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COURSE: Advance DevOPs (ITL504)

DATE: 07-09-2022

EXPERIMENT 8

1. What is hub.docker.com?

Docker Hub is the world's largest repository of container images with an array of content sources including container community developers, open-source projects and independent software vendors (ISV) building and distributing their code in containers. Users get access to free public repositories for storing and sharing images or can choose subscription plan for private repos. Docker Hub is a hosted repository service provided by Docker for finding and sharing container images with your team.

2. What is docker hub used for?

Key features of Docker hub include –

- Private Repositories: Push and pull container images.
- Automated Builds: Automatically build container images from GitHub and Bitbucket and push them to Docker Hub.
- Teams & Organizations: Manage access to private repositories.
- Official Images: Pull and use high-quality container images provided by Docker.
- Publisher Images: Pull and use high-quality container images provided by external vendors. Certified images also include support and guarantee compatibility with Docker Enterprise.
- Webhooks: Trigger actions after a successful push to a repository to integrate Docker Hub with other services.

3. Install docker on AWS EC2 –Ubuntu by using curl

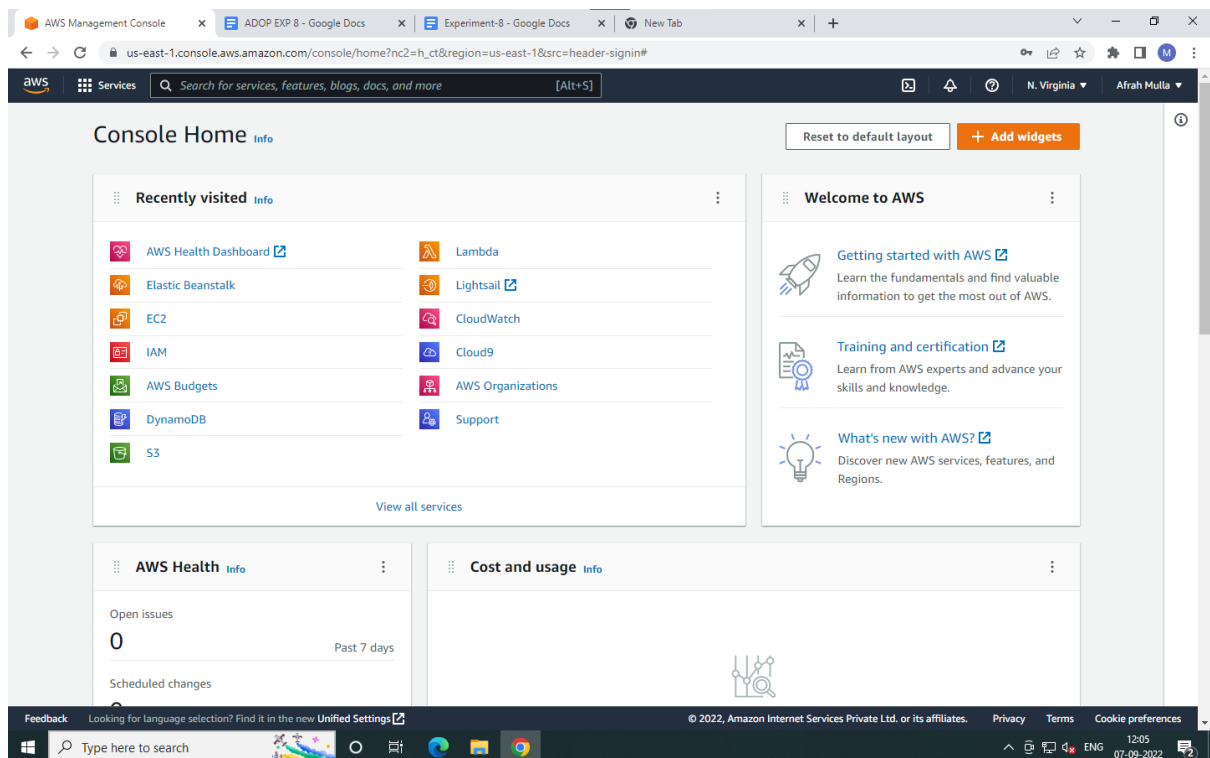
```
#curl -fsSL https://get.docker.com -o get-docker.sh
```

```
#sh get-docker.sh
```

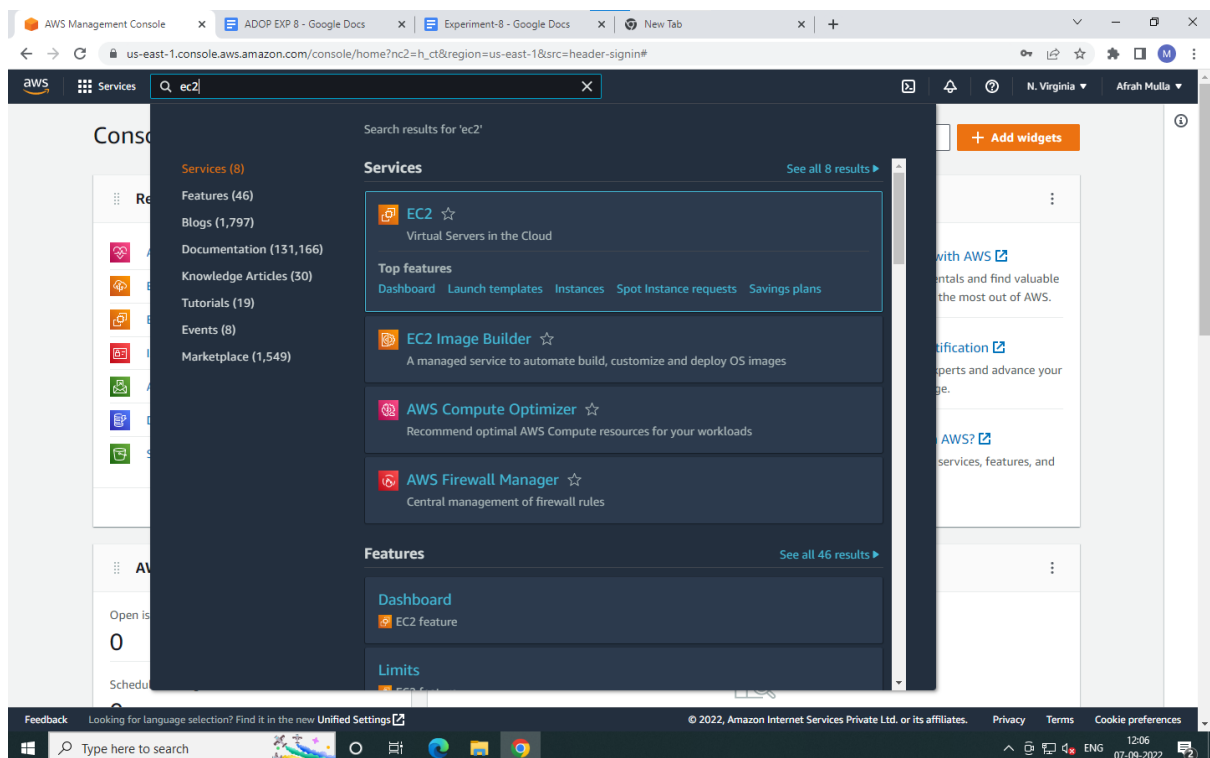
4. Run hello-world from docker hub and explain the steps.

5. Pull 3 or 4 images, one of the python, run “Hello World” inside container.

Step 1: AWS Management Console



Step 2: Go to EC2 instances, name and create an Ubuntu instance with 20.04 LTS version



Dashboard | EC2 Management Console | ADOP EXP 8 - Google Docs | Experiment-8 - Google Docs | New Tab

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Home

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New EC2 Experience

Tell us what you think

EC2 Dashboard

EC2 Global View

Events

Tags

Limits

Instances

Instances **New**

Instance Types

Launch Templates

Spot Requests

Savings Plans

Reserved Instances **New**

Dedicated Hosts

Scheduled Instances

Capacity Reservations

Images

AMIs **New**

AMI Catalog

Elastic Block Store

Volumes **New**

Resources

EC2 Global view

You are using the following Amazon EC2 resources in the US East (N. Virginia) Region:

Instances (running)	0	Dedicated Hosts	0	Elastic IPs	0
Instances	0	Key pairs	3	Load balancers	0
Placement groups	0	Security groups	4	Snapshots	0
Volumes	0				

Easily size, configure, and deploy Microsoft SQL Server Always On availability groups on AWS using the AWS Launch Wizard for SQL Server. [Learn more](#)

Launch instance

To get started, launch an Amazon EC2 instance, which is a virtual server in the cloud.

Launch instance

Migrate a server

Note: Your instances will launch in the US East (N. Virginia) Region

Service health

AWS Health Dashboard

Region
US East (N. Virginia)

Status
 This service is operating normally

Zones

Account attributes

Supported platforms

- VPC

Default VPC
vpc-0b840b1e2a1bd4344

Settings

EBS encryption

Zones

EC2 Serial Console

Default credit specification

Console experiments

Explore AWS

Save Up to 45% on ML Inference

EC2 Inf1 instances provide high performance and lowest cost ML inference in the cloud. [Learn more](#)

Get Up to 40% Better Price Performance

T4g instances deliver the best price performance for burstable general purpose workloads in Amazon EC2. [Learn more](#)

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Launch an instance | EC2 Management Console | ADOP EXP 8 - Google Docs | Experiment-8 - Google Docs | New Tab

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances

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Launch an instance

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

Name and tags

Name
exp8-afrah

Add additional tags

Application and OS Images (Amazon Machine Image)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Summary

