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Assignment 7

Aim: Deploy a web application using Docker.

Theory:

1. What is Docker ?

Docker is a containerization platform that allows developers to package an application and its dependencies into a container that can run on any machine with Docker installed.

2. Docker Architecture:

Docker architecture includes three main components: the Docker daemon, the Docker client, and the Docker registry. The Docker daemon is the background service that manages the containers, images, and networks. The Docker client is a command-line interface that allows users to interact with the Docker daemon. The Docker registry is a place where Docker images can be stored and shared.

3. Difference between Docker and Virtual machine?

Docker is different from a virtual machine in that it shares the host operating system's kernel and doesn't require a separate operating system for each container. This means that Docker containers are much lighter and faster to start up than virtual machines.



4. Docker Commands:

Docker commands include docker run, docker build, docker push, docker pull, docker ps, and docker logs. These commands are used to manage Docker containers, images, and networks.

5. Dockerfile:

A Dockerfile is a text file that contains instructions for building a Docker image. It specifies the base image, any additional software packages to install, and any configuration settings needed for the application to run.

6. Docker-Compose and Docker-swarm:

Docker-compose is a tool for defining and running multi-container Docker applications. Docker-swarm is a tool for managing a cluster of Docker nodes and deploying a Docker stack to that cluster.



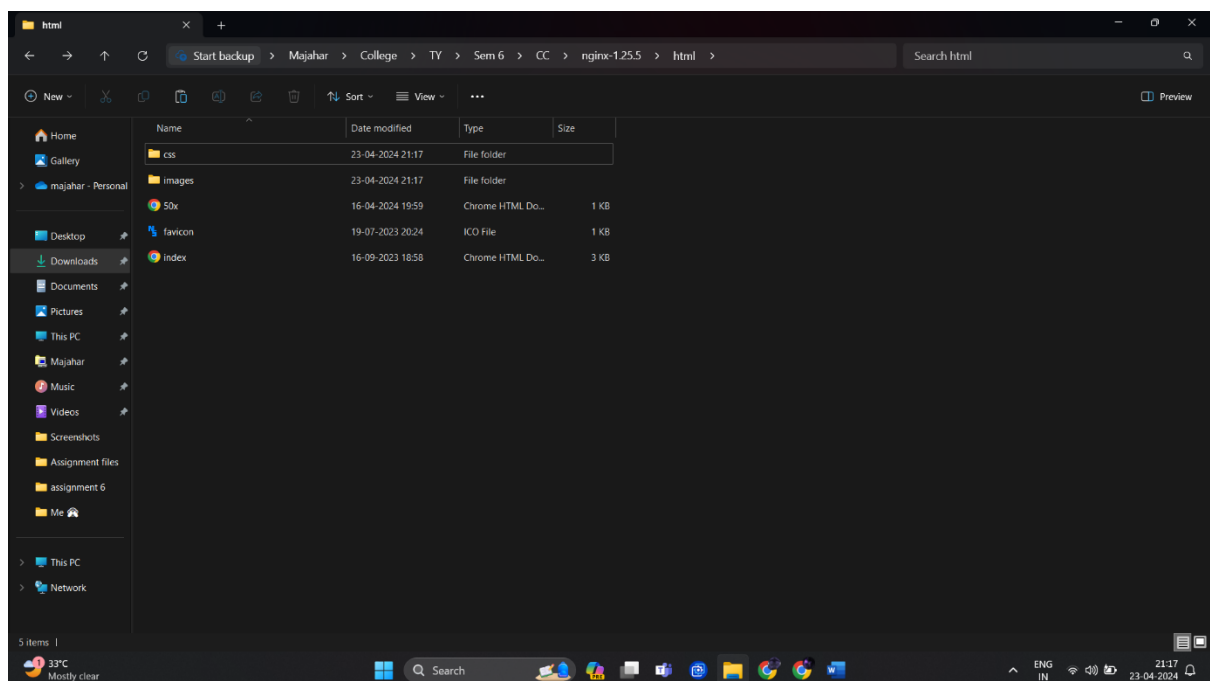
Implementation:

Step 1: Install nginx on windows follow the link:

