

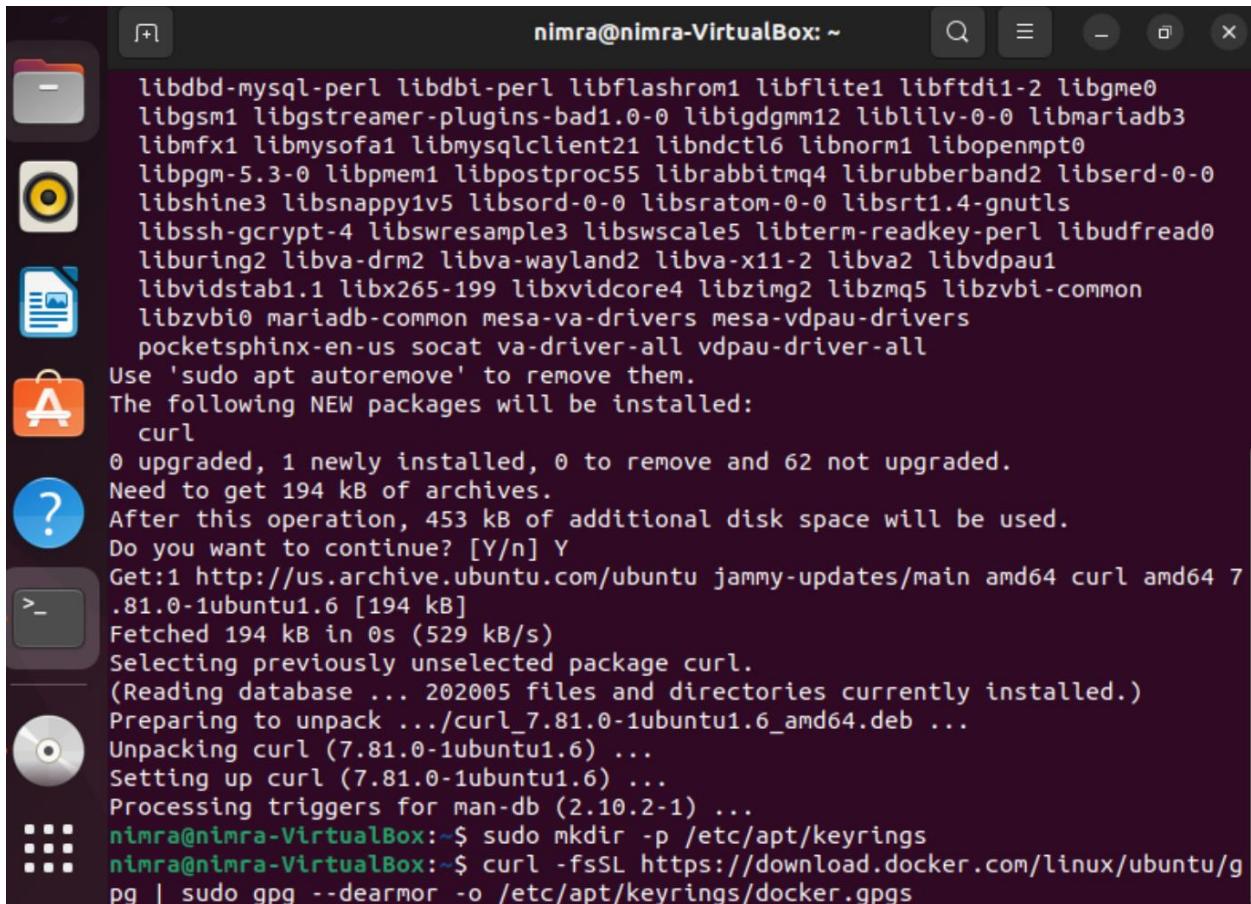
Experiment Steps

1. **Install docker on either your local operating system or a virtual machine. Links:**

Installing Docker on Desktop

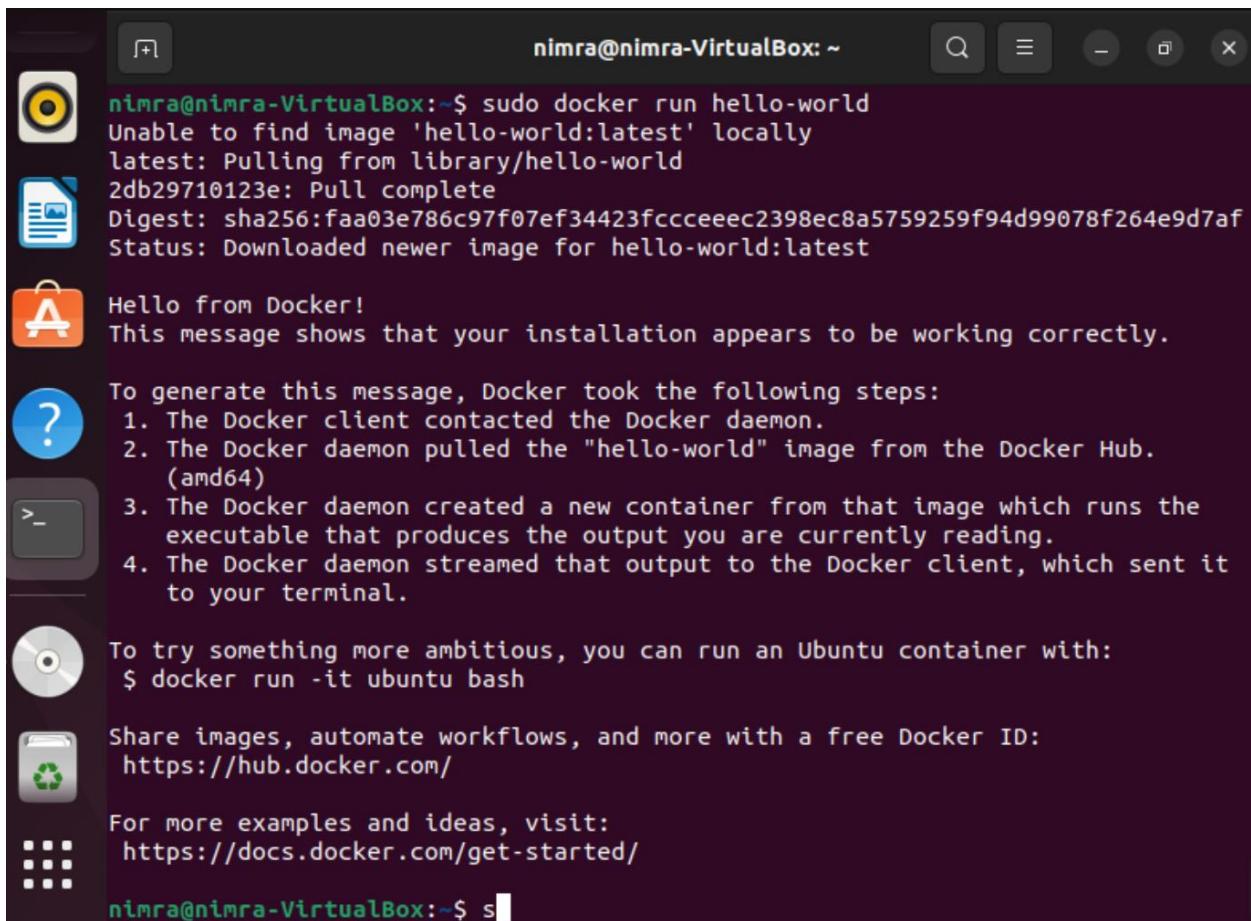
Installing Dependencies & setting up Keyrings

