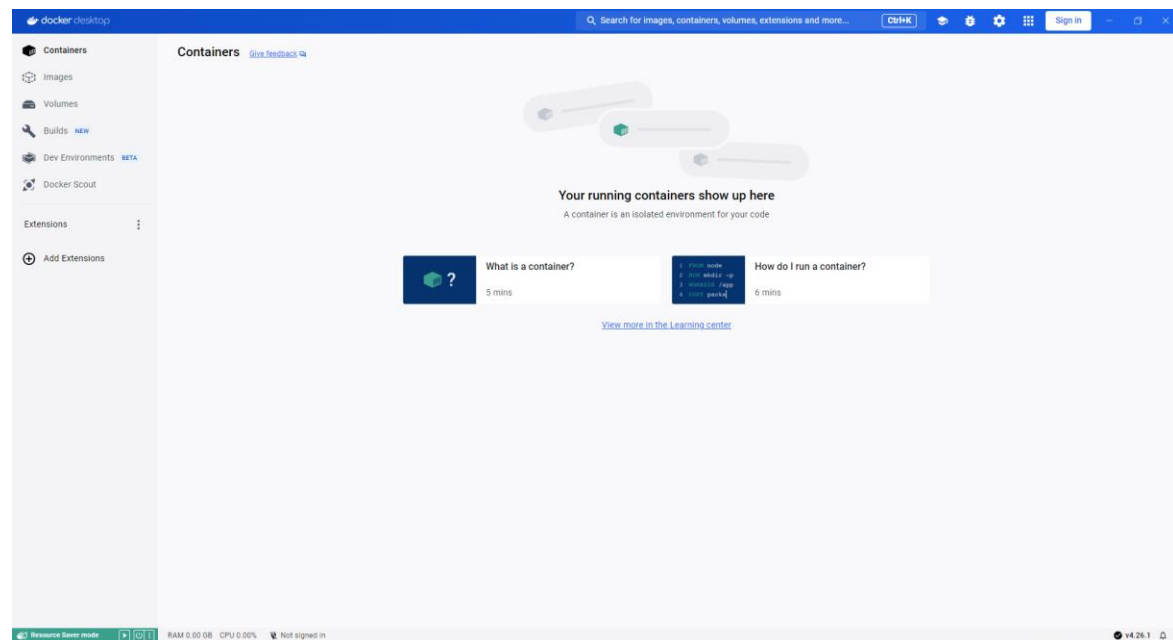


Section 1.0

Installation of Linux Distribution: Ubuntu

```
enangha@DESKTOP-THWA4H0:~$  
Installing, this may take a few minutes...  
Please create a default UNIX user account. The username does not need to match your Windows username.  
For more information visit: https://aka.ms/wslusers  
Enter new UNIX username:enangha  
New password:  
Retype new password:  
passwd: password updated successfully  
The operation completed successfully.  
Installation successful!  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.133.1-microsoft-standard-WSL2 x86_64)  
  
 * Documentation:  https://help.ubuntu.com  
 * Management:    https://landscape.canonical.com  
 * Support:       https://ubuntu.com/advantage  
  
System information as of Sat Jan 13 22:18:35 EST 2024  
  
System load: 3.45      Processes:            62  
Usage of /:  0.1% of 1006.85GB   Users logged in:     0  
Memory usage: 5%      IPv4 address for eth0: 172.29.177.110  
Swap usage:  0%  
  
Expanded Security Maintenance for Applications is not enabled.  
  
0 updates can be applied immediately.  
  
Enable ESM Apps to receive additional future security updates.  
See https://ubuntu.com/esm or run: sudo pro status  
  
The list of available updates is more than a week old.  
To check for new updates run: sudo apt update  
  
This message is shown once a day. To disable it please create the  
/home/enangha/.hushlogin file.  
enangha@DESKTOP-THWA4H0:~$ sudo apt update  
[sudo] password forenangha:  
Hit:1 http://archive.ubuntu.com/ubuntu focal InRelease  
Get:2 http://archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]  
Get:3 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]  
Get:4 http://archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]  
Get:5 http://archive.ubuntu.com/ubuntu focal/universe amd64 Packages [8628 kB]  
Get:6 http://archive.ubuntu.com/ubuntu focal/universe Translation-en [5124 kB]  
Get:7 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [2647 kB]  
Get:8 http://archive.ubuntu.com/ubuntu focal/universe amd64 c-n-f Metadata [265 kB]  
Get:9 http://archive.ubuntu.com/ubuntu focal/multiverse amd64 Packages [144 kB]
```

