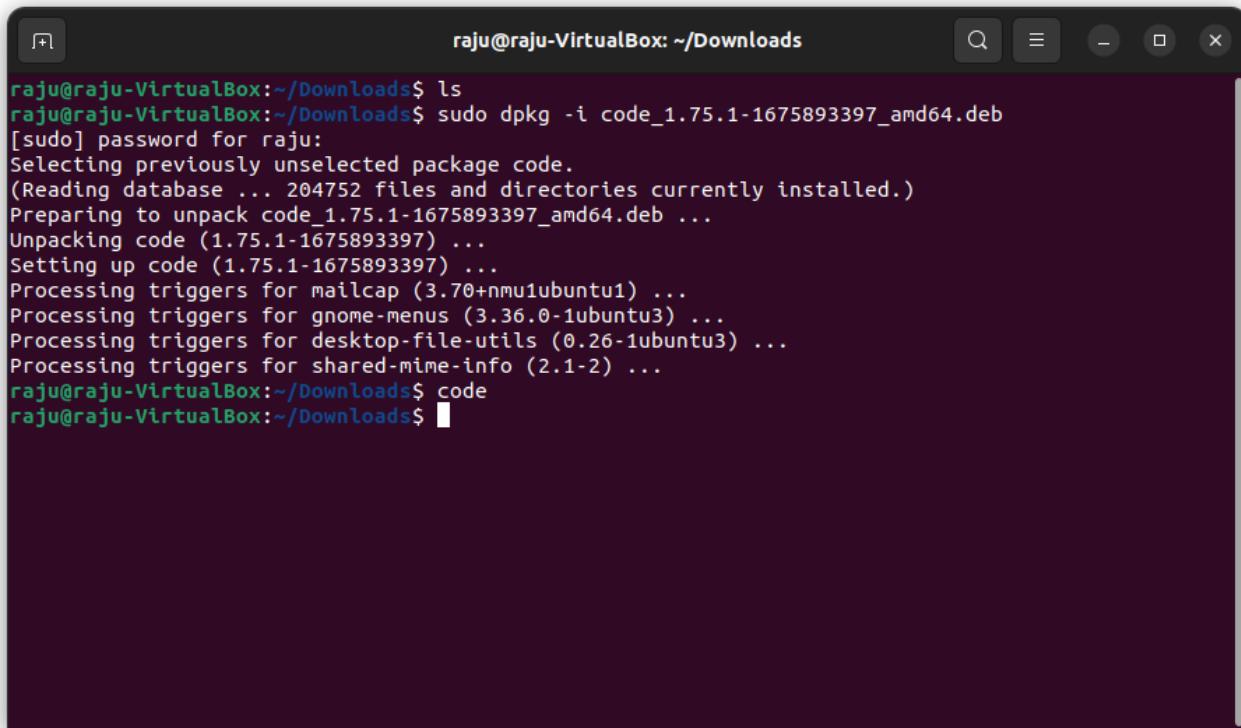
Visual Studio Code in Action



Install Visual Studio

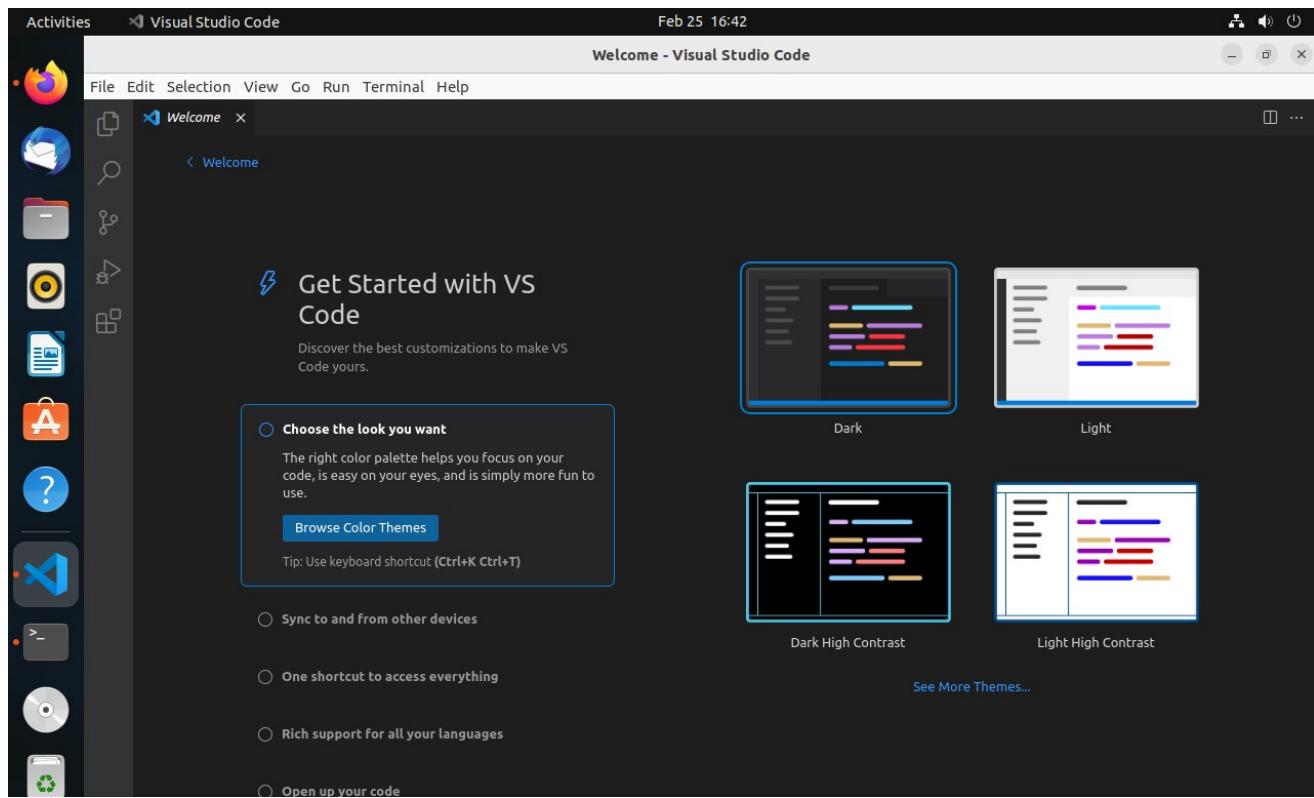


```
raju@raju-VirtualBox: ~/Downloads$ ls
raju@raju-VirtualBox: ~/Downloads$ sudo dpkg -i code_1.75.1-1675893397_amd64.deb
```



```
raju@raju-VirtualBox: ~/Downloads$ ls
raju@raju-VirtualBox: ~/Downloads$ sudo dpkg -i code_1.75.1-1675893397_amd64.deb
[sudo] password for raju:
Selecting previously unselected package code.
(Reading database ... 204752 files and directories currently installed.)
Preparing to unpack code_1.75.1-1675893397_amd64.deb ...
Unpacking code (1.75.1-1675893397) ...
Setting up code (1.75.1-1675893397) ...
Processing triggers for mailcap (3.70+nmu1ubuntu1) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu3) ...
Processing triggers for desktop-file-utils (0.26-1ubuntu3) ...
Processing triggers for shared-mime-info (2.1-2) ...
raju@raju-VirtualBox: ~/Downloads$ code
raju@raju-VirtualBox: ~/Downloads$
```