First we need to install a few dependencies such as the ca-certificates, curl, gnupg and lsb-release packages



```
nimra@nimra-VirtualBox: ~
libdbd-mysql-perl libdbi-perl libflashrom1 libflite1 libftdi1-2 libgme0
libgsml1 libgstreamer-plugins-bad1.0-0 libigdgmm12 liblivilv-0-0 libmariadb3
libmfx1 libmysofa1 libmysqlclient21 libndctl6 libnorm1 libopenmpt0
libpgm-5.3-0 libpmem1 libpostproc55 librabbitmq4 librubberband2 libserd-0-0
libshine3 libsnappy1v5 libsord-0-0 libsrtatom-0-0 libsrt1.4-gnutls
libssh-gcrypt-4 libswresample3 libswscale5 libterm-readkey-perl libudfread0
liburing2 libva-drm2 libva-wayland2 libva-x11-2 libva2 libvpau1
libvidstab1.1 libx265-199 libxvidcore4 libzimg2 libzmq5 libzvbi-common
libzvbi0 mariadb-common mesa-va-drivers mesa-vpau-drivers
pocketsphinx-en-us socat va-driver-all vpau-driver-all
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  curl
0 upgraded, 1 newly installed, 0 to remove and 62 not upgraded.
Need to get 194 kB of archives.
After this operation, 453 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://us.archive.ubuntu.com/ubuntu jammy-updates/main amd64 curl amd64 7
.81.0-1ubuntu1.6 [194 kB]
Fetched 194 kB in 0s (529 kB/s)
Selecting previously unselected package curl.
(Reading database ... 202005 files and directories currently installed.)
Preparing to unpack .../curl_7.81.0-1ubuntu1.6_amd64.deb ...
Unpacking curl (7.81.0-1ubuntu1.6) ...
Setting up curl (7.81.0-1ubuntu1.6) ...
Processing triggers for man-db (2.10.2-1) ...
nimra@nimra-VirtualBox:~$ sudo mkdir -p /etc/apt/keyrings
nimra@nimra-VirtualBox:~$ curl -fsSL https://download.docker.com/linux/ubuntu/g
pg | sudo gpg --dearmor -o /etc/apt/keyrings/docker.gpgs
```

Next we want to set up the keyrings. Keyrings are a way to ensure that package files are actually coming from the repository we have set up.



The screenshot shows a terminal window titled "nimra@nimra-VirtualBox: ~". The terminal displays the following text:

```
nimra@nimra-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:faa03e786c97f07ef34423fccceec2398ec8a5759259f94d99078f264e9d7af
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/
```

At the bottom of the terminal, the prompt "nimra@nimra-VirtualBox:~\$ s" is visible.

Then run the following curl command, which sets up Docker's gpg keys inside the directory we have just created:

Installing Docker

The next command setup Docker's repository on our machine

Verify Docker Installation

From now onwards you can use docker-based commands to create images and spin up new containers.

We can also add the current user to the docker group so that we can run docker commands without prefixing with sudo.

```
[+]
nimra@nimra-VirtualBox:~$ docker pull [OPTIONS] NAME[:TAG|@DIGEST]
"docker pull" requires exactly 1 argument.
See 'docker pull --help'.

Usage:  docker pull [OPTIONS] NAME[:TAG|@DIGEST]

Pull an image or a repository from a registry
@DIGEST]: command not found
nimra@nimra-VirtualBox:~$ docker pull --help

Usage:  docker pull [OPTIONS] NAME[:TAG|@DIGEST]

Pull an image or a repository from a registry

Options:
  -a, --all-tags          Download all tagged images in the repository
  --disable-content-trust Skip image verification (default true)
  --platform string       Set platform if server is multi-platform
                          capable
  -q, --quiet             Suppress verbose output
nimra@nimra-VirtualBox:~$ sudo docker pull ubuntu
[sudo] password for nimra:
Using default tag: latest
latest: Pulling from library/ubuntu
e96e057aae67: Pull complete
Digest: sha256:4b1d0c4a2d2aaf63b37111f34eb9fa89fa1bf53dd6e4ca954d47caebca4005c2
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest
nimra@nimra-VirtualBox:~$ S
```

nimra@nimra-VirtualBox:~

Thunderbird Mail

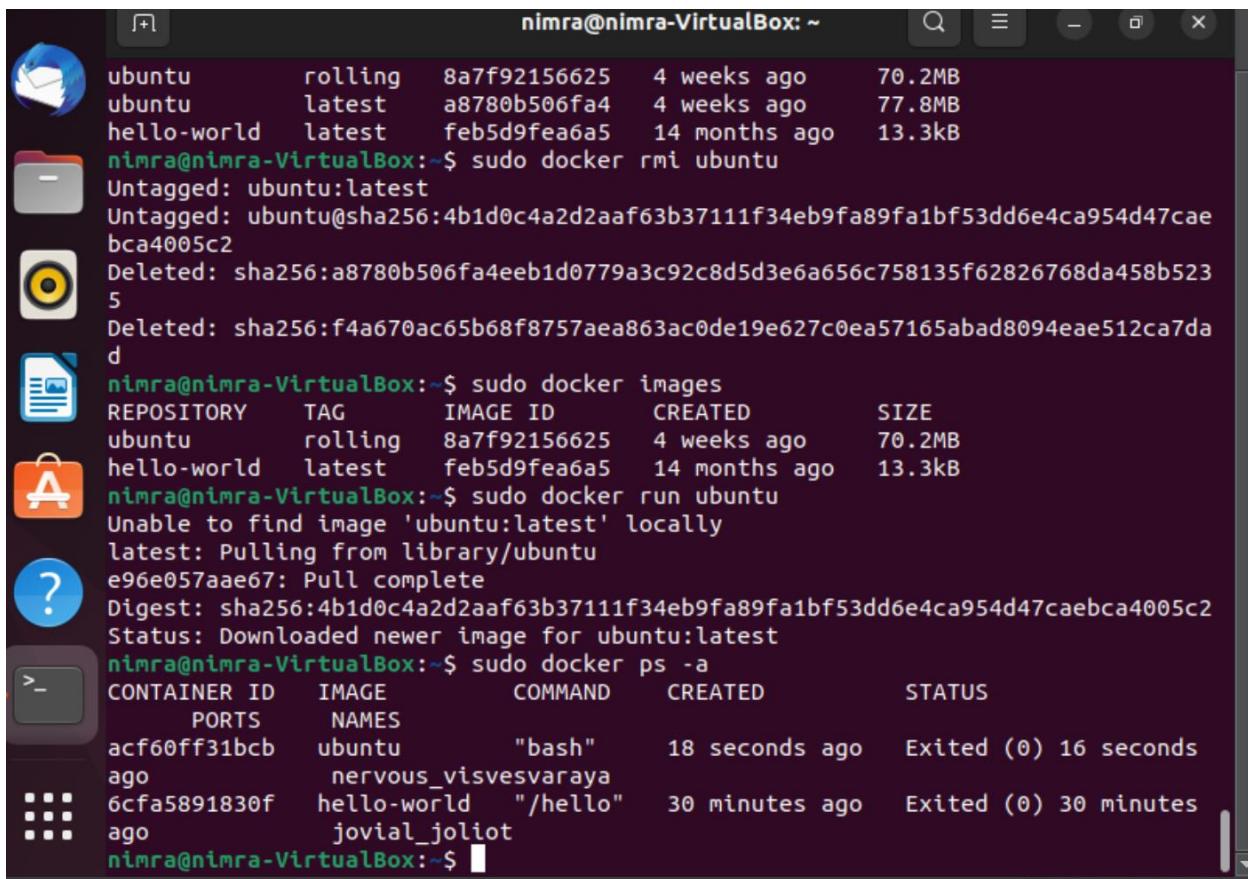
Pull an image or a repository from a registry