Installed Docker Desktop



Download Docker on the Ubuntu Package

```
enangha@DESKTOP-THWA4H0:~$ sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu focal stable"  
Hit:1 http://security.ubuntu.com/ubuntu focal-security InRelease  
Hit:2 http://archive.ubuntu.com/ubuntu focal InRelease  
Hit:3 http://archive.ubuntu.com/ubuntu focal-updates InRelease  
Hit:4 http://archive.ubuntu.com/ubuntu focal-backports InRelease  
Get:5 https://download.docker.com/linux/ubuntu focal InRelease [57.7 kB]  
Get:6 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages [34.2 kB]  
Fetched 91.8 kB in 1s (130 kB/s)  
Reading package lists... Done  
enangha@DESKTOP-THWA4H0:~$
```

Docker installation

```
enangha@DESKTOP-THMA4H0:~$ sudo apt install docker-ce
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  containerd.io docker-buildx-plugin docker-ce-cli docker-ce-rootless-extras docker-compose-plugin pigz slirp4netns
Suggested packages:
  aufs-tools cgroupfs-mount | cgroup-lite
The following NEW packages will be installed:
  containerd.io docker-buildx-plugin docker-ce docker-ce-cli docker-ce-rootless-extras docker-compose-plugin pigz slirp4netns
```

Installed Docker testing

```
enangha@DESKTOP-THMA4H0:~$ docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
c1ec31eb5944: Pull complete
Digest: sha256:4bd7811b6914a99dbc560ea20eab57ff6655aea4a80c50b0c5491968cbc2e6
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
   (amd64)
3. The Docker daemon created a new container from that image which runs the
   executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it
   to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/

For more examples and ideas, visit:
https://docs.docker.com/get-started/
```

Created a container and pull a docker image from docker hub

```
enangha@DESKTOP-THMA4H0:~$ docker pull alpine
$: command not found
enangha@DESKTOP-THMA4H0:~$ docker pull alpine
Using default tag: latest
latest: Pulling from library/alpine
661ff4d9561e: Pull complete
Digest: sha256:51b67269f354137895d43f3b3d810bfacd3945438e94dc5ac55fdac340352f48
Status: Downloaded newer image for alpine:latest
docker.io/library/alpine:latest
enangha@DESKTOP-THMA4H0:~$ docker images
REPOSITORY          TAG             IMAGE ID        CREATED         SIZE
alpine               latest          f8c20f8bbcb6   5 weeks ago    7.38MB
hello-world          latest          d2c94e258dcb   8 months ago   13.3kB
enangha@DESKTOP-THMA4H0:~$
```

Docker Run Command Output

```
enangha@DESKTOP-THMA4H0:~$ docker run alpine ls -l
total 56
drwxr-xr-x  2 root    root      4096 Dec  7 09:43 bin
drwxr-xr-x  5 root    root      340 Jan 14 06:59 dev
drwxr-xr-x  1 root    root      4096 Jan 14 06:59 etc
drwxr-xr-x  2 root    root      4096 Dec  7 09:43 home
drwxr-xr-x  7 root    root      4096 Dec  7 09:43 lib
drwxr-xr-x  5 root    root      4096 Dec  7 09:43 media
drwxr-xr-x  2 root    root      4096 Dec  7 09:43 mnt
drwxr-xr-x  2 root    root      4096 Dec  7 09:43 opt
dr-xr-xr-x 288 root    root        0 Jan 14 06:59 proc
drwx----- 2 root    root      4096 Dec  7 09:43 root
drwxr-xr-x  2 root    root      4096 Dec  7 09:43 run
drwxr-xr-x  2 root    root      4096 Dec  7 09:43 sbin
drwxr-xr-x  2 root    root      4096 Dec  7 09:43 srv
dr-xr-xr-x 11 root    root        0 Jan 14 06:59 sys
drwxrwxrwt  2 root    root      4096 Dec  7 09:43 tmp
drwxr-xr-x  7 root    root      4096 Dec  7 09:43 usr
drwxr-xr-x 12 root    root      4096 Dec  7 09:43 var
```

