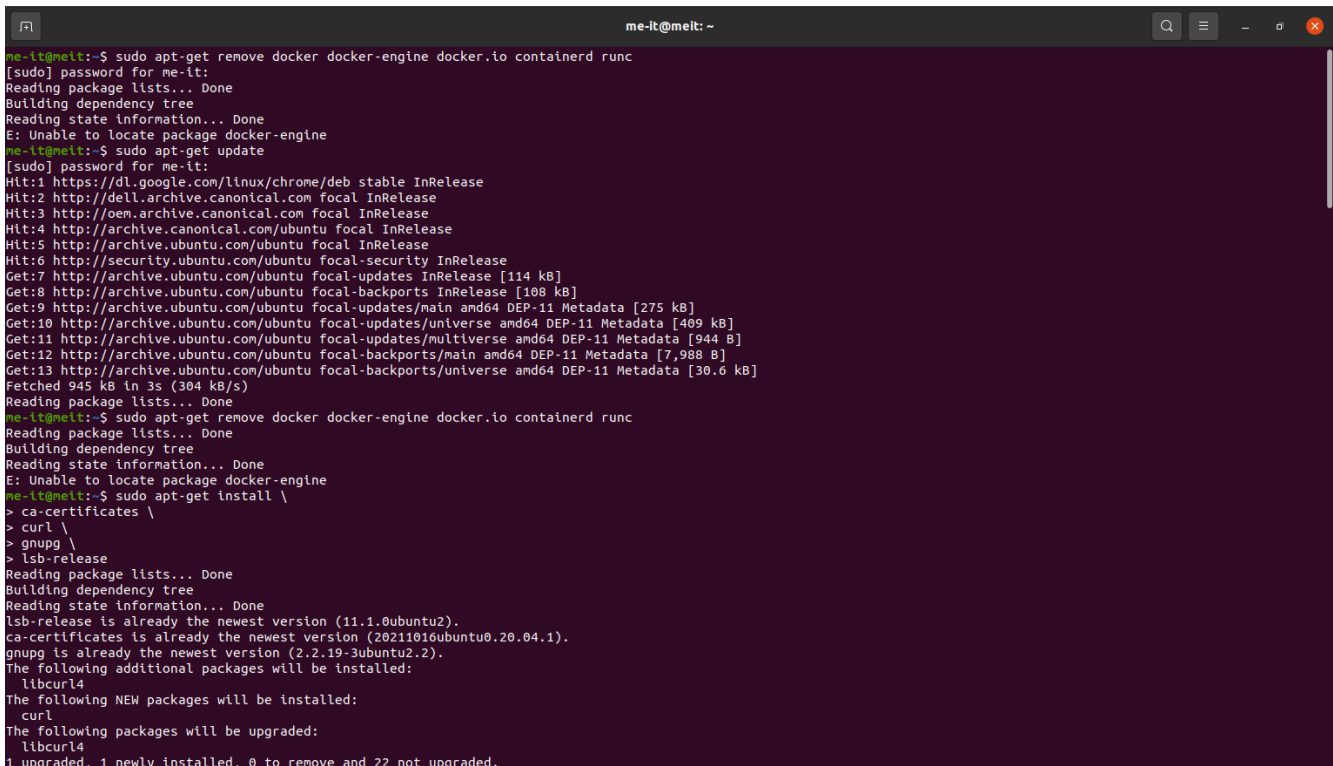


Web Application Development

Assignment: 02 – (B)

Step 1 — Removing previously installed Docker and updating the packages.