Installed and Launched Visual Studio Code



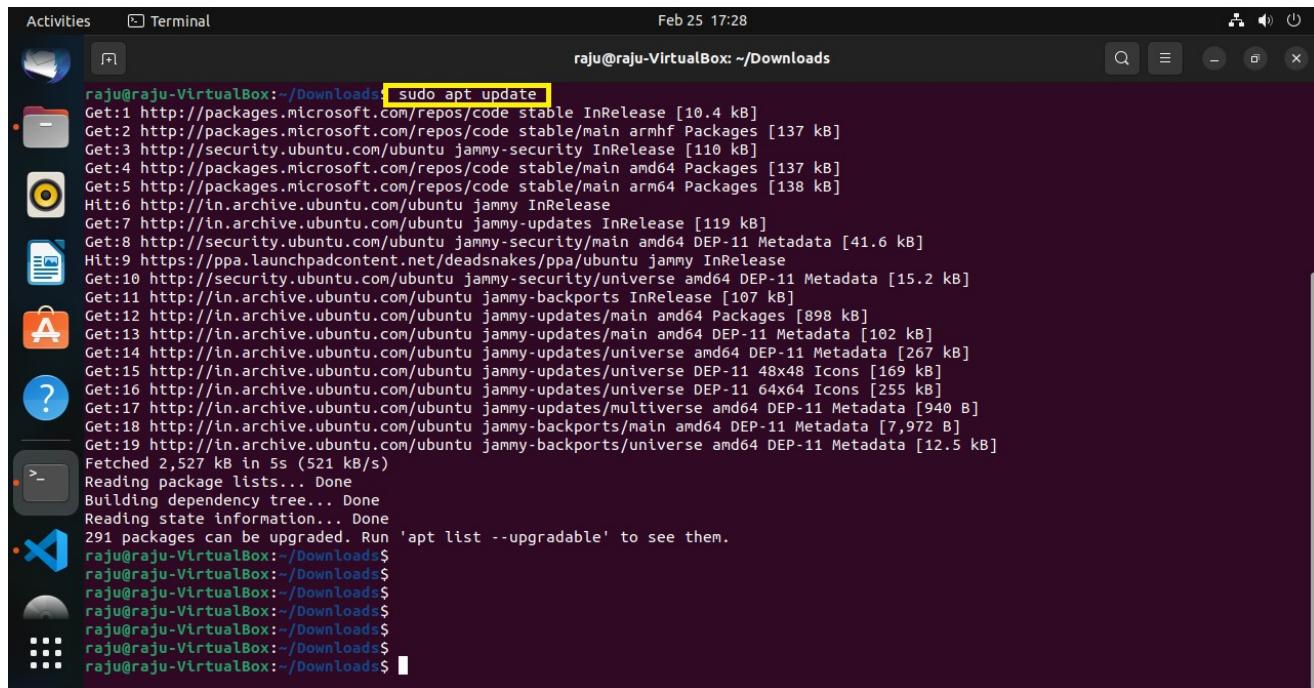
STEP 3

SETUP PYTHON

Commands to install and verify Python

```
sudo apt update
sudo apt install software-properties-common
sudo add-apt-repository ppa:deadsnakes/ppa
sudo apt install python3.10

python3 --version
```



The image shows a screenshot of an Ubuntu desktop environment. At the top, there is a dock with icons for Dash, Home, Applications, and others. Below the dock, a terminal window is open with the following command history:

```
Activities Terminal Feb 25 17:28
raju@raju-VirtualBox: ~/Downloads
```

```
raju@raju-VirtualBox:~/Downloads$ sudo apt update
Get:1 http://packages.microsoft.com/repos/code stable InRelease [10.4 kB]
Get:2 http://packages.microsoft.com/repos/code/stable/main armhf Packages [137 kB]
Get:3 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:4 http://packages.microsoft.com/repos/code/stable/main amd64 Packages [137 kB]
Get:5 http://packages.microsoft.com/repos/code/stable/main arm64 Packages [138 kB]
Hit:6 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Get:7 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:8 http://security.ubuntu.com/ubuntu jammy-security/main amd64 DEP-11 Metadata [41.6 kB]
Hit:9 https://ppa.launchpadcontent.net/deadsnakes/ppa/ubuntu jammy InRelease
Get:10 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 DEP-11 Metadata [15.2 kB]
Get:11 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease [107 kB]
Get:12 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [898 kB]
Get:13 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 DEP-11 Metadata [102 kB]
Get:14 http://in.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 DEP-11 Metadata [267 kB]
Get:15 http://in.archive.ubuntu.com/ubuntu jammy-updates/universe DEP-11 48x48 Icons [169 kB]
Get:16 http://in.archive.ubuntu.com/ubuntu jammy-updates/universe DEP-11 64x64 Icons [255 kB]
Get:17 http://in.archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 DEP-11 Metadata [940 B]
Get:18 http://in.archive.ubuntu.com/ubuntu jammy-backports/main amd64 DEP-11 Metadata [7,972 B]
Get:19 http://in.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 DEP-11 Metadata [12.5 kB]
Fetched 2,527 kB in 5s (521 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
291 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

Below the terminal, a file manager window titled "Downloads" is visible, showing a list of files and folders. The status bar at the bottom of the screen also displays "raju@raju-VirtualBox: ~/Downloads".