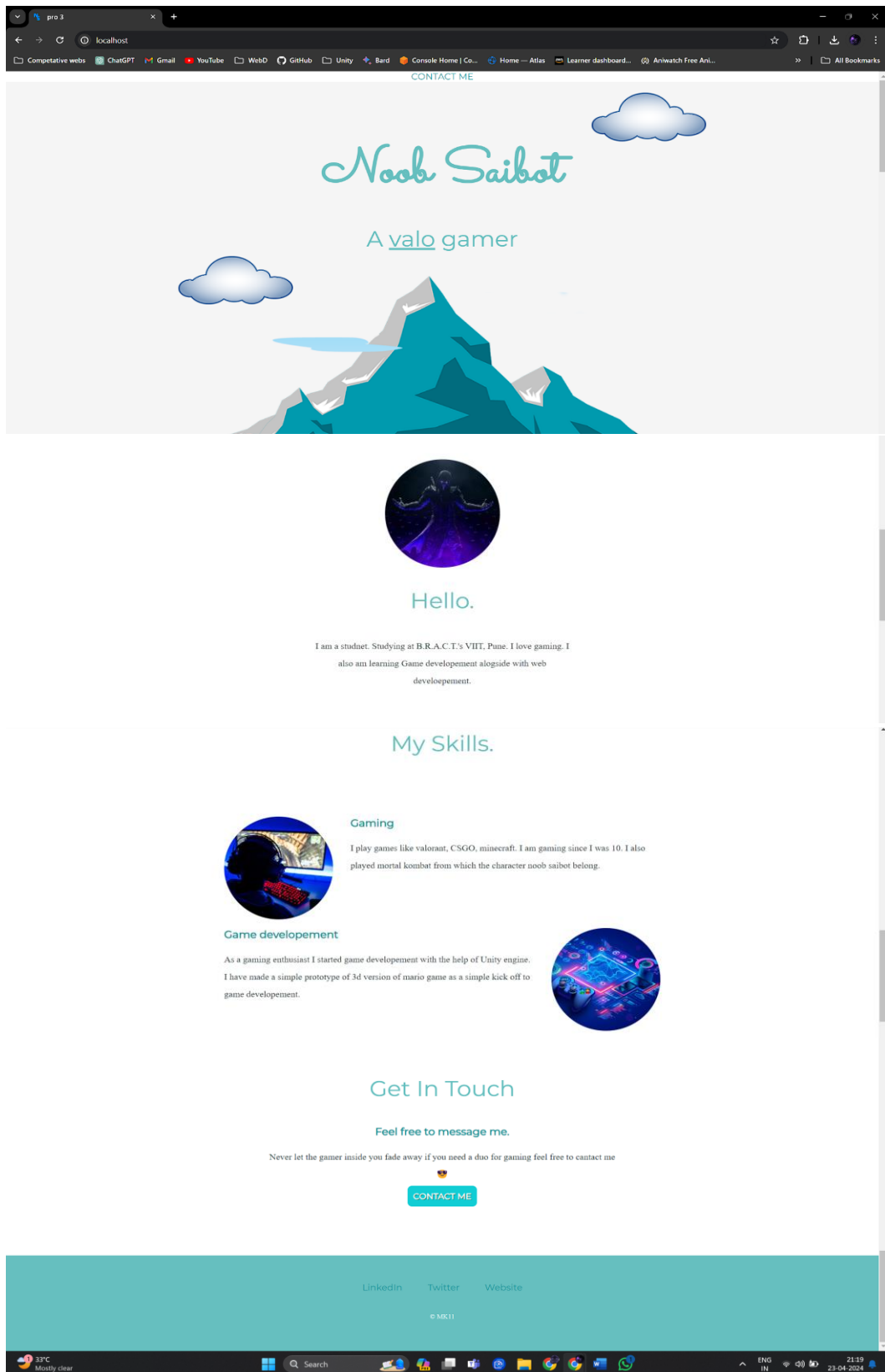
<http://nginx.org/en/docs/windows.html>



Step 2: Copy the sample-website in “C:\nginx\html\” folder

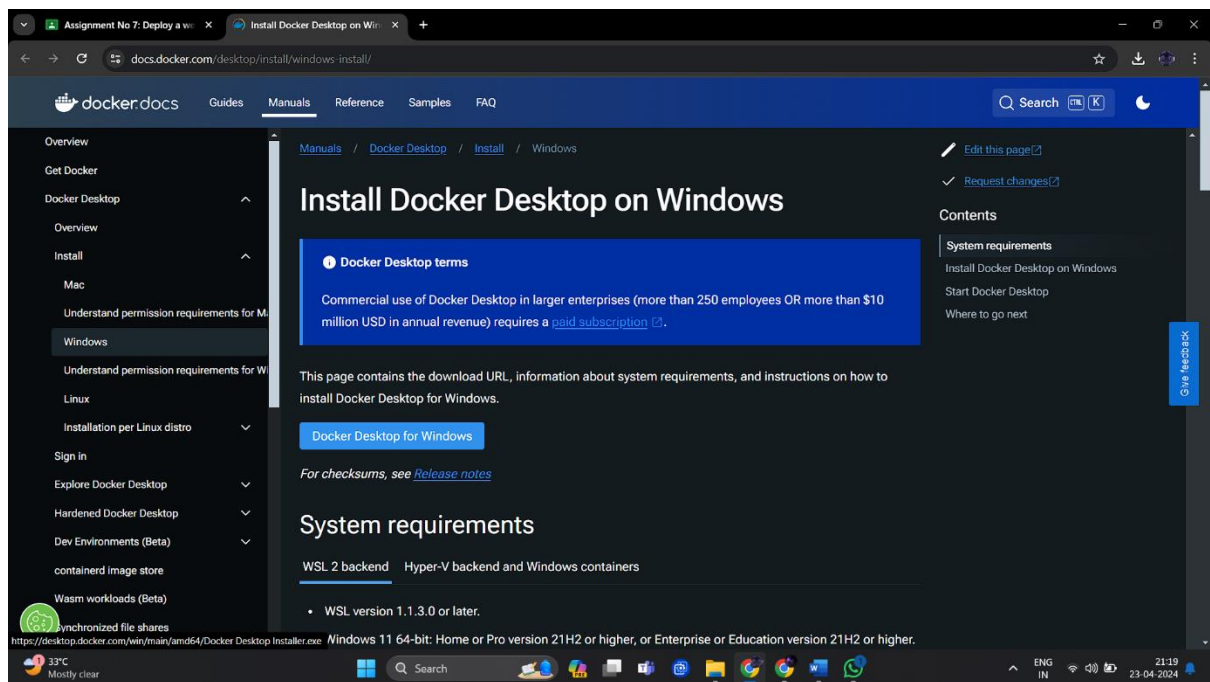


