# Codio Activity: Installing Docker Containers

Below is a tutorial on how to create containers (please note that this cannot be done in Codio). You can discuss your work further with your tutor.

- Perform a standard update to ensure you are using the latest libraries:

```
sudo apt-get update
```

2. Install Docker from the standard repository:

```
sudo apt install docker.io
```

3. As part of the installation process, Docker will create a new group (called docker). You need to add your username to that group:

```
sudo usermod -aG docker [user_name]
```

4. Log out and then back in to update your user status.
5. Check that you are a member of the docker group:

```
id
```

6. Issue the version command to check that docker is working properly:

```
docker version
```

7. You can also run the `docker run hello-world` command to test a (very simple) container.
8. Follow the instructions/tutorial at Docker.com to learn how to create your own containers to run python.

## Learning Outcomes

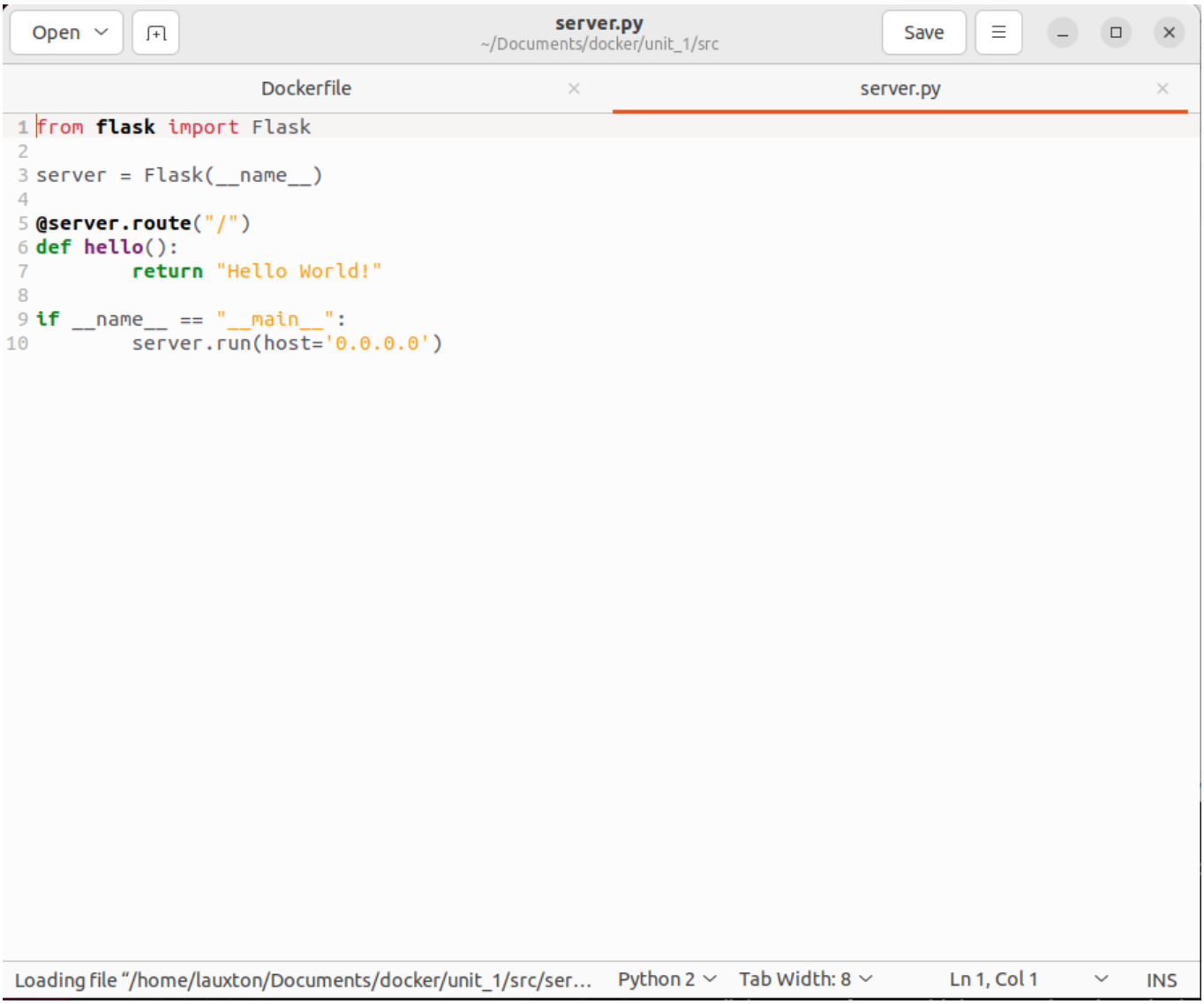
- Identify and critically analyse operating system risks and issues, and identify appropriate methodologies, tools and techniques to solve them.
- Evaluate and adapt platforms and systems, using processes such as code refactoring, to produce secure distributed system solutions.