- sudo apt-get remove docker docker-engine docker.io containerd runc: Uninstall any older versions before attempting to install a new version
- Update the apt package index and install packages to allow apt to use a repository over HTTPS
sudo apt-get update
sudo apt-get install \
 ca-certificates \
 curl \
 gnupg \
 lsb-release

A terminal window titled 'me-it@melt: ~' with a dark purple background. It shows the execution of several apt-get commands. First, 'sudo apt-get remove docker docker-engine docker.io containerd runc' is run, resulting in 'E: Unable to locate package docker-engine'. Then, 'sudo apt-get update' is run, showing a list of updates from various sources. Finally, 'sudo apt-get install \> ca-certificates \> curl \> gnupg \> lsb-release' is run, showing that some packages are already up-to-date and others will be installed or upgraded.

```
me-it@melt:~$ sudo apt-get remove docker docker-engine docker.io containerd runc
[sudo] password for me-it:
Reading package lists... Done
Building dependency tree
Reading state information... Done
E: Unable to locate package docker-engine
me-it@melt:~$ sudo apt-get update
[sudo] password for me-it:
Hit:1 https://dl.google.com/linux/chrome/deb stable InRelease
Hit:2 http://dell.archive.canonical.com focal InRelease
Hit:3 http://oem.archive.canonical.com focal InRelease
Hit:4 http://archive.canonical.com/ubuntu focal InRelease
Hit:5 http://archive.ubuntu.com/ubuntu focal InRelease
Hit:6 http://security.ubuntu.com/ubuntu focal-security InRelease
Get:7 http://archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:8 http://archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:9 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metadata [275 kB]
Get:10 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 DEP-11 Metadata [409 kB]
Get:11 http://archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 DEP-11 Metadata [944 B]
Get:12 http://archive.ubuntu.com/ubuntu focal-backports/main amd64 DEP-11 Metadata [7,988 B]
Get:13 http://archive.ubuntu.com/ubuntu focal-backports/universe amd64 DEP-11 Metadata [30.6 kB]
Fetched 945 kB in 3s (304 kB/s)
Reading package lists... Done
me-it@melt:~$ sudo apt-get remove docker docker-engine docker.io containerd runc
Reading package lists... Done
Building dependency tree
Reading state information... Done
E: Unable to locate package docker-engine
me-it@melt:~$ sudo apt-get install \
> ca-certificates \
> curl \
> gnupg \
> lsb-release
Reading package lists... Done
Building dependency tree
Reading state information... Done
lsb-release is already the newest version (11.1.0ubuntu2).
ca-certificates is already the newest version (20211016ubuntu0.20.04.1).
gnupg is already the newest version (2.2.19-3ubuntu2.2).
The following additional packages will be installed:
  libcurl4
The following NEW packages will be installed:
  curl
The following packages will be upgraded:
  libcurl4
1 upgraded, 1 newly installed, 0 to remove and 22 not upgraded.
```

Step 2 — Installing Docker

- sudo apt-get install docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin: To install the latest version

```

me-it@melt:~$ sudo apt-get update
Get:1 https://download.docker.com/linux/ubuntu focal InRelease [57.7 kB]
Get:2 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages [24.7 kB]
Hit:3 http://dell.archive.canonical.com focal InRelease
Hit:4 http://archive.canonical.com/ubuntu focal InRelease
Hit:5 http://archive.ubuntu.com/ubuntu focal InRelease
Hit:6 http://oem.archive.canonical.com focal InRelease
Hit:7 http://archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:8 http://archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:9 https://dl.google.com/linux/chrome/deb stable InRelease
Hit:10 http://security.ubuntu.com/ubuntu focal-security InRelease
Fetched 82.4 kB in 3s (28.3 kB/s)
Reading package lists... Done
me-it@melt:~$ sudo apt-get install docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  docker-ce-rootless-extras docker-scan-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 docker-scan-plugin pigz
  slirp4netns
0 upgraded, 9 newly installed, 0 to remove and 22 not upgraded.
Need to get 112 MB of archives.
After this operation, 401 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 https://download.docker.com/linux/ubuntu focal/stable amd64 containerd.io amd64 1.6.18-1 [28.2 MB]
Get:2 http://archive.ubuntu.com/ubuntu focal/universe amd64 pigz amd64 2.4-1 [57.4 kB]
Get:3 http://archive.ubuntu.com/ubuntu focal/universe amd64 slirp4netns amd64 0.4.3-1 [74.3 kB]
Get:4 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-buildx-plugin amd64 0.10.2-1-ubuntu.20.04-focal [25.9 MB]
Get:5 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce-cli amd64 5:23.0.1-1-ubuntu.20.04-focal [13.2 MB]
Get:6 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce amd64 5:23.0.1-1-ubuntu.20.04-focal [22.0 MB]
Get:7 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce-rootless-extras amd64 5:23.0.1-1-ubuntu.20.04-focal [8,765 kB]
Get:8 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-compose-plugin amd64 2.16.0-1-ubuntu.20.04-focal [10.2 MB]
Get:9 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-scan-plugin amd64 0.23.0-ubuntu-focal [3,622 kB]
Fetched 112 MB in 1min 4s (1,751 kB/s)
Selecting previously unselected package pigz.
dpkg: warning: Files list file for package 'libpaper1:amd64' missing; assuming package has no files currently installed
(Reading database ... 258584 files and directories currently installed.)
Preparing to unpack .../0-pigz_2.4-1_amd64.deb ...