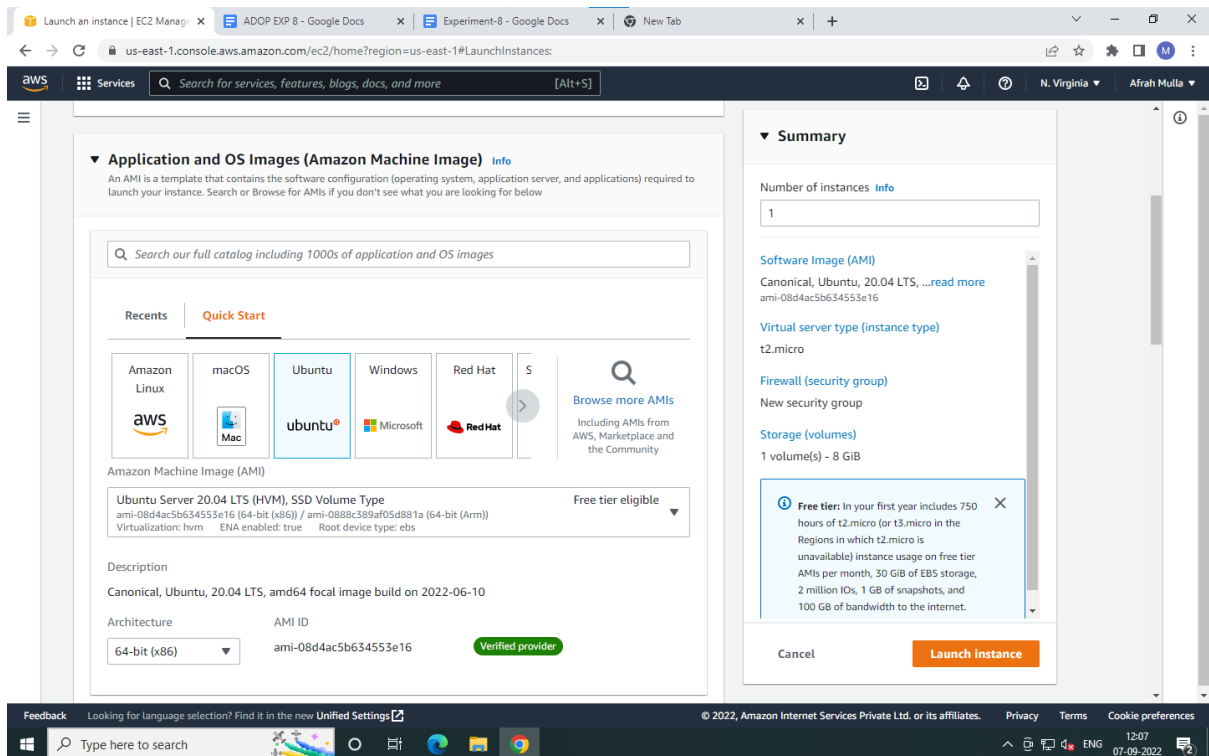
Number of instances
1

Software Image (AMI)
Canonical, Ubuntu, 22.04 LTS, ...[read more](#)
ami-052efd3df9dad4825

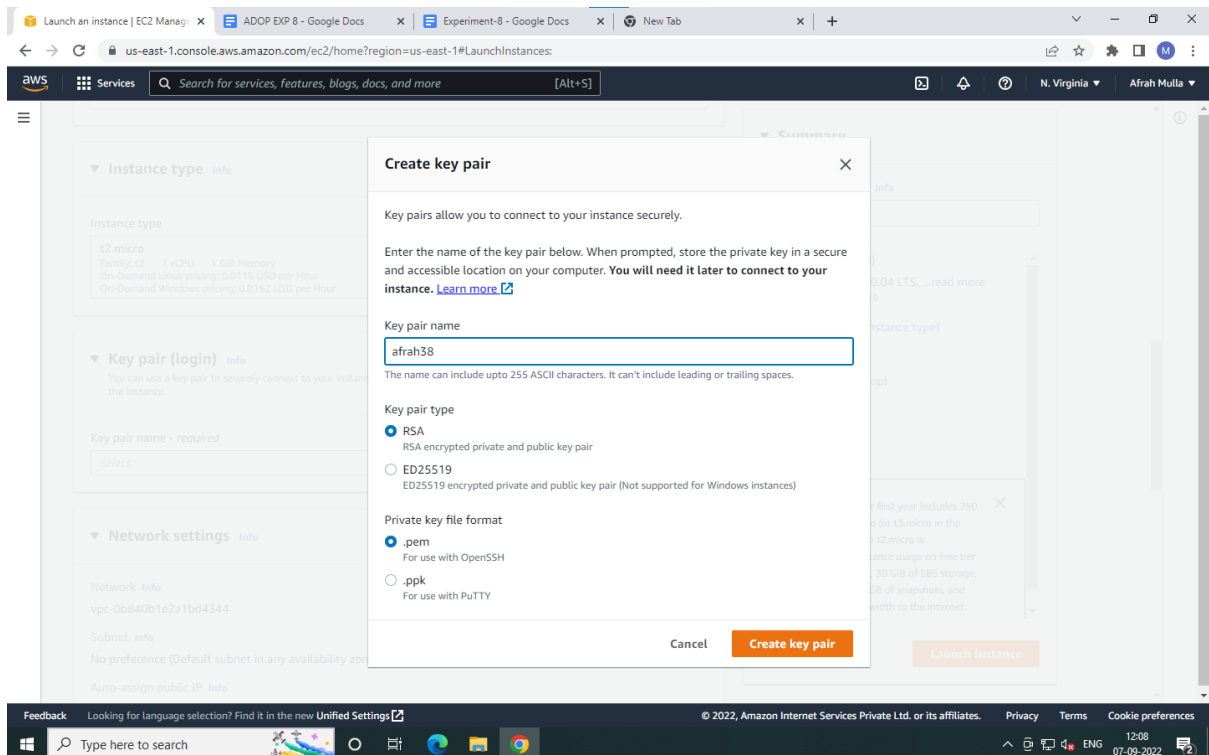
Virtual server type (instance type)
t2.micro

Firewall (security group)
New security group

Storage (volumes)
1 volume(s) - 8 GiB



Step 3: Create a key pair for your instance and in the network settings allow the HTTPS and HTTP traffic



Launch an instance | EC2 Manag... x ADOP EXP 8 - Google Docs x Experiment-8 - Google Docs x New Tab

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances:

aws Services Search for services, features, blogs, docs, and more [Alt+S]

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Instance type

Instance type

t2.micro Free tier eligible Compare instance types

Family: t2
1 vCPU 1 GiB Memory
On-Demand Linux pricing: 0.0116 USD per Hour
On-Demand Windows pricing: 0.0162 USD per Hour

Key pair (login)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - required

afrah38 Create new key pair

Network settings

Network

vpc-0b840b1e2a1bd4344

Subnet

No preference (Default subnet in any availability zone)

Auto-assign public IP

Summary

Number of instances

1

Software Image (AMI)

Canonical, Ubuntu, 20.04 LTS, ...read more
ami-08d4ac5b634553e16

Virtual server type (instance type)

t2.micro

Firewall (security group)

New security group

Storage (volumes)

1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Cancel Launch instance

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afrah38.pem Show all

Launch an instance | EC2 Manag... x ADOP EXP 8 - Google Docs x Experiment-8 - Google Docs x New Tab

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchInstances:

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Network settings

Network

vpc-0b840b1e2a1bd4344

Subnet

No preference (Default subnet in any availability zone)

Auto-assign public IP

Enable

Firewall (security groups)

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

Create security group Select existing security group

We'll create a new security group called 'launch-wizard-4' with the following rules:

- ☒ Allow SSH traffic from
Helps you connect to your instance
Anywhere
0.0.0.0/0
- ☒ Allow HTTPs traffic from the internet
To set up an endpoint, for example when creating a web server
- ☒ Allow HTTP traffic from the internet
To set up an endpoint, for example when creating a web server

Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Summary

Number of instances

1

Software Image (AMI)

Canonical, Ubuntu, 20.04 LTS, ...read more
ami-08d4ac5b634553e16

Virtual server type (instance type)

t2.micro

Firewall (security group)

New security group

Storage (volumes)

1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 30 GiB of EBS storage, 2 million I/Os, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Cancel Launch instance

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Type here to search

aws Services Search for services, features, blogs, docs, and more [Alt+S]

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EC2 > Instances > Launch an instance

Success

Successfully initiated launch of instance (i-0fc04a3daba4c0c02)

Launch log

Launch an instance | EC2 Management Console | Instances | EC2 Management Console | ADOP EXP 8 - Google Docs | Experiment-8 - Google Docs | New Tab

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:instanceId=i-0fc04a3daba4c0c02

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EC2 Dashboard
EC2 Global View
Events
Tags
Limits

Instances

Instances New
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances New
Dedicated Hosts
Scheduled Instances
Capacity Reservations

Images

AMIs New
AMI Catalog

Elastic Block Store

Volumes New

Instances (1/1) Info

Search

Instance ID = i-0fc04a3daba4c0c02 Clear filters

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
exp8-afrah	i-0fc04a3daba4c0c02	Running	t2.micro	Initializing	No alarms +	us-east-1d

Instance: i-0fc04a3daba4c0c02 (exp8-afrah)

Details Security Networking Storage Status checks Monitoring Tags

Instance summary Info

Instance ID i-0fc04a3daba4c0c02 (exp8-afrah)	Public IPv4 address 54.166.163.18 open address	Private IPv4 addresses 172.31.90.146
IPv6 address -	Instance state Running	Public IPv4 DNS ec2-54-166-163-18.compute-1.amazonaws.com open address
Hostname type IP name: ip-172-31-90-146.ec2.internal	Private IP DNS name (IPv4 only) ip-172-31-90-146.ec2.internal	

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12:11 07-09-2022

Launch an instance | EC2 Management Console | Connect to instance | EC2 Management Console | ADOP EXP 8 - Google Docs | Experiment-8 - Google Docs | New Tab

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#ConnectToInstance:instanceId=i-0fc04a3daba4c0c02

Services Search for services, features, blogs, docs, and more [Alt+S]

EC2 > Instances > i-0fc04a3daba4c0c02 > Connect to instance

Connect to instance Info

Connect to your instance i-0fc04a3daba4c0c02 (exp8-afrah) using any of these options

EC2 Instance Connect Session Manager SSH client EC2 serial console

Instance ID
i-0fc04a3daba4c0c02 (exp8-afrah)

- Open an SSH client.
- Locate your private key file. The key used to launch this instance is afrah38.pem
- Run this command, if necessary, to ensure your key is not publicly viewable.
chmod 400 afrah38.pem
- Connect to your instance using its Public DNS:
ec2-54-166-163-18.compute-1.amazonaws.com

Example:
ssh -i "afrah38.pem" ubuntu@ec2-54-166-163-18.compute-1.amazonaws.com

Note: In most cases, the guessed user name is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI user name.

