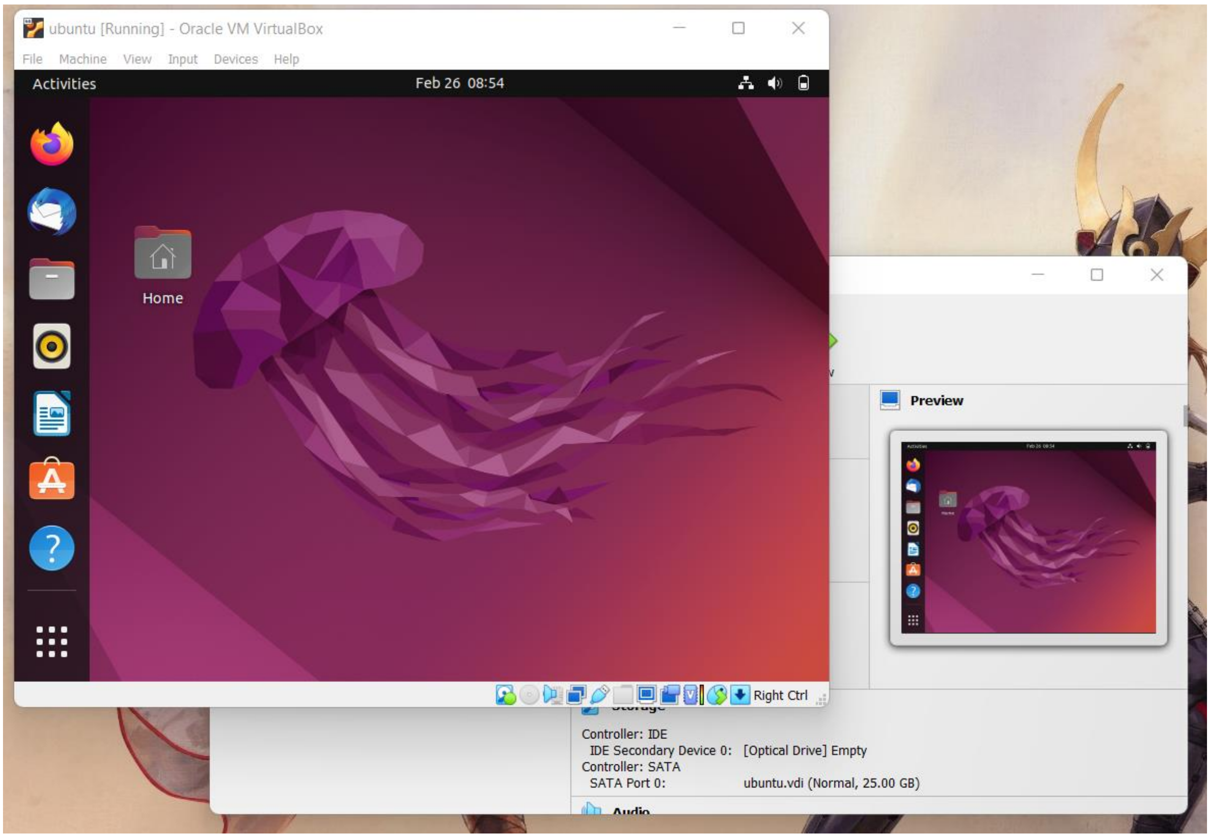
1.Host a Ubuntu Virtual Machine using Oracle VM Virtual Box. (5 marks)

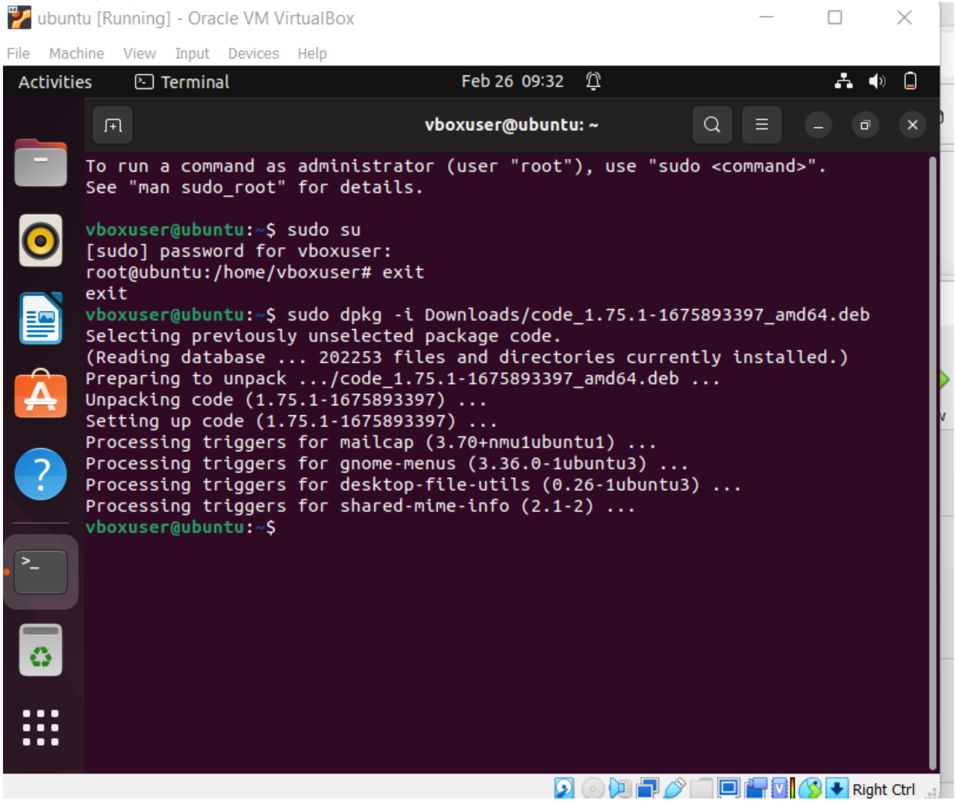

ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Feb 26 08:54
Home
Right Ctrl
Preview
Audio

Controller: IDE
IDE Secondary Device 0: [Optical Drive] Empty
Controller: SATA
SATA Port 0: ubuntu.vdi (Normal, 25.00 GB)

2.Set up Visual Studio code on Ubuntu VM. (5 marks)

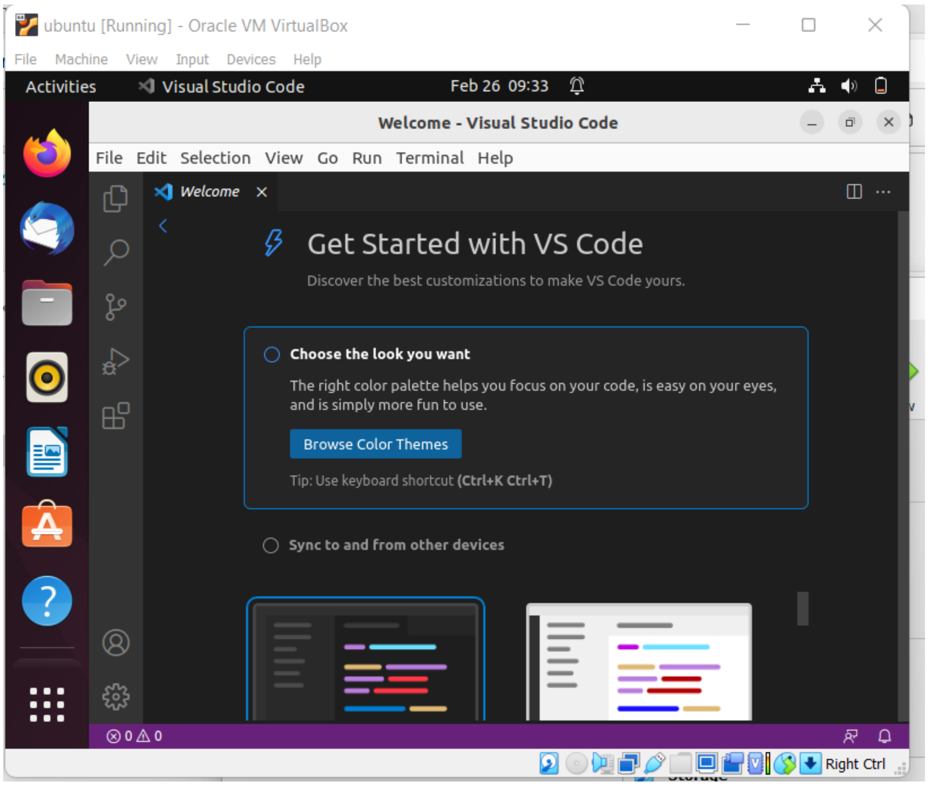
To install the vs code run below command after downloading the deb file

Sudo dpkg -i Downloads/code_1.75.1-1675893397_amd64.deb



ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 26 09:32
vboxuser@ubuntu: ~
Right Ctrl