```

- b. apt-cache policy docker-ce: to install from the Docker repo instead of the default Ubuntu repo

```

me-it@melt:~/ubuntu-in-docker$ apt-cache policy docker-ce
docker-ce:
  Installed: 5:23.0.1-1-ubuntu.20.04-focal
  Candidate: 5:23.0.1-1-ubuntu.20.04-focal
  Version table:
 *** 5:23.0.1-1-ubuntu.20.04-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
    100 /var/lib/dpkg/status
 5:23.0.0-1-ubuntu.20.04-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.23-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.22-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.21-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.20-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.19-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.18-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.17-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.16-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.15-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.14-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.13-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.12-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.11-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.10-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.9-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages
 5:20.10.8-3-0-ubuntu-focal 500
    500 https://download.docker.com/linux/ubuntu focal/stable amd64 Packages

```

- c. sudo systemctl status docker: Docker installed, the daemon started, and the process enabled to start on boot. Check that it's running.

```
root@f767ec4c5cfc: /
me-it@melt:~/ubuntu-in-docker$ sudo apt install docker-ce
[sudo] password for me-it:
Reading package lists... Done
Building dependency tree
Reading state information... Done
docker-ce is already the newest version (5:23.0.1-1-ubuntu.20.04~focal).
0 upgraded, 0 newly installed, 0 to remove and 22 not upgraded.
me-it@melt:~/ubuntu-in-docker$ sudo systemctl status docker
● docker.service - Docker Application Container Engine
   Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2023-02-28 09:57:25 IST; 25min ago
   TriggeredBy: ● docker.socket
     Docs: https://docs.docker.com
    Main PID: 21052 (dockerd)
      Tasks: 18
     Memory: 27.1M
    CGroup: /system.slice/docker.service
            └─21052 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock

Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.782730280+05:30" level=info msg="[core] [channel #4] Channel Connectivity change to READY" module=grpc
Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.799632401+05:30" level=info msg="Loading containers: start."
Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.904801501+05:30" level=info msg="Default bridge (docker0) is assigned with an IP address 172.17.0.0/16.
Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.951824542+05:30" level=info msg="Loading containers: done."
Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.962468560+05:30" level=info msg="Docker daemon" commit=bc3805a graphdriver=overlay2 version=23.0.1
Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.962596985+05:30" level=info msg="Daemon has completed initialization"
Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.989101685+05:30" level=info msg="[core] [server #7] Server created" module=grpc
Feb 28 09:57:25 melt systemd[1]: Started Docker Application Container Engine.
Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.996512281+05:30" level=info msg="API listen on /run/docker.sock"
Feb 28 09:58:49 melt dockerd[21052]: time="2023-02-28T09:58:49.258635306+05:30" level=info msg="ignoring event" container=192f471e3875e6b5c127715c0819208b910b473f42b4f
...skipping...
● docker.service - Docker Application Container Engine
   Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2023-02-28 09:57:25 IST; 25min ago
   TriggeredBy: ● docker.socket
     Docs: https://docs.docker.com
    Main PID: 21052 (dockerd)
      Tasks: 18
     Memory: 27.1M
    CGroup: /system.slice/docker.service
            └─21052 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock

Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.782730280+05:30" level=info msg="[core] [channel #4] Channel Connectivity change to READY" module=grpc
Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.799632401+05:30" level=info msg="Loading containers: start."
Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.904801501+05:30" level=info msg="Default bridge (docker0) is assigned with an IP address 172.17.0.0/16.
Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.951824542+05:30" level=info msg="Loading containers: done."
Feb 28 09:57:25 melt dockerd[21052]: time="2023-02-28T09:57:25.962468560+05:30" level=info msg="Docker daemon" commit=bc3805a graphdriver=overlay2 version=23.0.1
```

