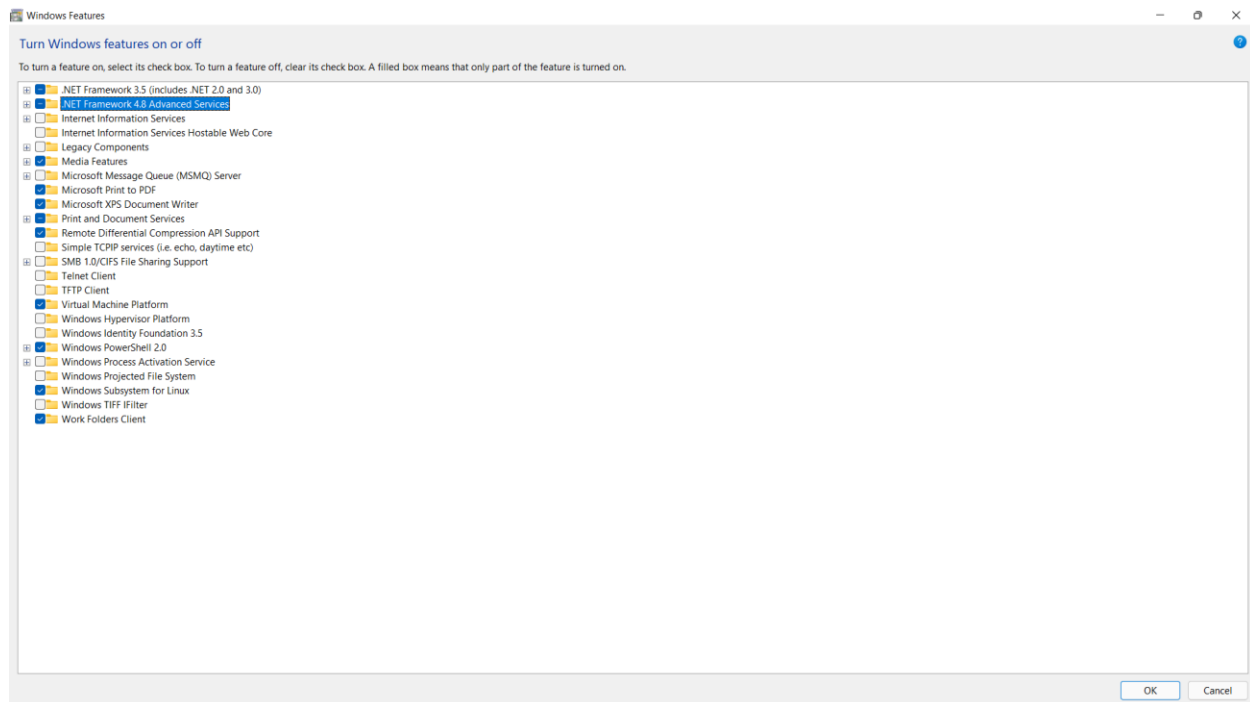


Task 1:

Hyper-v must be enabled to enable hardware virtualization technology. I first tried to enable Hardware Virtualization in the BIOS option. I then tried to enable Hyper-V using Powershell ran as an administrator. Next I tried to enable Hyper-V with CMD and DISM as an administrator. And finally I tried to enable the Hyper-V role through settings and all strategies led to the same response shown below. Hyper_v nowhere to be found. Even as I look on the official docker website and scoured the internet for troubleshooting, it didn't seem to work on my laptop. What I realized later was that if my CPU doesn't support virtualization, there's unfortunately nothing I could have done to run a virtual machine. I needed to upgrade the processor, and perhaps the motherboard.



```
Select Administrator: Command Prompt
Microsoft Windows [Version 10.0.22000.613]
(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>DISM /Online /Enable-Feature /All /FeatureName:Microsoft-Hyper-V

Deployment Image Servicing and Management tool
Version: 10.0.22000.1

Image Version: 10.0.22000.613

Error: 0x800f080c

Feature name Microsoft-Hyper-V is unknown.
A Windows feature name was not recognized.
Use the /Get-Features option to find the name of the feature in the image and try the command again.

The DISM log file can be found at C:\WINDOWS\Logs\DISM\dism.log

C:\WINDOWS\system32>
```