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

vboxuser@ubuntu:~$ sudo su
[sudo] password for vboxuser:
root@ubuntu:/home/vboxuser# exit
exit
vboxuser@ubuntu:~$ sudo dpkg -i Downloads/code_1.75.1-1675893397_amd64.deb
Selecting previously unselected package code.
(Reading database ... 202253 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) ...
vboxuser@ubuntu:~$
```



ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Visual Studio Code
Feb 26 09:33
Welcome - Visual Studio Code
File Edit Selection View Go Run Terminal Help
Welcome ×
Browse Color Themes
⊗ 0 ⚠ 0
Right Ctrl

Get Started with VS Code

Discover the best customizations to make VS Code yours.

○ Choose the look you want

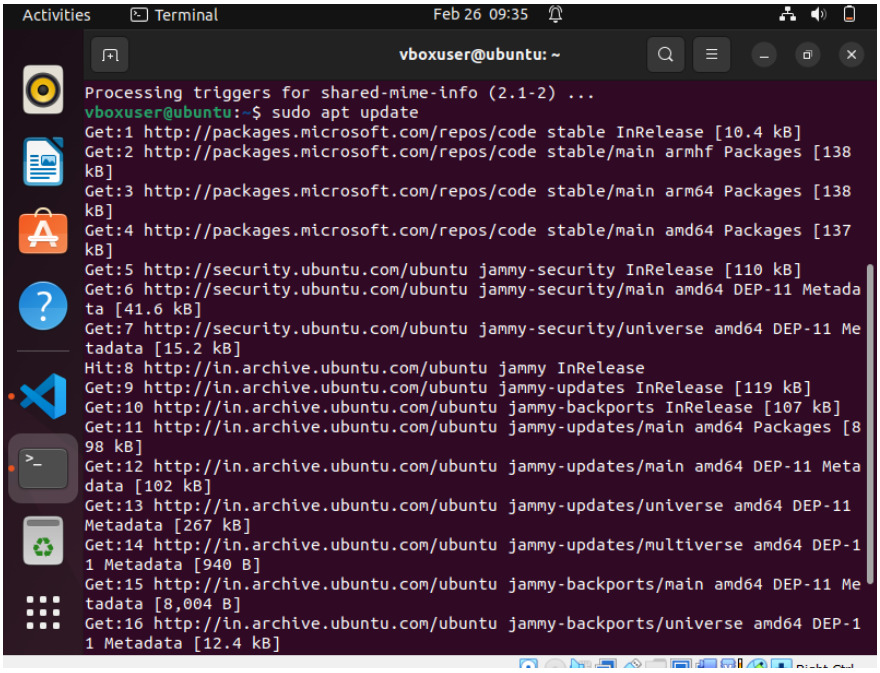
The right color palette helps you focus on your code, is easy on your eyes, and is simply more fun to use.

Tip: Use keyboard shortcut **(Ctrl+K Ctrl+T)**

○ Sync to and from other devices

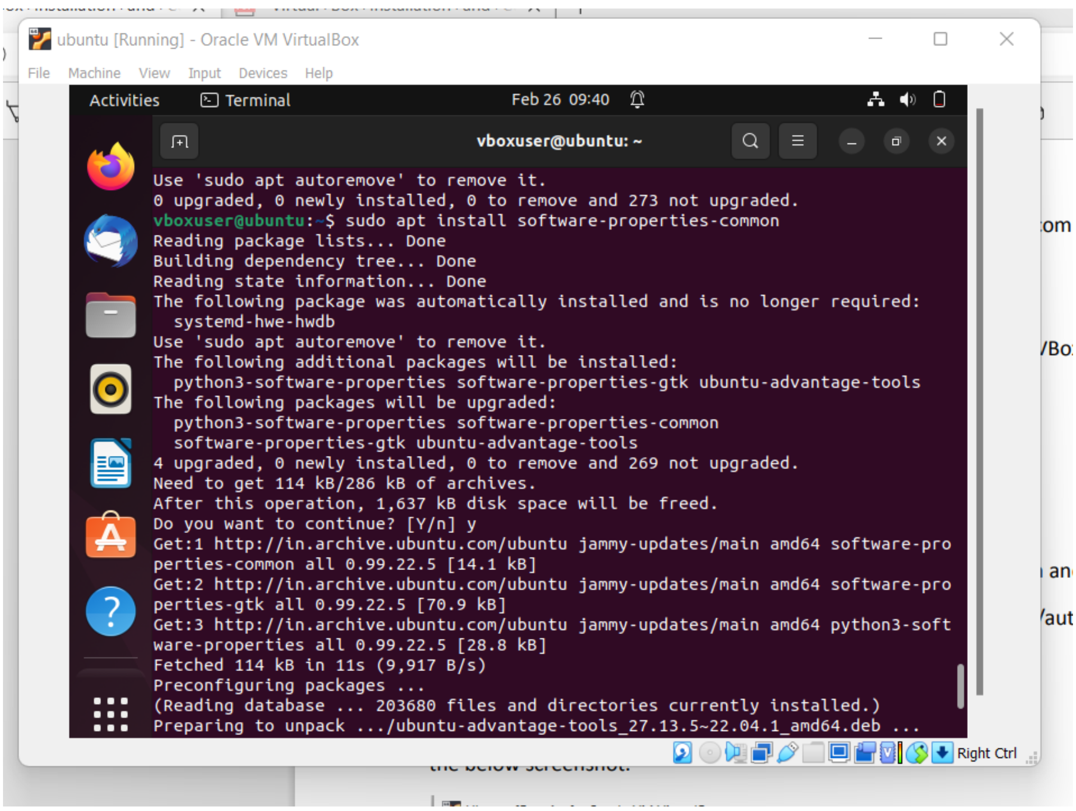
3.Set up Python. (5 marks)

sudo apt update



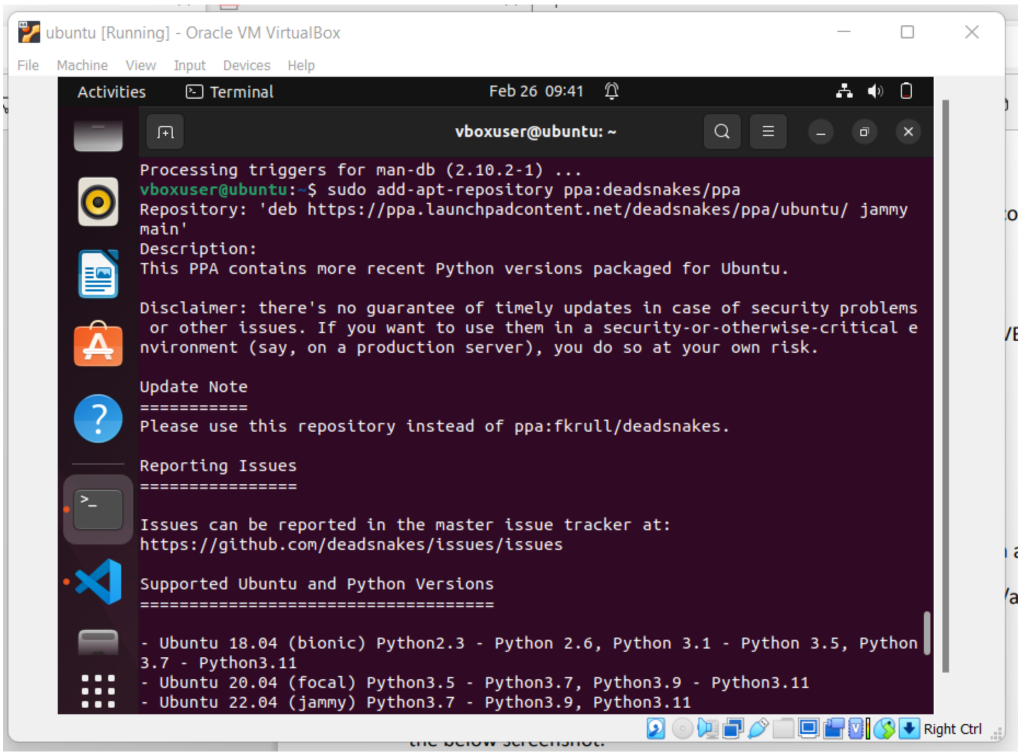
```
Processing triggers for shared-mime-info (2.1-2) ...
vboxuser@ubuntu:~$ sudo apt update
Get:1 http://packages.microsoft.com/repos/code stable InRelease [10.4 kB]
Get:2 http://packages.microsoft.com/repos/code stable/main armhf Packages [138
kB]
Get:3 http://packages.microsoft.com/repos/code stable/main arm64 Packages [138
kB]
Get:4 http://packages.microsoft.com/repos/code stable/main amd64 Packages [137
kB]
Get:5 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:6 http://security.ubuntu.com/ubuntu jammy-security/main amd64 DEP-11 Metada
ta [41.6 kB]
Get:7 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 DEP-11 Me
tadata [15.2 kB]
Hit:8 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Get:9 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:10 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease [107 kB]
Get:11 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [8
98 kB]
Get:12 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 DEP-11 Meta
data [102 kB]
Get:13 http://in.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 DEP-11
Metadata [267 kB]
Get:14 http://in.archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 DEP-1
1 Metadata [940 B]
Get:15 http://in.archive.ubuntu.com/ubuntu jammy-backports/main amd64 DEP-11 Me
tadata [8,004 B]
Get:16 http://in.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 DEP-1
1 Metadata [12.4 kB]
```

sudo apt install software-properties-common



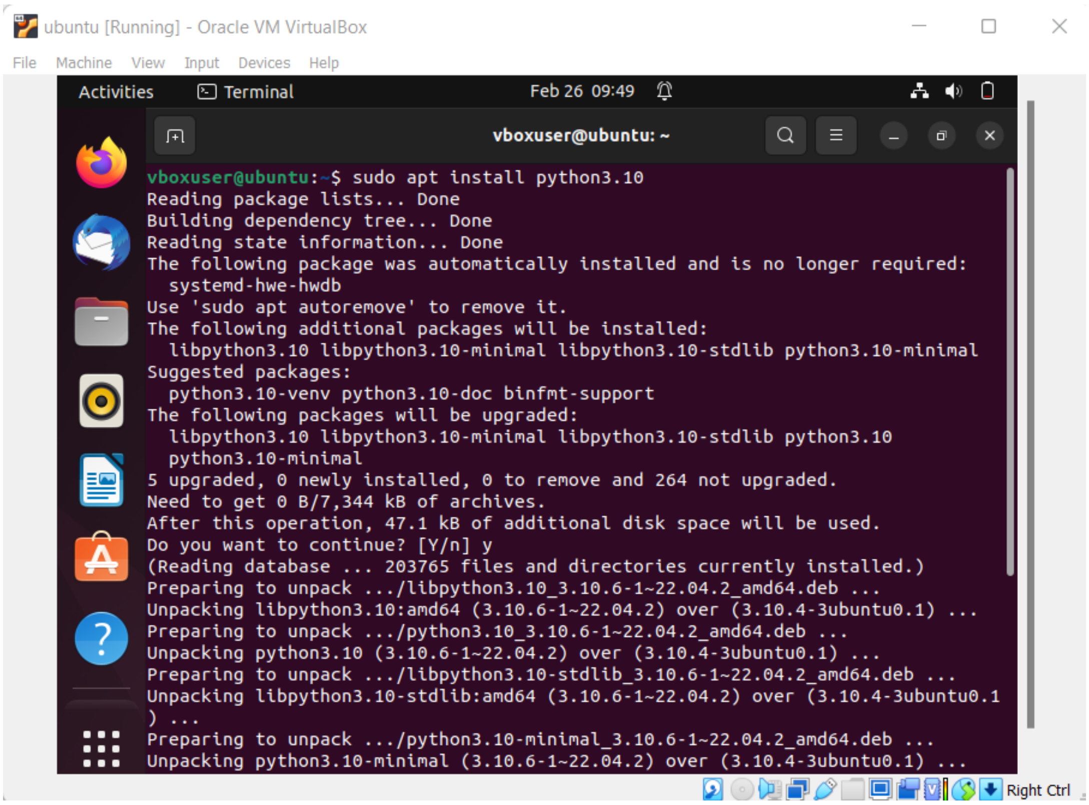
```
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 273 not upgraded.
vboxuser@ubuntu:~$ sudo apt install software-properties-common
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
  systemd-hwe-hwdb
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  python3-software-properties software-properties-gtk ubuntu-advantage-tools
The following packages will be upgraded:
  python3-software-properties software-properties-common
  software-properties-gtk ubuntu-advantage-tools
4 upgraded, 0 newly installed, 0 to remove and 269 not upgraded.
Need to get 114 kB/286 kB of archives.
After this operation, 1,637 kB disk space will be freed.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 software-pro
perties-common all 0.99.22.5 [14.1 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 software-pro
perties-gtk all 0.99.22.5 [70.9 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3-soft
ware-properties all 0.99.22.5 [28.8 kB]
Fetched 114 kB in 11s (9,917 B/s)
Preconfiguring packages ...
(Reading database ... 203680 files and directories currently installed.)
Preparing to unpack .../ubuntu-advantage-tools_27.13.5~22.04.1_amd64.deb ...
```

sudo add-apt-repository ppa:deadsnakes/ppa


ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 26 09:41
vboxuser@ubuntu: ~
Right Ctrl

```
Processing triggers for man-db (2.10.2-1) ...
vboxuser@ubuntu:~$ 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 e
nvironment (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/issues