Options:

-a, --all-tags	Download all tagged images in the repository
--disable-content-trust	Skip image verification (default true)
--platform string	Set platform if server is multi-platform capable
-q, --quiet	Suppress verbose output

```
nimra@nimra-VirtualBox:~$ sudo docker pull ubuntu
[sudo] password for nimra:
Using default tag: latest
latest: Pulling from library/ubuntu
e96e057aae67: Pull complete
Digest: sha256:4b1d0c4a2d2aaaf63b37111f34eb9fa89fa1bf53dd6e4ca954d47caebca4005c2
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest
nimra@nimra-VirtualBox:~$ sudo docker pull ubuntu:rolling
rolling: Pulling from library/ubuntu
daae843197f7: Pull complete
Digest: sha256:edc5125bd9443ab5d5c92096cf0e481f5e8cb12db9f5461ab1ab7a936c7f7d30
Status: Downloaded newer image for ubuntu:rolling
docker.io/library/ubuntu:rolling
nimra@nimra-VirtualBox:~$ sudo docker images
REPOSITORY      TAG          IMAGE ID      CREATED        SIZE
ubuntu          rolling       8a7f92156625   4 weeks ago    70.2MB
ubuntu          latest        a8780b506fa4   4 weeks ago    77.8MB
hello-world     latest        feb5d9fea6a5   14 months ago   13.3kB
nimra@nimra-VirtualBox:~$
```

```
See docker --help
nimra@nimra-VirtualBox:~$ sudo docker ps -a
CONTAINER ID   IMAGE      COMMAND      CREATED        STATUS
              PORTS NAMES
6cfa5891830f  hello-world "/hello"   27 minutes ago   Exited (0) 27 minutes
ago            jovial_joliot
nimra@nimra-VirtualBox:~$ sudo docker images
REPOSITORY      TAG          IMAGE ID      CREATED        SIZE
ubuntu          rolling       8a7f92156625   4 weeks ago    70.2MB
ubuntu          latest        a8780b506fa4   4 weeks ago    77.8MB
hello-world     latest        feb5d9fea6a5   14 months ago   13.3kB
nimra@nimra-VirtualBox:~$ sudo docker rmi ubuntu
Untagged: ubuntu:latest
Untagged: ubuntu@sha256:4b1d0c4a2d2aaaf63b37111f34eb9fa89fa1bf53dd6e4ca954d47cae
bca4005c2
Deleted: sha256:a8780b506fa4eeb1d0779a3c92c8d5d3e6a656c758135f62826768da458b523
5
Deleted: sha256:f4a670ac65b68f8757aea863ac0de19e627c0ea57165abad8094eae512ca7da
d
nimra@nimra-VirtualBox:~$ sudo docker images
REPOSITORY      TAG          IMAGE ID      CREATED        SIZE
ubuntu          rolling       8a7f92156625   4 weeks ago    70.2MB
hello-world     latest        feb5d9fea6a5   14 months ago   13.3kB
nimra@nimra-VirtualBox:~$
```



The screenshot shows a terminal window with a dark theme. The user, nimra, is connected to a VirtualBox instance. The terminal history includes:

- `sudo docker rmi ubuntu` - Untagged: ubuntu:latest
- `Deleted: sha256:a8780b506fa4eeb1d0779a3c92c8d5d3e6a656c758135f62826768da458b5235`
- `Deleted: sha256:f4a670ac65b68f8757aea863ac0de19e627c0ea57165abad8094eae512ca7dad`
- `sudo docker images` - Shows two images: ubuntu (rolling) and hello-world (latest).
- `sudo docker run ubuntu` - Unable to find image 'ubuntu:latest' locally, pulling from library/ubuntu.
- `Digest: sha256:4b1d0c4a2d2aaaf63b37111f34eb9fa89fa1bf53dd6e4ca954d47caebca4005c2`
- `Status: Downloaded newer image for ubuntu:latest`
- `sudo docker ps -a` - Shows two containers: 'ago' (nervous_visvesvaraya) and 'ago' (jovial_joliot).

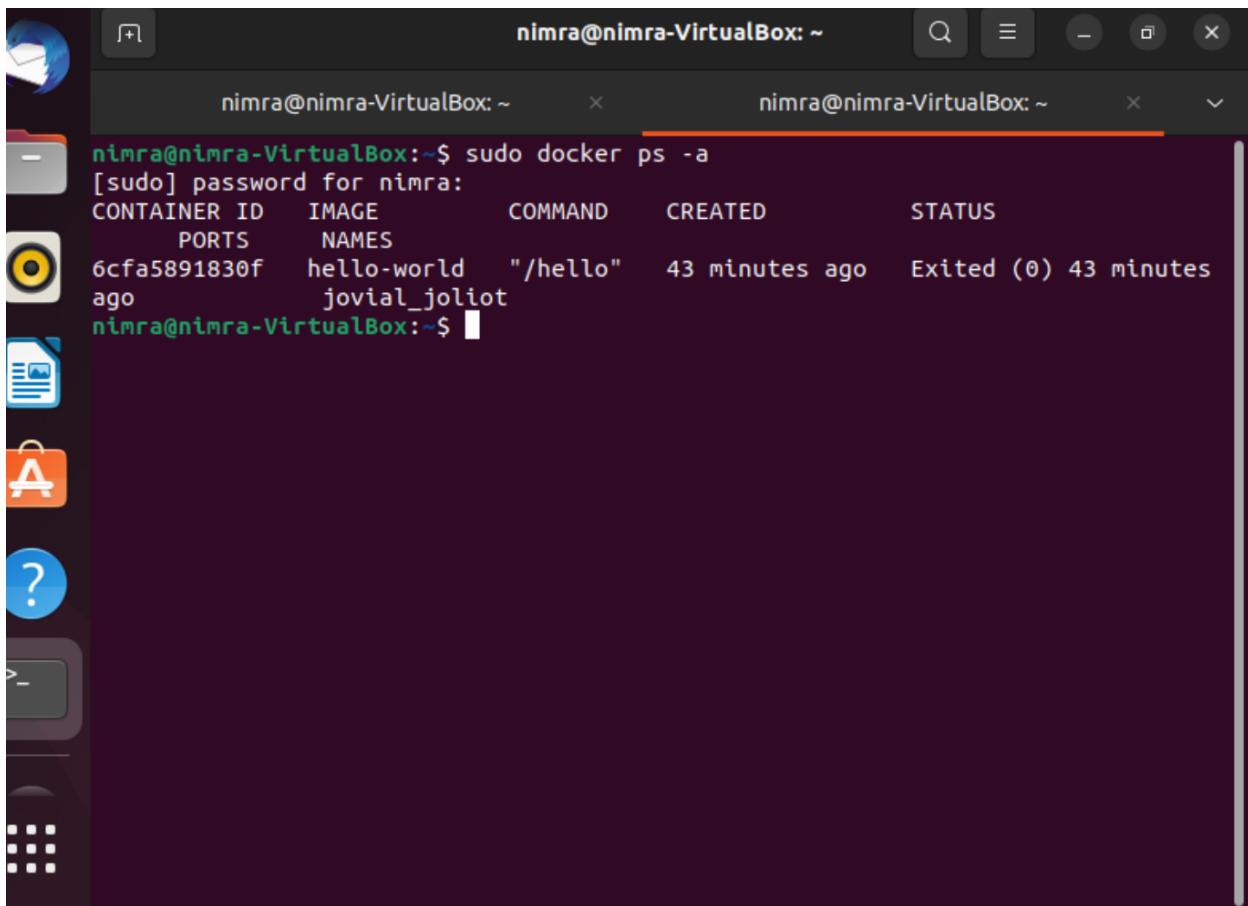
2. Practice basic docker commands:

- Use docker pull to pull an Ubuntu Linux image
- Use docker images to show docker images present locally
- use docker run to start an Ubuntu container named myubuntu using the Ubuntu image and run bash command
- Use docker stop to stop the container
- Use docker rm to delete the container

```
root@9cb71893c366:/# exit
exit
nimra@nimra-VirtualBox:~$ sudo docker ps -a
CONTAINER ID        IMAGE       COMMAND      CREATED          STATUS
              PORTS     NAMES
9cb71893c366        ubuntu      "bash"       21 seconds ago   Exited (0) 8 seconds ago
go                  myubuntu
acf60ff31bcb        ubuntu      "bash"       2 minutes ago    Exited (0) 2 minutes ago
go                  nervous_visvesvaraya
6cfa5891830f        hello-world  "/hello"    32 minutes ago   Exited (0) 32 minutes ago
ago                jovial_joliot
nimra@nimra-VirtualBox:~$ sudo docker rm/myubuntu
docker: 'rm/myubuntu' is not a docker command.
See 'docker --help'
nimra@nimra-VirtualBox:~$ sudo docker rm /myubuntu
/myubuntu
nimra@nimra-VirtualBox:~$ sudo docker ps -a
CONTAINER ID        IMAGE       COMMAND      CREATED          STATUS
              PORTS     NAMES
acf60ff31bcb        ubuntu      "bash"       3 minutes ago    Exited (0) 3 minutes ago
go                  nervous_visvesvaraya
6cfa5891830f        hello-world  "/hello"    33 minutes ago   Exited (0) 33 minutes ago
ago                jovial_joliot
nimra@nimra-VirtualBox:~$ sudo docker run --name myubuntu -it ubuntu
root@d69db683cbee:/# exit
exit
nimra@nimra-VirtualBox:~$ sudo docker stop myubuntu
myubuntu
nimra@nimra-VirtualBox:~$
```

```
nimra@nimra-VirtualBox:~$ docker: 'rm/myubuntu' is not a docker command.  
See 'docker --help'  
nimra@nimra-VirtualBox:~$ sudo docker rm /myubuntu  
/myubuntu  
nimra@nimra-VirtualBox:~$ sudo docker ps -a  
CONTAINER ID IMAGE COMMAND CREATED STATUS  
PORTS NAMES  
acf60ff31bcb ubuntu "bash" 3 minutes ago Exited (0) 3 minutes ago  
go nervous_visvesvaraya  
6cfa5891830f hello-world "/hello" 33 minutes ago Exited (0) 33 minutes ago  
jovial_joliot  
nimra@nimra-VirtualBox:~$ sudo docker run --name myubuntu -it ubuntu  
root@d69db683cbee:/# exit  
exit  
nimra@nimra-VirtualBox:~$ sudo docker stop myubuntu  
myubuntu  
nimra@nimra-VirtualBox:~$ sudo docker pull ubuntu:18.04  
18.04: Pulling from library/ubuntu  
a404e5416296: Pull complete  
Digest: sha256:ca70a834041dd1bf16cc38dfcd24f0888ec4fa431e09f3344f354cf8d1724499  
Status: Downloaded newer image for ubuntu:18.04  
docker.io/library/ubuntu:18.04  
nimra@nimra-VirtualBox:~$ sudo docker images  
REPOSITORY TAG IMAGE ID CREATED SIZE  
ubuntu rolling 8a7f92156625 4 weeks ago 70.2MB  
ubuntu latest a8780b506fa4 4 weeks ago 77.8MB  
ubuntu 18.04 71eaf13299f4 5 weeks ago 63.1MB  
hello-world latest feb5d9fea6a5 14 months ago 13.3kB  
nimra@nimra-VirtualBox:~$
```

```
a404e5416296: Pull complete
Digest: sha256:ca70a834041dd1bf16cc38dfcd24f0888ec4fa431e09f3344f354cf8d1724499
Status: Downloaded newer image for ubuntu:18.04
docker.io/library/ubuntu:18.04
nimra@nimra-VirtualBox:~$ sudo docker images
REPOSITORY      TAG      IMAGE ID      CREATED      SIZE
ubuntu          rolling   8a7f92156625  4 weeks ago   70.2MB
ubuntu          latest    a8780b506fa4  4 weeks ago   77.8MB
ubuntu          18.04    71eaf13299f4  5 weeks ago   63.1MB
hello-world     latest    feb5d9fea6a5  14 months ago  13.3kB
nimra@nimra-VirtualBox:~$ sudo docker rm /acf60ff31bcb
docker: 'rm/acf60ff31bcb' is not a docker command.
See 'docker --help'
nimra@nimra-VirtualBox:~$ sudo docker rm /acf60ff31bcb
/acf60ff31bcb
nimra@nimra-VirtualBox:~$ sudo docker ps -a
CONTAINER ID      IMAGE      COMMAND      CREATED      STATUS
              PORTS      NAMES
d69db683cbee    ubuntu      "bash"      4 minutes ago   Exited (0) 4 minutes ago
go               myubuntu
6cfa5891830f    hello-world  "/hello"    38 minutes ago   Exited (0) 38 minutes ago
jovial_joliot
nimra@nimra-VirtualBox:~$ sudo docker run --name myubuntu -it ubuntu
docker: Error response from daemon: Conflict. The container name "/myubuntu" is already in use by container "d69db683cbee75461b24170166b043457e83cf0c69d00da6867042ec3163477e". You have to remove (or rename) that container to be able to reuse that name.
See 'docker run --help'.
nimra@nimra-VirtualBox:~$
```



```
nimra@nimra-VirtualBox:~$ sudo docker ps -a
[sudo] password for nimra:
CONTAINER ID        IMAGE               COMMAND      CREATED             STATUS
              PORTS     NAMES
6cfa5891830f        hello-world        "/hello"    43 minutes ago   Exited (0) 43 minutes ago
ago
nimra@nimra-VirtualBox:~$
```

Pulling Nginx, PHP-FPM & MariaDB Images

to create a container first we need an image. Think of an image as a blueprint to create the container. While a container is a process run using an image.

There are hundreds of pre-built images available on the Docker Hub website. You can also create custom images based on those images.