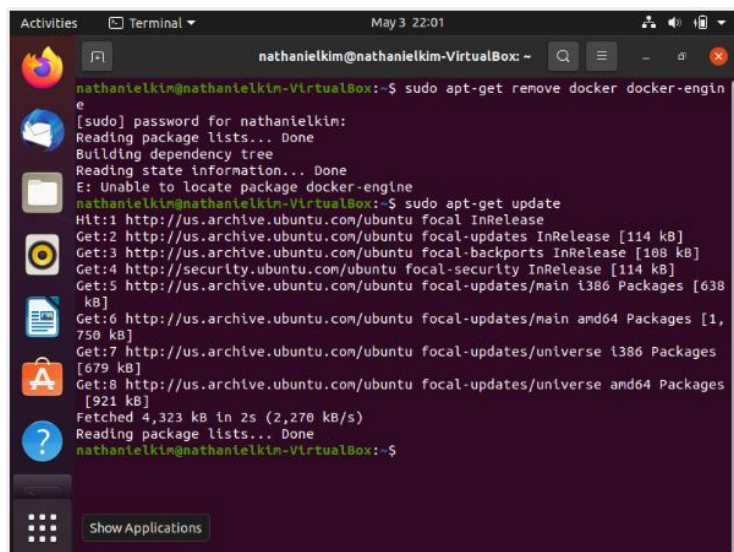
```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Enable-WindowsOptionalFeature : Feature name Microsoft-Hyper-V is unknown.
At line:1 char:1
+ Enable-WindowsOptionalFeature -Online -FeatureName Microsoft-Hyper-V ...
+ ~~~~~
+ CategoryInfo          : NotSpecified: (:) [Enable-WindowsOptionalFeature], COMException
+ FullyQualifiedErrorId : Microsoft.Dism.Commands.EnableWindowsOptionalFeatureCommand

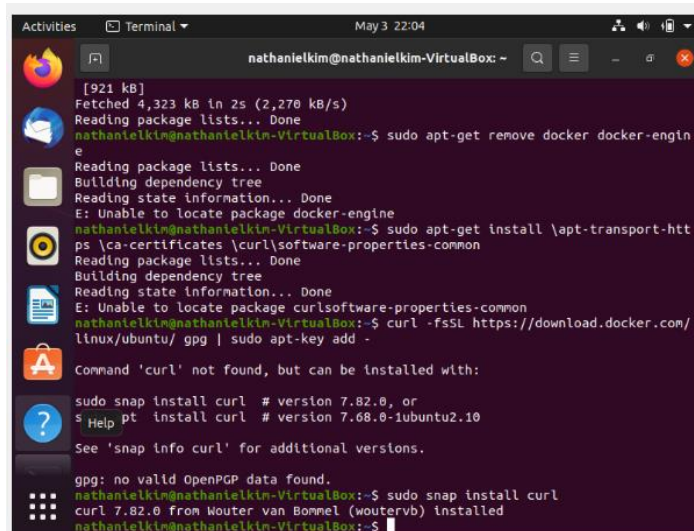
PS C:\WINDOWS\system32>
```

Running `sudo apt-get update` updates this on your local system. This is the step that retrieves information about what packages can be installed, including what updates to currently installed packages are available, from Internet sources. That was the first step and if the following and proceeding commands directly given in the instruction were followed, Docker was successfully installed with the final two commands, `sudo apt-get install snapd` and `sudo snap install docker` completing the “install Docker” portion of the Lab. Then, to check the docker installation, the command `sudo docker run hello-world` is ran to test the docker installation. Finally, the

commands `sudo docker run hello-world` should give a message that shows that my installation appears to be working correctly.



```
nathanielkim@nathanielkim-VirtualBox: ~  
nathanielkim@nathanielkim-VirtualBox:~$ sudo apt-get remove docker docker-engine  
[sudo] password for nathanielkim:  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
E: Unable to locate package docker-engine  
nathanielkim@nathanielkim-VirtualBox:~$ sudo apt-get update  
Hit:1 http://us.archive.ubuntu.com/ubuntu focal InRelease  
Get:2 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]  
Get:3 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]  
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]  
Get:5 http://us.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [638 kB]  
Get:6 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1,750 kB]  
Get:7 http://us.archive.ubuntu.com/ubuntu focal-updates/universe i386 Packages [679 kB]  
Get:8 http://us.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [921 kB]  
Fetched 4,323 kB in 2s (2,270 kB/s)  
Reading package lists... Done  
nathanielkim@nathanielkim-VirtualBox:~$
```