Supported Ubuntu and Python Versions
====================================

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

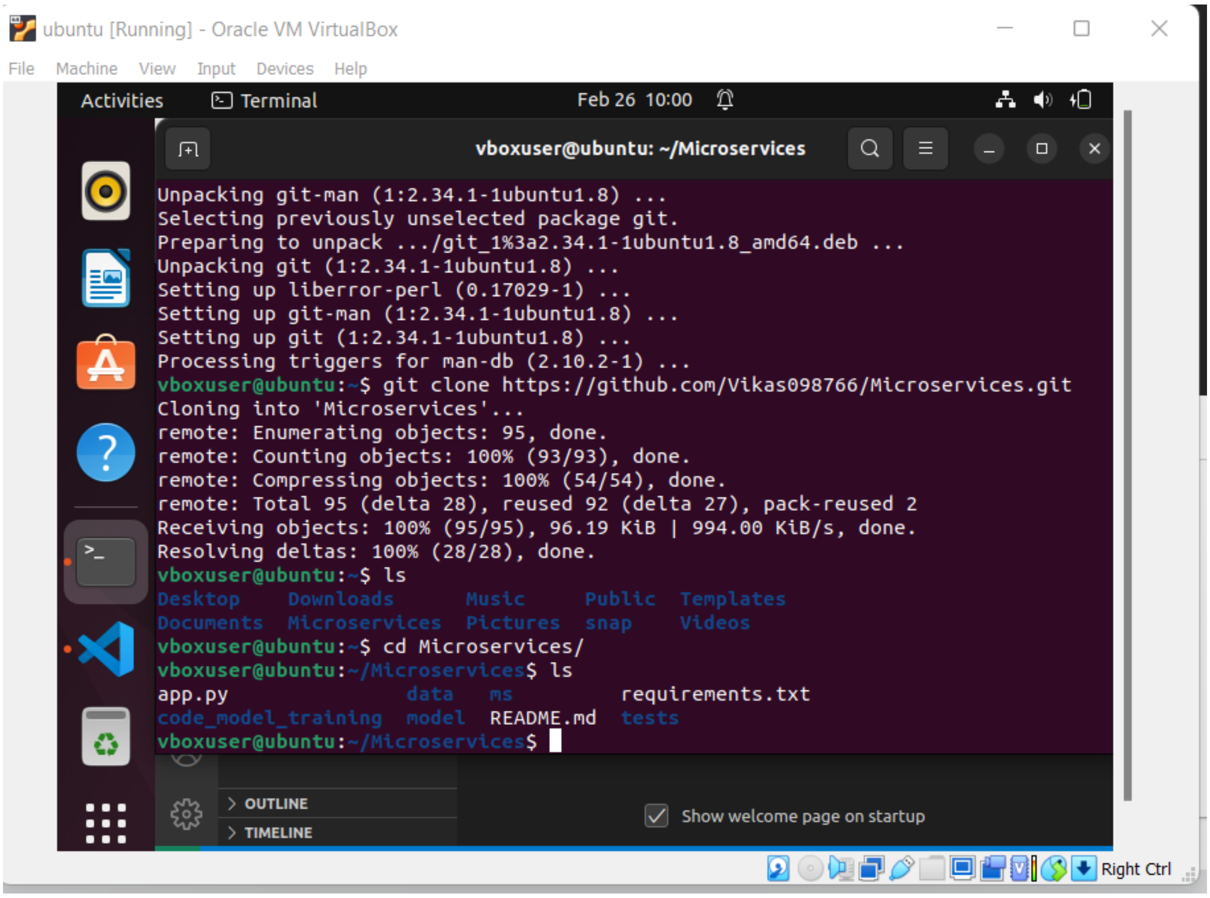
sudo apt install python3.10


ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 26 09:49
vboxuser@ubuntu: ~
Right Ctrl

```
vboxuser@ubuntu:~$ sudo apt install python3.10
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
  systemd-hwe-hwdb
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  libpython3.10 libpython3.10-minimal libpython3.10-stdlib python3.10-minimal
Suggested packages:
  python3.10-venv python3.10-doc binfmt-support
The following packages will be upgraded:
  libpython3.10 libpython3.10-minimal libpython3.10-stdlib python3.10
  python3.10-minimal
5 upgraded, 0 newly installed, 0 to remove and 264 not upgraded.
Need to get 0 B/7,344 kB of archives.
After this operation, 47.1 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
(Reading database ... 203765 files and directories currently installed.)
Preparing to unpack .../libpython3.10_3.10.6-1~22.04.2_amd64.deb ...
Unpacking libpython3.10:amd64 (3.10.6-1~22.04.2) over (3.10.4-3ubuntu0.1) ...
Preparing to unpack .../python3.10_3.10.6-1~22.04.2_amd64.deb ...
Unpacking python3.10 (3.10.6-1~22.04.2) over (3.10.4-3ubuntu0.1) ...
Preparing to unpack .../libpython3.10-stdlib_3.10.6-1~22.04.2_amd64.deb ...
Unpacking libpython3.10-stdlib:amd64 (3.10.6-1~22.04.2) over (3.10.4-3ubuntu0.1
) ...
Preparing to unpack .../python3.10-minimal_3.10.6-1~22.04.2_amd64.deb ...
Unpacking python3.10-minimal (3.10.6-1~22.04.2) over (3.10.4-3ubuntu0.1) ...
```

4.Clone this Github repository https://github.com/Vikas098766/Microservices.git(1 mark)

git clone https://github.com/Vikas098766/Microservices.git



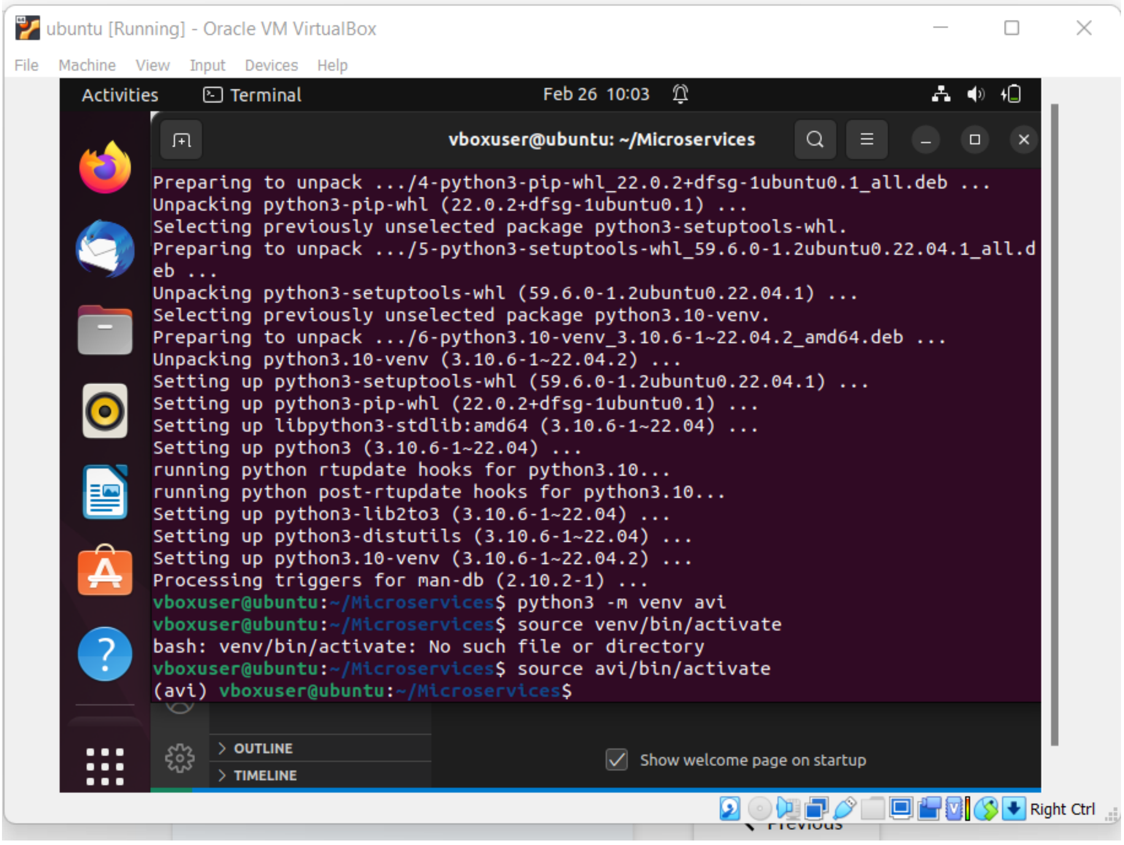
ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 26 10:00
vboxuser@ubuntu: ~/Microservices
OUTLINE
TIMELINE
☑ Show welcome page on startup
Right Ctrl

```
Unpacking git-man (1:2.34.1-1ubuntu1.8) ...
Selecting previously unselected package git.
Preparing to unpack .../git_1%3a2.34.1-1ubuntu1.8_amd64.deb ...
Unpacking git (1:2.34.1-1ubuntu1.8) ...
Setting up liberror-perl (0.17029-1) ...
Setting up git-man (1:2.34.1-1ubuntu1.8) ...
Setting up git (1:2.34.1-1ubuntu1.8) ...
Processing triggers for man-db (2.10.2-1) ...
vboxuser@ubuntu:~$ git clone https://github.com/Vikas098766/Microservices.git
Cloning into 'Microservices'...
remote: Enumerating objects: 95, done.
remote: Counting objects: 100% (93/93), done.
remote: Compressing objects: 100% (54/54), done.
remote: Total 95 (delta 28), reused 92 (delta 27), pack-reused 2
Receiving objects: 100% (95/95), 96.19 KiB | 994.00 KiB/s, done.
Resolving deltas: 100% (28/28), done.
vboxuser@ubuntu:~$ ls
Desktop    Downloads      Music     Public  Templates
Documents  Microservices  Pictures  snap    Videos
vboxuser@ubuntu:~$ cd Microservices/
vboxuser@ubuntu:~/Microservices$ ls
app.py               data   ms      requirements.txt
code_model_training  model  README.md  tests
vboxuser@ubuntu:~/Microservices$ 
```

5.Create a Virtual Environment. (1 mark)

Python3 -m venv avi // to create virtual env with name avi

Source avi/bin/activate // to activate the env

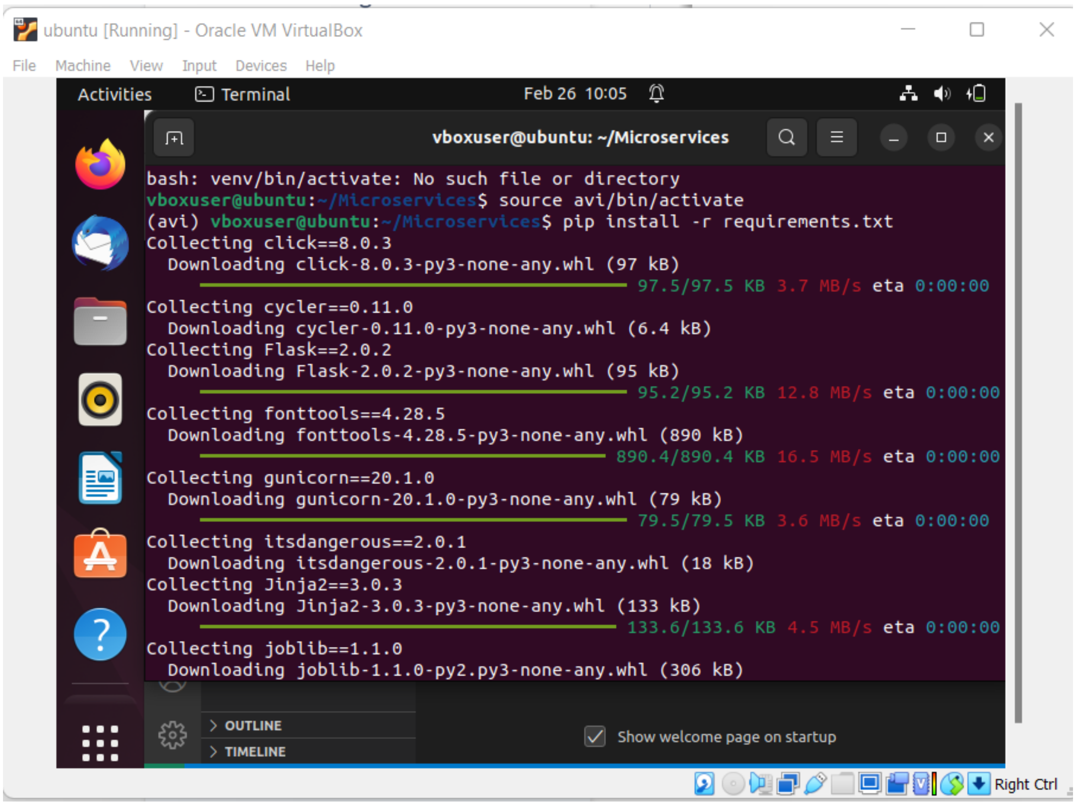


ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 26 10:03
vboxuser@ubuntu: ~/Microservices
OUTLINE
TIMELINE
☑ Show welcome page on startup
Right Ctrl

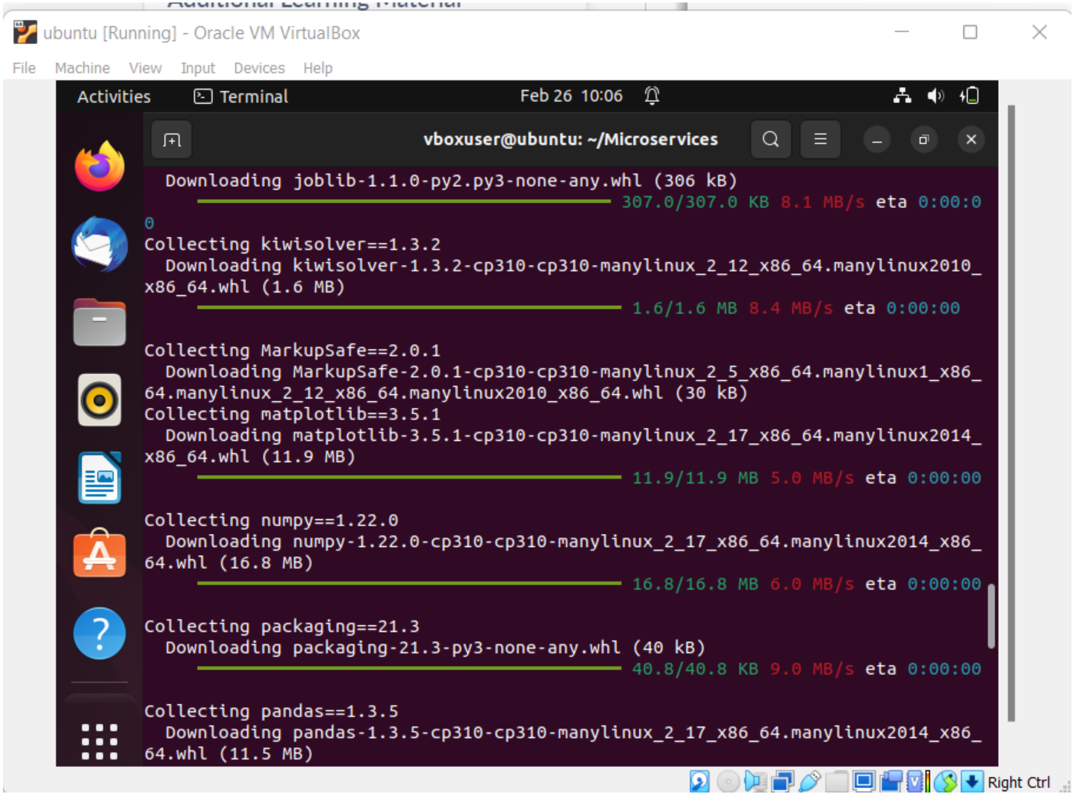
```
Preparing to unpack .../4-python3-pip-whl_22.0.2+dfsg-1ubuntu0.1_all.deb ...
Unpacking python3-pip-whl (22.0.2+dfsg-1ubuntu0.1) ...
Selecting previously unselected package python3-setuptools-whl.
Preparing to unpack .../5-python3-setuptools-whl_59.6.0-1.2ubuntu0.22.04.1_all.d
eb ...
Unpacking python3-setuptools-whl (59.6.0-1.2ubuntu0.22.04.1) ...
Selecting previously unselected package python3.10-venv.
Preparing to unpack .../6-python3.10-venv_3.10.6-1~22.04.2_amd64.deb ...
Unpacking python3.10-venv (3.10.6-1~22.04.2) ...
Setting up python3-setuptools-whl (59.6.0-1.2ubuntu0.22.04.1) ...
Setting up python3-pip-whl (22.0.2+dfsg-1ubuntu0.1) ...
Setting up libpython3-stdlib:amd64 (3.10.6-1~22.04) ...
Setting up python3 (3.10.6-1~22.04) ...
running python rtupdate hooks for python3.10...
running python post-rtupdate hooks for python3.10...
Setting up python3-lib2to3 (3.10.6-1~22.04) ...
Setting up python3-distutils (3.10.6-1~22.04) ...
Setting up python3.10-venv (3.10.6-1~22.04.2) ...
Processing triggers for man-db (2.10.2-1) ...
vboxuser@ubuntu:~/Microservices$ python3 -m venv avi
vboxuser@ubuntu:~/Microservices$ source venv/bin/activate
bash: venv/bin/activate: No such file or directory
vboxuser@ubuntu:~/Microservices$ source avi/bin/activate
(avi) vboxuser@ubuntu:~/Microservices$
```