```
raju@raju-VirtualBox:~/Downloads$  
raju@raju-VirtualBox:~/Downloads$  
raju@raju-VirtualBox:~/Downloads$  
raju@raju-VirtualBox:~/Downloads$  
raju@raju-VirtualBox:~/Downloads$  
raju@raju-VirtualBox:~/Downloads$ sudo apt install software-properties-common  
[sudo] password for raju:  
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-v-a-driver intel-media-va-driver libaaacs0 libaom3 libavcodec58 libavformat58  
  libavutil56 libbdplus0 libblas3 libbluray2 libbs2b0 libchromaprint1 libcodec2-1.0 libdavids5 libflite1 libgme0 libgsml  
  libgstreamer-plugins-bad1.0-0 libigdmm12 liblilv-0-0 libmfx1 libmysofa1 libnorm1 libopenmp0 libpgm-5.3-0 libpostproc55 librabbitmq4  
  librubberband2 libserd-0-0 libshine3 libsnappy1v5 libsound-0-0 librsvg-2.42-1 libssh-gcrypt-4 libswresample3 libswscale5  
  libudread0 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 systemd-hwe-hwdb va-driver-all vdpau-driver-all  
Use 'sudo apt autoremove' to remove them.  
The following additional packages will be installed:  
  python3-software-properties software-properties-gtk ubuntu-adantage-tools
```

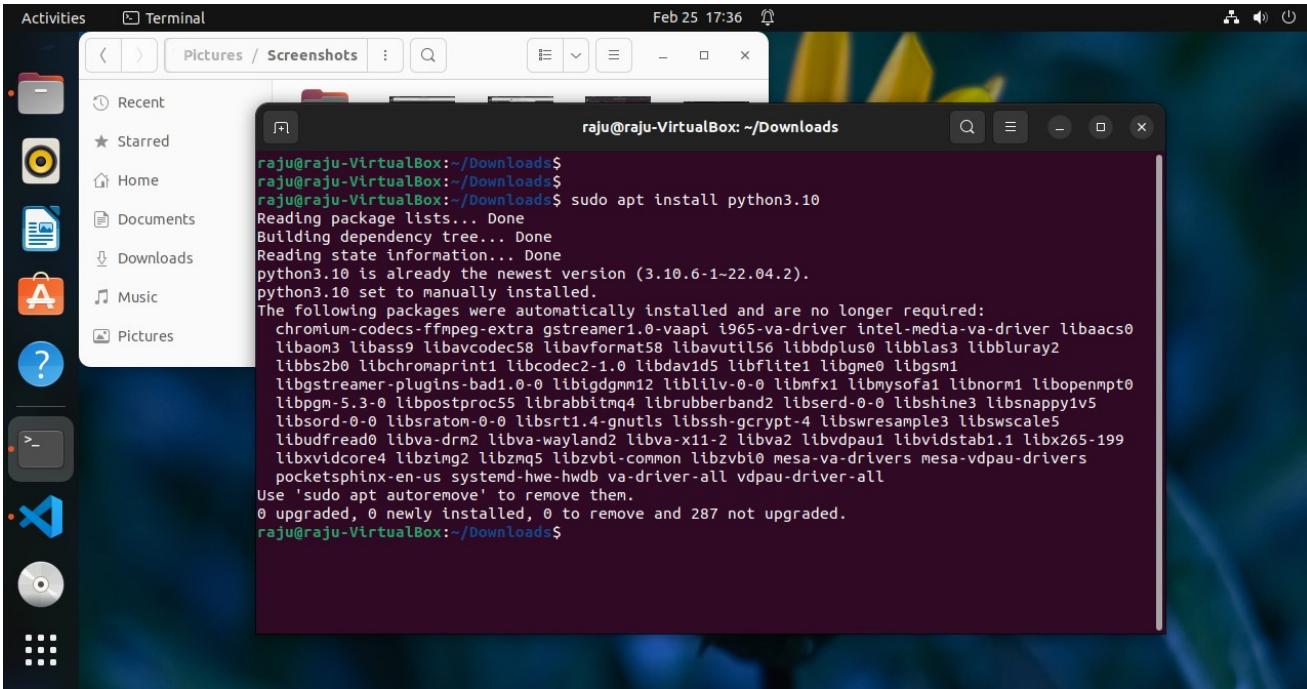
```
Setting up software-properties-gtk (0.99.22.5) ...  
Processing triggers for dbus (1.12.20-2ubuntu4) ...  
Processing triggers for shared-mime-info (2.1-2) ...  
Processing triggers for mailcap (3.70+nmu1ubuntu1) ...  
Processing triggers for desktop-file-utils (0.26-1ubuntu3) ...  
Processing triggers for hicolor-icon-theme (0.17-2) ...  
Processing triggers for gnome-menus (3.36.0-1ubuntu3) ...  
Processing triggers for libglib2.0-0:amd64 (2.72.1-1) ...  
Processing triggers for man-db (2.10.2-1) ...  
raju@raju-VirtualBox:~/Downloads$ sudo add-apt-repository ppa:deadsnakes/ppa  
Repository: 'deb https://ppa.launchpadcontent.net/deadsnakes/ppa/ubuntu/ jammy main'  
Description:  
This PPA contains more recent Python versions packaged for Ubuntu.  
  
Disclaimer: there's no guarantee of timely updates in case of security problems or other issues. If you want to use them in a security-or-otherwise-critical environment (say, on a production server), you do so at your own risk.  
  
Update Note  
=====  
Please use this repository instead of ppa:fkrull/deadsnakes.  
  
Reporting Issues  
=====  
  
Issues can be reported in the master issue tracker at:  
https://github.com/deadsnakes/issues  
  
Supported Ubuntu and Python Versions  
=====  


- Ubuntu 18.04 (bionic) Python2.3 - Python 2.6, Python 3.1 - Python 3.5, Python3.7 - Python3.11
- Ubuntu 20.04 (focal) Python3.5 - Python3.7, Python3.9 - Python3.11
- Ubuntu 22.04 (jammy) Python3.7 - Python3.9, Python3.11