Inside container shell

```

enangha@DESKTOP-THMA4H0:~$ docker run -it alpine /bin/sh
/ # ls -l
total 56
drwxr-xr-x 2 root root 4096 Dec 7 09:43 bin
drwxr-xr-x 5 root root 360 Jan 14 07:04 dev
drwxr-xr-x 1 root root 4096 Jan 14 07:04 etc
drwxr-xr-x 2 root root 4096 Dec 7 09:43 home
drwxr-xr-x 7 root root 4096 Dec 7 09:43 lib
drwxr-xr-x 5 root root 4096 Dec 7 09:43 media
drwxr-xr-x 2 root root 4096 Dec 7 09:43 mnt
drwxr-xr-x 2 root root 4096 Dec 7 09:43 opt
dr-xr-xr-x 269 root root 0 Jan 14 07:04 proc
drwx----- 1 root root 4096 Jan 14 07:05 root
drwxr-xr-x 2 root root 4096 Dec 7 09:43 run
drwxr-xr-x 2 root root 4096 Dec 7 09:43 sbin
drwxr-xr-x 2 root root 4096 Dec 7 09:43 srv
dr-xr-xr-x 11 root root 0 Jan 14 07:04 sys
drwxrwxrwt 2 root root 4096 Dec 7 09:43 tmp
drwxr-xr-x 7 root root 4096 Dec 7 09:43 usr
drwxr-xr-x 12 root root 4096 Dec 7 09:43 var
/ #

```

How to view all containers

```

enangha@DESKTOP-THMA4H0:~$ docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
enangha@DESKTOP-THMA4H0:~$ docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
22c23c2aa2dd   alpine    "/bin/sh"  2 minutes ago   Exited (0) 38 seconds ago   gracious_mclaren
975c4052e36a   alpine    "/bin/sh"  3 minutes ago   Exited (0) 3 minutes ago   priceless_fermi
6d6adda2033d   alpine    "echo 'hello form al..."  4 minutes ago   Exited (0) 4 minutes ago   lucid_bhaskara
cb833ee8bcca   alpine    "ls -l"    7 minutes ago   Exited (0) 7 minutes ago   loving_leakey
c98ff07a7494   alpine    "ls -l"    7 minutes ago   Exited (0) 7 minutes ago   cranky_bardeen
eedbd882c766   hello-world  "/hello"   16 minutes ago   Exited (0) 16 minutes ago   modest_germain
enangha@DESKTOP-THMA4H0:~$

```

Section 2.0

Pulling a docker image from docker hub

```

enangha@DESKTOP-THMA4H0:~$ docker pull dockersamples/static-site
Using default tag: latest
latest: Pulling from dockersamples/static-site
fdd5d7827f33: Pull complete
a3ed95caeb02: Pull complete
716f7a5f3082: Pull complete
7b10f03a0309: Pull complete
aff3ab7e9c39: Pull complete
Digest: sha256:daa686c61d7d239b7977e72157997489db49f316b9b9af3909d9f10fd28b2dec
Status: Downloaded newer image for dockersamples/static-site:latest
docker.io/dockersamples/static-site:latest

```

Docker commands to stop, remove and view containers

```

enangha@DESKTOP-THMA4H0:~$ docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
22c23c2aa2dd   alpine    "/bin/sh"  36 minutes ago   Exited (0) 34 minutes ago   gracious_mclaren
975c4052e36a   alpine    "/bin/sh"  37 minutes ago   Exited (0) 37 minutes ago   priceless_fermi
c98ff07a7494   alpine    "ls -l"    41 minutes ago   Exited (0) 41 minutes ago   cranky_bardeen
enangha@DESKTOP-THMA4H0:~$ docker stop 22c23c2aa2dd
22c23c2aa2dd
enangha@DESKTOP-THMA4H0:~$ docker rm 22c23c2aa2dd
22c23c2aa2dd
enangha@DESKTOP-THMA4H0:~$ docker stop 975c4052e36a
975c4052e36a
enangha@DESKTOP-THMA4H0:~$ docker rm 975c4052e36a
975c4052e36a
enangha@DESKTOP-THMA4H0:~$ docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
c98ff07a7494   alpine    "ls -l"    43 minutes ago   Exited (0) 43 minutes ago   cranky_bardeen
enangha@DESKTOP-THMA4H0:~$ docker stop c98ff07a7494
c98ff07a7494
enangha@DESKTOP-THMA4H0:~$ docker rm c98ff07a7494
c98ff07a7494
enangha@DESKTOP-THMA4H0:~$ docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
enangha@DESKTOP-THMA4H0:~$ docker run -d dockersamples/static-site
8445d438770b57b4882a02cf7cb2fc7e059d113f395e767a13e9f1b89d0d855
enangha@DESKTOP-THMA4H0:~$ docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
8445d438770b57b4882a02cf7cb2fc7e059d113f395e767a13e9f1b89d0d855   dockersamples/static-site   "/bin/sh -c 'cd /usr..."  16 seconds ago   Up 15 seconds   80/tcp, 443/tcp   clever_galois
enangha@DESKTOP-THMA4H0:~$