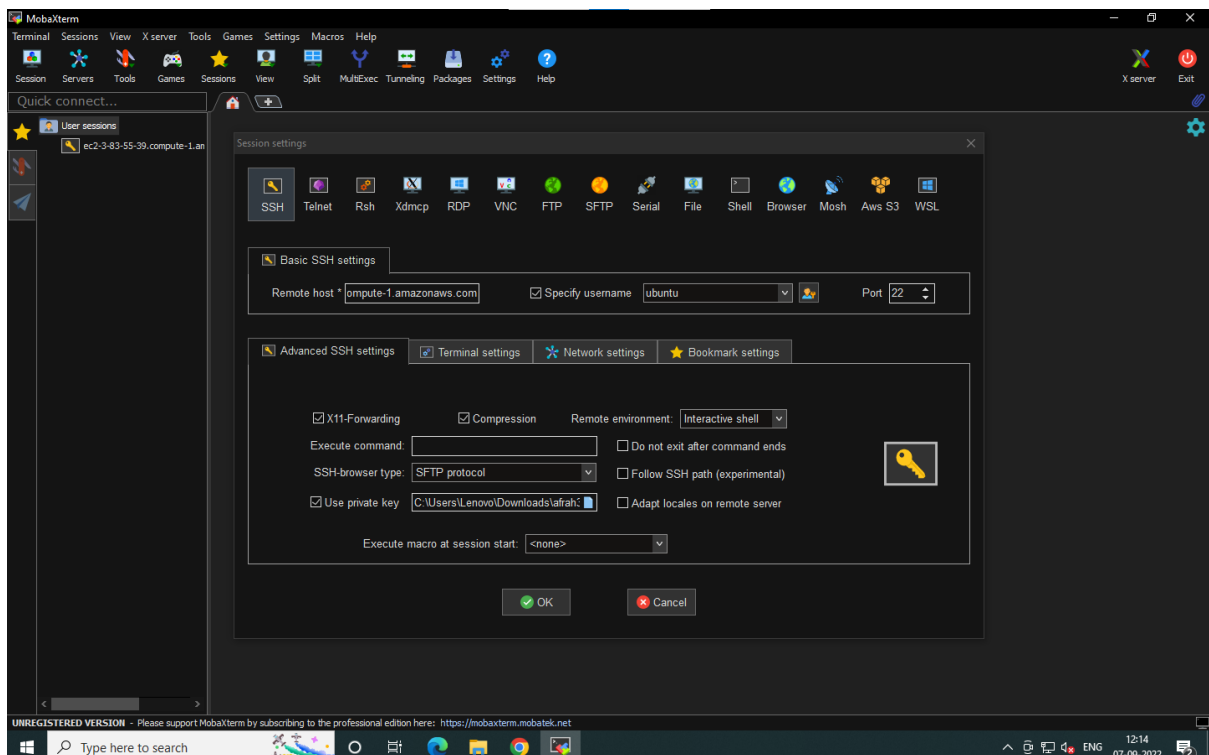
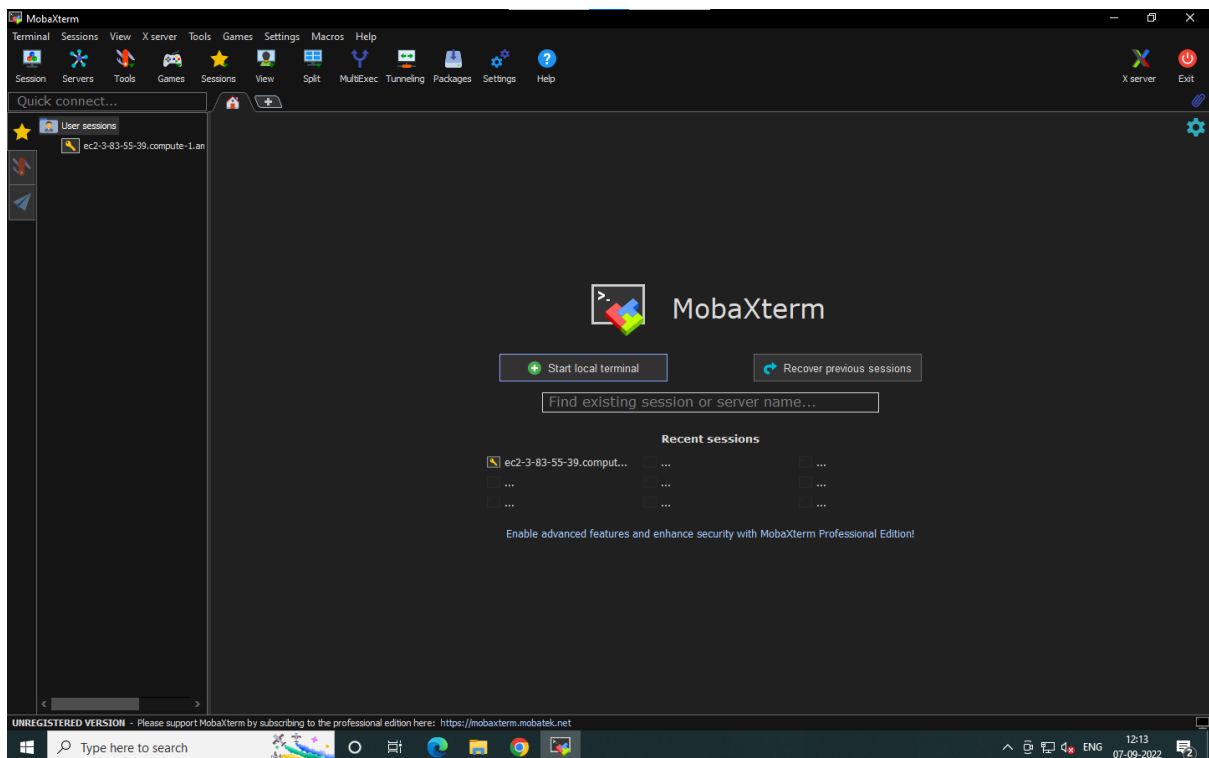
Cancel

Feedback Looking for language selection? Find it in the new Unified Settings

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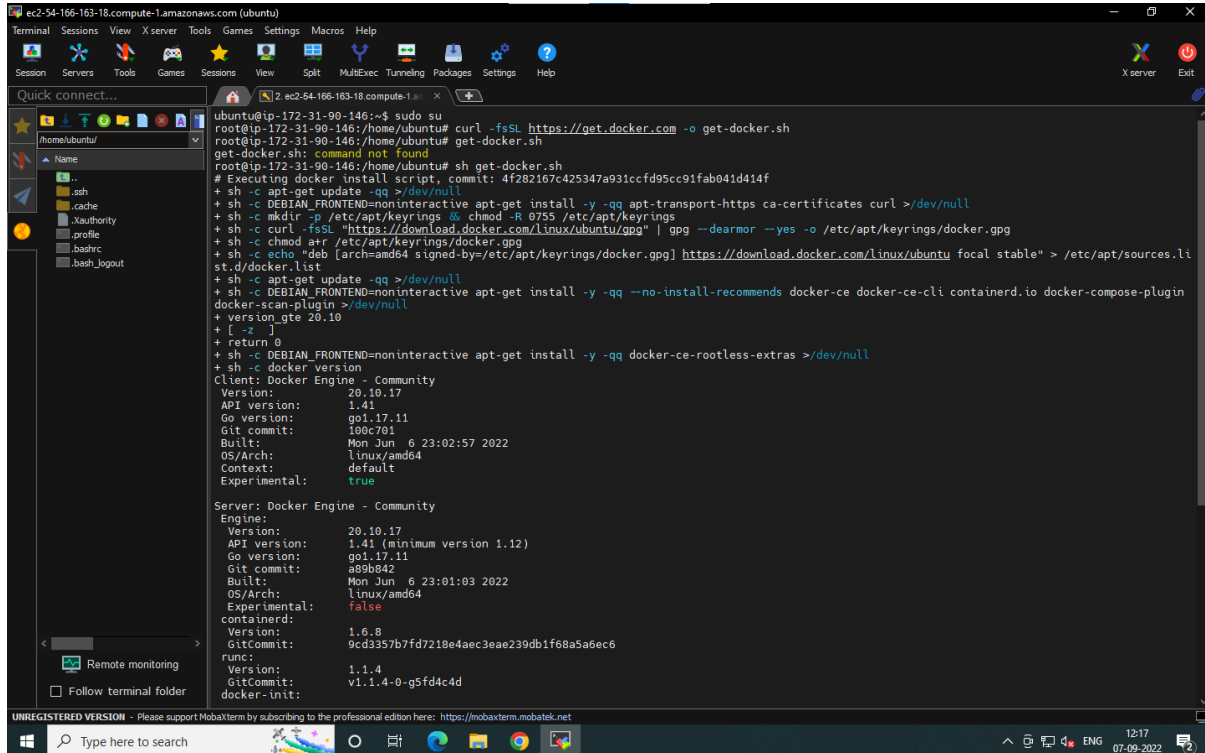
Step 4: Launch MobaXterm -> Select SSH session -> Copy the public DNS of your instance and paste it into the remote host. Use the downloaded key pair as the private key



Step 5: Run the command 'sudo su' to gain root user access. Then enter commands:

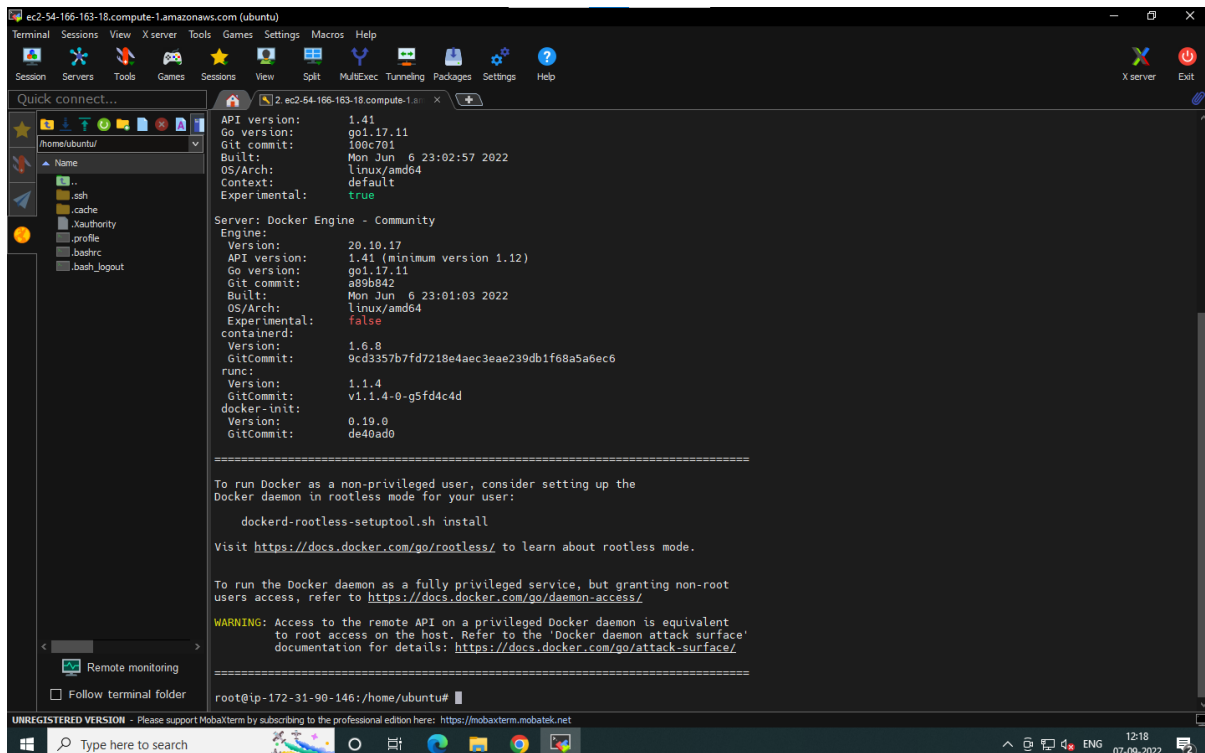
```
curl -fsSL https://get.docker.com -o get-docker.sh
```

```
sh get-docker.sh
```



```
ubuntu@ip-172-31-90-146:~$ sudo su
root@ip-172-31-90-146:/home/ubuntu# curl -fsSL https://get.docker.com -o get-docker.sh
root@ip-172-31-90-146:/home/ubuntu# sh get-docker.sh
# Executing docker install script, commit: 4f282167c425347a931ccfd95cc91fab041d414f
+ sh -c apt-get update -qq >/dev/null
+ sh -c DEBIAN_FRONTEND=noninteractive apt-get install -y -qq apt-transport-https ca-certificates curl >/dev/null
+ sh -c mkdir -p /etc/apt/keyrings & chmod -R 0755 /etc/apt/keyrings
+ sh -c curl -fsSL "https://download.docker.com/linux/ubuntu/gpg" | gpg --dearmor --yes -o /etc/apt/keyrings/docker.gpg
+ sh -c chmod a+r /etc/apt/keyrings/docker.gpg
+ sh -c echo "deb [arch=amd64 signed-by=/etc/apt/keyrings/docker.gpg] https://download.docker.com/linux/ubuntu focal stable" > /etc/apt/sources.list.d/docker.list
+ sh -c apt-get update -qq >/dev/null
+ sh -c DEBIAN_FRONTEND=noninteractive apt-get install -y -qq --no-install-recommends docker-ce docker-ce-cli containerd.io docker-compose-plugin
+ sh -c docker version
Client: Docker Engine - Community
Version: 20.10.17
API version: 1.41
Go version: go1.17.11
Git commit: 108c701
Built: Mon Jun 6 23:02:57 2022
OS/Arch: linux/amd64
Context: default
Experimental: true

Server: Docker Engine - Community
Engine:
Version: 20.10.17
API version: 1.41 (minimum version 1.12)
Go version: go1.17.11
Git commit: a89b842
Built: Mon Jun 6 23:01:03 2022
OS/Arch: linux/amd64
Experimental: false
containerd:
Version: 1.6.8
GitCommit: 9cd3357b7fd7218e4aec3eae239db1f68a5a6ec6
runc:
Version: 1.1.4
GitCommit: v1.1.4-0-g5fd4c4d
docker-init:
Version: 0.19.0
GitCommit: de40ad0
```



```
API version: 1.41
Go version: go1.17.11
Git commit: 108c701
Built: Mon Jun 6 23:02:57 2022
OS/Arch: linux/amd64
Context: default
Experimental: true

Server: Docker Engine - Community
Engine:
Version: 20.10.17
API version: 1.41 (minimum version 1.12)
Go version: go1.17.11
Git commit: a89b842
Built: Mon Jun 6 23:01:03 2022
OS/Arch: linux/amd64
Experimental: false
containerd:
Version: 1.6.8
GitCommit: 9cd3357b7fd7218e4aec3eae239db1f68a5a6ec6
runc:
Version: 1.1.4
GitCommit: v1.1.4-0-g5fd4c4d
docker-init:
Version: 0.19.0
GitCommit: de40ad0

=====

To run Docker as a non-privileged user, consider setting up the
Docker daemon in rootless mode for your user:

    dockerd-rootless-setup.sh install

Visit https://docs.docker.com/go/rootless/ to learn about rootless mode.

To run the Docker daemon as a fully privileged service, but granting non-root
users access, refer to https://docs.docker.com/go/daemon-access/

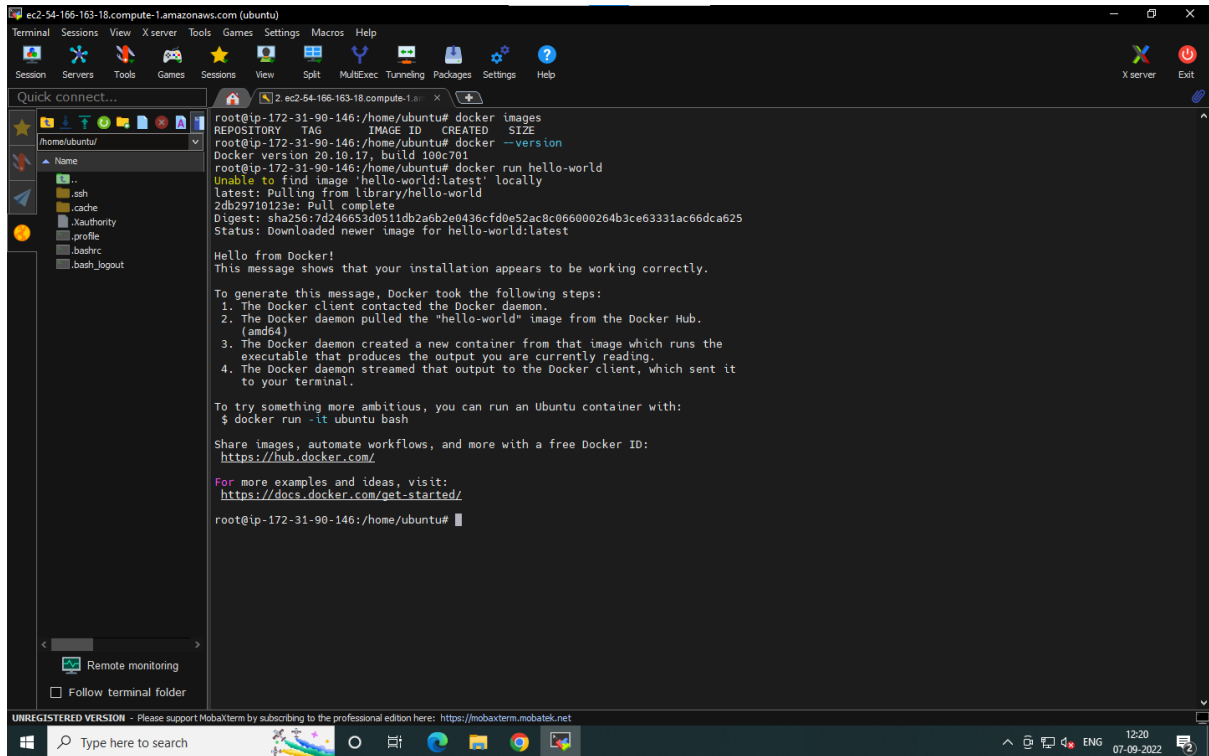
WARNING: Access to the remote API on a privileged Docker daemon is equivalent
to root access on the host. Refer to the 'Docker daemon attack surface'
documentation for details: https://docs.docker.com/go/attack-surface/

=====

root@ip-172-31-90-146:/home/ubuntu#
```

Step 6: Enter command 'docker --version' to see current docker version

Step 7: Enter command 'docker images' to see installed images. At the beginning, there will be no images in the repository. Run command 'docker run hello-world' which will pull a hello-world image and run it



The screenshot shows a terminal window on an Ubuntu system. The user has run the command `docker images`, which shows no images. Then, they run `docker --version`, displaying `Docker version 20.10.17, build 100c701`. Next, they run `docker run hello-world`, which pulls the `hello-world:latest` image from Docker Hub and runs it. The output shows a message from Docker confirming the installation and providing instructions on how to generate the message, try running an Ubuntu container, and share images. The terminal window is titled `ec2-54-166-163-18.compute-1.amazonaws.com (ubuntu)` and has a sidebar with file explorer and session management options.

```
root@ip-172-31-90-146:/home/ubuntu# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
root@ip-172-31-90-146:/home/ubuntu# docker --version
Docker version 20.10.17, build 100c701
root@ip-172-31-90-146:/home/ubuntu# docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
2db29710123e: Pull complete
Digest: sha256:7d246653d0511db2a6b2e0436cfd0e52ac9c066000264b3ce63331ac66dca625
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/
root@ip-172-31-90-146:/home/ubuntu#
```

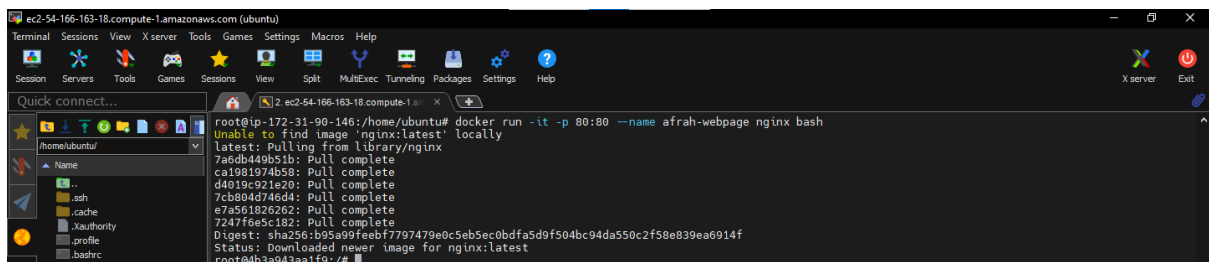
Step 8: Now, run 'docker images' again, the repository will have an image named 'hello world'



The screenshot shows a terminal window with the command `docker images` run again. The output now shows the `hello-world:latest` image in the repository. The terminal window is titled `ec2-54-166-163-18.compute-1.amazonaws.com (ubuntu)` and has a sidebar with file explorer and session management options.