Step 3 — Working with Docker Images:

- docker search ubuntu: You can search for images available on Docker Hub by using the docker command with the search subcommand.
- docker run hello-world: To check whether you can access and download images from Docker Hub.

```
root@f767ec4c5cfc: /
me-it@melt:~/ubuntu-in-docker$ sudo docker search ubuntu
NAME                DESCRIPTION                               STARS     OFFICIAL   AUTOMATED
ubuntu              Ubuntu is a Debian-based Linux operating sys... 15650     [OK]
websphere-liberty   WebSphere Liberty multi-architecture images ... 292       [OK]
open-liberty        Open Liberty multi-architecture images based... 58        [OK]
neurodebian         NeuroDebian provides neuroscience research s... 98        [OK]
ubuntu-debootstrap  DEPRECATED; use "ubuntu" instead          50        [OK]
ubuntu-upstart      DEPRECATED, as is Upstart (find other proces... 112       [OK]
ubuntu/nginx        Nginx, a high-performance reverse proxy & we... 79
ubuntu/cortex       Cortex provides storage for Prometheus. Long... 3
ubuntu/apache2      Apache, a secure & extensible open-source HT... 53
ubuntu/squid        Squid is a caching proxy for the Web. Long-t... 52
ubuntu/mysql        MySQL open source fast, stable, multi-thread... 42
ubuntu/redis        Redis, an open source key-value store. Long-... 16
ubuntu/bind9        BIND 9 is a very flexible, full-featured DNS... 46
ubuntu/prometheus   Prometheus is a systems and service monitori... 38
ubuntu/postgres     PostgreSQL is an open source object-relatio... 25
ubuntu/kafka        Apache Kafka, a distributed event streaming ... 25
ubuntu/zookeeper    ZooKeeper maintains configuration informatio... 5
ubuntu/grafana       Grafana, a feature rich metrics dashboard & ... 7
ubuntu/memcached    Memcached, in-memory keyvalue store for smal... 5
ubuntu/prometheus-alertmanager Alertmanager handles client alerts from Prom... 8
ubuntu/cassandra    Cassandra, an open source NoSQL distributed ... 2
ubuntu/dotnet-deps  Chiselled Ubuntu for self-contained .NET & A... 6
ubuntu/telegraf     Telegraf collects, processes, aggregates & w... 4
ubuntu/dotnet-runtime Chiselled Ubuntu runtime image for .NET apps... 5
ubuntu/dotnet-aspnet Chiselled Ubuntu runtime image for ASP.NET a... 3
me-it@melt:~/ubuntu-in-docker$ sudo docker run hello-world

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/
```

- docker pull ubuntu: to download the official ubuntu image to your computer.

- d. docker images: To see the images that have been downloaded to the computer.

```
root@f767ec4c5cfc: /  
me-It@melt:~/ubuntu-in-docker$ sudo docker pull ubuntu  
Using default tag: latest  
latest: Pulling from library/ubuntu  
677076032cca: Pull complete  
Digest: sha256:9a0bde4188b896a372804be2384015e90e3f84906b750c1a53539b585fbbe7f  
Status: Downloaded newer image for ubuntu:latest  
docker.io/library/ubuntu:latest  
me-It@melt:~/ubuntu-in-docker$ sudo docker images  
REPOSITORY      TAG         IMAGE ID      CREATED        SIZE  
ubuntu           latest      58db3edaf2be  4 weeks ago    77.8MB  
hello-world      latest     feb5d9fea6a5  17 months ago  13.3kB
```