Step 3: open browser and run “localhost:80”



Step 4: Download Docker for windows, follow the link

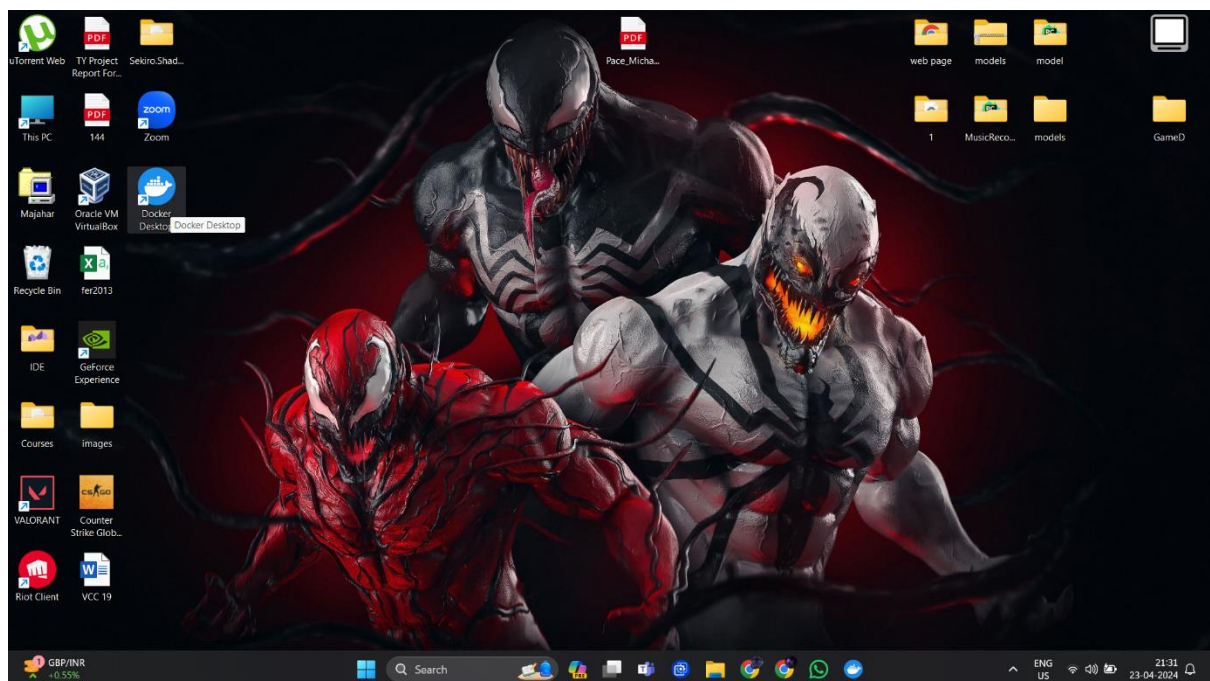
<https://docs.docker.com/desktop/install/windows-install/>