6.Install the dependencies from requirements.txt file. (1 mark)

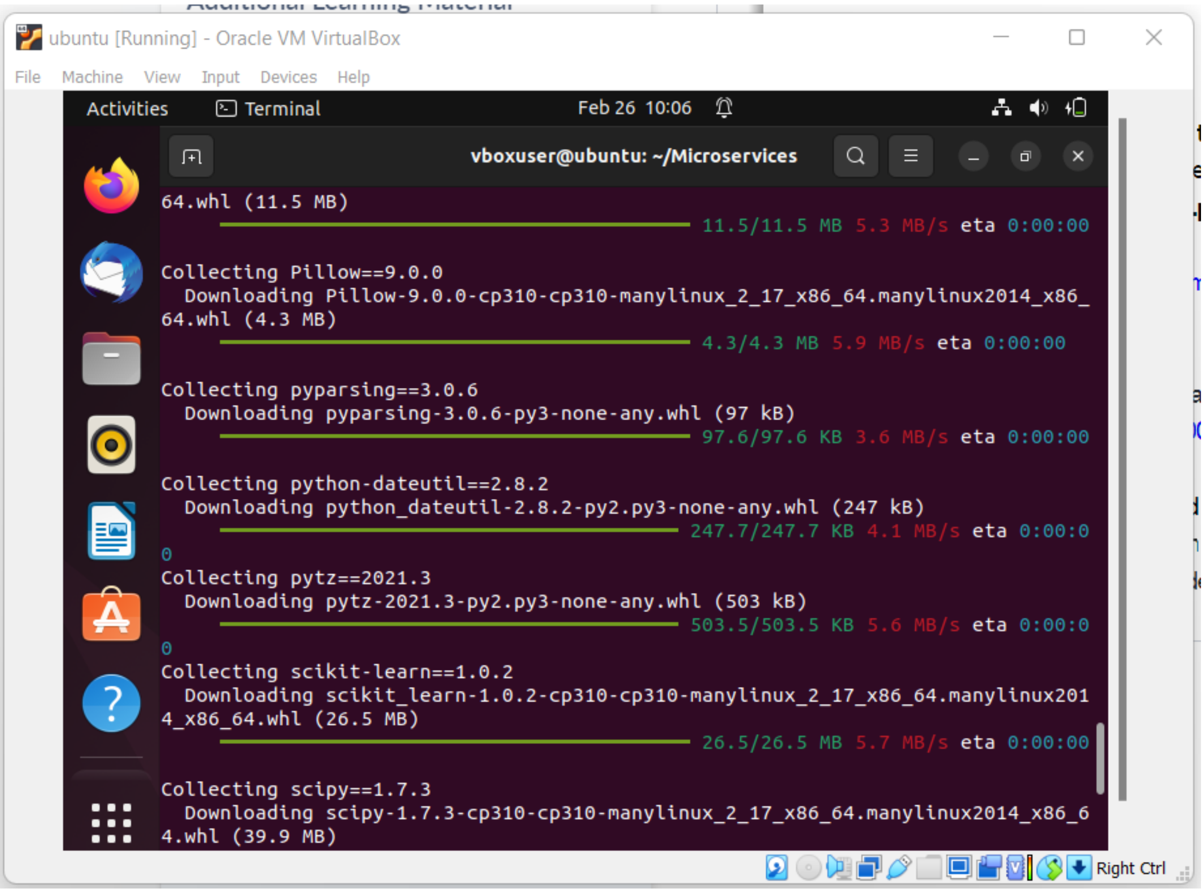
Python3 pip install -r requirements.txt


ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 26 10:05
vboxuser@ubuntu: ~/Microservices
OUTLINE
TIMELINE
☑ Show welcome page on startup
Right Ctrl

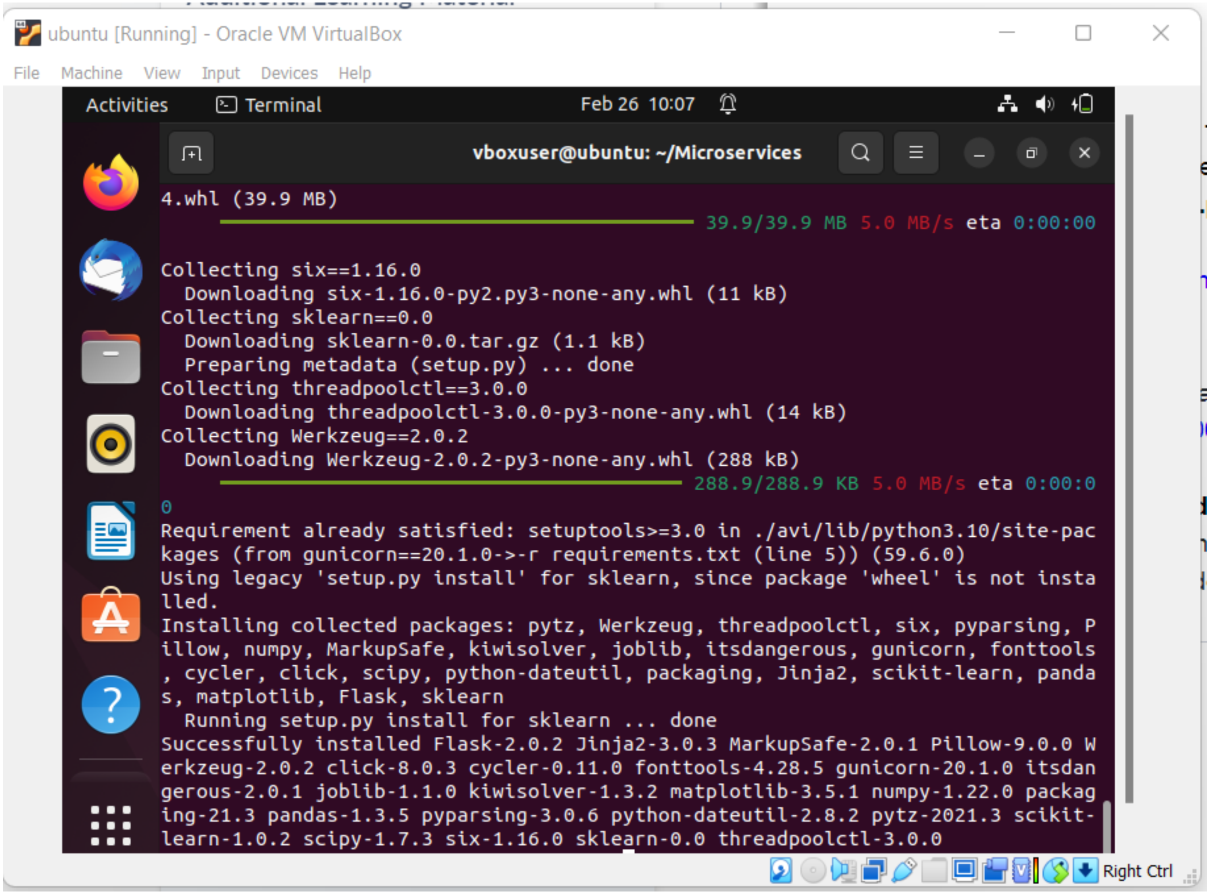
```
bash: venv/bin/activate: No such file or directory
vboxuser@ubuntu:~/Microservices$ source avi/bin/activate
(avi) vboxuser@ubuntu:~/Microservices$ pip install -r requirements.txt
Collecting click==8.0.3
  Downloading click-8.0.3-py3-none-any.whl (97 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 97.5/97.5 KB 3.7 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 12.8 MB/s eta 0:00:00
Collecting fonttools==4.28.5
  Downloading fonttools-4.28.5-py3-none-any.whl (890 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 890.4/890.4 KB 16.5 MB/s eta 0:00:00
Collecting gunicorn==20.1.0
  Downloading gunicorn-20.1.0-py3-none-any.whl (79 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 79.5/79.5 KB 3.6 MB/s eta 0:00:00
Collecting itsdangerous==2.0.1
  Downloading itsdangerous-2.0.1-py3-none-any.whl (18 kB)
Collecting Jinja2==3.0.3
  Downloading Jinja2-3.0.3-py3-none-any.whl (133 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 133.6/133.6 KB 4.5 MB/s eta 0:00:00
Collecting joblib==1.1.0
  Downloading joblib-1.1.0-py2.py3-none-any.whl (306 kB)
```


ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 26 10:06
vboxuser@ubuntu: ~/Microservices
Right Ctrl

```
  Downloading joblib-1.1.0-py2.py3-none-any.whl (306 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 307.0/307.0 KB 8.1 MB/s eta 0:00:0
0
Collecting kiwisolver==1.3.2
  Downloading kiwisolver-1.3.2-cp310-cp310-manylinux_2_12_x86_64.manylinux2010_
x86_64.whl (1.6 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 1.6/1.6 MB 8.4 MB/s eta 0:00:00

Collecting MarkupSafe==2.0.1
  Downloading MarkupSafe-2.0.1-cp310-cp310-manylinux_2_5_x86_64.manylinux1_x86_
64.manylinux_2_12_x86_64.manylinux2010_x86_64.whl (30 kB)
Collecting matplotlib==3.5.1
  Downloading matplotlib-3.5.1-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_
x86_64.whl (11.9 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 11.9/11.9 MB 5.0 MB/s eta 0:00:00

Collecting numpy==1.22.0
  Downloading numpy-1.22.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_
64.whl (16.8 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 16.8/16.8 MB 6.0 MB/s eta 0:00:00

Collecting packaging==21.3
  Downloading packaging-21.3-py3-none-any.whl (40 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 40.8/40.8 KB 9.0 MB/s eta 0:00:00

Collecting pandas==1.3.5
  Downloading pandas-1.3.5-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_
64.whl (11.5 MB)
```


ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 26 10:06
vboxuser@ubuntu: ~/Microservices
Right Ctrl