```
[921 kB]  
Fetched 4,323 kB in 2s (2,270 kB/s)  
Reading package lists... Done  
nathanielkim@nathanielkim-VirtualBox:~$ sudo apt-get remove docker docker-engine  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
E: Unable to locate package docker-engine  
nathanielkim@nathanielkim-VirtualBox:~$ sudo apt-get install \apt-transport-https \ca-certificates \curl\software-properties-common  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
E: Unable to locate package curlsoftware-properties-common  
nathanielkim@nathanielkim-VirtualBox:~$ curl -fsSL https://download.docker.com/linux/ubuntu/ gpg | sudo apt-key add -  
Command 'curl' not found, but can be installed with:  
  
sudo snap install curl # version 7.82.0, or  
$ sudo apt install curl # version 7.68.0-1ubuntu2.10  
See 'snap info curl' for additional versions.  
  
gpg: no valid OpenPGP data found.  
nathanielkim@nathanielkim-VirtualBox:~$ sudo snap install curl  
curl 7.82.0 from Wouter van Bommel (woutervb) installed  
nathanielkim@nathanielkim-VirtualBox:~$
```

```
Activities Terminal May 3 22:40
nathanielkim@nathanielkim-VirtualBox: ~
nux/ubuntu/ gpg | sudo apt-key add -
gpg: no valid OpenPGP data found.
nathanielkim@nathanielkim-VirtualBox:~$ curl -fs https://download.docker.com/li
nux/ubuntu/gpg | sudo apt-key add -
OK
nathanielkim@nathanielkim-VirtualBox:~$ sudo add-apt-repository "deb [arch=amdo
4] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"
Hit:1 http://us.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu focal-security InRelease
Get:5 https://download.docker.com/linux/ubuntu focal InRelease [57.7 kB]
Get:6 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages [15.
5 kB]
Fetched 73.1 kB in 1s (124 kB/s)
Reading package lists... Done
nathanielkim@nathanielkim-VirtualBox:~$ sudo apt-get update
Hit:1 http://us.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:4 https://download.docker.com/linux/ubuntu focal InRelease
Hit:5 http://security.ubuntu.com/ubuntu focal-security InRelease
Reading package lists... Done
nathanielkim@nathanielkim-VirtualBox:~$ sudo apt-get install docker-ce
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
bridge-utils ubuntu-fan
```

```
Activities Terminal May 3 22:40
nathanielkim@nathanielkim-VirtualBox: ~
Hit:5 http://security.ubuntu.com/ubuntu focal-security InRelease
Reading package lists... Done
nathanielkim@nathanielkim-VirtualBox:~$ sudo apt-get install docker-ce
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
bridge-utils ubuntu-fan
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
containerd.io docker-ce-cli docker-ce-rootless-extras docker-scan-plugin
slirp4netns
Suggested packages:
aufs-tools cgroupfs-mount | cgroup-lite
The following packages will be REMOVED:
containerd docker.io runc
The following NEW packages will be installed:
containerd.io docker-ce docker-ce-cli docker-ce-rootless-extras
docker-scan-plugin slirp4netns
0 upgraded, 6 newly installed, 3 to remove and 397 not upgraded.
Need to get 96.3 MB of archives.
After this operation, 72.0 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us.archive.ubuntu.com/ubuntu focal/universe amd64 slirp4netns amd
4 0.4.3-1 [74.3 kB]
Get:2 https://download.docker.com/linux/ubuntu focal/stable amd64 containerd.io
amd64 1.5.11-1 [22.9 MB]
Get:3 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce-cli
amd64 5:20.10.14~3-0-ubuntu-focal [41.0 MB]
```

```
Activities Terminal May 3 22:42
nathanielkim@nathanielkim-VirtualBox: ~
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
2db29710123e: Pull complete
Digest: sha256:10d7d58d5ebd2a652f4d93fdd86da8f265f5318c6a73cc5b6a9798ff6d2b2e67
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.
   (and64)
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

See https://hub.docker.com/ for more examples and ideas, visit:
https://docs.docker.com/get-started/

nathanielkim@nathanielkim-VirtualBox:~$
```

```
Activities Terminal May 3 22:43
nathanielkim@nathanielkim-VirtualBox: ~
For more examples and ideas, visit:
https://docs.docker.com/get-started/

