Experiment No. 1.3

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Subject Name: Containerization with Docker **Subject Code: 22CAH-742**

1. Aim/Overview of the practical:

Deploying Docker images as Stateless Containers.

2. Task to be done:

Deploying Docker images as stateless containers is a common practice in container orchestration and cloud-native applications. We need to build a Docker image and then deploy it as a stateless container.

3. Code/Steps for practical:

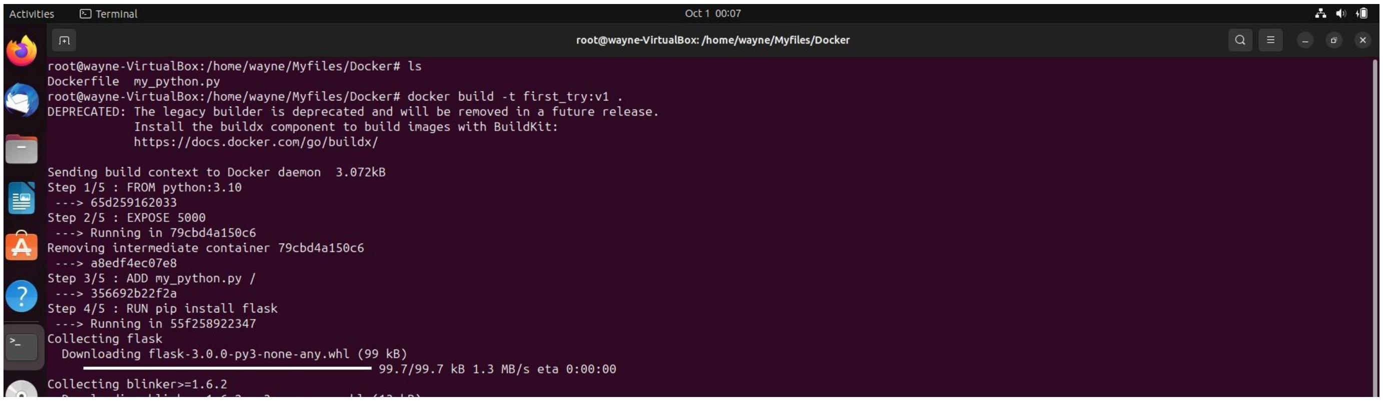
Here are the steps to deploy Docker images as stateless containers on **Ubuntu using Terminal**:

i. **Install Docker**: Ensure Docker is installed on the machine. If not, then open Terminal and type:

sudo apt install docker.io

ii. **Create a Docker Image**: Build a Docker image for the application. We can use the **docker build** command to build the image. For example:

docker build -t image-name:tag .