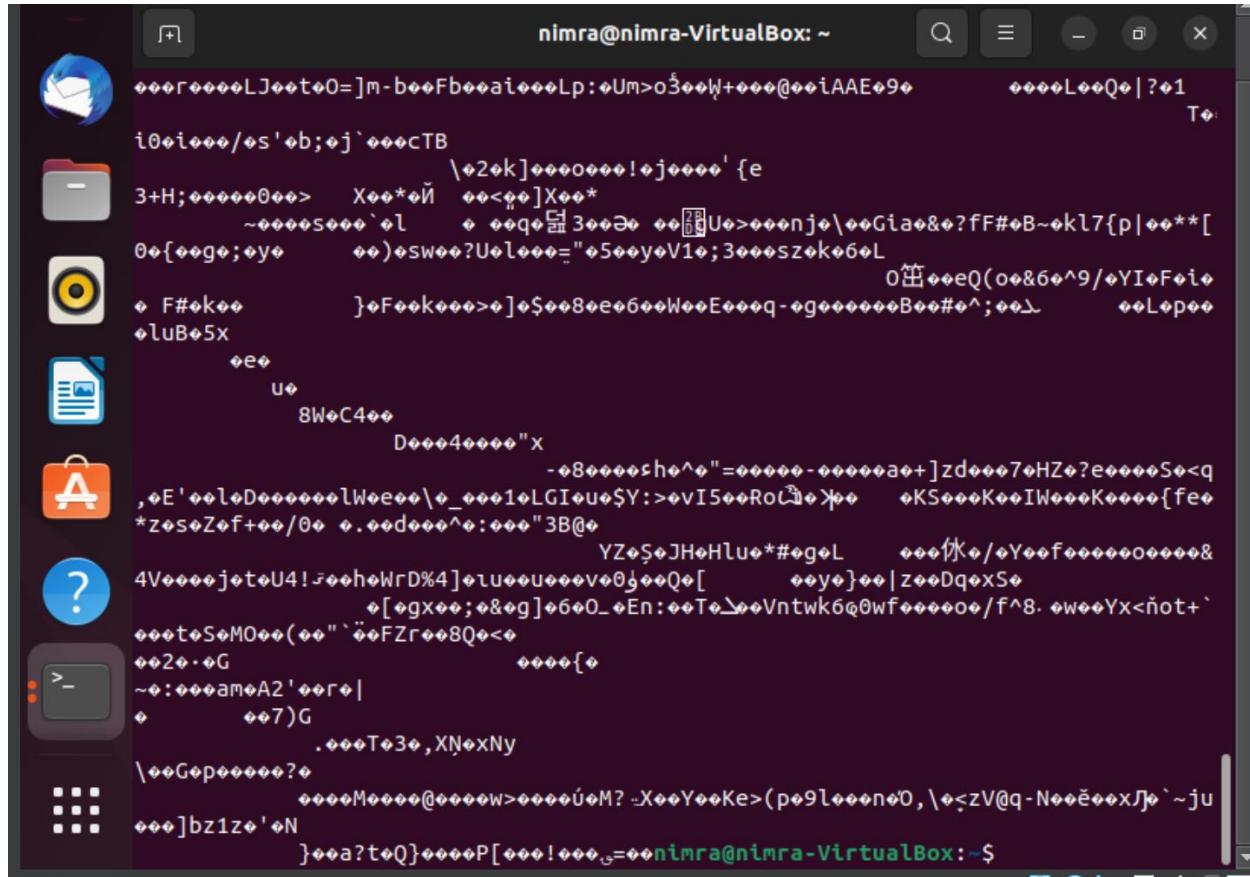
We want to create a LEMP stack for our PHP development environment.

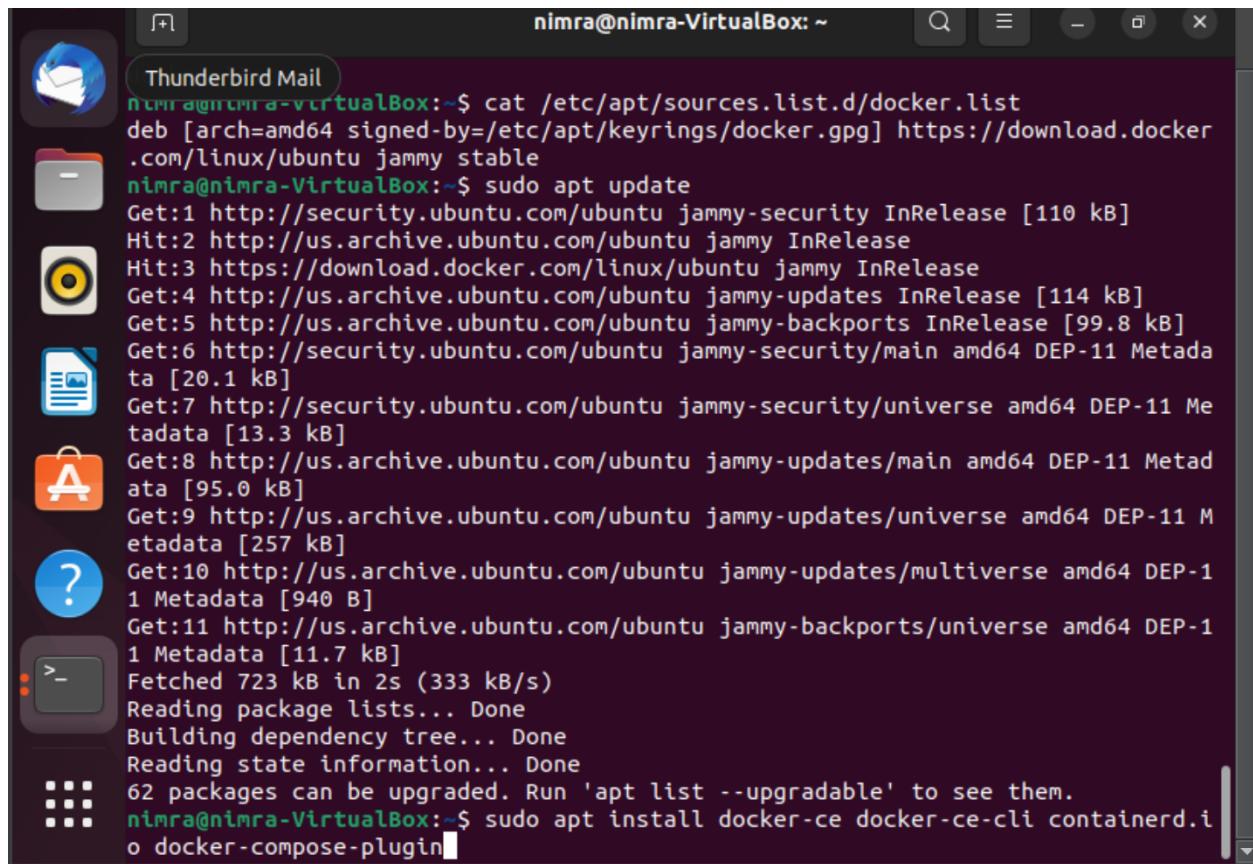
Here are the steps we are going to do:

1. First we will pull the three required images from the hub, that is PHP-fpm, Mariadb, and Nginx.
2. Then we will create a Dockerfile to customise the PHP image with additional extensions such as xdebug. Not just PHP you can create separate dockerfiles to customize other images as well. All these images will be stored separately inside the var/lib/docker directory.
3. Then we will create a compose file to configure our custom image from these base images the compose file will be in the yaml format.



```
nimra@nimra-VirtualBox: ~
Reading state information... Done
62 packages can be upgraded. Run 'apt list --upgradable' to see them.
nimra@nimra-VirtualBox:~$ sudo apt install ca-certificates curl gnupg lsb-release
se
LibreOffice Writer lists... Done
LibreOffice Writer Sync tree... Done
Reading state information... Done
lsb-release is already the newest version (11.1.0ubuntu4).
ca-certificates is already the newest version (2021016ubuntu0.22.04.1).
curl is already the newest version (7.81.0-1ubuntu1.6).
gnupg is already the newest version (2.2.27-3ubuntu2.1).
The following packages were automatically installed and are no longer required:
chromium-codecs-ffmpeg-extra galera-4 gstreamer1.0-vaapi i965-va-driver
intel-media-va-driver libaacs0 libaom3 libass9 libavcodec58 libavformat58
libavutil56 libbdplus0 libblas3 libbluray2 libbs2b0 libchromaprint1
libcodec2-1.0 libconfig-inifiles-perl libdavids libdaxctl1
libdbd-mysql-perl libdbi-perl libflashrom1 libflite1 libftdi1-2 libgme0
libgsm1 libgstreamer-plugins-bad1.0-0 libigdgmm12 liblilv-0-0 libmariadb3
libmfx1 libmysofa1 libmysqlclient21 libndctl6 libnorm1 libopenmpt0
libpgm-5.3-0 libpmem1 libpostproc55 librabbitmq4 librubberband2 libserd-0-0
libshine3 libsnappy1v5 libsord-0-0 libsratom-0-0 libsrt1.4-gnutls
libssh-gcrypt-4 libswresample3 libswscales libterm-readkey-perl libudfread0
liburing2 libva-drm2 libva-wayland2 libva-x11-2 libva2 libvdpau1
libvidstab1.1 libx265-199 libxvidcore4 libzimg2 libzmq5 libzvbi-common
libzvbi0 mariadb-common mesa-va-drivers mesa-vdpau-drivers
pocketsphinx-en-us socat va-driver-all vdpau-driver-all
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 62 not upgraded.
nimra@nimra-VirtualBox:~$
```