Step 4 — Running a Docker Container

- a. docker run -it ubuntu: to run a container using the latest image of Ubuntu. The combination of the -i and -t switches gives you interactive shell access into the container
- b. apt update: update the package database inside the container.
- c. apt install nodejs: install Node.js

```
me-It@melt:~/ubuntu-in-docker$ sudo docker run -it ubuntu  
root@f767ec4c5cfc:/# apt update  
Get:1 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]  
Get:2 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages [752 kB]  
Get:3 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [810 kB]  
Get:4 http://security.ubuntu.com/ubuntu jammy-security/multiverse amd64 Packages [5557 B]  
Get:5 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [869 kB]  
Get:6 http://archive.ubuntu.com/ubuntu jammy InRelease [270 kB]  
Get:7 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]  
Get:8 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [107 kB]  
Get:9 http://archive.ubuntu.com/ubuntu jammy/universe amd64 Packages [17.5 MB]  
Get:10 http://archive.ubuntu.com/ubuntu jammy/main amd64 Packages [1792 kB]  
Get:11 http://archive.ubuntu.com/ubuntu jammy/restricted amd64 Packages [164 kB]  
Get:12 http://archive.ubuntu.com/ubuntu jammy/multiverse amd64 Packages [266 kB]  
Get:13 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1103 kB]  
Get:14 http://archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 Packages [10.9 kB]  
Get:15 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [1136 kB]  
Get:16 http://archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages [808 kB]  
Get:17 http://archive.ubuntu.com/ubuntu jammy-backports/universe amd64 Packages [22.4 kB]  
Get:18 http://archive.ubuntu.com/ubuntu jammy-backports/main amd64 Packages [49.0 kB]  
Fetched 25.9 MB in 26s (977 kB/s)  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
6 packages can be upgraded. Run 'apt list --upgradable' to see them.  
root@f767ec4c5cfc:/# apt install nodejs  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
The following additional packages will be installed:  
  ca-certificates javascript-common libbrotli1 libc-ares2 libicu70 libjs-highlight.js libnghttp2-14 libnode72 libuv1 nodejs-doc openssl  
Suggested packages:  
  apache2 | lighttpd | httpd npm  
The following NEW packages will be installed:  
  ca-certificates javascript-common libbrotli1 libc-ares2 libicu70 libjs-highlight.js libnghttp2-14 libnode72 libuv1 nodejs nodejs-doc openssl
```

- d. node -v: When the installation finishes, verify that Node.js is installed

```
me-It@melt:~/ubuntu-in-docker  
perl/5.34 /usr/local/lib/site_perl) at /usr/share/perl5/Debconf/FrontEnd/Readline.pm line 7.)  
debconf: falling back to frontend: Teletype  
Updating certificates in /etc/ssl/certs...  
124 added, 0 removed; done.  
Setting up nodejs-doc (12.22.9-dfsg-1ubuntu3) ...  
Setting up nodejs (12.22.9-dfsg-1ubuntu3) ...  
update-alternatives: using /usr/bin/nodejs to provide /usr/bin/js (js) in auto mode  
update-alternatives: warning: skip creation of /usr/share/man/man1/js.1.gz because associated file /usr/share/man/man1/nodejs.1.gz (of link group js) doesn't exist  
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...  
Processing triggers for ca-certificates (20211016ubuntu0.22.04.1) ...  
Updating certificates in /etc/ssl/certs...  
0 added, 0 removed; done.  
Running hooks in /etc/ca-certificates/update.d...  
done.  
root@f767ec4c5cfc:/# node -v  
v12.22.9  
root@f767ec4c5cfc:/# exit  
exit
```