## Outcome

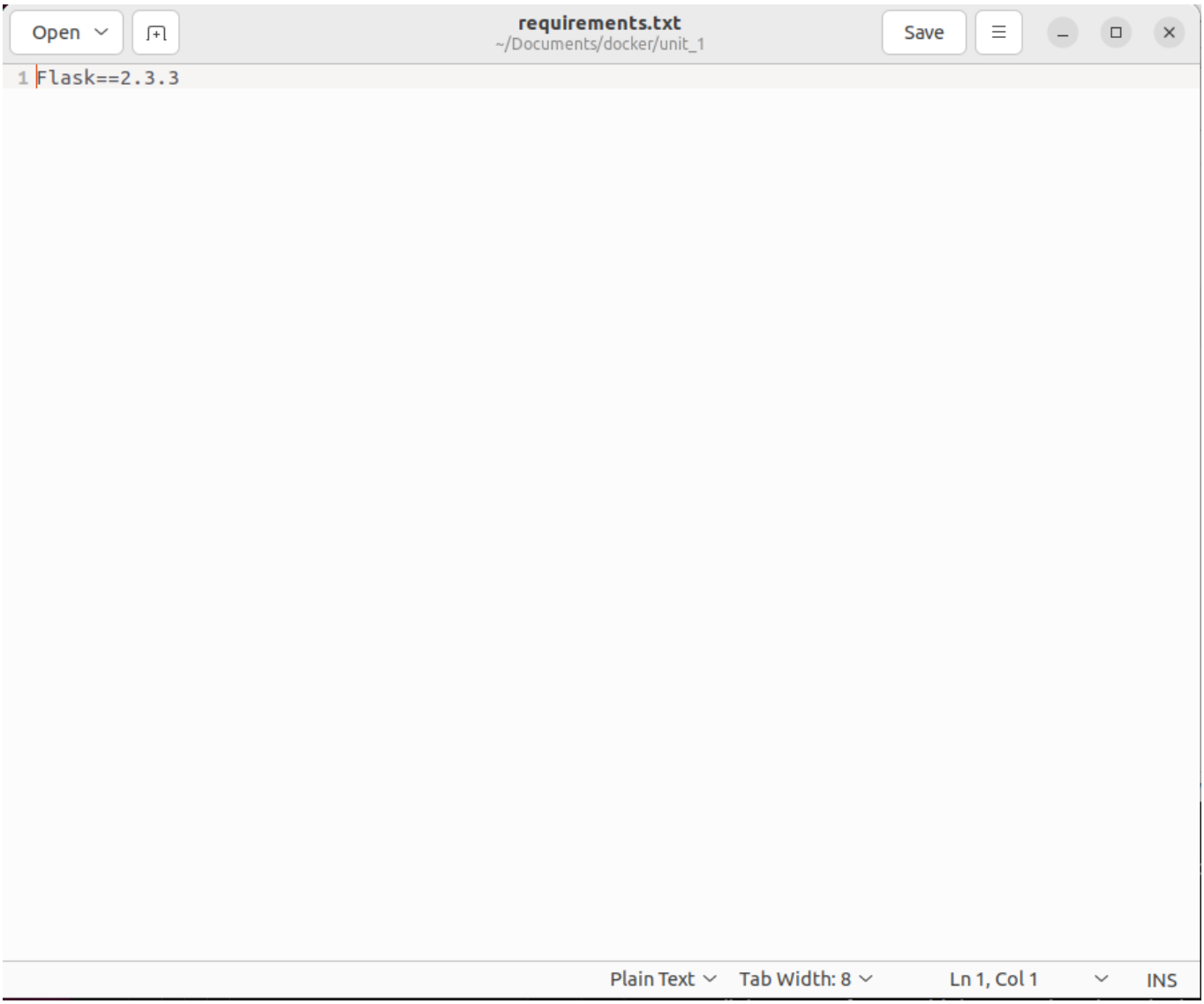
```
Collecting click>=8.1.3 (from Flask==2.3.3->-r requirements.txt (line 1))
  Obtaining dependency information for click>=8.1.3 from https://files.pythonhosted.org/packages/00/2e
/d53fa4befbf2cfa713304affc7ca780ce4fc1fd8710527771b58311a3229/click-8.1.7-py3-none-any.whl.metadata
  Downloading click-8.1.7-py3-none-any.whl.metadata (3.0 kB)
Collecting blinker>=1.6.2 (from Flask==2.3.3->-r requirements.txt (line 1))
  Downloading blinker-1.6.2-py3-none-any.whl (13 kB)
Collecting MarkupSafe>=2.0 (from Jinja2>=3.1.2->Flask==2.3.3->-r requirements.txt (line 1))
  Obtaining dependency information for MarkupSafe>=2.0 from https://files.pythonhosted.org/packages/fe
/21/2eff1de472ca6c99ec3993eab11308787b9879af9ca8bbceb4868cf4f2ca/MarkupSafe-2.1.3-cp311-cp311-manylinu
x_2_17_x86_64.manylinux2014_x86_64.whl.metadata
  Downloading MarkupSafe-2.1.3-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (3.
0 kB)
Downloading flask-2.3.3-py3-none-any.whl (96 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 96.1/96.1 kB 43.7 MB/s eta 0:00:00
Downloading click-8.1.7-py3-none-any.whl (97 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 97.9/97.9 kB 57.5 MB/s eta 0:00:00
Downloading werkzeug-2.3.7-py3-none-any.whl (242 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 242.2/242.2 kB 35.0 MB/s eta 0:00:00
Downloading MarkupSafe-2.1.3-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (28 kB)
Installing collected packages: MarkupSafe, itsdangerous, click, blinker, Werkzeug, Jinja2, Flask
Successfully installed Flask-2.3.3 Jinja2-3.1.2 MarkupSafe-2.1.3 Werkzeug-2.3.7 blinker-1.6.2 click-8.
1.7 itsdangerous-2.1.2
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting behaviour wit