The screenshot shows a terminal window titled "nimra@nimra-VirtualBox: ~" running on an Ubuntu desktop. The terminal displays the following command-line session:

```
nimra@nimra-VirtualBox:~$ cat /etc/apt/sources.list.d/docker.list
deb [arch=amd64 signed-by=/etc/apt/keyrings/docker.gpg] https://download.docker
.com/linux/ubuntu jammy stable
nimra@nimra-VirtualBox:~$ sudo apt update
Get:1 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Hit:2 http://us.archive.ubuntu.com/ubuntu jammy InRelease
Hit:3 https://download.docker.com/linux/ubuntu jammy InRelease
Get:4 http://us.archive.ubuntu.com/ubuntu jammy-updates InRelease [114 kB]
Get:5 http://us.archive.ubuntu.com/ubuntu jammy-backports InRelease [99.8 kB]
Get:6 http://security.ubuntu.com/ubuntu jammy-security/main amd64 DEP-11 Metada
ta [20.1 kB]
Get:7 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 DEP-11 Me
tadata [13.3 kB]
Get:8 http://us.archive.ubuntu.com/ubuntu jammy-updates/main amd64 DEP-11 Metad
ata [95.0 kB]
Get:9 http://us.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 DEP-11 M
etadata [257 kB]
Get:10 http://us.archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 DEP-1
1 Metadata [940 B]
Get:11 http://us.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 DEP-1
1 Metadata [11.7 kB]
Fetched 723 kB in 2s (333 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
62 packages can be upgraded. Run 'apt list --upgradable' to see them.
nimra@nimra-VirtualBox:~$ sudo apt install docker-ce docker-ce-cli containerd.i
o docker-compose-plugin
```

Setting up Project Directory

Next, let us create a directory where we're going to put our PHP applications. I'm going to create a directory called site1 in the home directory:

Inside that, create another directory called public, where we'll put our website files.

Let's create a PHP file inside the public directory:

We'll mount three things to our container:

1. our app folder where our code is residing
2. the nginx configuration file, which we'll soon create
3. and, our mysql data. So, even after we destroy our container, our data persists on the host machine.

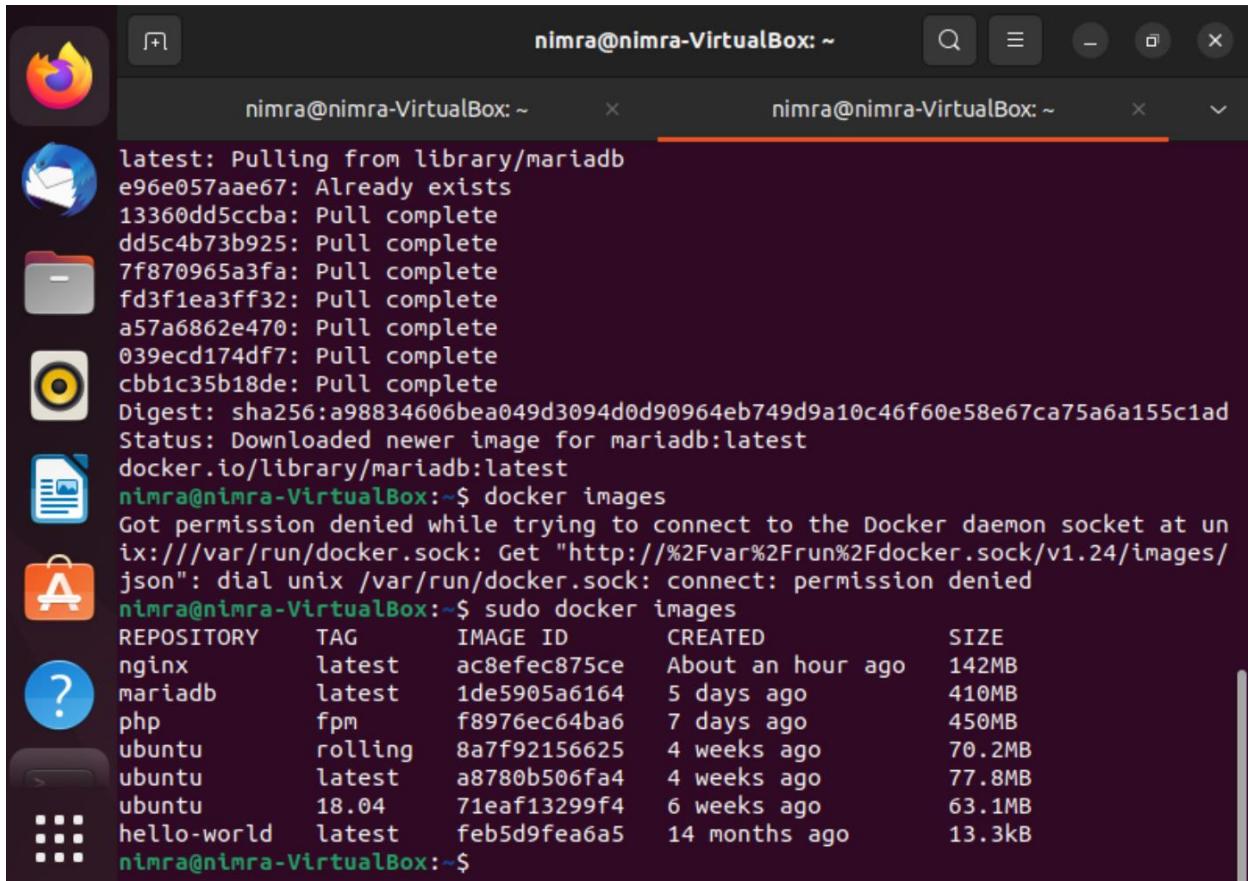
nimra@nimra-VirtualBox: ~

```
libvidstab1.1 libx265-199 libxvidcore4 libzimg2 libzmq5 libzvbi-common
libzvbi0 mariadb-common mesa-va-drivers mesa-vdpau-drivers
pocketsphinx-en-us socat va-driver-all vdpau-driver-all
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 62 not upgraded.
nimra@nimra-VirtualBox:~$ sudo systemctl status docker.service
● docker.service - Docker Application Container Engine
   Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor prese>
   Active: active (running) since Mon 2022-12-05 19:04:58 EST; 3h 30min ago
     TriggeredBy: ● docker.socket
      Docs: https://docs.docker.com
   Main PID: 26212 (dockerd)
      Tasks: 12
     Memory: 218.0M
        CPU: 40.402s
       CGroup: /system.slice/docker.service
               └─26212 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/co>

Dec 05 19:04:58 nimra-VirtualBox systemd[1]: Started Docker Application Contai>
Dec 05 19:04:58 nimra-VirtualBox dockerd[26212]: time="2022-12-05T19:04:58.763>
Dec 05 19:05:09 nimra-VirtualBox dockerd[26212]: time="2022-12-05T19:05:09.862>
Dec 05 19:29:57 nimra-VirtualBox dockerd[26212]: time="2022-12-05T19:29:57.873>
Dec 05 19:29:57 nimra-VirtualBox dockerd[26212]: time="2022-12-05T19:29:57.875>
Dec 05 19:35:05 nimra-VirtualBox dockerd[26212]: time="2022-12-05T19:35:05.963>
Dec 05 19:37:13 nimra-VirtualBox dockerd[26212]: time="2022-12-05T19:37:13.791>
Dec 05 19:39:08 nimra-VirtualBox dockerd[26212]: time="2022-12-05T19:39:08.934>
Dec 05 19:45:54 nimra-VirtualBox dockerd[26212]: time="2022-12-05T19:45:54.877>
Dec 05 21:45:10 nimra-VirtualBox dockerd[26212]: time="2022-12-05T21:45:10.339>
lines 1-22/22 (END)
```