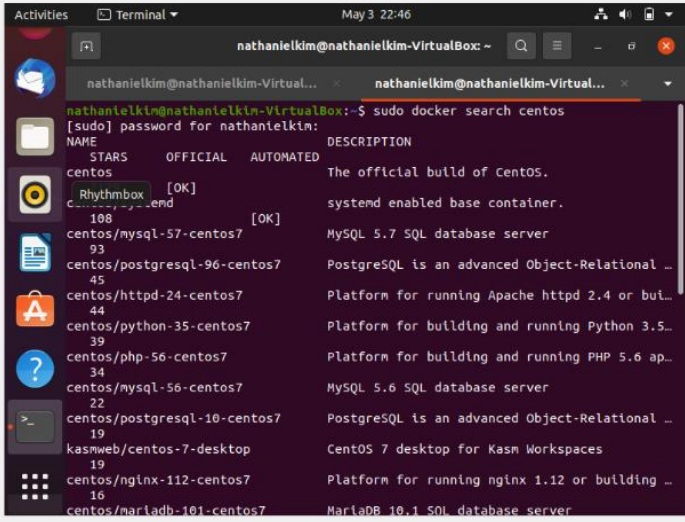
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
hello-world latest feb5d9fea6a5 7 months ago 13.3kB

nathanielkim@nathanielkim-VirtualBox:~$ service docker status
● docker.service - Docker Application Container Engine
   Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor prese
   Active: active (running) since Tue 2022-05-03 22:41:10 EDT; 1min 57s ago
   TriggeredBy: ● docker.socket
   Docs: https://docs.docker.com
   Main PID: 4654 (dockerd)
   Tasks: 9
   Memory: 57.3M
   CGroup: /system.slice/docker.service
           └─4654 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/con

May 03 22:41:09 nathanielkim-VirtualBox dockerd[4654]: time="2022-05-03T22:41:
May 03 22:41:09 nathanielkim-VirtualBox dockerd[4654]: time="2022-05-03T22:41:
May 03 22:41:09 nathanielkim-VirtualBox dockerd[4654]: time="2022-05-03T22:41:
May 03 22:41:09 nathanielkim-VirtualBox dockerd[4654]: time="2022-05-03T22:41:
May 03 22:41:10 nathanielkim-VirtualBox dockerd[4654]: time="2022-05-03T22:41:
May 03 22:41:10 nathanielkim-VirtualBox dockerd[4654]: time="2022-05-03T22:41:
May 03 22:41:10 nathanielkim-VirtualBox dockerd[4654]: time="2022-05-03T22:41:
May 03 22:41:10 nathanielkim-VirtualBox systemd[1]: Started Docker Application
May 03 22:41:10 nathanielkim-VirtualBox dockerd[4654]: time="2022-05-03T22:41:
May 03 22:42:43 nathanielkim-VirtualBox dockerd[4654]: time="2022-05-03T22:42:
lines 1-21/21 (END)
```


Task 2:

First, the command `sudo docker search centos` was used to download an official image of centos for docker. Then, because I needed a container for the images, the docker container was created with the command `sudo docker pull centos`, `sudo docker ps -a`, `sudo docker images`, `sudo docker run centos cat /etc/issue`, and `sudo docker run centos cat /etc/shadow`. When the commands `sudo docker run -it centos bash` and `sudo docker ps -l` will allocate a terminal to created container by '-it'. Finally, to check and test the running containers in the system the commands `sudo docker ps` and `curl https://localhost:B1` were executed.

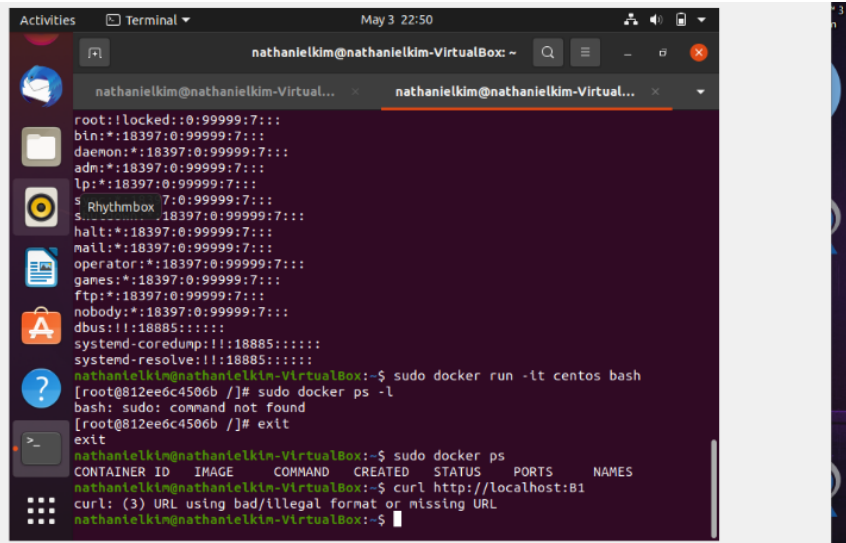