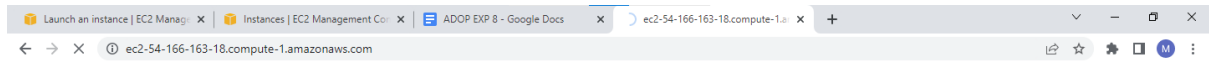
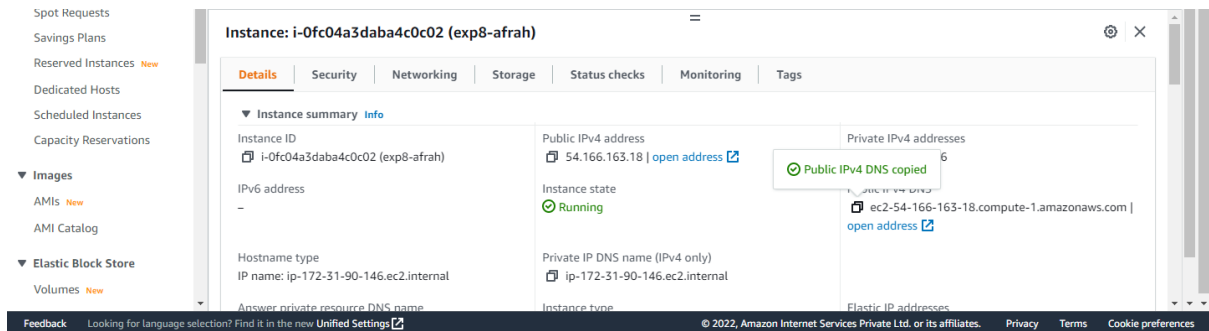
```
root@ip-172-31-90-146:/home/ubuntu# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
hello-world latest feb5d9fea6a5 11 months ago 13.3kB
root@ip-172-31-90-146:/home/ubuntu#
```

Step 9: Run command 'docker run -it -p 80:80 --name (name of webpage) nginx bash'. Now, to launch the nginx web server, copy the IPv4 address from the EC2 instance details and paste it into a web browser



The screenshot shows a terminal window with the command `docker run -it -p 80:80 --name afrah-webpage nginx bash` run. The output shows the `nginx:latest` image being pulled from Docker Hub and the container being created. The terminal window is titled `ec2-54-166-163-18.compute-1.amazonaws.com (ubuntu)` and has a sidebar with file explorer and session management options.

```
root@ip-172-31-90-146:/home/ubuntu# docker run -it -p 80:80 --name afrah-webpage nginx bash
Unable to find image 'nginx:latest' locally
latest: Pulling from library/nginx
7a5db449b51b: Pull complete
ca1981974b58: Pull complete
d4019c921e20: Pull complete
7cb804d746d4: Pull complete
e7a5b1826262: Pull complete
7247f6e8c182: Pull complete
Digest: sha256:b95a99feebf7797479e0c5eb5ec0bdfa5d9f504bc94da550c2f58e839ea6914f
Status: Downloaded newer image for nginx:latest
root@4b3a943aa1f9:/#
```



This site can't be reached

ec2-54-166-163-18.compute-1.amazonaws.com refused to connect.

Try:

- Checking the connection
- [Checking the proxy and the firewall](#)

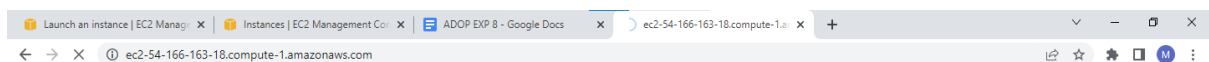
ERR_CONNECTION_REFUSED

Reload

Details

Step 10: Within the container use command 'service nginx start' to deploy the web server. After deploying the web server, the web page will be visible without any errors

```
Status: Downloaded newer image for nginx:latest
root@4b3a943aa1f9:/# service nginx start
2022/09/07 06:57:21 [notice] 12#12: using the "epoll" event method
2022/09/07 06:57:21 [notice] 12#12: nginx/1.23.1
2022/09/07 06:57:21 [notice] 12#12: built by gcc 10.2.1 20210110 (Debian 10.2.1-6)
2022/09/07 06:57:21 [notice] 12#12: OS: Linux 5.13.0-1029-aws
2022/09/07 06:57:21 [notice] 12#12: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2022/09/07 06:57:21 [notice] 13#13: start worker processes
root@4b3a943aa1f9:/# 2022/09/07 06:57:21 [notice] 13#13: start worker process 14
```



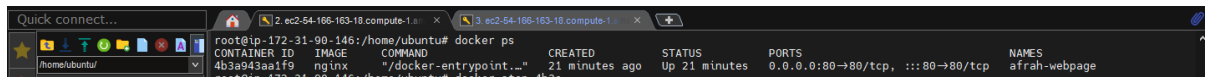
Welcome to nginx!

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

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

Thank you for using nginx.

Step 11: To exit the container, use 'CTRL+P+Q'. Create a duplicate tab and take the root user rights. Run commands: 'docker ps' 'docker ps -a' Also run 'docker images' to check the images in the repository



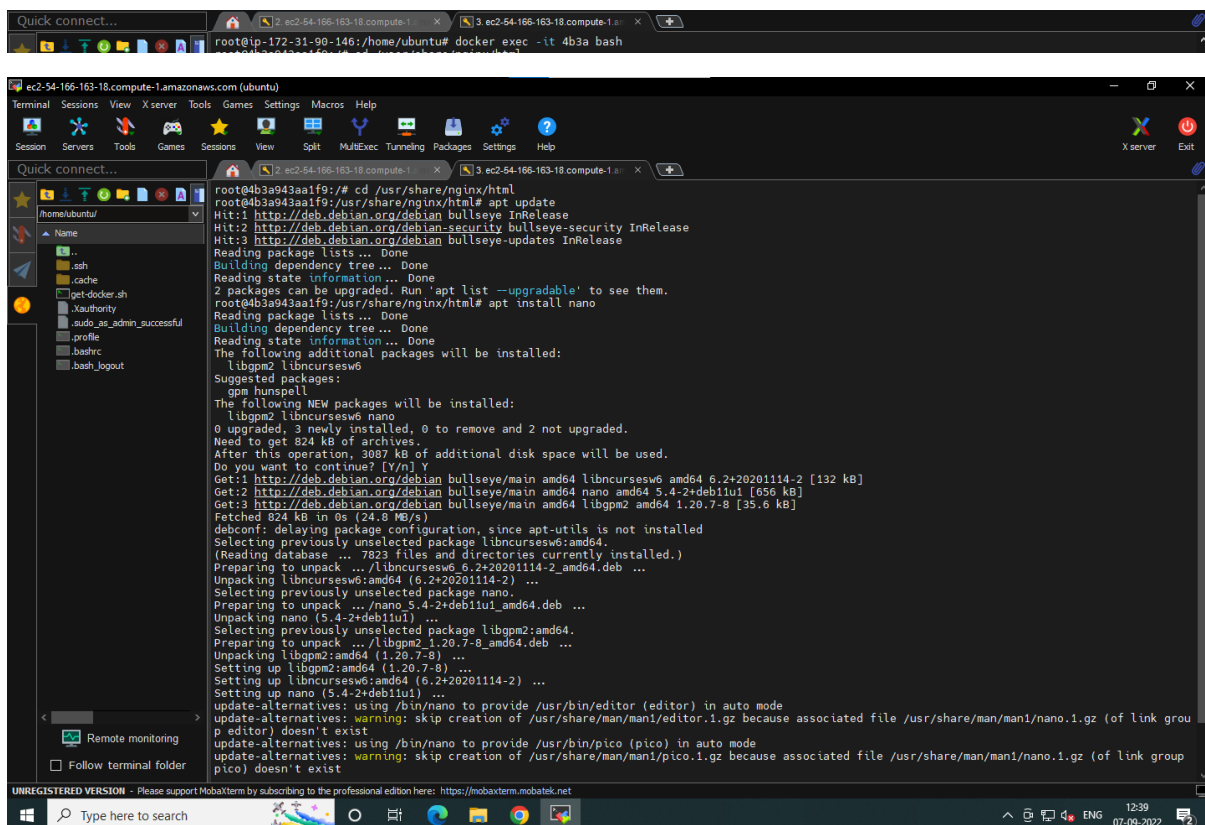
CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
4b3a943aa1f9	nginx	"/docker-entrypoint..."	21 minutes ago	Up 21 minutes	0.0.0.0:80->80/tcp, :::80->80/tcp	afrah-webpage

Step 12: To make changes to a file within a container use command 'docker exec -it (container id) bash'

Update the container using command 'apt update'.

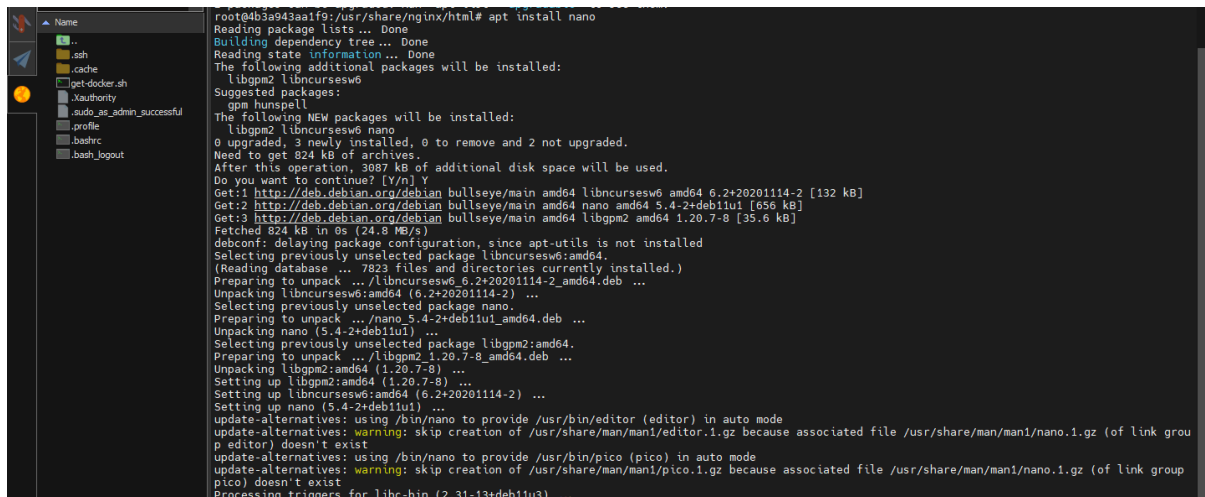
Now within the container navigate to the html directory using command: 'cd /usr/share/nginx/html'

Then update container using command 'apt update'



```
root@ip-172-31-90-146:/home/ubuntu# docker exec -it 4b3a bash
root@4b3a943aa1f9:/# cd /usr/share/nginx/html
root@4b3a943aa1f9:/usr/share/nginx/html# apt update
Hit:1 http://deb.debian.org/debian bullseye InRelease
Hit:2 http://deb.debian.org/debian-security bullseye-security InRelease
Hit:3 http://deb.debian.org/debian bullseye-updates InRelease
Reading package lists ... Done
Building dependency tree ... Done
Reading state information ... Done
2 packages can be upgraded. Run 'apt list --upgradable' to see them.
root@4b3a943aa1f9:/usr/share/nginx/html# apt install nano
Reading package lists ... Done
Building dependency tree ... Done
Reading state information ... Done
The following additional packages will be installed:
  libgpm2 libncursesw6
Suggested packages:
  gpm hunspell
The following NEW packages will be installed:
  libgpm2 libncursesw6 nano
0 upgraded, 3 newly installed, 0 to remove and 2 not upgraded.
Need to get 824 kB of archives.
After this operation, 3087 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://deb.debian.org/debian bullseye/main amd64 libncursesw6 amd64 6.2+20201114-2 [132 kB]
Get:2 http://deb.debian.org/debian bullseye/main amd64 nano amd64 5.4-2+deb11u1 [656 kB]
Get:3 http://deb.debian.org/debian bullseye/main amd64 libgpm2 amd64 1.20.7-8 [35.6 kB]
Fetched 824 kB in 0s (24.8 MB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package libncursesw6:amd64.
(Reading database ... 7823 files and directories currently installed.)
Preparing to unpack .../libncursesw6_6.2+20201114-2_amd64.deb ...
Unpacking libncursesw6:amd64 (6.2+20201114-2) ...
Selecting previously unselected package nano.
Preparing to unpack .../nano_5.4-2+deb11u1_amd64.deb ...
Unpacking nano (5.4-2+deb11u1) ...
Selecting previously unselected package libgpm2:amd64.
Preparing to unpack .../libgpm2_1.20.7-8_amd64.deb ...
Unpacking libgpm2:amd64 (1.20.7-8) ...
Setting up libgpm2:amd64 (1.20.7-8) ...
Setting up libncursesw6:amd64 (6.2+20201114-2) ...
Setting up nano (5.4-2+deb11u1) ...
update-alternatives: using /bin/nano to provide /usr/bin/editor (editor) in auto mode
update-alternatives: warning: skip creation of /usr/share/man/man1/editor.1.gz because associated file /usr/share/man/man1/nano.1.gz (of link group p editor) doesn't exist
update-alternatives: using /bin/nano to provide /usr/bin/pico (pico) in auto mode
update-alternatives: warning: skip creation of /usr/share/man/man1/pico.1.gz because associated file /usr/share/man/man1/nano.1.gz (of link group pico) doesn't exist
```