- Note: Python2.7 (all), Python 3.6 (bionic), Python 3.8 (focal), Python 3.10 (jammy) are not provided by deadsnakes as upstream ubuntu provides those packages.


```



A screenshot of an Ubuntu desktop environment. On the left is a vertical dock with icons for Activities, Terminal, Home, Documents, Downloads, Music, Pictures, and Help. A file browser window titled 'Pictures / Screenshots' is open. In the center, a terminal window titled 'raju@raju-VirtualBox: ~/Downloads' shows the output of a command to upgrade packages:

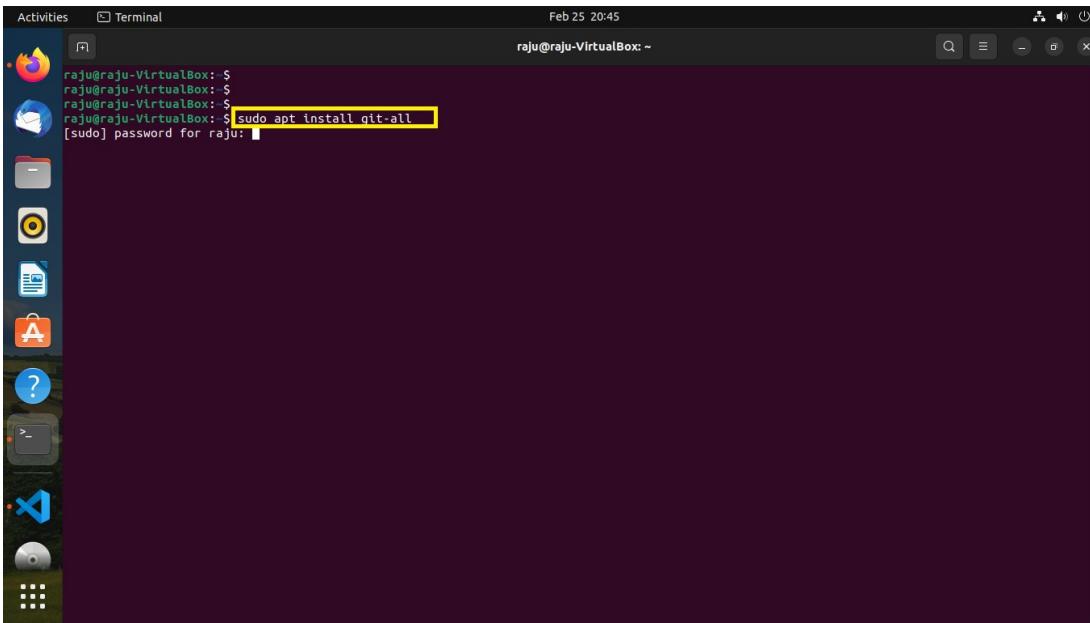
```
raju@raju-VirtualBox:~/Downloads$ sudo apt install python3.10
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
python3.10 is already the newest version (3.10.6-1~22.04.2).
python3.10 set to manually installed.
The following packages were automatically installed and are no longer required:
  chromium-codecs-ffmpeg-extra gstreamer1.0-vaapi i965-va-driver intel-media-va-driver libaacs0
  libao0 libass9 libavcodec58 libavformat58 libavutil56 libbdplus0 libblas3 libbluray2
  libbs2b0 libchromaprint1 libcodecs2-1.0 libdavids1 libflite1 libgme0 libgsml
  libgstreamer-plugins-bad1.0-0 libigdmm12 libl10n-0-0 libmfx1 libmysofa1 libnorm1 libopenmpt0
  libpgm-5.3-0 libpostproc55 librabbitmq4 librubberband2 libserd-0-0 libshine3 libsnappy1v5
  libsord-0-0 libsratom-0-0 libstbi1.4-gnutls libssh-gcrypt-4 libswresample3 libswscale5
  libudfread0 libva-drm2 libva-wayland2 libva-x11-2 libvaz libvdpa1 libvidstab1.1 libx265-199
  libxvidcore libzimg2 libznq5 libzvbi-common libzvbio mesa-va-drivers mesa-vdpau-drivers
  pocketsphinx-en-us systemd-hwe-hwdb va-driver-all vdpau-driver-all
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 287 not upgraded.
raju@raju-VirtualBox:~/Downloads$
```

STEP 4

CLONE THE REPOSITORY

Clone the repository from

<https://github.com/Vikas098766/Microservices>



A screenshot of an Ubuntu desktop environment. On the left is a vertical dock with icons for Activities, Terminal, Home, Documents, Downloads, Music, Pictures, and Help. A terminal window titled 'raju@raju-VirtualBox: ~' shows the command 'sudo apt install git-all' being typed:

```
raju@raju-VirtualBox:~$ sudo apt install git-all
[sudo] password for raju:
```

Activities Terminal Feb 25 20:46 raju@raju-VirtualBox: ~

```
Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site 000-default.
info: Executing deferred 'a2enconf gitweb' for package gitweb
Enabling conf gitweb.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service → /lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service.
service → /lib/systemd/system/apache-htcacheclean.service.
Setting up libspecio-perl (0.47-1) ...
Setting up libparams-validate-perl:amd64 (1.30-1build3) ...
Setting up liblib-hooks-endofscope-perl (0.25-1) ...
Setting up libnamespace-clean-perl (0.27-1) ...
Setting up libnamespace-autoclean-perl (0.29-1) ...
Setting up libdatetime-local-perl (1:1.33-1) ...
Setting up libdatetime-tzzone-perl (1:2.51-1+2021e) ...
Setting up libdatetime-perl:amd64 (2:1.55-1build1) ...
Setting up libdatetime-format-strptime-perl (1.7900-1) ...
Setting up libdatetime-format-builder-perl (0.8300-1) ...
Setting up libdatetime-format-iso8601-perl (0.16-1) ...
Setting up git-mediawiki (1:2.34.1-1ubuntu1.8) ...
Setting up git-all (1:2.34.1-1ubuntu1.8) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
Processing triggers for ufw (0.36.1-4build1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for install-info (6.8-4build1) ...
raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ git --version
git version 2.34.1
raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$ raju@raju-VirtualBox:~$
```

Activities Terminal Feb 25 21:15 raju@raju-VirtualBox: ~/Desktop/Week 11 Assignment

```
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment$ git clone http://github.com/Vikas098766/Microservices.git
Cloning into 'Microservices'...
warning: redirecting to https://github.com/Vikas098766/Microservices.git/
remote: Enumerating objects: 95, done.
remote: Counting objects: 100% (2/2), done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 95 (delta 0), reused 0 (delta 0), pack-reused 93
Receiving objects: 100% (95/95), 96.43 KiB | 645.00 KiB/s, done.
Resolving deltas: 100% (27/27), done.
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment$ code .
```