Step 5 — Managing Docker Containers

- docker ps: to see active (running) and inactive containers on the computer. In this case, active.
- docker ps -a: To view all containers — active and inactive, run docker ps with the -a switch
- docker ps -l: To view the latest container you created, pass it the -l switch:
- docker start ID: To start a stopped container, use docker start, followed by the container ID or the container's name.
- docker stop container ID or name: To stop a running container, use docker stop, followed by the container ID or name

```
me-it@melt:~/ubuntu-in-docker$ sudo docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
me-it@melt:~/ubuntu-in-docker$ sudo docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
f767ec4c5cfc   ubuntu   "/bin/bash"   7 minutes ago   Exited (0) About a minute ago   crazy_khorana
dcfbba61a2e7   hello-world   "/hello"   8 minutes ago   Exited (0) 8 minutes ago   affectionate_lovelace
192f471e3875   hello-world   "/hello"   47 minutes ago   Exited (0) 47 minutes ago   funny_yalow
me-it@melt:~/ubuntu-in-docker$ sudo docker ps -l
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
f767ec4c5cfc   ubuntu   "/bin/bash"   7 minutes ago   Exited (0) About a minute ago   crazy_khorana
me-it@melt:~/ubuntu-in-docker$ sudo docker start f767ec4c5cfc
f767ec4c5cfc
me-it@melt:~/ubuntu-in-docker$ sudo docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
f767ec4c5cfc   ubuntu   "/bin/bash"   9 minutes ago   Up 29 seconds   crazy_khorana
me-it@melt:~/ubuntu-in-docker$ sudo docker stop crazy_khorana
crazy_khorana
```

Step 6 — Committing Changes in a Container to a Docker Image

- docker commit -m "added Node.js" -a "savani" d9b100f2f636 savani/ubuntu-nodejs: commit the changes to a new Docker image instance using the command.
- docker images: Listing the Docker images again will show the new image, as well as the old one that it was derived.

```
me-it@melt:~/ubuntu-in-docker$ sudo docker commit -m "added Node.js" -a "Savani" f767ec4c5cfc Savani/ubuntu-nodejs
invalid reference format: repository name must be lowercase
me-it@melt:~/ubuntu-in-docker$ sudo docker commit -m "added Node.js" -a "savani" f767ec4c5cfc savani/ubuntu-nodejs
sha256:7fb660f6112b93b50fe699840beb0eb6c9997f1ff288677ee847bb8b3709f5b5
me-it@melt:~/ubuntu-in-docker$ sudo docker images
REPOSITORY      TAG         IMAGE ID      CREATED        SIZE
savani/ubuntu-nodejs   latest      7fb660f6112b   36 seconds ago   203MB
ubuntu           latest      58db3edaf2be   4 weeks ago     77.8MB
hello-world       latest      feb5d9fea6a5   17 months ago   13.3kB
me-it@melt:~/ubuntu-in-docker$
```

Step 7 — Pushing Docker Images to a Docker Repository

- docker login -u docker-registry-username: To push your image, first log into Docker Hub.
- docker tag sammy/ubuntu-nodejs docker-registry-username/ubuntu-nodejs : If your Docker registry username is different from the local username you used to create the image, you will have to tag your image with your registry username.
- docker push savani/ubuntu-nodejs: To push the ubuntu-nodejs image to the savani repository.

```
me-it@melt:~/ubuntu-in-docker$ sudo docker login -u docker-registry-username
Password:
Error response from daemon: Get "https://registry-1.docker.io/v2/": unauthorized: incorrect username or password
me-it@melt:~/ubuntu-in-docker$ docker tag savani/ubuntu-nodejs docker-registry-username/ubuntu-nodejs
permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Post "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/images/savani/ubuntu-nodejs/tag?repo=docker-registry-username%2Fubuntu-nodejs&tag=latest": dial unix /var/run/docker.sock: connect: permission denied
me-it@melt:~/ubuntu-in-docker$ sudo docker tag savani/ubuntu-nodejs docker-registry-username/ubuntu-nodejs
Using default tag: latest
The push refers to repository [docker.io/savani/ubuntu-nodejs]
2fcf4c7e44f4: Preparing
c5ff2d88f679: Preparing
denied: requested access to the resource is denied
me-it@melt:~/ubuntu-in-docker$
```