Step 13: Now use command: 'apt install nano' to install nano text editor

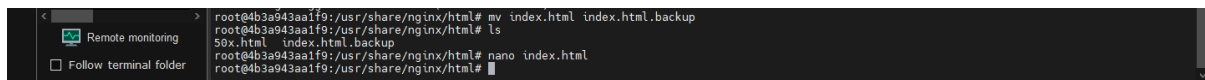


```
root@4b3a943a1f9:/usr/share/nginx/html# apt install nano
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libgpm2 libncursesw6
Suggested packages:
  gpm lunspell
The following NEW packages will be installed:
  libgpm2 libncursesw6 nano
0 upgraded, 3 newly installed, 0 to remove and 2 not upgraded.
After this operation, 3087 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://deb.debian.org/debian bullseye/main amd64 libncursesw6 amd64 6.2+20201114-2 [132 kB]
Get:2 http://deb.debian.org/debian bullseye/main amd64 nano amd64 5.4-2+deb11u1 [656 kB]
Get:3 http://deb.debian.org/debian bullseye/main amd64 libgpm2 amd64 1.20.7-8 [35.6 kB]
Fetched 824 kB in 0s (24.8 MB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package libncursesw6:amd64.
(Reading database ... 7823 files and directories currently installed.)
Preparing to unpack .../libncursesw6_6.2+20201114-2_amd64.deb ...
Unpacking libncursesw6:amd64 (6.2+20201114-2) ...
Selecting previously unselected package nano.
Preparing to unpack .../nano_5.4-2+deb11u1_amd64.deb ...
Unpacking nano (5.4-2+deb11u1) ...
Selecting previously unselected package libgpm2:amd64.
Preparing to unpack .../libgpm2_1.20.7-8_amd64.deb ...
Unpacking libgpm2:amd64 (1.20.7-8) ...
Setting up libncursesw6:amd64 (6.2+20201114-2) ...
Setting up nano (5.4-2+deb11u1) ...
update-alternatives: using /bin/nano to provide /usr/bin/editor (editor) in auto mode
update-alternatives: warning: skip creation of /usr/share/man/man1/editor.1.gz because associated file /usr/share/man/man1/nano.1.gz (of link group p editor) doesn't exist
update-alternatives: using /bin/nano to provide /usr/bin/pico (pico) in auto mode
update-alternatives: warning: skip creation of /usr/share/man/man1/pico.1.gz because associated file /usr/share/man/man1/nano.1.gz (of link group pico) doesn't exist
Processing triggers for libc-bin (2.31-13+deb11u3) ...
```

Step 14: Now move the original nginx index as a backup so you can create your own html index file using the command:

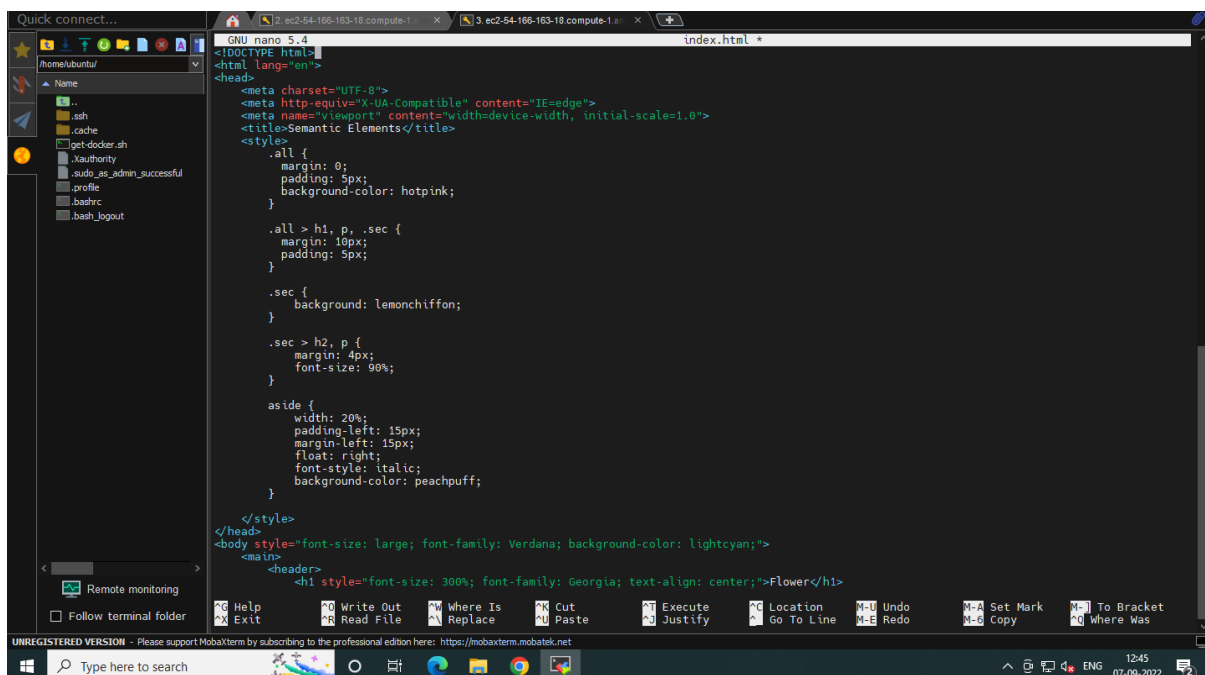
'mv index.html index.html.backup'

Then, open nano text editor using command: 'nano index.html'



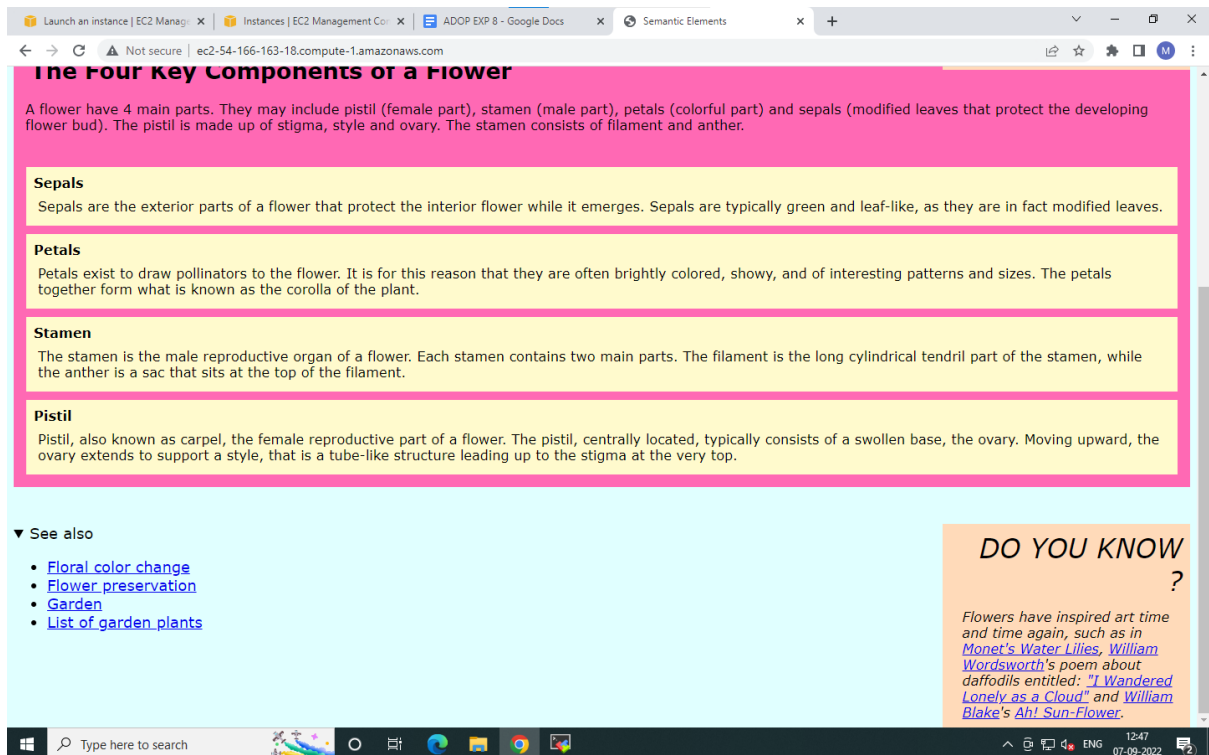
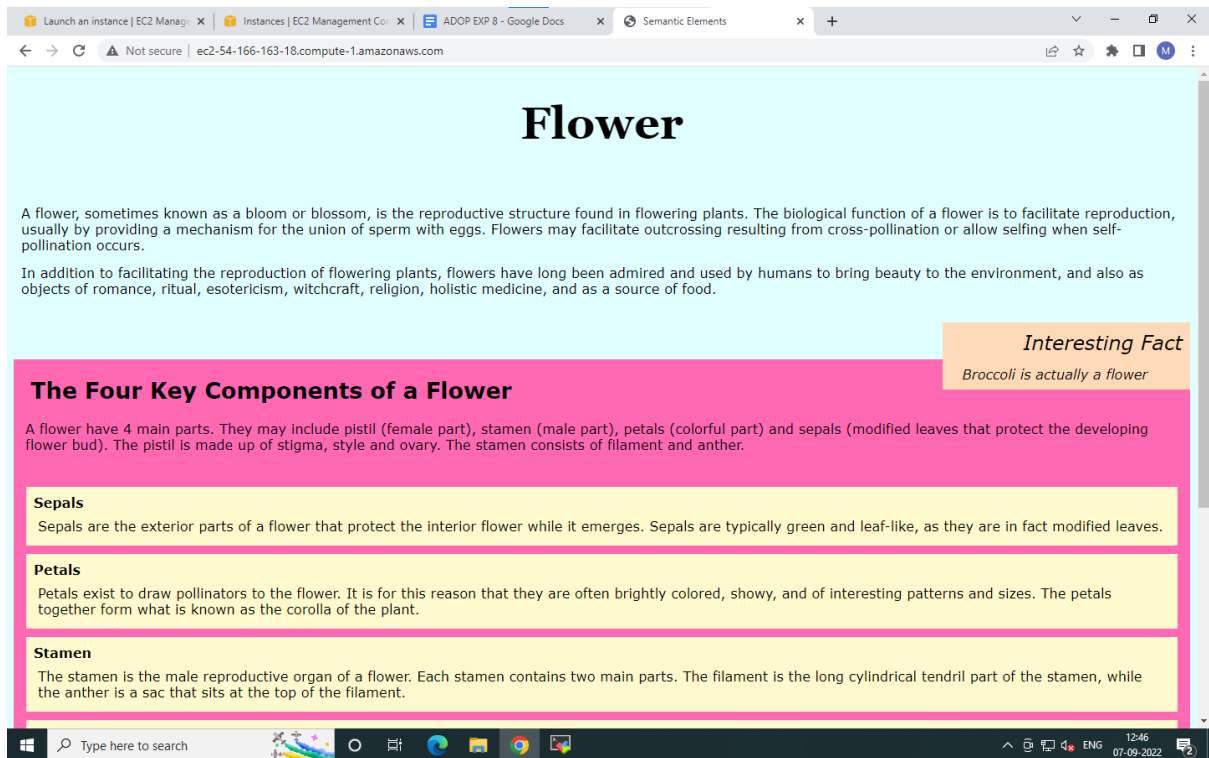
```
root@4b3a943a1f9:/usr/share/nginx/html# mv index.html index.html.backup
root@4b3a943a1f9:/usr/share/nginx/html# ls
50x.html  index.html.backup
root@4b3a943a1f9:/usr/share/nginx/html# nano index.html
root@4b3a943a1f9:/usr/share/nginx/html#
```