```
# Local imports
import datetime
# Third party imports
from flask import request
import pandas as pd
from ms import app
from ms.functions import get_model_response
model_name = "Breast Cancer Wisconsin (Diagnostic)"
model_file = 'model_binary.dat.gz'
version = "v1.0.0"
@app.route('/info', methods=['GET'])
def info():
    """Return model information, version, how to call"""
    result = {}
    result["name"] = model_name
    result["version"] = version
    return result
@app.route('/health', methods=['GET'])
def health():
    """Return service health"""
    return 'ok'
```

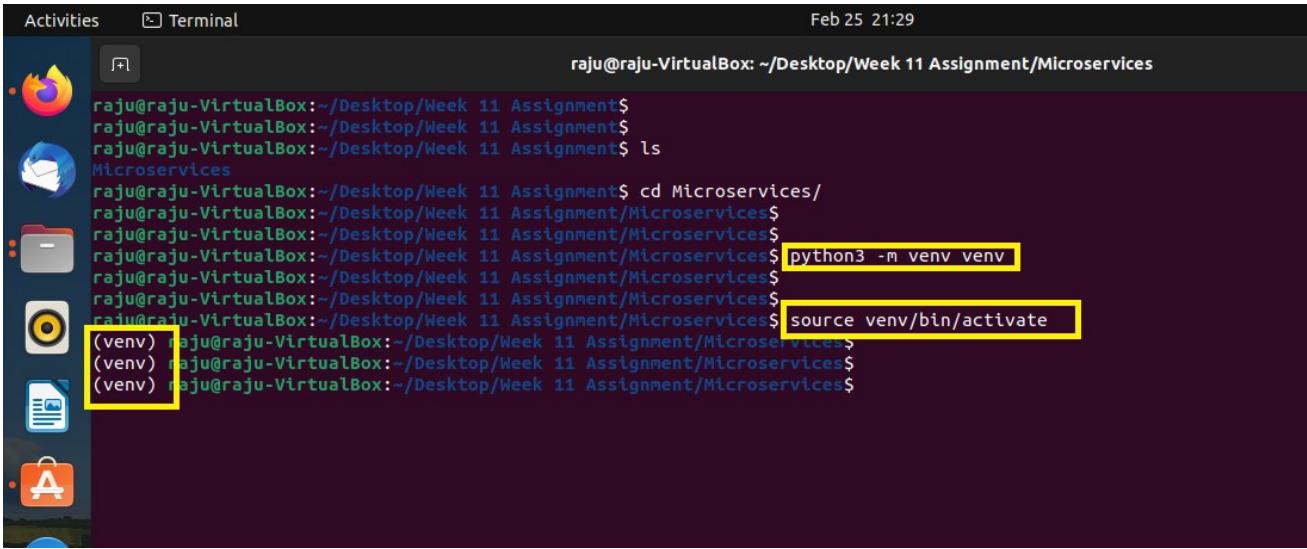
STEP 5

CREATE A VIRTUAL ENVIRONMENT

```
python3 -m venv venv
source venv/bin/activate
```

Activities Terminal Feb 25 21:29

```
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment$  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment$ ls  
Microservices  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment$ cd Microservices/  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ python3 -m venv venv  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ source venv/bin/activate  
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$  
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$  
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$
```

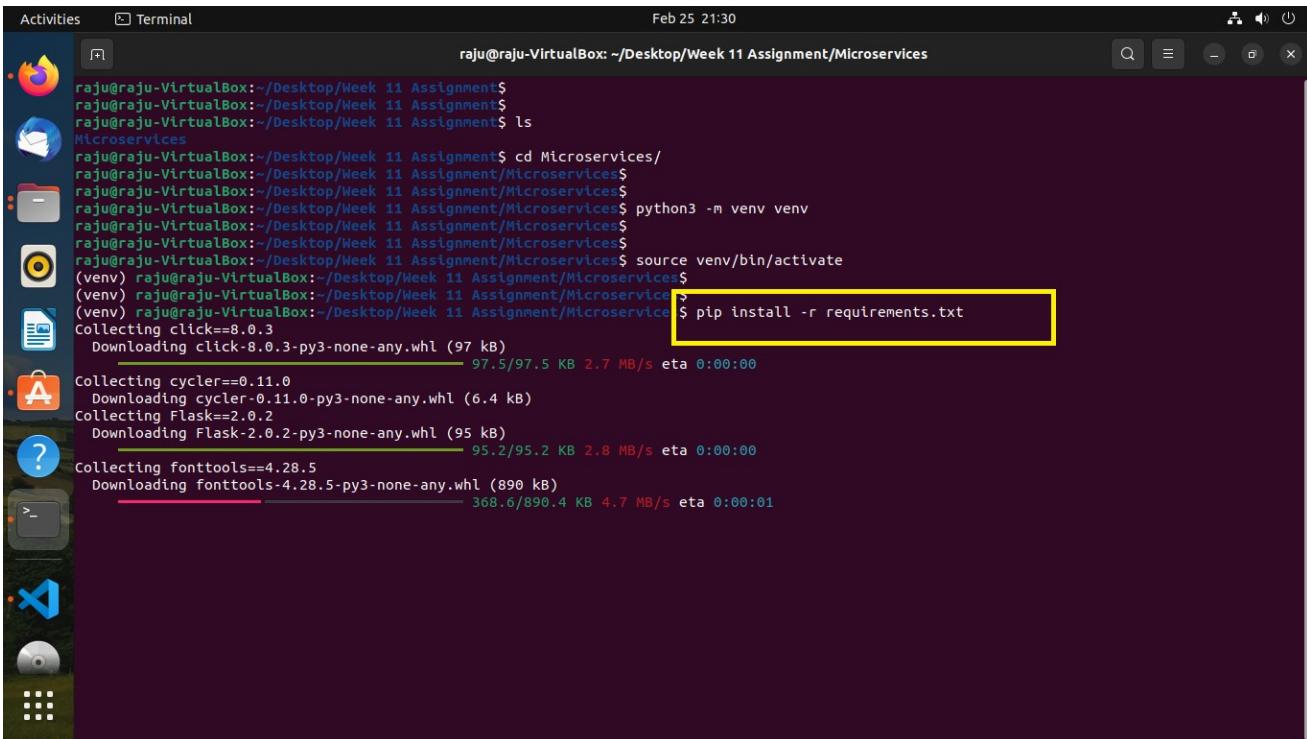


STEP 6

INSTALL THE DEPENDENCIES

Activities Terminal Feb 25 21:30