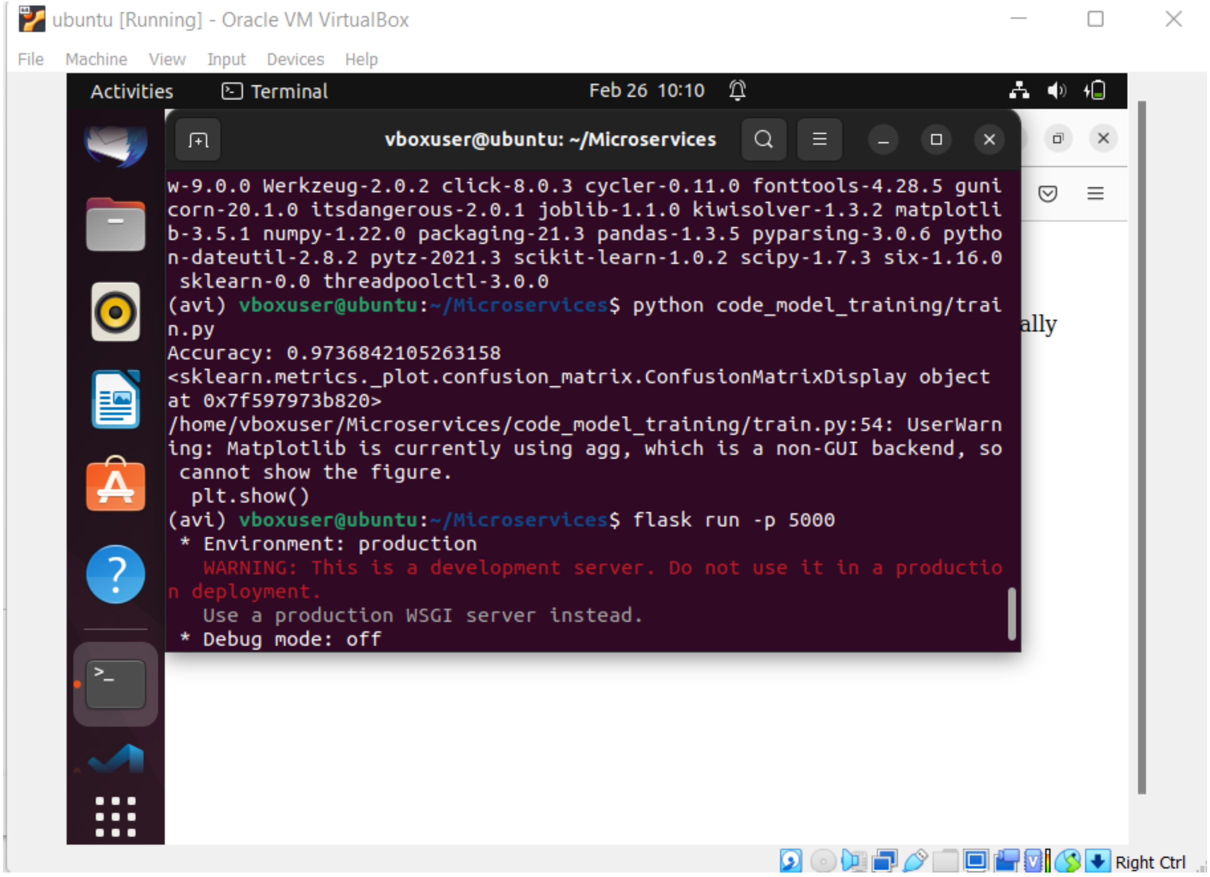
```
64.whl (11.5 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 11.5/11.5 MB 5.3 MB/s eta 0:00:00

Collecting Pillow==9.0.0
  Downloading Pillow-9.0.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_
64.whl (4.3 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 4.3/4.3 MB 5.9 MB/s eta 0:00:00

Collecting pyparsing==3.0.6
  Downloading pyparsing-3.0.6-py3-none-any.whl (97 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 97.6/97.6 KB 3.6 MB/s eta 0:00:00

Collecting python-dateutil==2.8.2
  Downloading python_dateutil-2.8.2-py2.py3-none-any.whl (247 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 247.7/247.7 KB 4.1 MB/s eta 0:00:0
0
Collecting pytz==2021.3
  Downloading pytz-2021.3-py2.py3-none-any.whl (503 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 503.5/503.5 KB 5.6 MB/s eta 0:00:0
0
Collecting scikit-learn==1.0.2
  Downloading scikit_learn-1.0.2-cp310-cp310-manylinux_2_17_x86_64.manylinux201
4_x86_64.whl (26.5 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 26.5/26.5 MB 5.7 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_6
4.whl (39.9 MB)
```


ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 26 10:07
vboxuser@ubuntu: ~/Microservices
Right Ctrl

```
4.whl (39.9 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 39.9/39.9 MB 5.0 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 5.0 MB/s eta 0:00:0
0
Requirement already satisfied: setuptools>=3.0 in ./avi/lib/python3.10/site-pac
kages (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 insta
lled.
Installing collected packages: pytz, Werkzeug, threadpoolctl, six, pyparsing, P
illow, numpy, MarkupSafe, kiwisolver, joblib, itsdangerous, gunicorn, fonttools
, cycler, click, scipy, python-dateutil, packaging, Jinja2, scikit-learn, panda
s, 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 W
erkzeug-2.0.2 click-8.0.3 cycler-0.11.0 fonttools-4.28.5 gunicorn-20.1.0 itsdan
gerous-2.0.1 joblib-1.1.0 kiwisolver-1.3.2 matplotlib-3.5.1 numpy-1.22.0 packag
ing-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
```

7.Train and save the model. (2 marks)

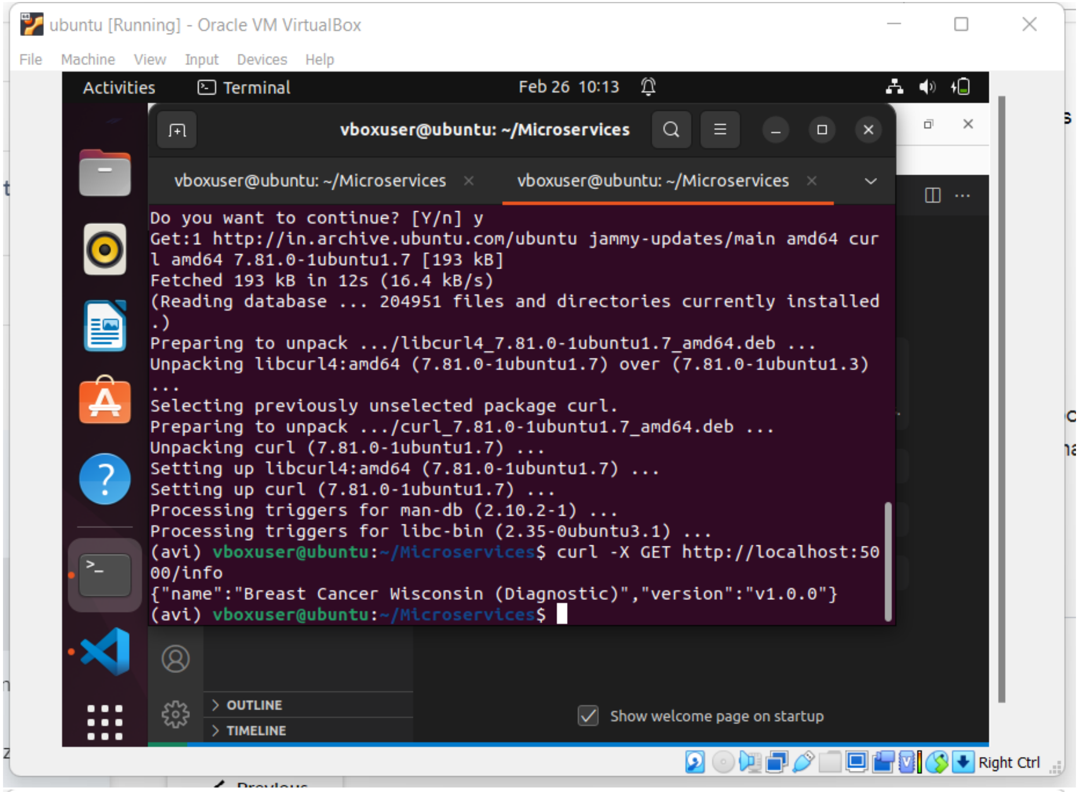
python code_model_training/train.py



ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 26 10:10
vboxuser@ubuntu: ~/Microservices
Right Ctrl

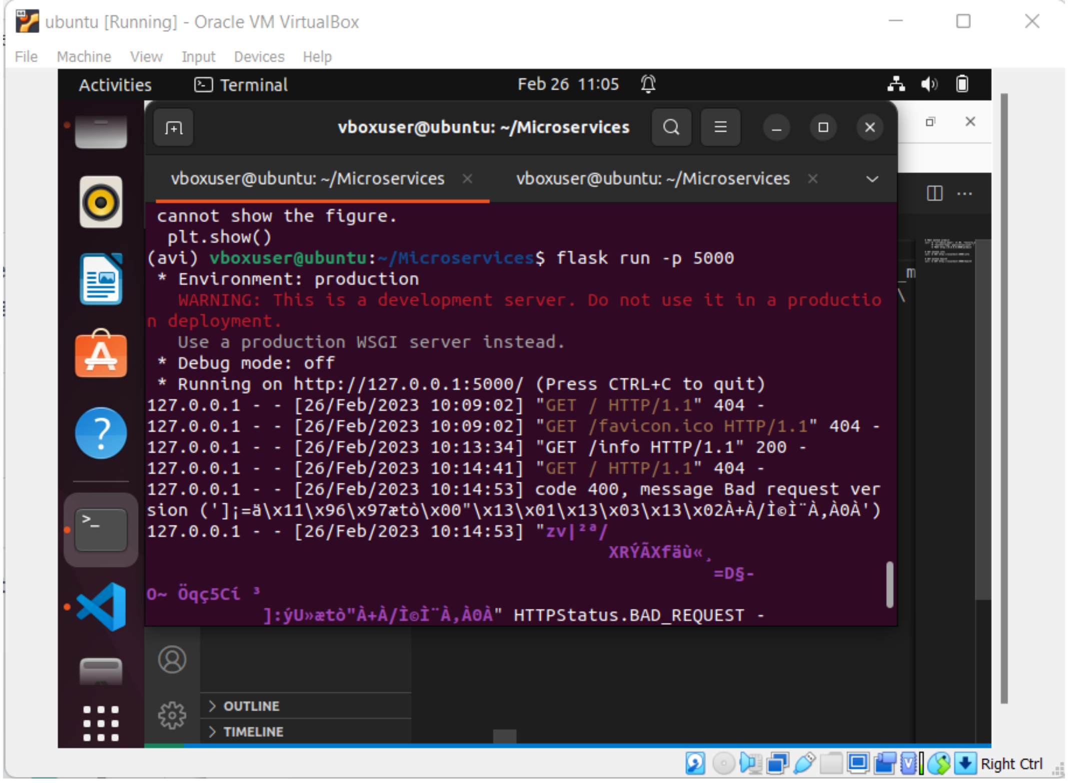
```
w-9.0.0 Werkzeug-2.0.2 click-8.0.3 cycler-0.11.0 fonttools-4.28.5 guni
corn-20.1.0 itsdangerous-2.0.1 joblib-1.1.0 kiwisolver-1.3.2 matplotli
b-3.5.1 numpy-1.22.0 packaging-21.3 pandas-1.3.5 pyparsing-3.0.6 pytho
n-dateutil-2.8.2 pytz-2021.3 scikit-learn-1.0.2 scipy-1.7.3 six-1.16.0
 sklearn-0.0 threadpoolctl-3.0.0
(avi) vboxuser@ubuntu:~/Microservices$ python code_model_training/trai
n.py
Accuracy: 0.9736842105263158
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay object
at 0x7f597973b820>
/home/vboxuser/Microservices/code_model_training/train.py:54: UserWarn
ing: Matplotlib is currently using agg, which is a non-GUI backend, so
 cannot show the figure.
  plt.show()
(avi) vboxuser@ubuntu:~/Microservices$ flask run -p 5000
 * Environment: production
   WARNING: This is a development server. Do not use it in a productio
n deployment.
   Use a production WSGI server instead.
 * Debug mode: off
```

8.Test the Flask web application. (5 marks)