```
nathanielkim@nathanielkim-VirtualBox: ~  
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker search centos  
[sudo] password for nathanielkim:  
NAME                STARS     OFFICIAL   AUTOMATED  DESCRIPTION  
centos              1088      [OK]       [OK]       The official build of CentOS.  
centos/systemd      1088      [OK]       [OK]       systemd enabled base container.  
centos/mysql-57-centos7 93        [OK]       [OK]       MySQL 5.7 SQL database server  
centos/postgresql-96-centos7 45        [OK]       [OK]       PostgreSQL is an advanced Object-Relational ...  
centos/httpd-24-centos7 44        [OK]       [OK]       Platform for running Apache httpd 2.4 or bui...  
centos/python-35-centos7 39        [OK]       [OK]       Platform for building and running Python 3.5...  
centos/php-56-centos7 34        [OK]       [OK]       Platform for building and running PHP 5.6 ap...  
centos/mysql-56-centos7 22        [OK]       [OK]       MySQL 5.6 SQL database server  
centos/postgresql-10-centos7 19        [OK]       [OK]       PostgreSQL is an advanced Object-Relational ...  
kasmweb/centos-7-desktop 19        [OK]       [OK]       CentOS 7 desktop for Kasm Workspaces  
centos/nginx-112-centos7 16        [OK]       [OK]       Platform for running nginx 1.12 or building ...  
centos/mariadb-101-centos7 16        [OK]       [OK]       MariaDB 10.1 SQL database server
```

```
Activities Terminal May 3 22:47
nathanielkim@nathanielkim-VirtualBox: ~
nathanielkim@nathanielkim-VirtualBox: ~
0
datadog/centos-1386
0
ibmcom/fhe-toolkit-centos The IBM Fully Homomorphic Encryption (FHE) T...
0
ibmcom/fhe-toolkit-centos-amd64 The IBM Fully Homomorphic Encryption (FHE) T...
0
centos/nginx-110-centos7 Platform for running nginx 1.10 or building ...
0
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker pull centos
Using default tag: latest
latest: Pulling from library/centos
aid0c7532777: Pull complete
Digest: sha256:a27fd8080b517143cbbab9dfb7c8571c40d67d534bbdee55bd6c473f432b177
Status: Downloaded newer image for centos:latest
docker.io/library/centos:latest
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS
PORTS              NAMES
20c8f0f68818       hello-world        "/hello"           4 minutes ago       Exited (0) 4 minutes ago
o                    intelligent_nobel
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker images
REPOSITORY          TAG                IMAGE ID           CREATED            SIZE
hello-world         latest            feb5d9fea6a5      7 months ago      13.3kB
c                    test              5d0da3dc9764      7 months ago      231MB
Show Applications
nathanielkim@nathanielkim-VirtualBox:~$
```

```
Activities Terminal May 3 22:48
nathanielkim@nathanielkim-VirtualBox: ~
nathanielkim@nathanielkim-VirtualBox: ~
centos latest 5d0da3dc9764 7 months ago 231MB
nathanielkim@nathanielkim-VirtualBox:~$ docker run centos cat /etc/issue
docker: Got permission denied while trying to connect to the Docker daemon sock
et at unix:///var/run/docker.sock: Post "http://N2FvarX2FrunX2Fdocker.sock/v1.2
4/containers/create": dial unix /var/run/docker.sock: connect: permission denie
d.
See 'docker run --help'.
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker run centos cat /etc/issue
\5
Kernel \r on an \m
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker run centos cat /etc/shadow
root:!:locked!:0:99999:7:::
bin:*:18397:0:99999:7:::
daemon:*:18397:0:99999:7:::
adm:*:18397:0:99999:7:::
l-*:*:18397:0:99999:7:::
s_Help :18397:0:99999:7:::
shutdown:*:18397:0:99999:7:::
halt:*:18397:0:99999:7:::
mail:*:18397:0:99999:7:::
operator:*:18397:0:99999:7:::
games:*:18397:0:99999:7:::
ftp:*:18397:0:99999:7:::
nobody:*:18397:0:99999:7:::
dbus:!:18885:::
systemd-coredump:!:18885:::

```

The screenshot shows a terminal window titled 'nathanielkim@nathanielkim-VirtualBox: ~' with a search bar and window controls. The terminal displays a list of system users and groups, followed by a series of Docker-related commands and their outputs. The commands include running a bash shell in a Docker container, listing Docker containers, and attempting to run a curl command. The output shows the container ID, image, command, creation time, status, ports, and name for the container. The curl command fails with an error message: 'curl: (3) URL using bad/illegal format or missing URL'.