```
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment$  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment$  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment$ ls  
Microservices  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment$ cd Microservices/  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ python3 -m venv venv  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$  
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ source venv/bin/activate  
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$  
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ pip install -r requirements.txt  
Collecting click==8.0.3  
  Downloading click-8.0.3-py3-none-any.whl (97 kB)  
    97.5/97.5 KB 2.7 MB/s eta 0:00:00  
Collecting cycler==0.11.0  
  Downloading cycler-0.11.0-py3-none-any.whl (6.4 kB)  
Collecting Flask==2.0.2  
  Downloading Flask-2.0.2-py3-none-any.whl (95 kB)  
    95.2/95.2 KB 2.8 MB/s eta 0:00:00  
Collecting fonttools==4.28.5  
  Downloading fonttools-4.28.5-py3-none-any.whl (890 kB)  
    368.6/890.4 KB 4.7 MB/s eta 0:00:01
```

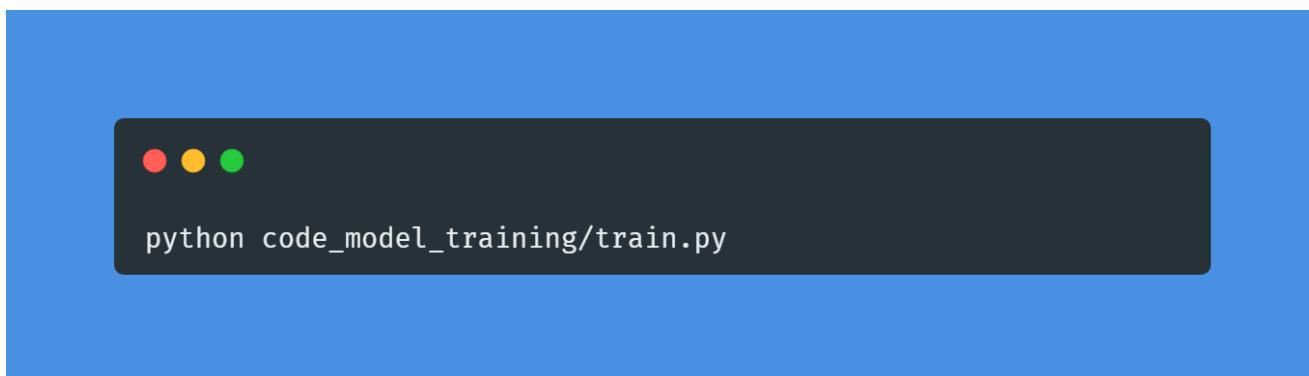


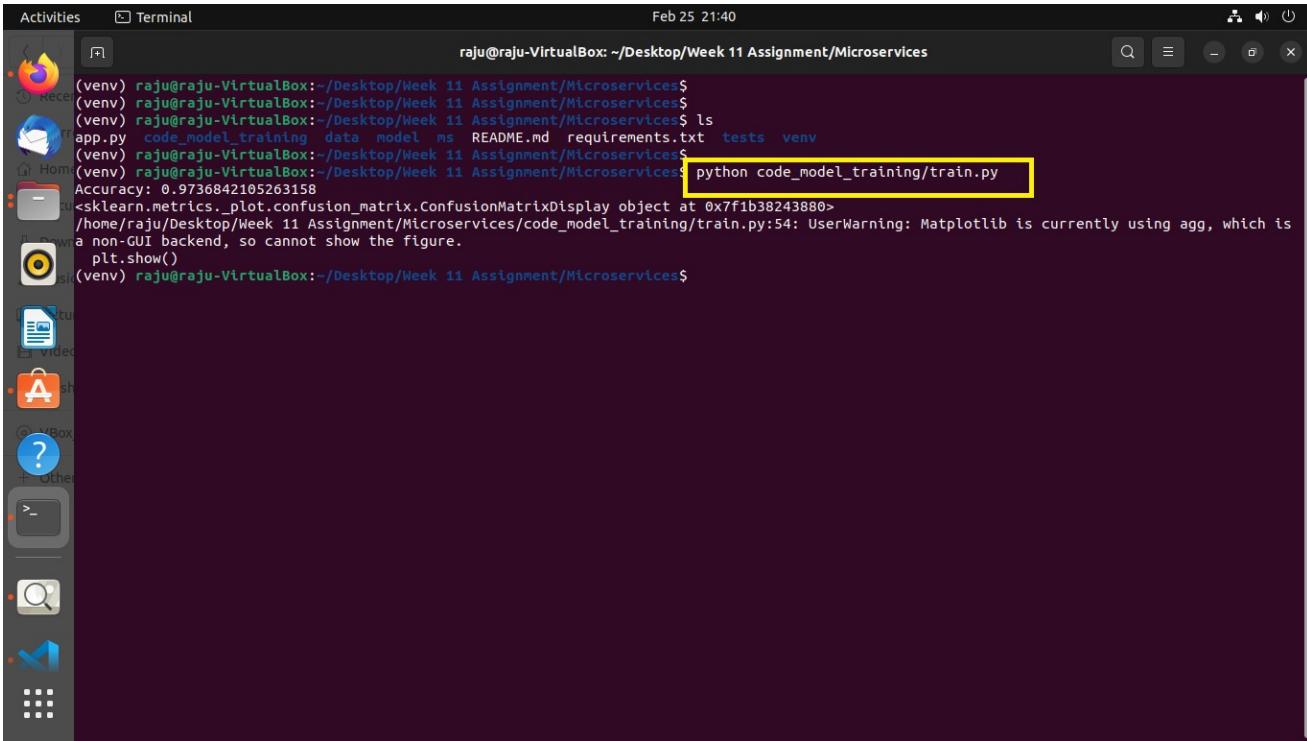
Activities Terminal Feb 25 21:32