Step 15: Write an html code of your choice -> CTRL+O -> ENTER -> CTRL X. This will save the code



```
GNU nano 5.4 index.html
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Semantic Elements</title>
  <style>
    .all {
      margin: 0;
      padding: 5px;
      background-color: hotpink;
    }
    .all > h1, p, .sec {
      margin: 10px;
      padding: 5px;
    }
    .sec {
      background: lemonchiffon;
    }
    .sec > h2, p {
      margin: 4px;
      font-size: 90%;
    }
    aside {
      width: 20%;
      padding-left: 15px;
      margin-left: 15px;
      float: right;
      font-style: italic;
      background-color: peachpuff;
    }
  </style>
</head>
<body style="font-size: large; font-family: Verdana; background-color: lightcyan;">
  <main>
    <header>
      <h1 style="font-size: 300%; font-family: Georgia; text-align: center;">Flower</h1>
```

Step 16: Again, refresh the nginx web browser, it will be updated with the new changes



Step 17: Create another duplicate tab and get the root user access.

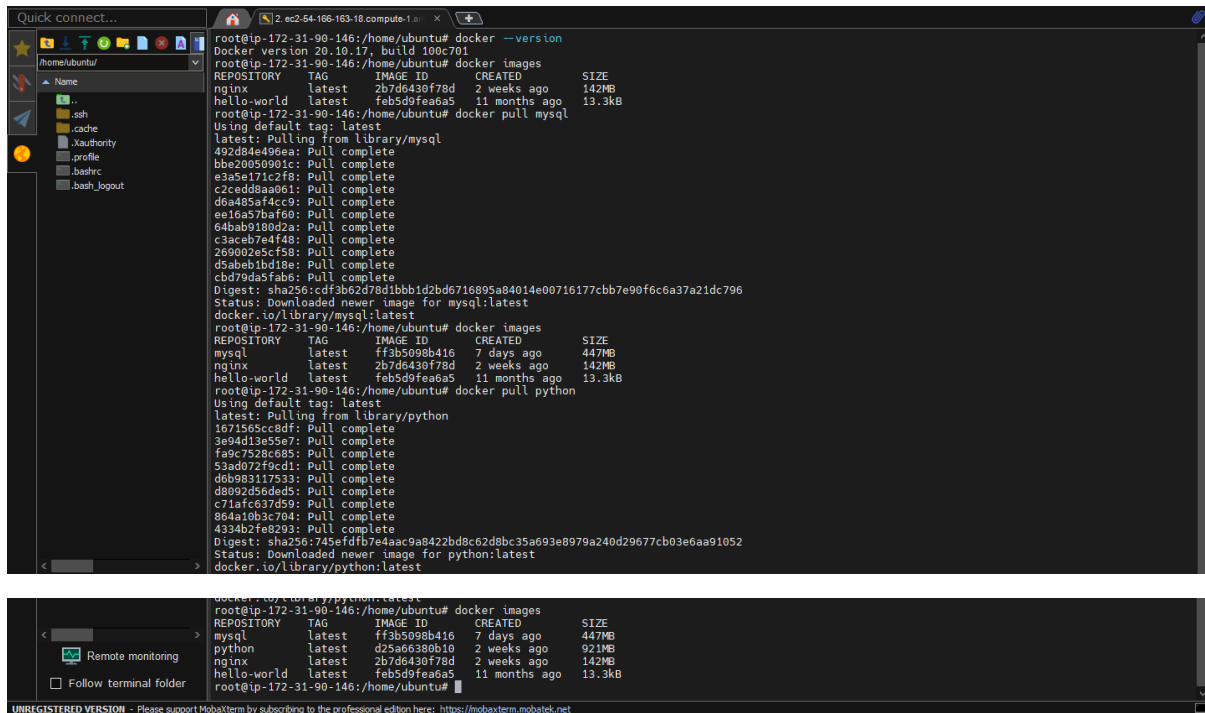
Run the command: 'docker pull mysql' to install a mysql image.

Then, run 'docker images' to check the image upload in the repository.

Subsequently, run commands such as

'docker pull python'

to install the respective images. Check the repository for the upload



The first screenshot shows a terminal window with the following commands and output:

```
root@ip-172-31-90-146:/home/ubuntu# docker --version
Docker version 20.10.17, build 100c701

root@ip-172-31-90-146:/home/ubuntu# docker images
REPOSITORY          TAG             IMAGE ID        CREATED         SIZE
mysql                latest          ff3b5098b416   7 days ago     447MB
python               latest          d25a66380b10   2 weeks ago    921MB
nginx                latest          2b7d6430f78d   2 weeks ago    142MB
hello-world          latest          feb5d9fea6a5    11 months ago  13.3kB

root@ip-172-31-90-146:/home/ubuntu# docker pull mysql
Using default tag: latest
latest: Pulling from library/mysql
492d04e495e7: Pull complete
b8e20050901c: Pull complete
e3a5e171c2f8: Pull complete
c2cedd8aa061: Pull complete
d6a485af4cc9: Pull complete
ea16a57bafe9: Pull complete
64bab9180d2a: Pull complete
c3aceb7e4f48: Pull complete
269002e5cf58: Pull complete
d5abeb1bd18e: Pull complete
cbd79dasfab6: Pull complete
Digest: sha256:cd3b62d78d1bb1d2bd6716895a84014e00716177cbb7e90f6c6a37a21dc796
Status: Downloaded newer image for mysql:latest
docker.io/library/mysql:latest

root@ip-172-31-90-146:/home/ubuntu# docker images
REPOSITORY          TAG             IMAGE ID        CREATED         SIZE
mysql                latest          ff3b5098b416   7 days ago     447MB
python               latest          d25a66380b10   2 weeks ago    921MB
nginx                latest          2b7d6430f78d   2 weeks ago    142MB
hello-world          latest          feb5d9fea6a5    11 months ago  13.3kB

root@ip-172-31-90-146:/home/ubuntu# docker pull python
Using default tag: latest
latest: Pulling from library/python
1671565cc8df: Pull complete
3e94d19e5e7: Pull complete
fa9c7528c685: Pull complete
53ad072f9cd1: Pull complete
d6b983117533: Pull complete
d8092d5d6d5d: Pull complete
c71af637859: Pull complete
864a10b3c704: Pull complete
4334b2fe8293: Pull complete
Digest: sha256:745efdfb7e4aac9a8422bd8c62d8bc35a693e8979a240d29677cb03e6aa91052
Status: Downloaded newer image for python:latest
docker.io/library/python:latest
```

The second screenshot shows the same terminal window with the following commands and output:

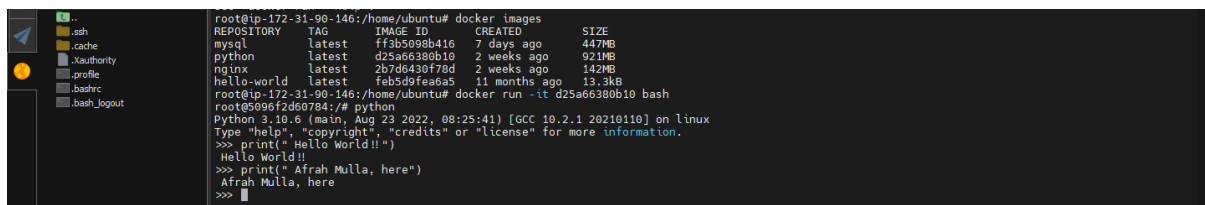
```
root@ip-172-31-90-146:/home/ubuntu# docker images
REPOSITORY          TAG             IMAGE ID        CREATED         SIZE
mysql                latest          ff3b5098b416   7 days ago     447MB
python               latest          d25a66380b10   2 weeks ago    921MB
nginx                latest          2b7d6430f78d   2 weeks ago    142MB
hello-world          latest          feb5d9fea6a5    11 months ago  13.3kB

root@ip-172-31-90-146:/home/ubuntu#
```

Step 18: Now, to enter the python container use command:

'docker run -it (image id) bash' and type 'python' to enter the shell

Execute any command using python syntax such as -> print("Hello World")



The screenshot shows a terminal window with the following commands and output:

```
root@ip-172-31-90-146:/home/ubuntu# docker images
REPOSITORY          TAG             IMAGE ID        CREATED         SIZE
mysql                latest          ff3b5098b416   7 days ago     447MB
python               latest          d25a66380b10   2 weeks ago    921MB
nginx                latest          2b7d6430f78d   2 weeks ago    142MB
hello-world          latest          feb5d9fea6a5    11 months ago  13.3kB

root@ip-172-31-90-146:/home/ubuntu# docker run -it d25a66380b10 bash
root@d596f2d6070d1:/# python
Python 3.10.6 (main, Aug 23 2022, 08:25:41) [GCC 10.2.1 20210110] on linux
Type "help", "copyright", "credits" or "license()" for more information.
>>> print("Hello World!!")
Hello World!!
>>> print("Afrah Mulla, here")
Afrah Mulla, here
>>>
```

Step 19: Run the command ‘docker ps’ to check the number of containers and their ID’s.