```
nathanielkim@nathanielkim-VirtualBox: ~  
root:!!locked::0:99999:7:::  
bin:!:18397:0:99999:7:::  
daemon:!:18397:0:99999:7:::  
adm:!:18397:0:99999:7:::  
lp:!:18397:0:99999:7:::  
s_Rhythmbox:7:0:99999:7:::  
s_18397:0:99999:7:::  
halt:!:18397:0:99999:7:::  
mail:!:18397:0:99999:7:::  
operator:!:18397:0:99999:7:::  
games:!:18397:0:99999:7:::  
ftp:!:18397:0:99999:7:::  
nobody:!:18397:0:99999:7:::  
dbus:!!:18885:!!!!:  
systemd-coredump:!!:18885:!!!!:  
systemd-resolve:!!:18885:!!!!:  
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker run -it centos bash  
[root@812ee6c4506b /]# sudo docker ps -l  
bash: sudo: command not found  
[root@812ee6c4506b /]# exit  
exit  
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker ps  
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES  
nathanielkim@nathanielkim-VirtualBox:~$ curl http://localhost:81  
curl: (3) URL using bad/illegal format or missing URL  
nathanielkim@nathanielkim-VirtualBox:~$
```

Task 3:

In task 3 we needed to install nginx on ubuntu using docker by first executing the command `sudo docker run --name mynginx -P -d nginx`. Then, to create a webpage using nginx and

docker, I need to create an index.html file for my webpage with the command `sudo docker run --name mynginx -P -d nginx` and `sudo docker ps` again twice followed by `sudo docker stop mynginx`.

```
Activities Terminal May 3 22:57
nathanielkim@nathanielkim-VirtualBox: ~
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker run --name mynginx -P -d nginx
Unable to find image 'nginx:latest' locally
latest: Pulling from library/nginx
1fe172e4850f: Pull complete
35c195f487df: Pull complete
213b9b16f495: Pull complete
a8172d9e19b9: Pull complete
f5eee2cb2150: Pull complete
93e404ba8667: Pull complete
Digest: sha256:859ab6768a6f26a79bc42b231664111317d095a4f04e4b6fe79ce37b3d199097
Status: Downloaded newer image for nginx:latest
fc06af5ada0ce60903ac5dab370360e9a75dde6f32b18030d91e1166f35b5c49
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS
PORTS
fc06af5ada0c   nginx    "/docker-entrypoint..." 2 minutes ago  Up 2 minutes
0.0.0.0:49153->80/tcp, :::49153->80/tcp   mynginx
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker run --name mynginx -P -d -v
Help ktop/html:/usr/share/nginx/html nginx
docker: Error response from daemon: Conflict. The container name "/mynginx" is
already in use by container "fc06af5ada0ce60903ac5dab370360e9a75dde6f32b18030d9
1e1166f35b5c49". You have to remove (or rename) that container to be able to re
use that name.
See 'docker run --help'.
nathanielkim@nathanielkim-VirtualBox:~$
```

```
Activities Terminal May 3 22:58
nathanielkim@nathanielkim-VirtualBox: ~
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS
PORTS
fc06af5ada0c   nginx    "/docker-entrypoint..." 2 minutes ago  Up 2 minutes
0.0.0.0:49153->80/tcp, :::49153->80/tcp   mynginx
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker run --name mynginx -P -d -v
~/Desktop/html:/usr/share/nginx/html nginx
docker: Error response from daemon: Conflict. The container name "/mynginx" is
already in use by container "fc06af5ada0ce60903ac5dab370360e9a75dde6f32b18030d9
1e1166f35b5c49". You have to remove (or rename) that container to be able to re
use that name.
See 'docker run --help'.
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS
PORTS
fc06af5ada0c   nginx    "/docker-entrypoint..." 4 minutes ago  Up 4 minutes
0.0.0.0:49153->80/tcp, :::49153->80/tcp   mynginx
nathanielkim@nathanielkim-VirtualBox:~$
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker stop mynginx
mynginx
nathanielkim@nathanielkim-VirtualBox:~$ sudo docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS        NAMES
nathanielkim@nathanielkim-VirtualBox:~$
nathanielkim@nathanielkim-VirtualBox:~$ Show Applications
nathanielkim@nathanielkim-VirtualBox:~$
```