```
raju@raju-VirtualBox: ~/Desktop/Week 11 Assignment/Microservices
Collecting pytz==2021.3
  Downloading pytz-2021.3-py3-none-any.whl (503 kB) 503.5/503.5 KB 4.3 MB/s eta 0:00:00
Collecting scikit-learn==1.0.2
  Downloading scikit_learn-1.0.2-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (26.5 MB) 26.5/26.5 MB 4.0 MB/s eta 0:00:00
Collecting scipy==1.7.3
  Downloading scipy-1.7.3-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (39.9 MB) 39.9/39.9 MB 3.8 MB/s eta 0:00:00
Collecting six==1.16.0
  Downloading six-1.16.0-py2.py3-none-any.whl (11 kB)
Collecting sklearn==0.0
  Downloading sklearn-0.0.tar.gz (1.1 kB)
  Preparing metadata (setup.py) ... done
Collecting threadpoolctl==3.0.0
  Downloading threadpoolctl-3.0.0-py3-none-any.whl (14 kB)
Collecting Werkzeug==2.0.2
  Downloading Werkzeug-2.0.2-py3-none-any.whl (288 kB) 288.9/288.9 KB 4.5 MB/s eta 0:00:00
Requirement already satisfied: setuptools>=3.0 in ./venv/lib/python3.10/site-packages (from gunicorn==20.1.0->-r requirements.txt (line 5)) (59.6.0)
Using legacy 'setup.py install' for sklearn, since package 'wheel' is not installed.
Installing collected packages: pytz, Werkzeug, threadpoolctl, six, pyparsing, Pillow, numpy, MarkupSafe, kiwisolver, joblib, itsdangerous, gunicorn, fonttools, cypher, click, scipy, python-dateutil, packaging, Jinja2, scikit-learn, pandas, matplotlib, Flask, sklearn
  Running setup.py install for sklearn ... done
Successfully installed Flask-2.0.2 Jinja2-3.0.3 MarkupSafe-2.0.1 Pillow-9.0.0 Werkzeug-2.0.2 click-8.0.3 cycler-0.11.0 fonttools-4.28.5 gunicorn-20.1.0 itsdangerous-2.0.1 joblib-1.1.0 kiwisolver-1.3.2 matplotlib-3.5.1 numpy-1.22.0 packaging-21.3 pandas-1.3.5 pyparsing-3.0.6 python-dateutil-2.8.2 pytz-2021.3 scikit-learn-1.0.2 scipy-1.7.3 six-1.16.0 sklearn-0.0 threadpoolctl-3.0.0
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ (venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$
```

STEP 7

TRAIN AND SAVE THE MODEL



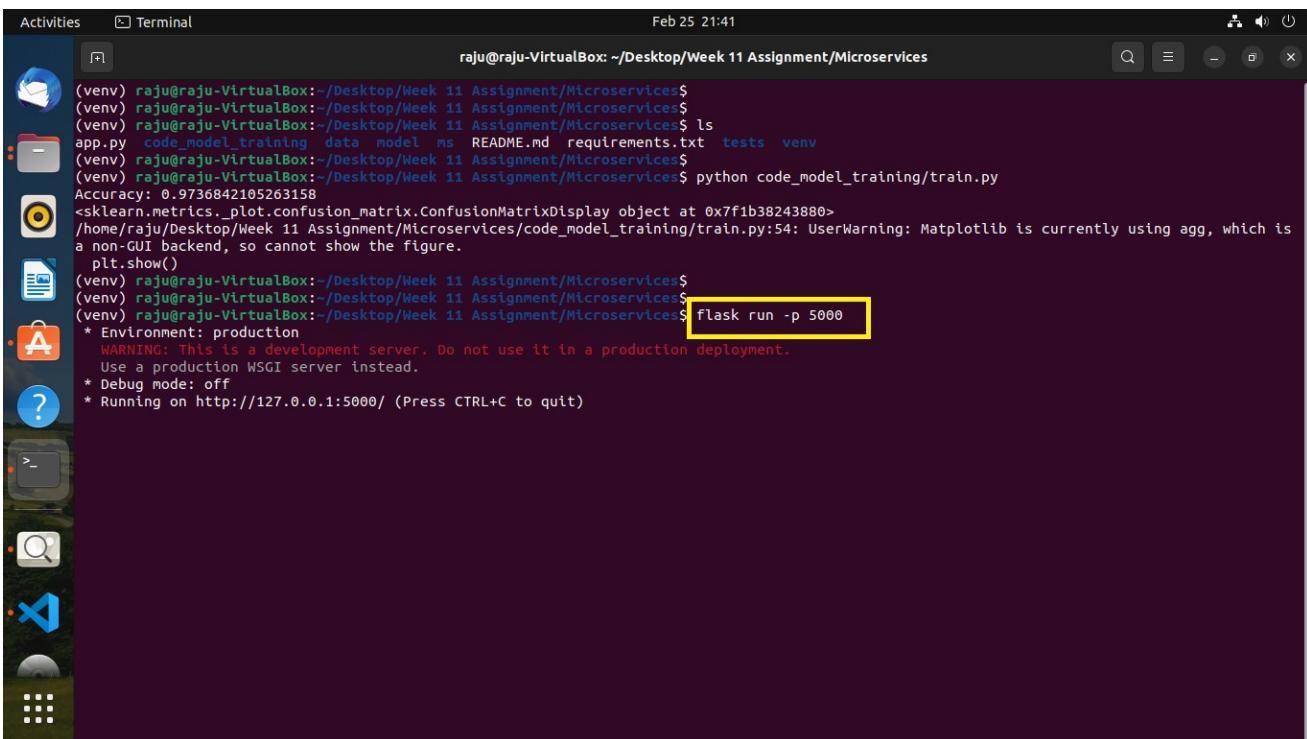


A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "Terminal" and the command line shows the user is in a virtual environment named "Microservices". The user has run the command "python code_model_training/train.py" which has produced a confusion matrix plot. The plot is displayed in the terminal window, indicated by the command "plt.show()". The accuracy of the model is printed as "Accuracy: 0.9736842105263158".

```
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ python code_model_training/train.py
Accuracy: 0.9736842105263158
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay object at 0x7f1b38243880>
/home/raju/Desktop/Week 11 Assignment/Microservices/code_model_training/train.py:54: UserWarning: Matplotlib is currently using agg, which is a non-GUI backend, so cannot show the figure.
  plt.show()
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$
```

STEP 8

TEST THE FLASK WEB APPLICATION



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "Terminal" and the command line shows the user is in a virtual environment named "Microservices". The user has run the command "flask run -p 5000" which has started a Flask development server. The output shows the environment is set to production, a warning about using it in production, and the server is running on port 5000.

```
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ flask run -p 5000
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