h the system package manager. It is recommended to use a virtual environment instead: https://pip.pypa
.io/warnings/venv
Removing intermediate container 8dc3c4be5c0d
 ---> 4258326b4503
Step 5/6 : COPY src/ .
 ---> d051c3dd4eb4
Step 6/6 : CMD [ "python", "./server.py" ]
 ---> Running in 63e423159547
Removing intermediate container 63e423159547
 ---> 71b8633f568b
Successfully built 71b8633f568b
Successfully tagged myimage:latest
(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$ docker images
REPOSITORY   TAG       IMAGE ID       CREATED          SIZE
myimage      latest    71b8633f568b   5 seconds ago    1.02GB
<none>       <none>    474a9d50eeec   9 minutes ago    1.02GB
<none>       <none>    8f0e80b2217d   19 minutes ago   1.02GB
python       3.11      b94d01b49295   4 weeks ago      1.01GB
(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$ docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$ docker run -d -p 5000:5000 myimage
ed6079e751baa6339168bb416ac832445a23da4a33fe07396a082db9b9c8457a
(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$ docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED         STATUS         PORTS
                    NAMES
ed6079e751ba   myimage   "python ./server.py"   3 seconds ago   Up 2 seconds   0.0.0.0:5000->5000/tcp,
 :::5000->5000/tcp   nervous_volhard
(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$ curl http://localhost:18000
curl: (7) Failed to connect to localhost port 18000 after 0 ms: Couldn't connect to server
(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$ curl http://localhost:5000
(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$ curl http://localhost:5000
Hello World!(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$
```