```

Encountered some issues when i tried to deploy my static webapp, so i tried to kill, remove and stop but it didn't work out

```
enangha@DESKTOP-THMA4H0: ~  
782a9c011". You have to remove (or rename) that container to be able to reuse that name.  
See 'docker run --help'.  
enangha@DESKTOP-THMA4H0:~$ docker rm 78d550d54d5fa3d9c30674ffffd44cdc4e4f80af41d679b92f07ef28782a9c011  
Error response from daemon: You cannot remove a running container 78d550d54d5fa3d9c30674ffffd44cdc4e4f80af41d679b92f07ef28782a9c011: g removal or force remove  
enangha@DESKTOP-THMA4H0:~$ docker stop 78d550d54d5fa3d9c30674ffffd44cdc4e4f80af41d679b92f07ef28782a9c011  
Error response from daemon: cannot stop container: 78d550d54d5fa3d9c30674ffffd44cdc4e4f80af41d679b92f07ef28782a9c011: tried to kill it event  
enangha@DESKTOP-THMA4H0:~$ docker-compose down  
no configuration file provided: not found  
enangha@DESKTOP-THMA4H0:~$ killall Docker && open /Applications/Docker.app  
Docker: no process found  
enangha@DESKTOP-THMA4H0:~$ docker kill 78d550d54d5fa3d9c30674ffffd44cdc4e4f80af41d679b92f07ef28782a9c011  
Error response from daemon: Cannot kill container: 78d550d54d5fa3d9c30674ffffd44cdc4e4f80af41d679b92f07ef28782a9c011: tried to kill it event  
enangha@DESKTOP-THMA4H0:~$
```

Later Resolved

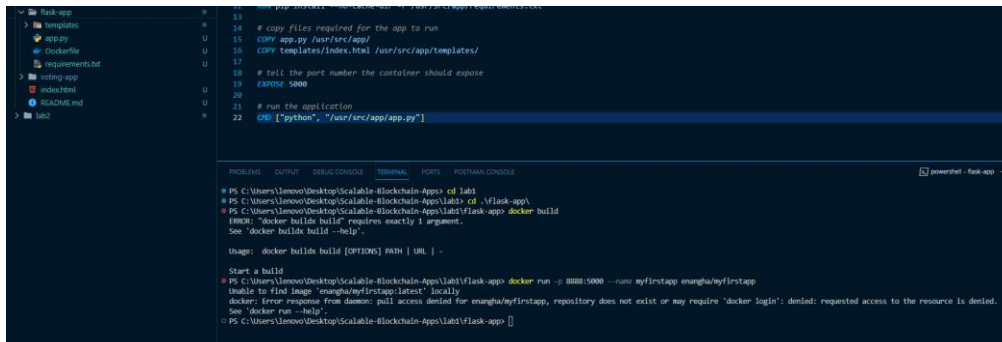
```
enangha@DESKTOP-THMA4H0:~$ docker ps -a  
CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS        PORTS  
f7fb59746fcd   dockersamples/static-site          "/bin/sh -c 'cd /usr..." 27 minutes ago Created  
161bf7c41481   dockersamples/static-site          "/bin/sh -c 'cd /usr..." 18 hours ago   Up 18 hours   443/tcp, 0.0.0.0  
>80/tcp, :::8888->80/tcp  
78d550d54d5f   dockersamples/static-site          "/bin/sh -c 'cd /usr..." 18 hours ago   Up 18 hours   0.0.0.0:32769->8  
, :::32769->80/tcp, 0.0.0.0:32768->443/tcp, :::32768->443/tcp  
8445d4338770   dockersamples/static-site          "/bin/sh -c 'cd /usr..." 18 hours ago   Up 18 hours   80/tcp, 443/tcp  
enangha@DESKTOP-THMA4H0:~$ docker port static-site  
80/tcp -> 0.0.0.0:32769  
80/tcp -> [::]:32769  
443/tcp -> 0.0.0.0:32768  
443/tcp -> [::]:32768
```

localhost:32769

Hello JONAS!

This is being served from a **docker**
container running Nginx.