STEP 9

TEST THE APPLICATION AND MAKE PREDICTIONS

```
# POST method predict
curl -d '[{"radius_mean": 17.99, "texture_mean": 10.38, "perimeter_mean": 122.8, "area_mean": 1001.0, "smoothness_mean": 0.1184, "compactness_mean": 0.2776, "concavity_mean": 0.3001, "concave points_mean": 0.1471, "symmetry_mean": 0.2419, "fractal_dimension_mean": 0.07871, "radius_se": 1.095, "texture_se": 0.9053, "perimeter_se": 8.589, "area_se": 153.4, "smoothness_se": 0.006399, "compactness_se": 0.04904, "concavity_se": 0.05373, "concave points_se": 0.01587, "symmetry_se": 0.03003, "fractal_dimension_se": 0.006193, "radius_worst": 25.38, "texture_worst": 17.33, "perimeter_worst": 184.6, "area_worst": 2019.0, "smoothness_worst": 0.1622, "compactness_worst": 0.6656, "concavity_worst": 0.7119, "concave points_worst": 0.2654, "symmetry_worst": 0.4601, "fractal_dimension_worst": 0.1189}]' \
-H "Content-Type: application/json" \
-X POST http://0.0.0.0:5000/predict

# GET method info
curl -X GET http://localhost:5000/info

# GET method health
curl -X GET http://localhost:5000/health
```

```
raju@raju-VirtualBox: ~/Desktop/Week 11 Assignment/Microservices
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ curl -X GET http://localhost:5000/info
{"name": "Breast Cancer Wisconsin (Diagnostic)", "version": "v1.0.0"}
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ curl -X GET http://localhost:5000/health
ok(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ curl -d '[{"radius_mean": 17.99, "texture_mean": 10.38, "perimeter_mean": 122.8, "area_mean": 1001.0, "smoothness_mean": 0.1184, "compactness_mean": 0.2776, "concavity_mean": 0.3001, "concave points_mean": 0.1471, "symmetry_mean": 0.2419, "fractal_dimension_mean": 0.07871, "radius_se": 1.095, "texture_se": 0.9053, "perimeter_se": 8.589, "area_se": 153.4, "smoothness_se": 0.006399, "compactness_se": 0.04904, "concavity_se": 0.05373, "concave points_se": 0.01587, "symmetry_se": 0.03003, "fractal_dimension_se": 0.006193, "radius_worst": 25.38, "texture_worst": 17.33, "perimeter_worst": 184.6, "area_worst": 2019.0, "smoothness_worst": 0.1622, "compactness_worst": 0.6656, "concavity_worst": 0.7119, "concave points_worst": 0.2654, "symmetry_worst": 0.4601, "fractal_dimension_worst": 0.1189}]' -H "Content-Type: application/json" -X POST http://0.0.0.0:5000/predict
{"label": "M", "prediction": 1, "status": 200}
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ (venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$
```

STEP 10

CREATE A DOCKER IMAGE

```
sudo apt-get install docker.io

sudo docker build -t microservice-breast-cancer-prediction .

sudo docker run -p 5000:5000 microservice-breast-cancer-prediction
```

```
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ source venv/bin/activate
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ 
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ [sudo] password for raju:
[sudo] password for raju:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  bridge-utils containerd pigz runc ubuntu-fan
Suggested packages:
  ifupdown aufs-tools btrfs-progs cgroupfs-mount | cgroup-lite debootstrap docker-doc rinse zfs-fuse | zfsutils
The following NEW packages will be installed:
  bridge-utils containerd docker.io pigz runc ubuntu-fan
0 upgraded, 6 newly installed, 0 to remove and 181 not upgraded.
Need to get 66.5 MB of archives.
After this operation, 286 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu jammy/universe amd64 pigz amd64 2.6-1 [63.6 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu jammy/main amd64 bridge-utils amd64 1.7-1ubuntu3 [34.4 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 runc amd64 1.1.0-0ubuntu1.1 [4,242 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 containerd amd64 1.5.9-0ubuntu3.1 [28.1 MB]
16% [4 containerd 686 kB/28.1 MB]
```

```
raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ source venv/bin/activate
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ sudo docker build -t microservice-breast-cancer-prediction .
[sudo] password for raju:
Sending build context to Docker daemon 21.17MB
```

```
raju@raju-VirtualBox: ~/Desktop/Week 11 Assignment/Microservices
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ 
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$ sudo docker images
REPOSITORY          TAG      IMAGE ID   CREATED        SIZE
microservice-breast-cancer-prediction    latest   78247b22dc0f  4 minutes ago  1.83GB
python              3.10    45e2736b39fe  36 hours ago  917MB
(venv) raju@raju-VirtualBox:~/Desktop/Week 11 Assignment/Microservices$
```

STEP 11

RUN CONTAINERIZED APPLICATION

```
raju@raju-VirtualBox:~/Desktop/Run Docker Here
raju@raju-VirtualBox:~/Desktop/Run Docker Here$ 
raju@raju-VirtualBox:~/Desktop/Run Docker Here$ sudo docker run -p 5000:5000 microservice-breast-cancer-prediction
[sudo] password for raju:
 * Serving Flask app 'ms' (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on all addresses.
   WARNING: This is a development server. Do not use it in a production deployment.
 * Running on http://172.17.0.2:5000/ (Press CTRL+C to quit)
```

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```
raju@raju-VirtualBox:~/Desktop/Run Docker Here
raju@raju-VirtualBox:~/Desktop/Run Docker Here$ raju@raju-VirtualBox:~/Desktop/Run Docker Here$ sudo docker run -p 5000:5000 microservice-breast-cancer-prediction
[sudo] password for raju:
 * Serving Flask app 'ms' (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on all addresses.
   WARNING: This is a development server
 * Running on http://172.17.0.2:5000/ (172.17.0.1) [26/Feb/2023 11:48:49] "GET / HTTP/1.1" 404 143
172.17.0.1 - - [26/Feb/2023 11:48:53] "<title>404 Not Found</title>
<h1>Not Found</h1>
<p>The requested URL was not found on the server. If you entered the URL manually please check your spelling and try again.</p>
"
raju@raju-VirtualBox:$ curl -X GET http://172.17.0.2:5000/info
{"name": "Breast Cancer Wisconsin (Diagnostic)", "version": "v1.0.0"}
raju@raju-VirtualBox:$ curl -X GET http://172.17.0.2:5000/health
ok|raju@raju-VirtualBox: $ raju@raju-VirtualBox:$ curl -d '[{"radius_mean": 17.99, "texture_mean": 10.38, "perimeter_mean": 122.8, "area_mean": 1001.0, "smoothness_mean": 0.1184, "compactness_mean": 0.2776, "concavity_mean": 0.3001, "concave_points_mean": 0.1471, "symmetry_mean": 0.2419, "fractal_dimension_mean": 0.07871, "radius_se": 1.095, "texture_se": 0.9053, "perimeter_se": 8.589, "area_se": 153.4, "smoothness_se": 0.006399, "compactness_se": 0.04904, "concavity_se": 0.05373, "concave_points_se": 0.01587, "symmetry_se": 0.03003, "fractal_dimension_se": 0.006193, "radius_worst": 25.38, "texture_worst": 17.33, "perimeter_worst": 184.6, "area_worst": 2019.0, "smoothness_worst": 0.1622, "compactness_worst": 0.6656, "concavity_worst": 0.7119, "concave_points_worst": 0.2654, "symmetry_worst": 0.4601, "fractal_dimension_worst": 0.1189}]' -H "Content-Type: application/json" -X POST http://172.17.0.2:5000/predict
{"label": "M", "prediction": 1, "status": 200}
raju@raju-VirtualBox:$
```

THANK YOU