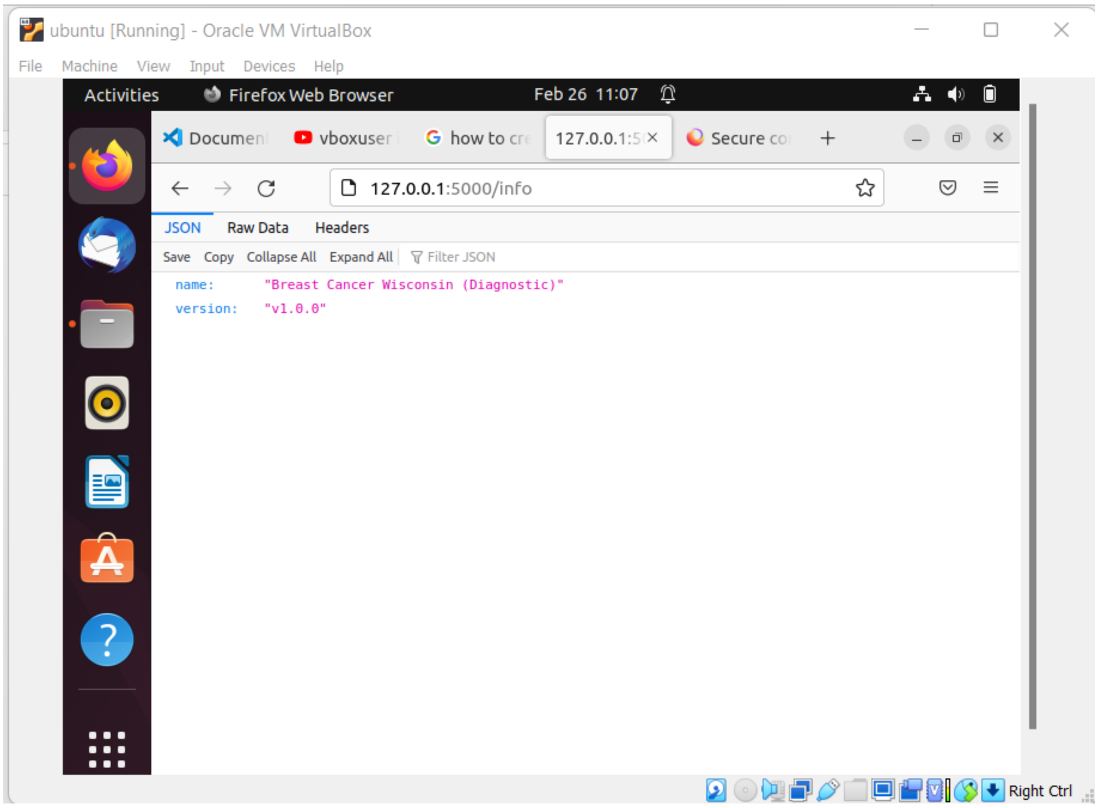
ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 26 10:13
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~/Microservices
OUTLINE
TIMELINE
Show welcome page on startup
Right Ctrl

```
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 cur
l amd64 7.81.0-1ubuntu1.7 [193 kB]
Fetched 193 kB in 12s (16.4 kB/s)
(Reading database ... 204951 files and directories currently installed
.)
Preparing to unpack .../libcurl4_7.81.0-1ubuntu1.7_amd64.deb ...
Unpacking libcurl4:amd64 (7.81.0-1ubuntu1.7) over (7.81.0-1ubuntu1.3)
...
Selecting previously unselected package curl.
Preparing to unpack .../curl_7.81.0-1ubuntu1.7_amd64.deb ...
Unpacking curl (7.81.0-1ubuntu1.7) ...
Setting up libcurl4:amd64 (7.81.0-1ubuntu1.7) ...
Setting up curl (7.81.0-1ubuntu1.7) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
(avi) vboxuser@ubuntu:~/Microservices$ curl -X GET http://localhost:50
00/info
{"name":"Breast Cancer Wisconsin (Diagnostic)","version":"v1.0.0"}
(avi) vboxuser@ubuntu:~/Microservices$ 
```



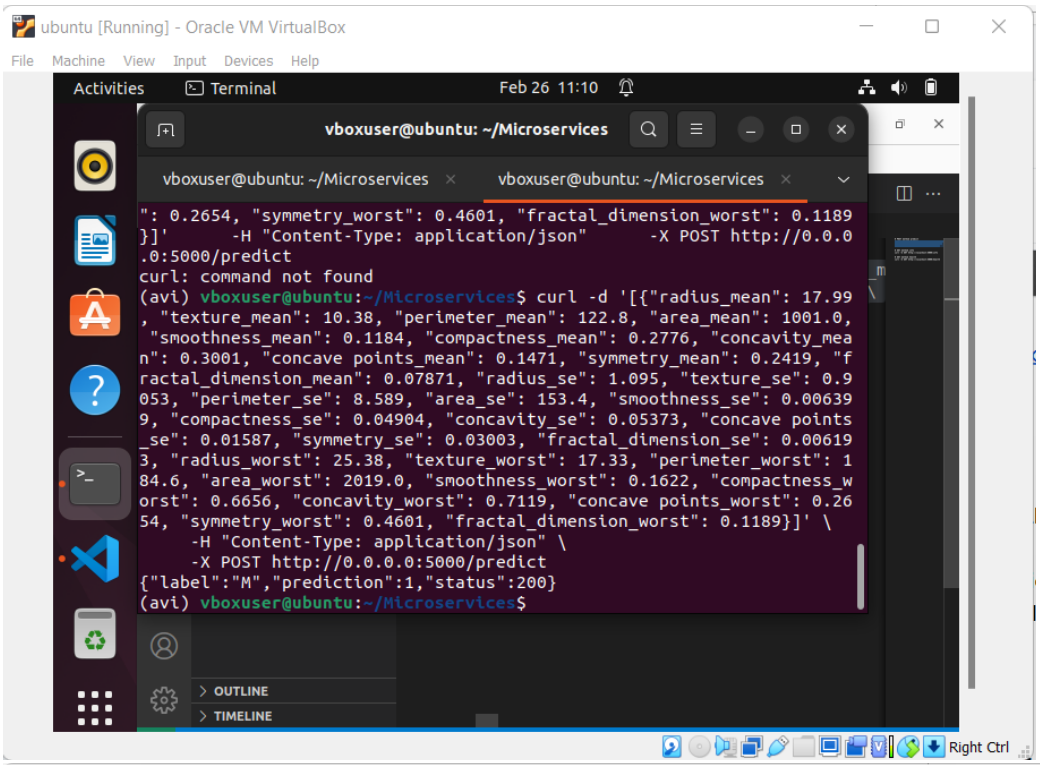
ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 26 11:05
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~/Microservices
OUTLINE
TIMELINE
Right Ctrl

```
cannot show the figure.
 plt.show()
(avi) vboxuser@ubuntu:~/Microservices$ flask run -p 5000
 * Environment: production
   WARNING: This is a development server. Do not use it in a productio
n deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
127.0.0.1 - - [26/Feb/2023 10:09:02] "GET / HTTP/1.1" 404 -
127.0.0.1 - - [26/Feb/2023 10:09:02] "GET /favicon.ico HTTP/1.1" 404 -
127.0.0.1 - - [26/Feb/2023 10:13:34] "GET /info HTTP/1.1" 200 -
127.0.0.1 - - [26/Feb/2023 10:14:41] "GET / HTTP/1.1" 404 -
127.0.0.1 - - [26/Feb/2023 10:14:53] code 400, message Bad request ver
sion ('];=ä\x11\x96\x97ætò\x00"\x13\x01\x13\x03\x13\x02À+À/Ì©Ì¨À,À0À')
127.0.0.1 - - [26/Feb/2023 10:14:53] "zv|²ª/
                                       XRÝÃXfäù«¸
                                                 =D§-
0~ Öqç5Cí ³
           ]:ýU»ætò"À+À/Ì©Ì¨À,À0À" HTTPStatus.BAD_REQUEST -
```

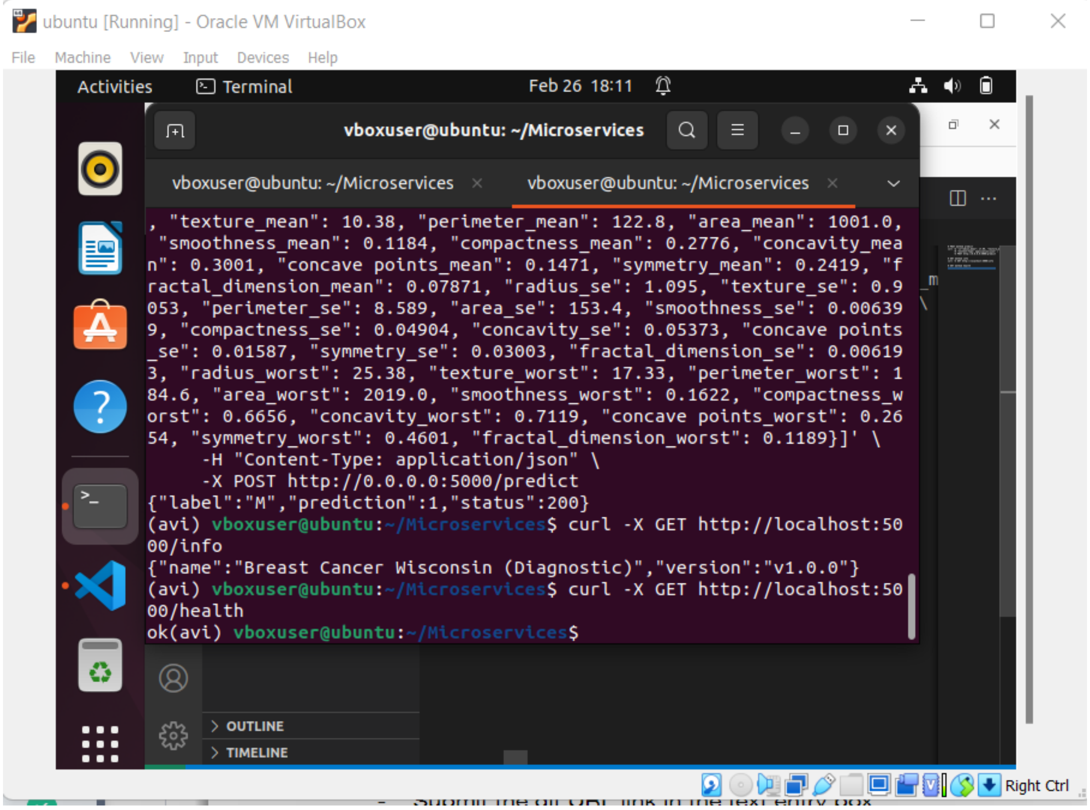


```
name:      "Breast Cancer Wisconsin (Diagnostic)"
version:   "v1.0.0"
```

9.Test the application and make predictions using the example calls available in the folder/tests.(5 marks)


ubuntu [Running] - Oracle VM VirtualBox
File
Machine
View
Input
Devices
Help
Activities
Terminal
Feb 26 11:10
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~/Microservices
OUTLINE
TIMELINE
Right Ctrl

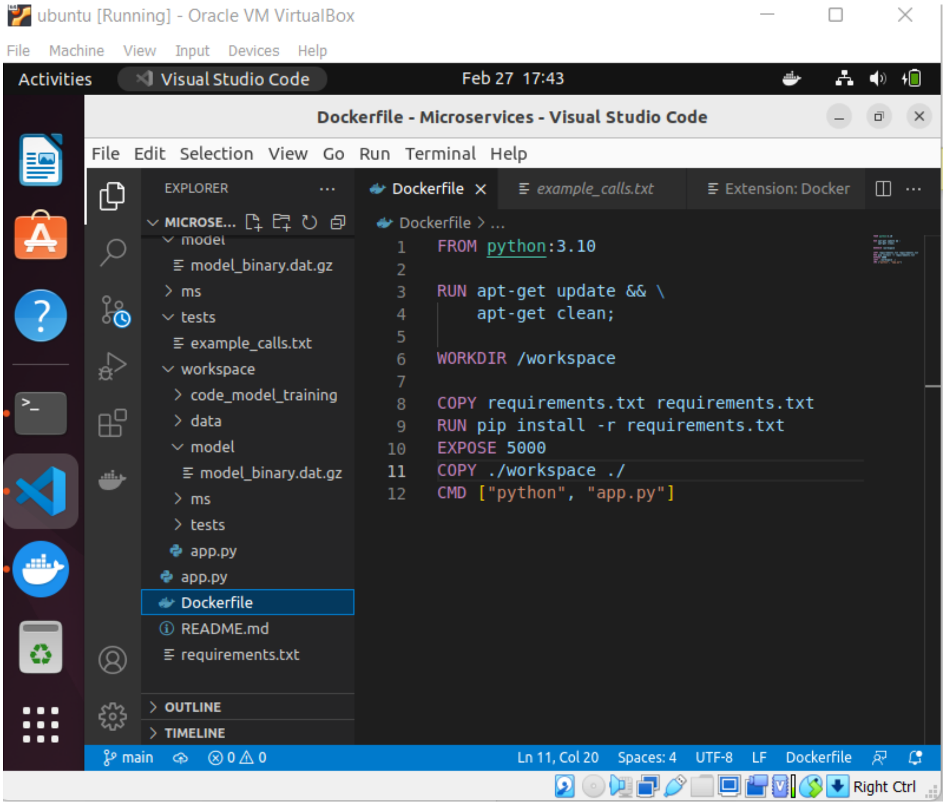
```
": 0.2654, "symmetry_worst": 0.4601, "fractal_dimension_worst": 0.1189
}]'      -H "Content-Type: application/json"      -X POST http://0.0.0
.0:5000/predict
curl: command not found
(avi) vboxuser@ubuntu:~/Microservices$ curl -d '[{"radius_mean": 17.99
, "texture_mean": 10.38, "perimeter_mean": 122.8, "area_mean": 1001.0,
 "smoothness_mean": 0.1184, "compactness_mean": 0.2776, "concavity_mea
n": 0.3001, "concave points_mean": 0.1471, "symmetry_mean": 0.2419, "f
ractal_dimension_mean": 0.07871, "radius_se": 1.095, "texture_se": 0.9
053, "perimeter_se": 8.589, "area_se": 153.4, "smoothness_se": 0.00639
9, "compactness_se": 0.04904, "concavity_se": 0.05373, "concave points
_se": 0.01587, "symmetry_se": 0.03003, "fractal_dimension_se": 0.00619
3, "radius_worst": 25.38, "texture_worst": 17.33, "perimeter_worst": 1
84.6, "area_worst": 2019.0, "smoothness_worst": 0.1622, "compactness_w
orst": 0.6656, "concavity_worst": 0.7119, "concave points_worst": 0.26
54, "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}
(avi) vboxuser@ubuntu:~/Microservices$
```