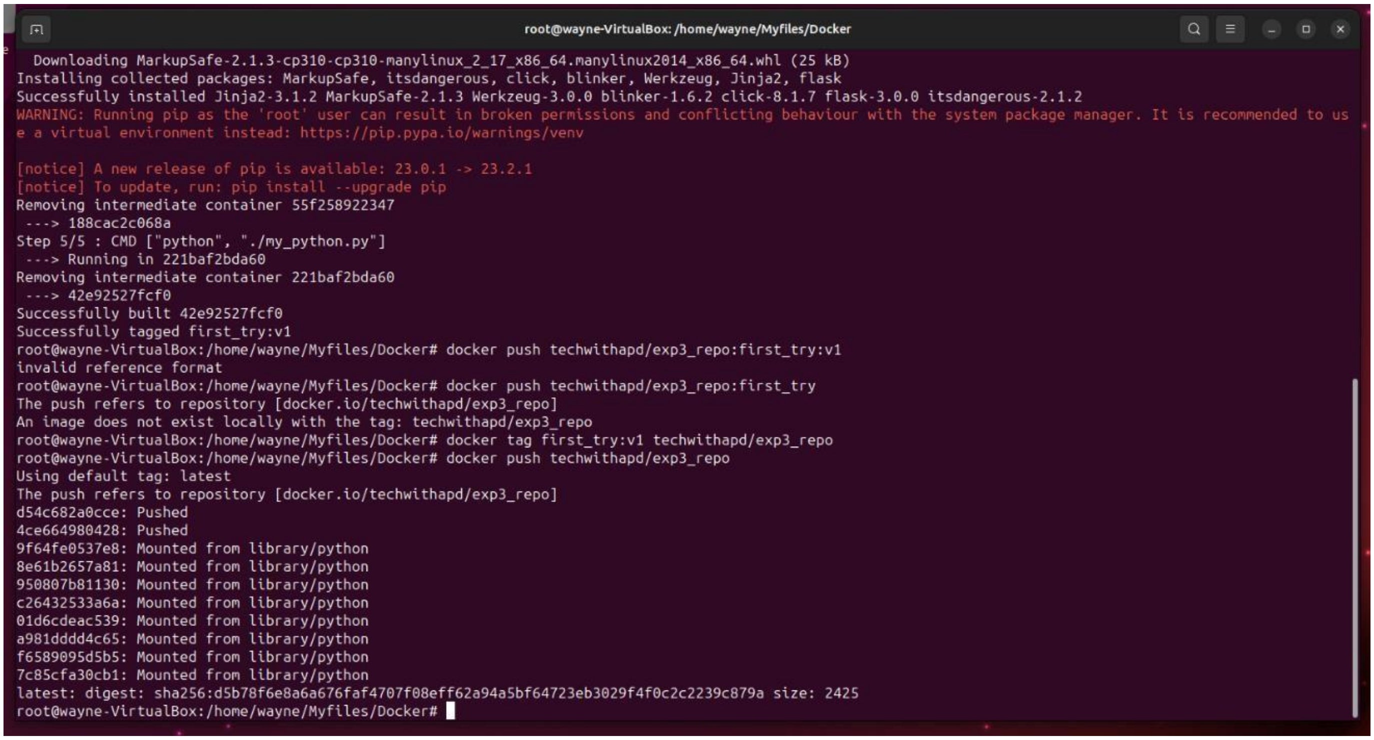


```
root@wayne-VirtualBox:/home/wayne/Myfiles/Docker# ls
Dockerfile  my_python.py
root@wayne-VirtualBox:/home/wayne/Myfiles/Docker# docker build -t first_try:v1 .
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
            Install the buildx component to build images with BuildKit:
            https://docs.docker.com/go/buildx/

Sending build context to Docker daemon  3.072kB
Step 1/5 : FROM python:3.10
 ---> 65d259162033
Step 2/5 : EXPOSE 5000
 ---> Running in 79cbd4a150c6
Removing intermediate container 79cbd4a150c6
 ---> a8edf4ec07e8
Step 3/5 : ADD my_python.py /
 ---> 356692b22f2a
Step 4/5 : RUN pip install flask
 ---> Running in 55f258922347
Collecting flask
  Downloading flask-3.0.0-py3-none-any.whl (99 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 99.7/99.7 kB 1.3 MB/s eta 0:00:00
Collecting blinker>=1.6.2
```

iii. **Push Image to a Registry (Optional)**: If you plan to share your Docker image with others or deploy it on multiple hosts, you can push the image to a container registry like Docker Hub. Use the **docker push** command for this:

docker push your-registry/image-name:tag



```
  Downloading MarkupSafe-2.1.3-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (25 kB)
Installing collected packages: MarkupSafe, itsdangerous, click, blinker, Werkzeug, Jinja2, flask
Successfully installed Jinja2-3.1.2 MarkupSafe-2.1.3 Werkzeug-3.0.0 blinker-1.6.2 click-8.1.7 flask-3.0.0 itsdangerous-2.1.2
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting behaviour with the system package manager. It is recommended to us
e a virtual environment instead: https://pip.pypa.io/warnings/venv

[notice] A new release of pip is available: 23.0.1 -> 23.2.1
[notice] To update, run: pip install --upgrade pip
Removing intermediate container 55f258922347
 ---> 188cac2c068a
Step 5/5 : CMD ["python", "./my_python.py"]
 ---> Running in 221baf2bda60
Removing intermediate container 221baf2bda60
 ---> 42e92527fcf0
Successfully built 42e92527fcf0
Successfully tagged first_try:v1
root@wayne-VirtualBox:/home/wayne/Myfiles/Docker# docker push techwithapd/exp3_repo:first_try:v1
invalid reference format
root@wayne-VirtualBox:/home/wayne/Myfiles/Docker# docker push techwithapd/exp3_repo:first_try
The push refers to repository [docker.io/techwithapd/exp3_repo]
An image does not exist locally with the tag: techwithapd/exp3_repo
root@wayne-VirtualBox:/home/wayne/Myfiles/Docker# docker tag first_try:v1 techwithapd/exp3_repo
root@wayne-VirtualBox:/home/wayne/Myfiles/Docker# docker push techwithapd/exp3_repo
Using default tag: latest
The push refers to repository [docker.io/techwithapd/exp3_repo]
d54c682a0cce: Pushed
4ce664980428: Pushed
9f64fe0537e8: Mounted from library/python
8e61b2657a81: Mounted from library/python
950807b81130: Mounted from library/python
c26432533a6a: Mounted from library/python
01d6cdeac539: Mounted from library/python
a981dddd4c65: Mounted from library/python
f6589095d5b5: Mounted from library/python
7c85cfa30cb1: Mounted from library/python
latest: digest: sha256:d5b78f6e8a6a676faf4707f08eff62a94a5bf64723eb3029f4f0c2c2239c879a size: 2425
root@wayne-VirtualBox:/home/wayne/Myfiles/Docker# 
```

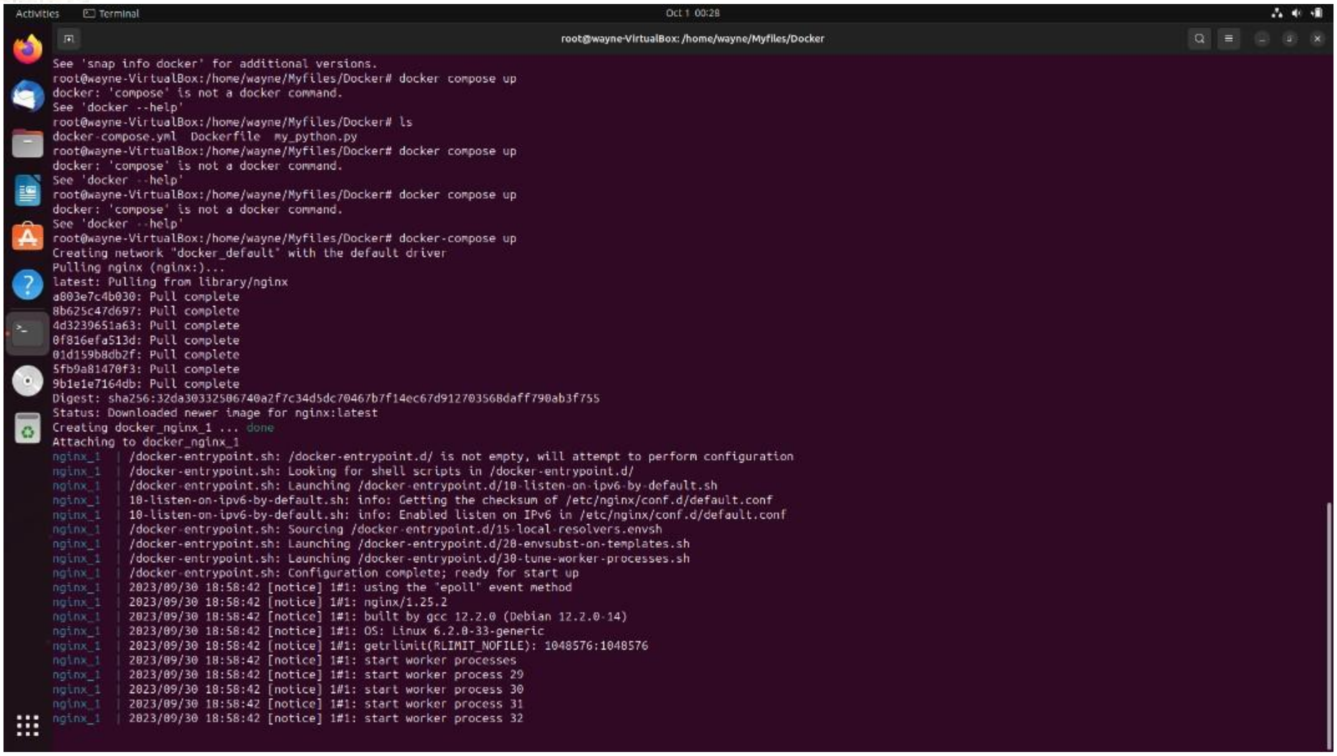
iv. **Set Up Environment Variables**: If your application relies on environment variables, make sure to define them, either in a configuration file or as part of your deployment process.