Activities Terminal Dec 6 00:48

```
nimra@nimra-VirtualBox:~$ sudo ls /var/lib
[nimra@nimra-VirtualBox:~] word for nimra:
Rhythmbox      git          shim-signed
acpi-support   grub         snapd
alsa           hp           snmp
apache2        ispell        sudo
app-info       libreoffice  swcatalog
apport         locales      systemd
apt            logrotate    tpm
aspell         man-db       ubiquity
avahi-autoipd  mecab        ubuntu-advantage
bluetooth      misc         ubuntu-drivers-common
boltd          mysql        ubuntu-release-upgrader
BrlAPI         mysql-upgrade ucf
colord         NetworkManager udisks2
command-not-found openvpn     unattended-upgrades
containerd     os-prober    update-manager
dbus           PackageKit  update-notifier
dhcp           pam          upower
dictionaries-common php          usb_modeswitch
docker         plymouth     usbutils
dpkg           polkit-1     vim
emacsclient-common power-profiles-daemon whoopsie
fprint         private      xfonts
fwupd          python      xbmc
gdm3          snapd       xml_coco
```



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window has two tabs, both labeled "nimra@nimra-VirtualBox: ~". The left tab shows the output of a Docker pull command for the mariadb image, indicating it already exists. The right tab shows the output of a docker images command, listing several images including nginx, mariadb, php, and ubuntu, along with their creation times and sizes. The desktop background features a dark theme with various icons for applications like a browser, file manager, and system tools.

```
latest: Pulling from library/mariadb
e96e057aae67: Already exists
13360dd5ccba: Pull complete
dd5c4b73b925: Pull complete
7f870965a3fa: Pull complete
fd3f1ea3ff32: Pull complete
a57a6862e470: Pull complete
039ecd174df7: Pull complete
cbb1c35b18de: Pull complete
Digest: sha256:a98834606bea049d3094d0d90964eb749d9a10c46f60e58e67ca75a6a155c1ad
Status: Downloaded newer image for mariadb:latest
docker.io/library/mariadb:latest
nimra@nimra-VirtualBox:~$ docker images
Got permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/images/json": dial unix /var/run/docker.sock: connect: permission denied
nimra@nimra-VirtualBox:~$ sudo docker images
REPOSITORY      TAG      IMAGE ID      CREATED      SIZE
nginx          latest    ac8efec875ce  About an hour ago  142MB
mariadb         latest    1de5905a6164  5 days ago   410MB
php             fpm      f8976ec64ba6  7 days ago   450MB
ubuntu          rolling   8a7f92156625  4 weeks ago  70.2MB
ubuntu          latest    a8780b506fa4  4 weeks ago  77.8MB
ubuntu          18.04    71eaf13299f4  6 weeks ago  63.1MB
hello-world     latest    feb5d9fea6a5  14 months ago  13.3kB
nimra@nimra-VirtualBox:~$
```

Creating PHP.Dockerfile

Next, we will create the *Dockerfile* for our customized PHP image. Let's name it as PHP.Dockerfile:

All Docker images start with a base image. Here our base image is the PHP-FPM image we've just pulled:

Creating docker-compose.yml File

Create a new file called docker-compose.yml. YAML or YML – both are same. Just like JSON for data, Yaml is a popular format for writing configuration files as it offers a very simple syntax.

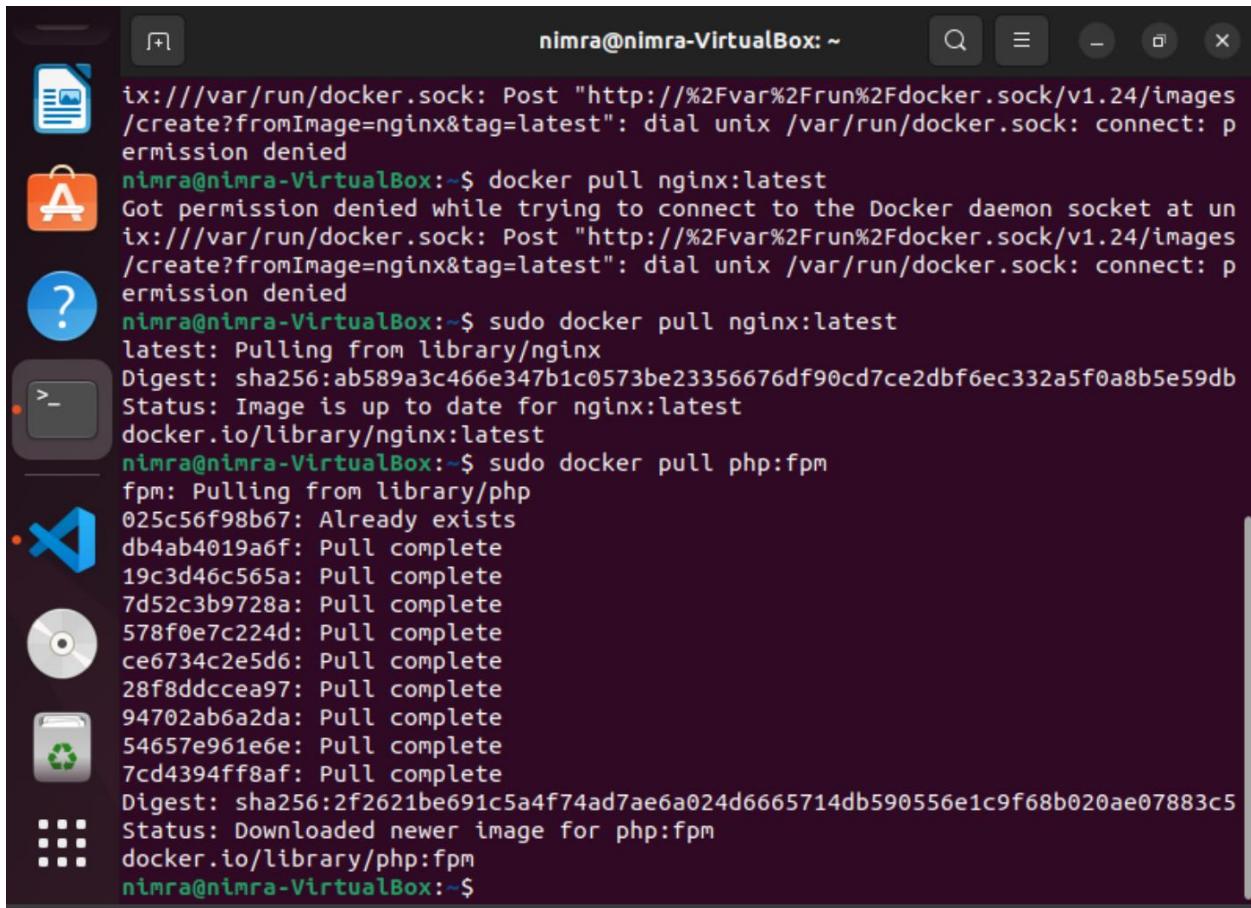
The screenshot shows the Visual Studio Code interface with the title bar "docker-compose.yml - site1 - Visual Studio Code". The left sidebar has icons for Explorer, Search, Issues, Pull Requests, GitHub, Help, and a pinned icon for Docker. The Explorer view shows a folder named "SITE1" containing "public" (with "index.php" file), "docker-compose.yml" (selected), "nginx.conf", "PHP.Dockerfile", and ".vscode". The main editor area displays the "docker-compose.yml" file:

```
version: '3.8'
services:
  php:
    build:
      context: .
      dockerfile: PHP.Dockerfile
    volumes:
      - ./public:/site1/public
    restart: always
  mysql:
    image: mariadb:latest
    environment:
      MYSQL_ROOT_PASSWORD: 'password'
      MYSQL_USER: 'abhinav'
      MYSQL_PASSWORD: 'password'
      MYSQL_DATABASE: 'site1'
    volumes:
      - site1:/var/lib/mysql
    ports:
      - 3306:3306
    restart: always
```