ubuntu [Running] - Oracle VM VirtualBox
File
Machine
View
Input
Devices
Help
Activities
Terminal
Feb 26 18:11
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~/Microservices
OUTLINE
TIMELINE
Right Ctrl

```
, "texture_mean": 10.38, "perimeter_mean": 122.8, "area_mean": 1001.0,
 "smoothness_mean": 0.1184, "compactness_mean": 0.2776, "concavity_mea
n": 0.3001, "concave points_mean": 0.1471, "symmetry_mean": 0.2419, "f
ractal_dimension_mean": 0.07871, "radius_se": 1.095, "texture_se": 0.9
053, "perimeter_se": 8.589, "area_se": 153.4, "smoothness_se": 0.00639
9, "compactness_se": 0.04904, "concavity_se": 0.05373, "concave points
_se": 0.01587, "symmetry_se": 0.03003, "fractal_dimension_se": 0.00619
3, "radius_worst": 25.38, "texture_worst": 17.33, "perimeter_worst": 1
84.6, "area_worst": 2019.0, "smoothness_worst": 0.1622, "compactness_w
orst": 0.6656, "concavity_worst": 0.7119, "concave points_worst": 0.26
54, "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}
(avi) vboxuser@ubuntu:~/Microservices$ curl -X GET http://localhost:50
00/info
{"name":"Breast Cancer Wisconsin (Diagnostic)","version":"v1.0.0"}
(avi) vboxuser@ubuntu:~/Microservices$ curl -X GET http://localhost:50
00/health
ok(avi) vboxuser@ubuntu:~/Microservices$
```

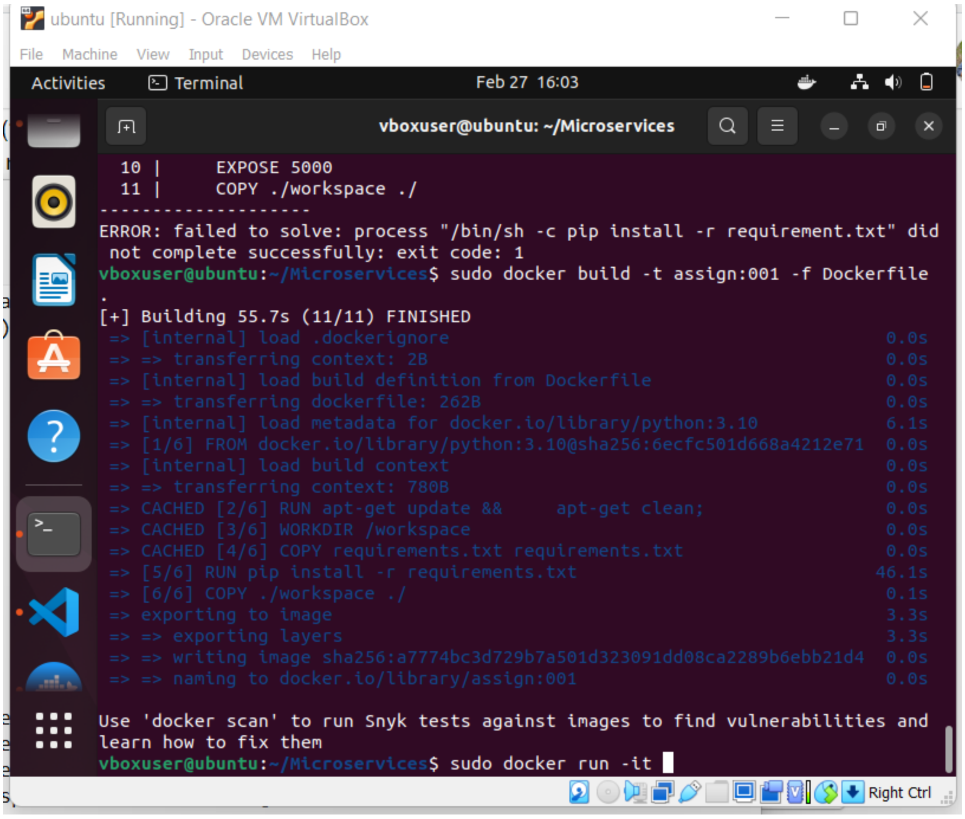
10.Create a docker image containing everything needed to run the application.(10 marks)

Create a docker file with below configuration



```
FROM python:3.10

RUN apt-get update && \
    apt-get clean;

WORKDIR /workspace

COPY requirements.txt requirements.txt
RUN pip install -r requirements.txt
EXPOSE 5000
COPY ./workspace ./
CMD ["python", "app.py"]
```

Build docker with below command - sudo docker build -t assign:001 -f Dockerfile .

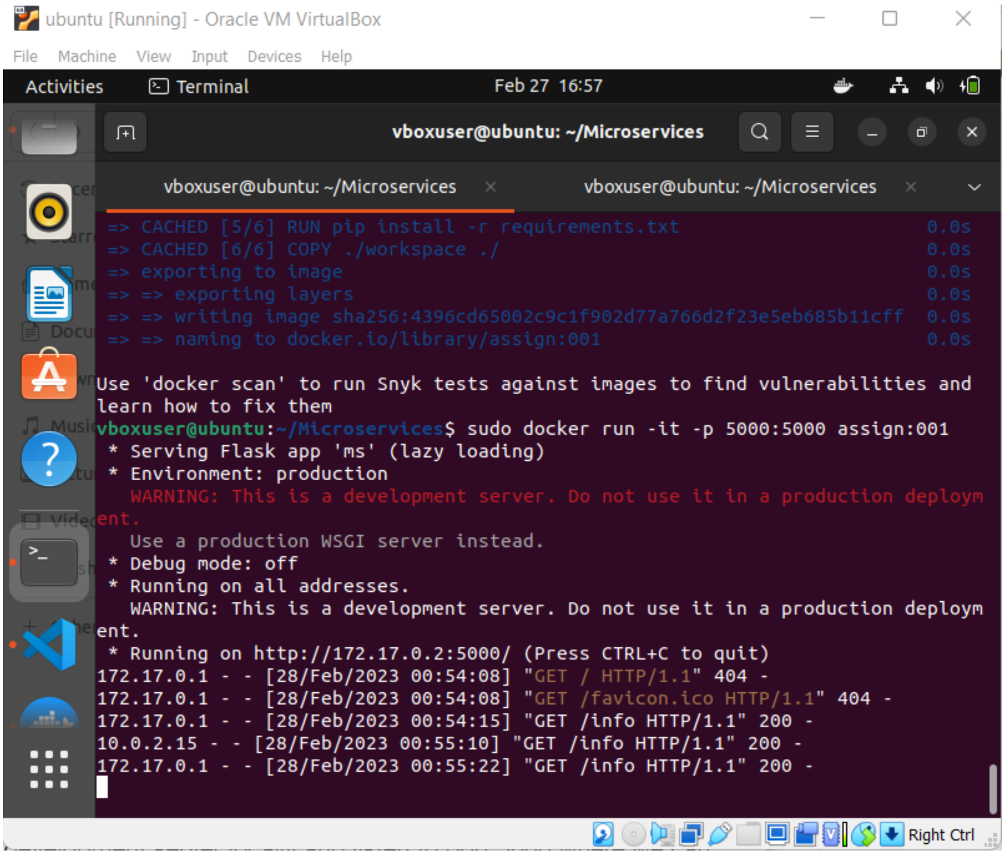

ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 27 16:03
vboxuser@ubuntu: ~/Microservices
Right Ctrl

```
  10 |      EXPOSE 5000
  11 |      COPY ./workspace ./
--------------------
ERROR: failed to solve: process "/bin/sh -c pip install -r requirement.txt" did
 not complete successfully: exit code: 1
vboxuser@ubuntu:~/Microservices$ sudo docker build -t assign:001 -f Dockerfile
.
[+] Building 55.7s (11/11) FINISHED
 => [internal] load .dockerignore                                          0.0s
 => => transferring context: 2B                                            0.0s
 => [internal] load build definition from Dockerfile                       0.0s
 => => transferring dockerfile: 262B                                       0.0s
 => [internal] load metadata for docker.io/library/python:3.10             6.1s
 => [1/6] FROM docker.io/library/python:3.10@sha256:6ecfc501d668a4212e71  0.0s
 => [internal] load build context                                          0.0s
 => => transferring context: 780B                                          0.0s
 => CACHED [2/6] RUN apt-get update &&     apt-get clean;                  0.0s
 => CACHED [3/6] WORKDIR /workspace                                        0.0s
 => CACHED [4/6] COPY requirements.txt requirements.txt                    0.0s
 => [5/6] RUN pip install -r requirements.txt                             46.1s
 => [6/6] COPY ./workspace ./                                              0.1s
 => exporting to image                                                     3.3s
 => => exporting layers                                                    3.3s
 => => writing image sha256:a7774bc3d729b7a501d323091dd08ca2289b6ebb21d4  0.0s
 => => naming to docker.io/library/assign:001                              0.0s

Use 'docker scan' to run Snyk tests against images to find vulnerabilities and
learn how to fix them
vboxuser@ubuntu:~/Microservices$ sudo docker run -it
```

11.Run the containerized application as a prediction service and test it locally by passing some example calls and get the prediction. (10 marks)

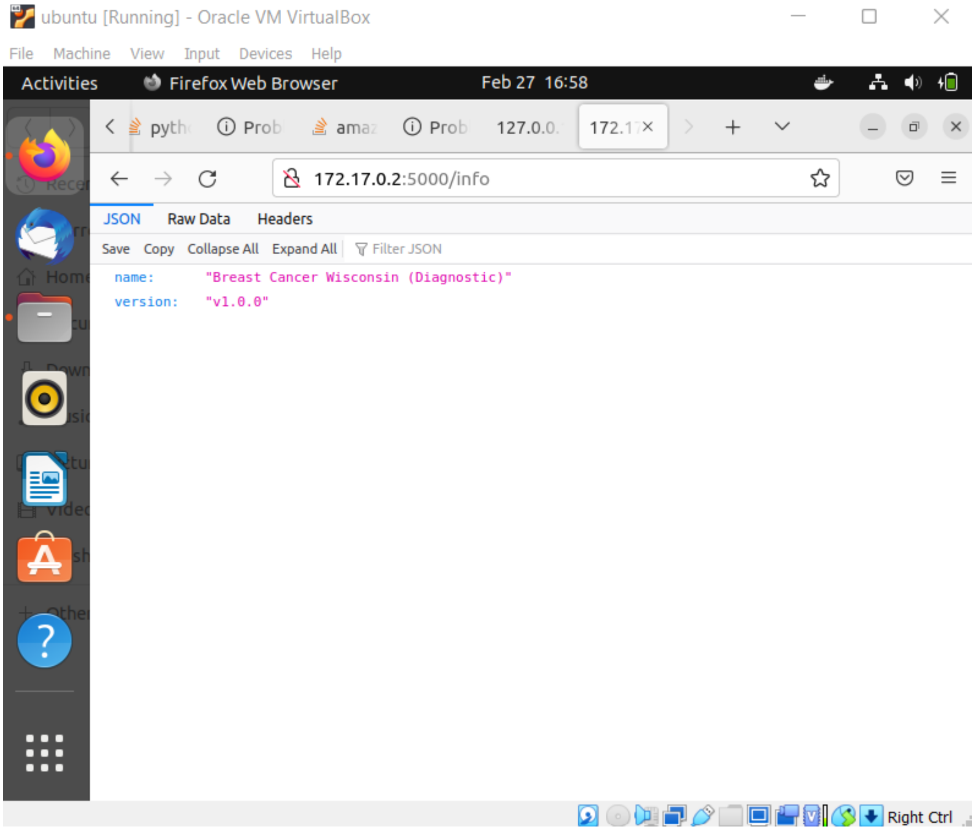
Run docker

Sudo docker run -it -p 5000:5000 assign:001


ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 27 16:57
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~/Microservices
Right Ctrl