v. **Deploy Stateless Containers**:

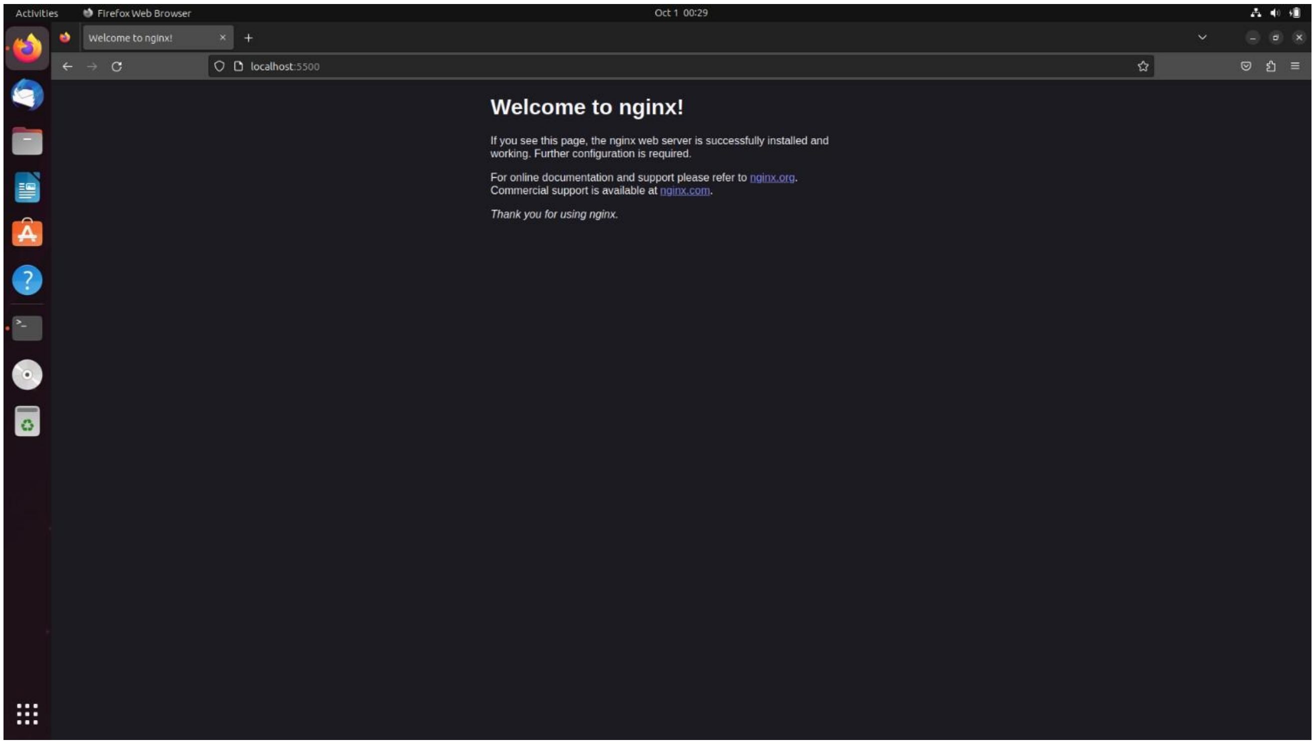
=> **Using Docker Compose** (for local development and testing):