# Containerize a Python Service

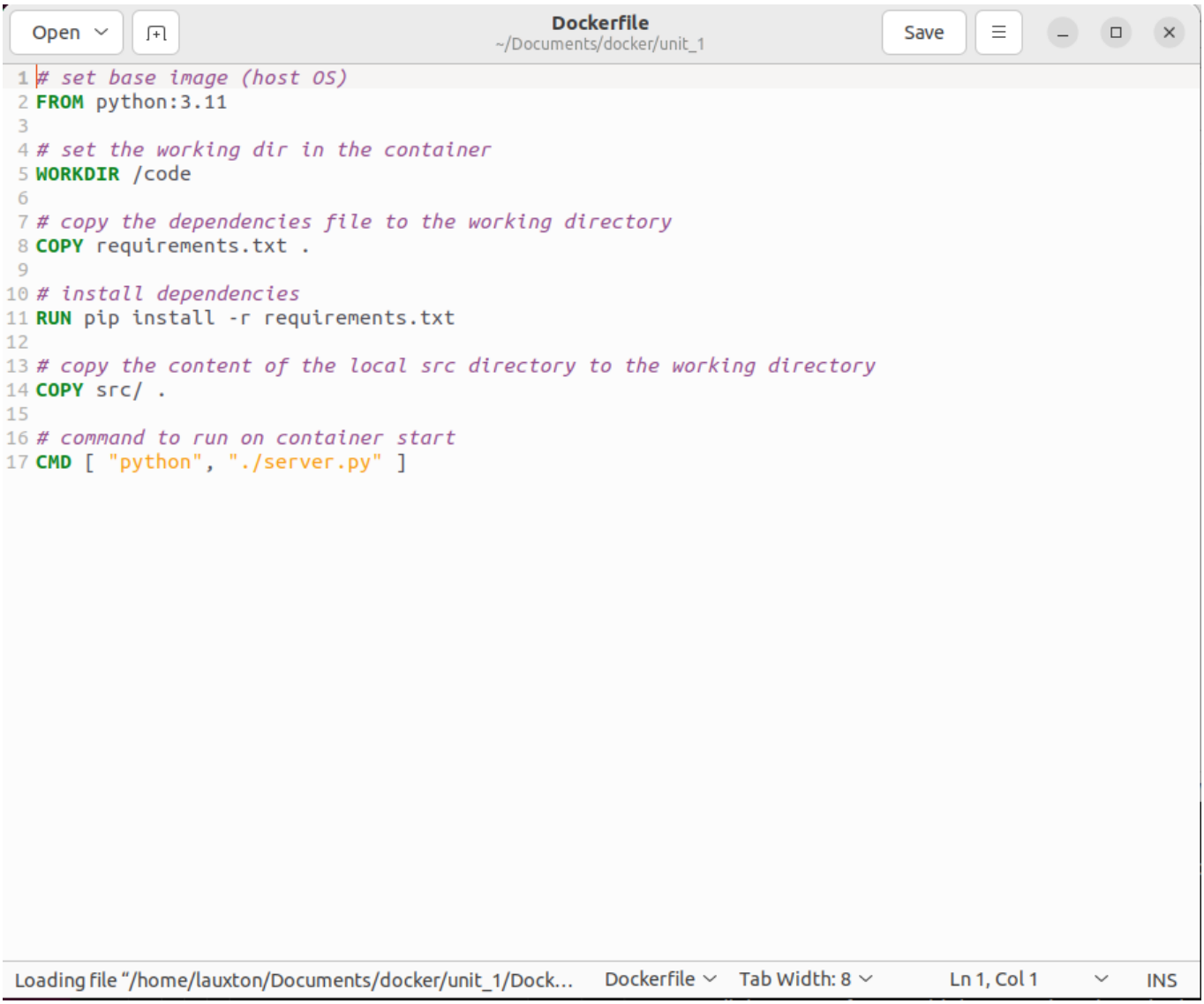
## server.py




# requirements.txt


Open
requirements.txt
~/Documents/docker/unit_1
Save
1 Flask==2.3.3
Plain Text
Tab Width: 8
Ln 1, Col 1
INS

# Dockerfile


Open
Dockerfile
~/Documents/docker/unit_1
Save
1 # set base image (host OS)
2 FROM python:3.11
3
4 # set the working dir in the container
5 WORKDIR /code
6
7 # copy the dependencies file to the working directory
8 COPY requirements.txt .
9
10 # install dependencies
11 RUN pip install -r requirements.txt
12
13 # copy the content of the local src directory to the working directory
14 COPY src/ .
15
16 # command to run on container start
17 CMD [ "python", "./server.py" ]
Loading file "/home/lauxton/Documents/docker/unit_1/Dock...
Dockerfile
Tab Width: 8
Ln 1, Col 1
INS

# Output

```
(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$ sudo apt-get update
[sudo] password for lauxton:
Hit:1 http://us.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://us.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:3 https://download.sublimetext.com apt/stable/ InRelease
Hit:4 https://repo.radeon.com/amdgpu/5.5.3/ubuntu jammy InRelease
Hit:5 http://us.archive.ubuntu.com/ubuntu jammy-backports InRelease
Hit:6 https://repo.radeon.com/rocm/apt/5.5.3 jammy InRelease
Hit:7 http://us.archive.ubuntu.com/ubuntu jammy-security InRelease
Reading package lists... Done
(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$ sudo apt install docker.io
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
docker.io is already the newest version (24.0.5-0ubuntu1~22.04.1).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$ id
uid=1000(lauxton) gid=1000(lauxton) groups=1000(lauxton),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev)
,122(lpadmin),135(lxd),136(sambashare),139(docker)
(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$ docker version
Client:
 Version:           24.0.5
 API version:       1.43
 Go version:        go1.20.3
 Git commit:        24.0.5-0ubuntu1~22.04.1
 Built:             Mon Aug 21 19:50:14 2023
 OS/Arch:           linux/amd64
 Context:           default

Server:
 Engine:
  Version:          24.0.5
  API version:      1.43 (minimum version 1.12)
  Go version:       go1.20.3
  Git commit:       24.0.5-0ubuntu1~22.04.1
  Built:            Mon Aug 21 19:50:14 2023
  OS/Arch:          linux/amd64
  Experimental:     false
 containerd:
  Version:          1.7.2
  GitCommit:
 runc:
  Version:          1.1.7-0ubuntu1~22.04.1
  GitCommit:
 docker-init:
  Version:          0.19.0
  GitCommit:
(ssaenv) lauxton@pg7700x6750xt:~/Documents/docker/unit_1$
```