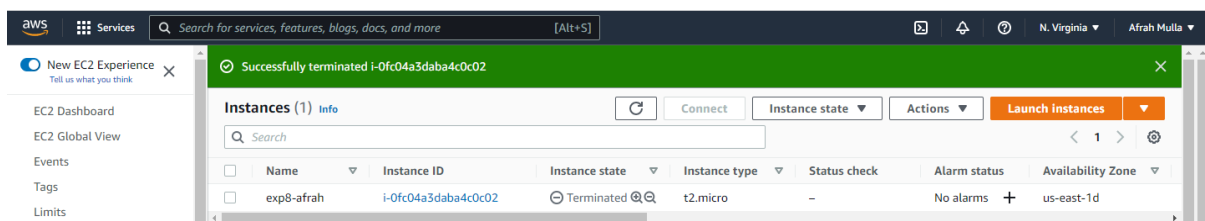
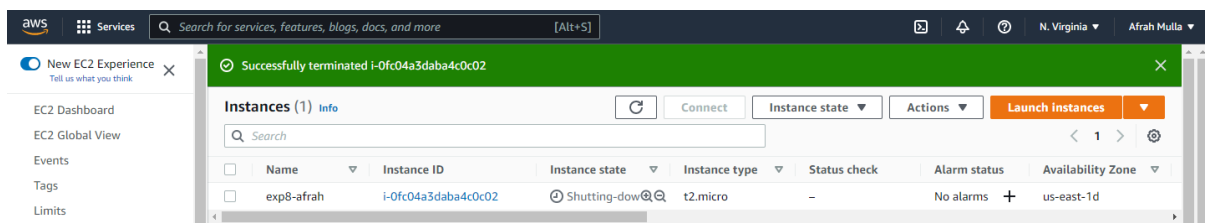
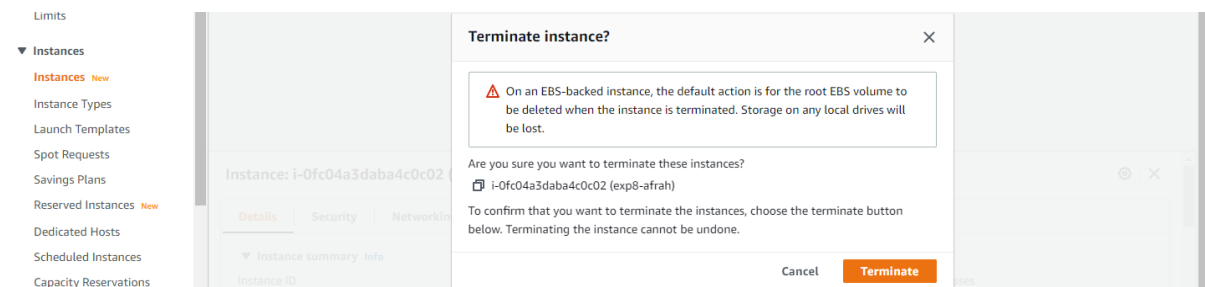
To stop a container use command: ‘docker stop (container id)’

You can use the command ‘docker ps -a’ to check the status of the container

```
Quick connect... 2 ec2-54-166-163-18 compute-1... 3 ec2-54-166-163-18 compute-1...
root@ip-172-31-90-146:/home/ubuntu# docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS                               NAMES
4b3a943aa1f9   nginx    "/docker-entrypoint..." 21 minutes ago Up 21 minutes 0.0.0.0:80->80/tcp, :::80->80/tcp  afrah-webpage
root@ip-172-31-90-146:/home/ubuntu# docker stop 4b3a
4b3a
root@ip-172-31-90-146:/home/ubuntu#

root@ip-172-31-90-146:/home/ubuntu# docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS                               NAMES
5096f2d60784   d25a08380b10  "bash"                  5 minutes ago Up 5 minutes                               gracious_maxwell
4b3a943aa1f9   nginx    "/docker-entrypoint..." 32 minutes ago Exited (137) 10 minutes ago           afrah-webpage
384f36a39a1a   hello-world  "/hello"                 35 minutes ago Exited (0) 35 minutes ago           brave_fermi
8958d492e9d0   hello-world  "/hello"                 39 minutes ago Exited (0) 39 minutes ago           tender_nobel
```

Step 20: Quit MobaXterm and then delete your EC2 instance



6. Demonstrate any 15 docker command and explain its uses.

Docker command	Uses
docker --version	This command is used to get the currently installed version of docker
docker <image name> --version	This command is used to get the currently installed version of images in docker
docker login	This command is used to login to the docker hub repository
docker logout	This command is used to logout from the docker hub repository
docker ps	This command is used to list the running containers
docker ps -a	This command is used to show all the running and exited containers
docker pull <image name>	This command is used to pull images from the docker repository (hub.docker.com)
docker images	This command lists all the locally stored docker images
docker exec -it <container_id> bash	This command is used to access the running container
docker run -it <image_id> bash	This command is used to create a container from an image
docker inspect <image name>	This command is used to display detailed information
docker history <image name>	This command is used to show the history of an image
docker rm <container_id>	This command is used to delete a stopped container
docker rmi <image_id>	This command is used to delete an image from local storage
docker stop <container_id>	This command stops a running container and let it shutdown gracefully
docker kill <container_id>	This command kills the container by stopping its execution immediately

```
Quick connect...
/home/ubuntu/
Name
ssh
.cache
get-docker.sh
.xauthority
.sudo_as_admin_successful
.profile
.bashrc
.bash_logout
.bash_history

ubuntu@ip-172-31-90-146:~$ sudo su
root@ip-172-31-90-146:/home/ubuntu# docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
5096f2d60784   d25a66380b10   "bash"    4 minutes ago   Up 4 minutes           gracious_maxwell

root@ip-172-31-90-146:/home/ubuntu# docker --version
Docker version 20.10.17, build 100c701

root@ip-172-31-90-146:/home/ubuntu# docker images
REPOSITORY    TAG       IMAGE ID       CREATED       SIZE
mysql          latest    ff3b50908b416   7 days ago   447MB
python         latest    d25a66380b10   2 weeks ago  921MB
nginx          latest    2b7d6430f78d   2 weeks ago  142MB
hello-world    latest    feb5d9fea6a5   11 months ago  13.3kB

root@ip-172-31-90-146:/home/ubuntu# docker mysql --version
Docker version 20.10.17, build 100c701

root@ip-172-31-90-146:/home/ubuntu# docker python --version
Docker version 20.10.17, build 100c701

root@ip-172-31-90-146:/home/ubuntu# docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
5096f2d60784   d25a66380b10   "bash"    5 minutes ago   Up 5 minutes           gracious_maxwell
4b3a943aa1f9   nginx     "/docker-entrypoint..."   32 minutes ago   Exited (137) 10 minutes ago   afrah-webpage
304f36a39a1a   hello-world   "/hello"   35 minutes ago   Exited (0) 35 minutes ago   brave_ferml
895d492e9d0   hello-world   "/hello"   39 minutes ago   Exited (0) 39 minutes ago   tender_nobel
```

```
Quick connect...
/home/ubuntu/
Name
ssh
.cache
get-docker.sh
.xauthority
.sudo_as_admin_successful
.profile
.bashrc
.bash_logout
.bash_history

root@ip-172-31-90-146:/home/ubuntu# docker inspect nginx
[
  {
    "Id": "sha256:2b7d6430f78d432f89109b29d88d4c36c868c8dbf15dc31d2132ceaa02b993763",
    "RepoTags": [
      "nginx:latest"
    ],
    "RepoDigests": [
      "nginx@sha256:b95a99feebf7797479e0c5eb5ec0bdfa5d9f504bc94da550c2f58e839ea6914f"
    ],
    "Parent": "",
    "Comment": "",
    "Created": "2022-08-23T03:59:02.789512663Z",
    "Container": "ae446df064f9d1aca13604145452bb55a0a203b4bb7583e3dec971b6133a4cb",
    "ContainerConfig": {
      "Hostname": "ae446df064f9",
      "Domainname": "",
      "User": "",
      "AttachStdin": false,
      "AttachStdout": false,
      "AttachStderr": false,
      "ExposedPorts": {
        "80/tcp": {}
      },
      "Tty": false,
      "OpenStdin": false,
      "StdinOnce": false,
      "Env": [
        "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin",
        "NGINX_VERSION=1.23.1",
        "NJS_VERSION=0.7.6",
        "PKG_RELEASE=1-bullseye"
      ],
      "Cmd": [
        "/bin/sh",
        "-c",
        "#(nop) ",
        "CMD"
      ]
    }
  ]
}
```

```
Quick connect...
/home/ubuntu/
Name
ssh
.cache
get-docker.sh
.xauthority
.sudo_as_admin_successful
.profile
.bashrc
.bash_logout
.bash_history

root@ip-172-31-90-146:/home/ubuntu# docker inspect python
[
  {
    "Id": "sha256:d25a66380b10283603ff696d7777bba5c1b9126f0be7d118b9574946bcf84",
    "RepoTags": [
      "python:latest"
    ],
    "RepoDigests": [
      "python@sha256:7450dfb7e4aac9a8422bd8c62dbbc35a693e8979a240d29677cb03e6aa91052"
    ],
    "Parent": "",
    "Comment": "",
    "Created": "2022-08-23T08:27:53.140006392Z",
    "Container": "f77e0061fe85",
    "ContainerConfig": {
      "Hostname": "f77e0061fe85",
      "Domainname": "",
      "User": "",
      "AttachStdin": false,
      "AttachStdout": false,
      "AttachStderr": false,
      "Tty": false,
      "OpenStdin": false,
      "StdinOnce": false,
      "Env": [
        "PATH=/usr/local/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin",
        "LANG=C.UTF-8",
        "GPG_KEY=A035C8C19210BA821ECAA86B64E28F8D6B44696D",
        "PYTHON_VERSION=3.10.6",
        "PYTHON_PIP_VERSION=22.2.1",
        "PYTHON_SETUPTOOLS_VERSION=63.2.0",
        "PYTHON_GET_PIP_URL=https://github.com/pypa/get-pip/raw/5eac1050023df1f5c98b173b248c260023f2278/public/get-pip.py",
        "PYTHON_GET_PIP_SHA256=5aefebade911d997af080b315ebcb7f882212d070465df544e1175ac2be519b4"
      ],
      "Cmd": [
        "python"
      ]
    }
  ]
}
```