- Create a **docker-compose.yml** file that defines your service, including the image, environment variables, ports, and any volume mounts.
- Run the application using **docker-compose up**.

4. Result/Output/Writing Summary:



```
See 'snap info docker' for additional versions.
root@wayne-VirtualBox:/home/wayne/Myfiles/Docker# docker compose up
docker: 'compose' is not a docker command.
See 'docker --help'
root@wayne-VirtualBox:/home/wayne/Myfiles/Docker# ls
docker-compose.yml  Dockerfile  my_python.py
root@wayne-VirtualBox:/home/wayne/Myfiles/Docker# docker compose up
docker: 'compose' is not a docker command.
See 'docker --help'
root@wayne-VirtualBox:/home/wayne/Myfiles/Docker# docker compose up
docker: 'compose' is not a docker command.
See 'docker --help'
root@wayne-VirtualBox:/home/wayne/Myfiles/Docker# docker-compose up
Creating network "docker_default" with the default driver
Pulling nginx (nginx:)...
latest: Pulling from library/nginx
a803e7c4b030: Pull complete
8b625c47d697: Pull complete
4d3239651a63: Pull complete
0f816efa513d: Pull complete
01d159b8db2f: Pull complete
5fb9a81470f3: Pull complete
9b1e1e7164db: Pull complete
Digest: sha256:32da30332506740a2f7c34d5dc70467b7f14ec67d912703568daff790ab3f755
Status: Downloaded newer image for nginx:latest
Creating docker_nginx_1 ... done
Attaching to docker_nginx_1
nginx_1  | /docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
nginx_1  | /docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
nginx_1  | /docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
nginx_1  | 10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
nginx_1  | 10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
nginx_1  | /docker-entrypoint.sh: Sourcing /docker-entrypoint.d/15-local-resolvers.envsh
nginx_1  | /docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
nginx_1  | /docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
nginx_1  | /docker-entrypoint.sh: Configuration complete; ready for start up
nginx_1  | 2023/09/30 18:58:42 [notice] 1#1: using the "epoll" event method
nginx_1  | 2023/09/30 18:58:42 [notice] 1#1: nginx/1.25.2
nginx_1  | 2023/09/30 18:58:42 [notice] 1#1: built by gcc 12.2.0 (Debian 12.2.0-14)
nginx_1  | 2023/09/30 18:58:42 [notice] 1#1: OS: Linux 6.2.0-33-generic
nginx_1  | 2023/09/30 18:58:42 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
nginx_1  | 2023/09/30 18:58:42 [notice] 1#1: start worker processes
nginx_1  | 2023/09/30 18:58:42 [notice] 1#1: start worker process 29
nginx_1  | 2023/09/30 18:58:42 [notice] 1#1: start worker process 30
nginx_1  | 2023/09/30 18:58:42 [notice] 1#1: start worker process 31
nginx_1  | 2023/09/30 18:58:42 [notice] 1#1: start worker process 32
```



Welcome to nginx!

If you see this page, the nginx web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to nginx.org.
Commercial support is available at nginx.com.

Thank you for using nginx.

5. Learning outcomes (What I have learned):

a) Learned to build a docker image by creating a Dockerfile, a docker-compose.yml and other required files.

b) Learned to push image to the docker hub or private registry.

c) Learned to deploy docker image as stateless containers.