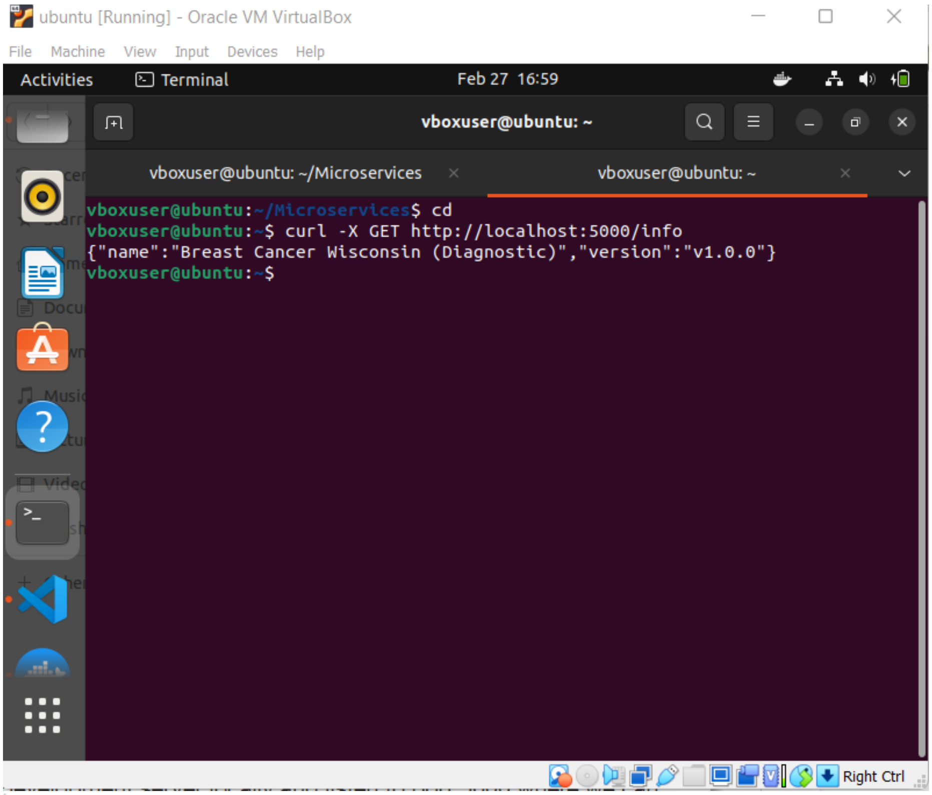
```
=> CACHED [5/6] RUN pip install -r requirements.txt                    0.0s
=> CACHED [6/6] COPY ./workspace ./                                    0.0s
=> exporting to image                                                  0.0s
=> => exporting layers                                                 0.0s
=> => writing image sha256:4396cd65002c9c1f902d77a766d2f23e5eb685b11cff  0.0s
=> => naming to docker.io/library/assign:001                           0.0s

Use 'docker scan' to run Snyk tests against images to find vulnerabilities and
learn how to fix them
vboxuser@ubuntu:~/Microservices$ sudo docker run -it -p 5000:5000 assign:001
 * Serving Flask app 'ms' (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deploym
ent.
   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 deploym
ent.
 * Running on http://172.17.0.2:5000/ (Press CTRL+C to quit)
172.17.0.1 - - [28/Feb/2023 00:54:08] "GET / HTTP/1.1" 404 -
172.17.0.1 - - [28/Feb/2023 00:54:08] "GET /favicon.ico HTTP/1.1" 404 -
172.17.0.1 - - [28/Feb/2023 00:54:15] "GET /info HTTP/1.1" 200 -
10.0.2.15 - - [28/Feb/2023 00:55:10] "GET /info HTTP/1.1" 200 -
172.17.0.1 - - [28/Feb/2023 00:55:22] "GET /info HTTP/1.1" 200 -
```

Web page response locally

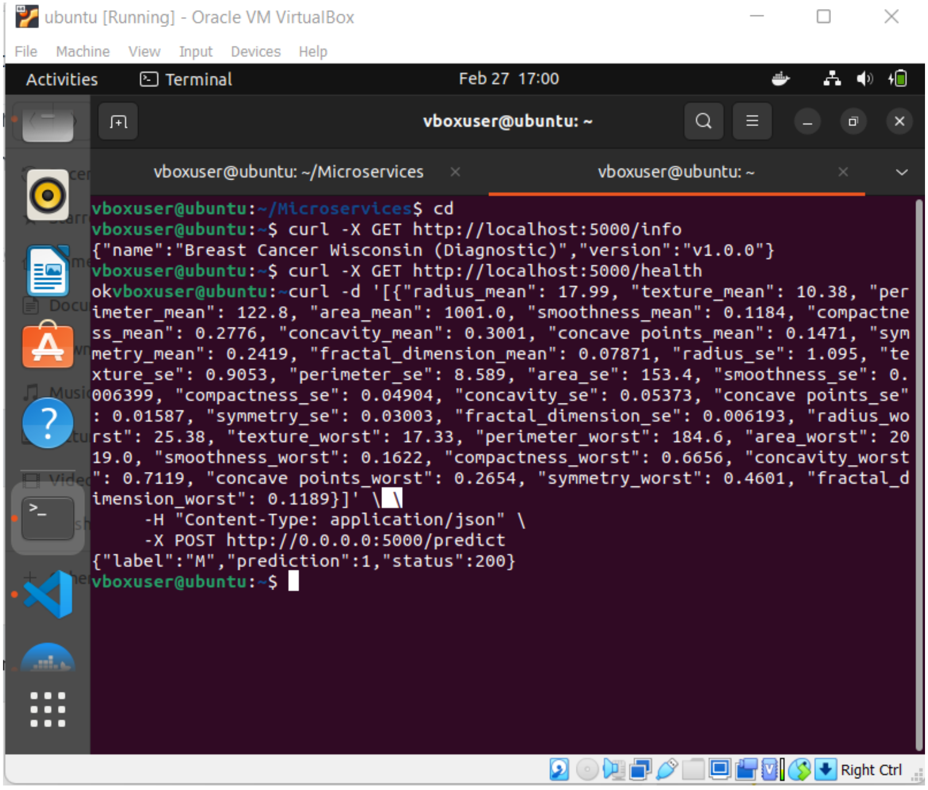


```
name:       "Breast Cancer Wisconsin (Diagnostic)"
version:    "v1.0.0"
```

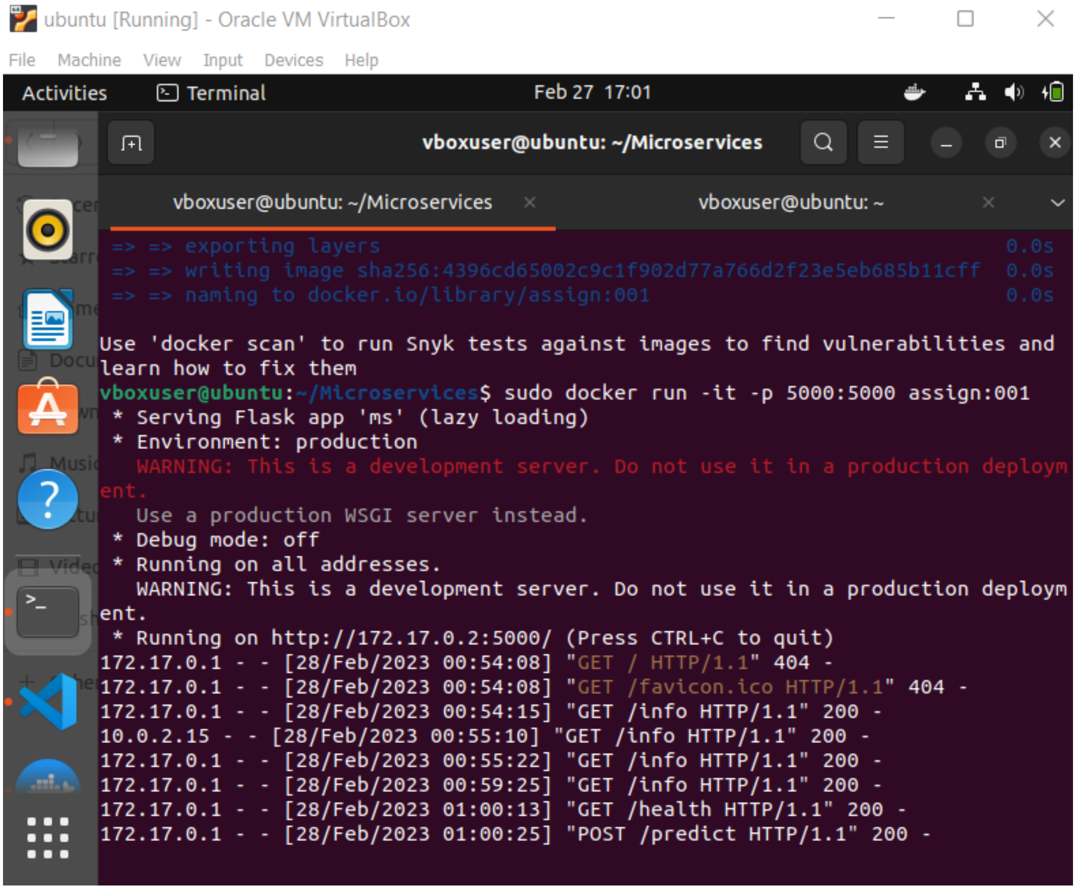
Testing the application locally


ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 27 16:59
vboxuser@ubuntu: ~
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~
Right Ctrl

```
vboxuser@ubuntu:~/Microservices$ cd
vboxuser@ubuntu:~$ curl -X GET http://localhost:5000/info
{"name":"Breast Cancer Wisconsin (Diagnostic)","version":"v1.0.0"}
vboxuser@ubuntu:~$
```


ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Feb 27 17:00
vboxuser@ubuntu: ~
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~
Right Ctrl

```
vboxuser@ubuntu:~/Microservices$ cd
vboxuser@ubuntu:~$ curl -X GET http://localhost:5000/info
{"name":"Breast Cancer Wisconsin (Diagnostic)","version":"v1.0.0"}
vboxuser@ubuntu:~$ curl -X GET http://localhost:5000/health
okvboxuser@ubuntu:~curl -d '[{"radius_mean": 17.99, "texture_mean": 10.38, "per
imeter_mean": 122.8, "area_mean": 1001.0, "smoothness_mean": 0.1184, "compactne
ss_mean": 0.2776, "concavity_mean": 0.3001, "concave points_mean": 0.1471, "sym
metry_mean": 0.2419, "fractal_dimension_mean": 0.07871, "radius_se": 1.095, "te
xture_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_wo
rst": 25.38, "texture_worst": 17.33, "perimeter_worst": 184.6, "area_worst": 20
19.0, "smoothness_worst": 0.1622, "compactness_worst": 0.6656, "concavity_worst
": 0.7119, "concave points_worst": 0.2654, "symmetry_worst": 0.4601, "fractal_d
imension_worst": 0.1189}]' \ \
     -H "Content-Type: application/json" \
     -X POST http://0.0.0.0:5000/predict
{"label":"M","prediction":1,"status":200}
vboxuser@ubuntu:~$ 
```



ubuntu [Running] - Oracle VM VirtualBox
File
Machine
View
Input
Devices
Help
Activities
Terminal
Feb 27 17:01
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~/Microservices
vboxuser@ubuntu: ~

```
=> => exporting layers                                                  0.0s
=> => writing image sha256:4396cd65002c9c1f902d77a766d2f23e5eb685b11cff  0.0s
=> => naming to docker.io/library/assign:001                            0.0s

Use 'docker scan' to run Snyk tests against images to find vulnerabilities and
learn how to fix them
vboxuser@ubuntu:~/Microservices$ sudo docker run -it -p 5000:5000 assign:001
 * Serving Flask app 'ms' (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deploym
ent.
   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 deploym
ent.
 * Running on http://172.17.0.2:5000/ (Press CTRL+C to quit)
172.17.0.1 - - [28/Feb/2023 00:54:08] "GET / HTTP/1.1" 404 -
172.17.0.1 - - [28/Feb/2023 00:54:08] "GET /favicon.ico HTTP/1.1" 404 -
172.17.0.1 - - [28/Feb/2023 00:54:15] "GET /info HTTP/1.1" 200 -
10.0.2.15 - - [28/Feb/2023 00:55:10] "GET /info HTTP/1.1" 200 -
172.17.0.1 - - [28/Feb/2023 00:55:22] "GET /info HTTP/1.1" 200 -
172.17.0.1 - - [28/Feb/2023 00:59:25] "GET /info HTTP/1.1" 200 -
172.17.0.1 - - [28/Feb/2023 01:00:13] "GET /health HTTP/1.1" 200 -
172.17.0.1 - - [28/Feb/2023 01:00:25] "POST /predict HTTP/1.1" 200 -
```