At the bottom, status bar items include Ln 33, Col 14, Spaces:2, UTF-8, LF, Compose, and a search icon.

The screenshot shows a terminal window titled "nimra@nimra-VirtualBox: ~/site1". The terminal history shows the following commands:

```
sudo: index.php: command not found
nimra@nimra-VirtualBox:~/site1/public$ sudo rm index.php
nimra@nimra-VirtualBox:~/site1/public$ ls
nimra@nimra-VirtualBox:~/site1/public$ sudo rm index.php
[Ubuntu Software] ve 'index.php': No such file or directory
nimra@nimra-VirtualBox:~/site1/public$ sudo touch index.php
nimra@nimra-VirtualBox:~/site1/public$ <?php
echo "Hello from PHP"
bash: ?php: No such file or directory
>
> sudo nano index.php
>
> ^C
nimra@nimra-VirtualBox:~/site1/public$ ^C
nimra@nimra-VirtualBox:~/site1/public$ ^C
nimra@nimra-VirtualBox:~/site1/public$ <?php
echo "Hello from PHP!"
phpinfo();^C
nimra@nimra-VirtualBox:~/site1/public$ ^C
nimra@nimra-VirtualBox:~/site1/public$ sudo nano index.php
nimra@nimra-VirtualBox:~/site1/public$ cd ../
nimra@nimra-VirtualBox:~/site1$ sudo touch nginx.conf
nimra@nimra-VirtualBox:~/site1$ sudo nano nginx.conf
nimra@nimra-VirtualBox:~/site1$ ls
nginx.conf ngnix.conf public
nimra@nimra-VirtualBox:~/site1$ ls
docker-compose.yml nginx.conf ngnix.conf PHP.Dockerfile public
nimra@nimra-VirtualBox:~/site1$ docker compose build
yaml: line 16: did not find expected key
```



```
ix:///var/run/docker.sock: Post "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/images/create?fromImage=nginx&tag=latest": dial unix /var/run/docker.sock: connect: permission denied
nimra@nimra-VirtualBox:~$ docker pull nginx:latest
Got 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/create?fromImage=nginx&tag=latest": dial unix /var/run/docker.sock: connect: permission denied
nimra@nimra-VirtualBox:~$ sudo docker pull nginx:latest
latest: Pulling from library/nginx
Digest: sha256:ab589a3c466e347b1c0573be23356676df90cd7ce2dbf6ec332a5f0a8b5e59db
Status: Image is up to date for nginx:latest
docker.io/library/nginx:latest
nimra@nimra-VirtualBox:~$ sudo docker pull php:fpm
fpm: Pulling from library/php
025c56f98b67: Already exists
db4ab4019a6f: Pull complete
19c3d46c565a: Pull complete
7d52c3b9728a: Pull complete
578f0e7c224d: Pull complete
ce6734c2e5d6: Pull complete
28f8ddcce97: Pull complete
94702ab6a2da: Pull complete
54657e961e6e: Pull complete
7cd4394ff8af: Pull complete
Digest: sha256:2f2621be691c5a4f74ad7ae6a024d6665714db590556e1c9f68b020ae07883c5
Status: Downloaded newer image for php:fpm
docker.io/library/php:fpm
nimra@nimra-VirtualBox:~$
```

3. Practice developing PHP using docker:

Pull the PHP docker to your local docker server. PHP docker image is available

Testing on the Browser

Now, go ahead and open it in a browser:

- <http://site1.local:8080>

PHP Version 8.1.6

System	Linux 03ad41f99619 5.15.0-30-generic #31-Ubuntu SMP Thu May 5 10:00:34 UTC 2022 x86_64
Build Date	May 28 2022 08:17:16
Build System	Linux b131d29e7cf2 5.10.0-13-cloud-amd64 #1 SMP Debian 5.10.106-1 (2022-03-17) x86_64 GNU/Linux
Configure Command	'./configure' '--build=x86_64-linux-gnu' '--with-config-file-path=/usr/local/etc/php' '--with-config-file-scan-dir=/usr/local/etc/php/conf.d' '--enable-option-checking=fatal' '--with-mhash' '--with-pic' '--enable-ftp' '--enable-mbstring' '--enable-mysqlind' '--with-password-argon2' '--with-sodium=shared' '--with-pdo-sqlite=/usr' '--with-sqlite3=/usr' '--with-curl' '--with-iconv' '--with-openssl' '--with-readline' '--with-zlib' '--disable-phpdbg' '--with-pear' '--with-libdir=lib/x86_64-linux-gnu' '--disable-cgi' '--enable-fpm' '--with-fpm-user=www-data' '--with-fpm-group=www-data' 'build_alias=x86_64-linux-gnu'
Server API	FPM/FastCGI
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/usr/local/etc/php
Loaded Configuration File	(none)
Scan this dir for additional .ini files	/usr/local/etc/php/conf.d
Additional .ini files parsed	/usr/local/etc/php/conf.d/docker-php-ext-bcmath.ini, /usr/local/etc/php/conf.d/docker-php-ext-exif.ini, /usr/local/etc/php/conf.d/docker-php-ext-gd.ini, /usr/local/etc/php/conf.d/docker-php-ext-imagick.ini, /usr/local/etc/php/conf.d/docker-php-ext-intl.ini, /usr/local/etc/php/conf.d/docker-php-ext-mysqli.ini, /usr/local/etc/php/conf.d/docker-php-ext-opcache.ini, /usr/local/etc/php/conf.d/docker-php-ext-pdo_mysql.ini, /usr/local/etc/php/conf.d/docker-php-ext-sodium.ini, /usr/local/etc/php/conf.d/docker-php-ext-xdebug.ini, /usr/local/etc/php/conf.d/docker-php-ext-zip.ini, /usr/local/etc/php/conf.d/opcache-recommended.ini
PHP API	20210902
PHP Extension	20210902
Zend Extension	420210902
Zend Extension Build	API420210902,NTS
PHP Extension Build	API20210902,NTS
Debug Build	no
Thread Safety	disabled
Zend Signal Handling	enabled
Zend Memory Manager	enabled

Database version: 10.8.3-MariaDB-1:10.8.3+maria~jammy