2.3 Deploying my first app



```
11 FROM python:3.7-slim
12
13 # copy files required for the app to run
14 COPY app.py /usr/src/app/
15 COPY templates/index.html /usr/src/app/templates/
16
17 # tell the port number the container should expose
18 EXPOSE 5000
19
20 # run the application
21 CMD ["python", "/usr/src/app/app.py"]
```

PS C:\Users\lenovo\Desktop\Scalable-Blockchain-Apps\lab1\flask-app> docker build
[Error] "docker build" requires exactly 1 argument.
See 'docker build --help'.
Usage: docker build build [OPTIONS] PATH | URL | -
Start a build
PS C:\Users\lenovo\Desktop\Scalable-Blockchain-Apps\lab1\flask-app> docker run -p 8080:5000 --name myfirstapp enganha/myfirstapp
Unable to find image 'enganha/myfirstapp:latest' locally
docker: Error response from daemon: pull access denied for enganha/myfirstapp, repository does not exist or may require 'docker login': denied: requested access to the resource is denied.
See 'docker run --help'.
PS C:\Users\lenovo\Desktop\Scalable-Blockchain-Apps\lab1\flask-app>

3.0 VOTING App

```
PS C:\Users\lenovo\Desktop> cd .\Scalable-Blockchain-Apps\
PS C:\Users\lenovo\Desktop\Scalable-Blockchain-Apps> cd lab1
PS C:\Users\lenovo\Desktop\Scalable-Blockchain-Apps\lab1> git clone https://github.com/docker/example-voting-app.git
Cloning into 'example-voting-app'...
remote: Enumerating objects: 1132, done.

Receiving objects: 100% (1132/1132), 1.17 MiB | 6.40 MiB/s, done.
Resolving deltas: 100% (432/432), done.
PS C:\Users\lenovo\Desktop\Scalable-Blockchain-Apps\lab1> cd .\example-voting-app\
PS C:\Users\lenovo\Desktop\Scalable-Blockchain-Apps\lab1\example-voting-app> docker swarm init
Swarm initialized: current node (ys6gzylvuspw6u7ts426pm7ju) is now a manager.

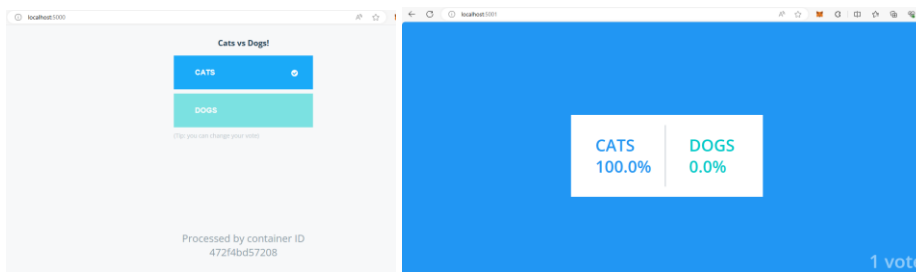
To add a worker to this swarm, run the following command:

    docker swarm join --token SWMTKN-1-49yqdcf1hel4htxqg1x6ddvnm2abt8n8cum3yu0nmp0mjiz5k-8umpvya1i05ew2eyzyg1b813m 192.168.65.3:2377

To add a manager to this swarm, run 'docker swarm join-token manager' and follow the instructions.

PS C:\Users\lenovo\Desktop\Scalable-Blockchain-Apps\lab1\example-voting-app> docker stack deploy --compose-file docker-stack.yml vote
Creating network vote_backend
Creating network vote_frontend
Creating service vote_db
Creating service vote_vote
Creating service vote_result
Creating service vote_worker
Creating service vote_redis
PS C:\Users\lenovo\Desktop\Scalable-Blockchain-Apps\lab1\example-voting-app> docker stack services vote
ID            NAME      MODE      REPLICAS  IMAGE                                  PORTS
9v5idtj5j6in vote_db    replicated 0/1        postgres:15-alpine
qoq427ft7f2r vote_redis replicated 0/1        redis:alpine
s361fb2u8d4u vote_result replicated 0/1        dockersamples/examplevotingapp_result:latest *:5001->80/tcp
7o2wop6vrdsx vote_vote  replicated 0/2        dockersamples/examplevotingapp_vote:latest  *:5000->80/tcp
rvgvzog9s500 vote_worker replicated 0/2        dockersamples/examplevotingapp_worker:latest
```

Rendering on Web Browser



Redeploying App

```
PS C:\Users\lenovo\Desktop\Scalable-Blockchain-Apps\lab1\example-voting-app> docker stack deploy --compose-file docker-stack.yml vote
Updating service vote_result (id: s361fb2u8d4u9zlcvf9112cp9)
Updating service vote_worker (id: rvgvzog9s500nqpv1c9fntwtq)
Updating service vote_redis (id: qoq427ft7f2racqplig4aunoe)
Updating service vote_db (id: 9v5idtj5j6inn3cduog8lo85c)
Updating service vote_vote (id: 7o2wop6vrdsx87pt8mqxybeoy)
PS C:\Users\lenovo\Desktop\Scalable-Blockchain-Apps\lab1\example-voting-app>
```