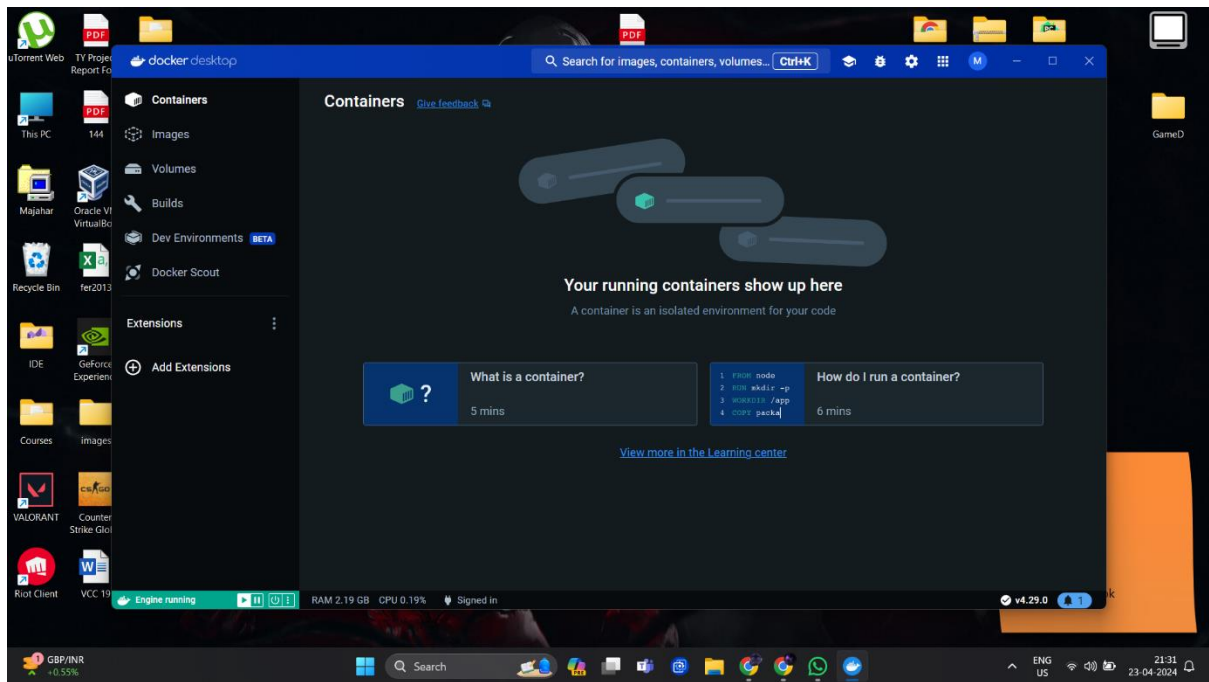


Step 5: Start Docker Desktop

Docker Desktop does not start automatically after installation. To start Docker Desktop:

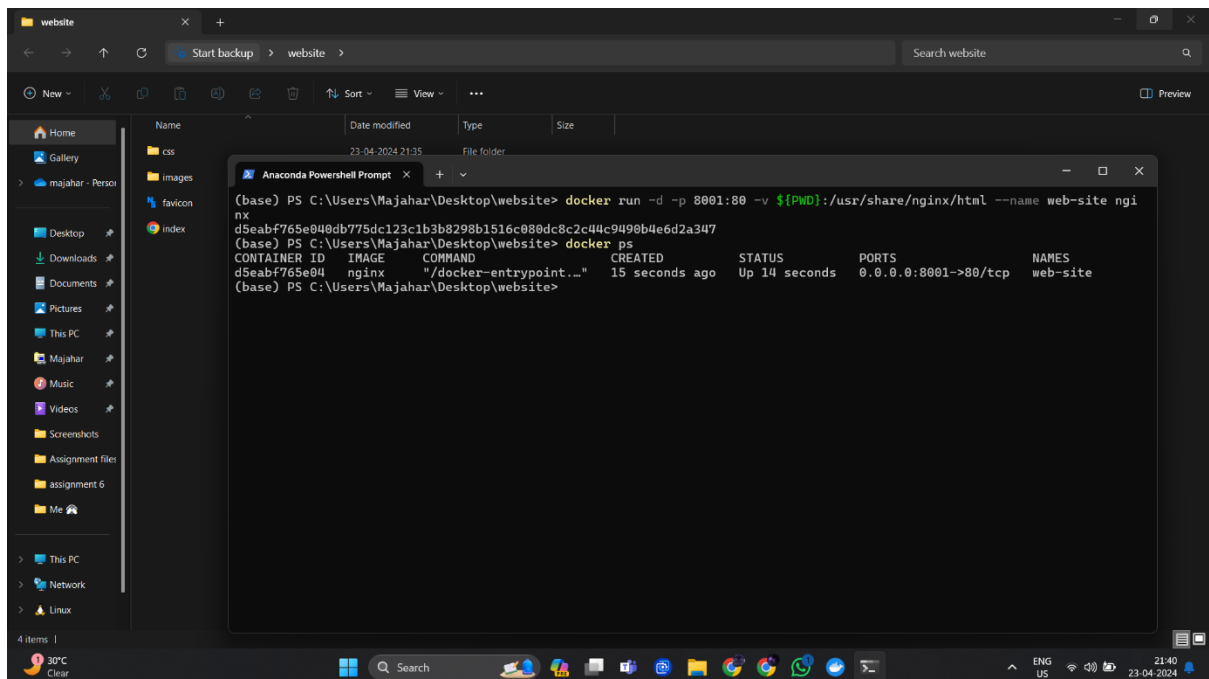
1. Search for Docker, and select Docker Desktop in the search results.





Step 6: Open Powershell and check Docker installation using commands:

a. `docker –version`



b. `docker info`

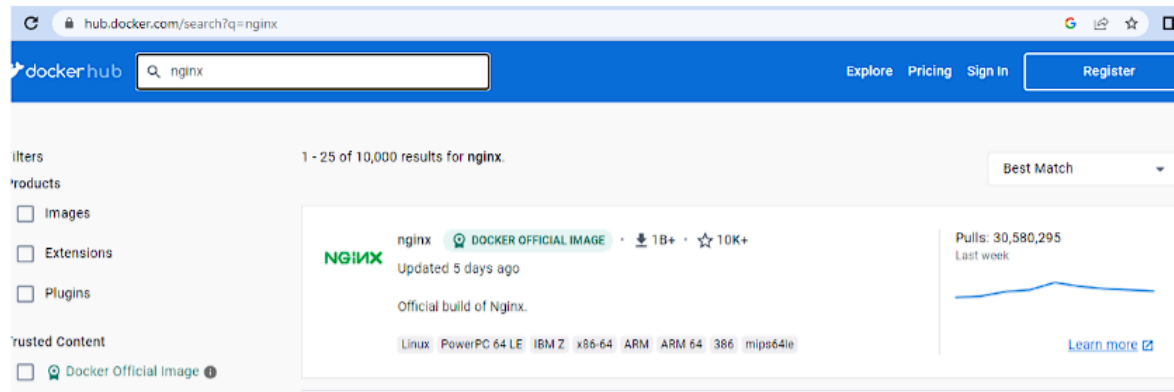
c. `docker version –format {{json .}};`



Steps to run the “Sample website” in Docker container

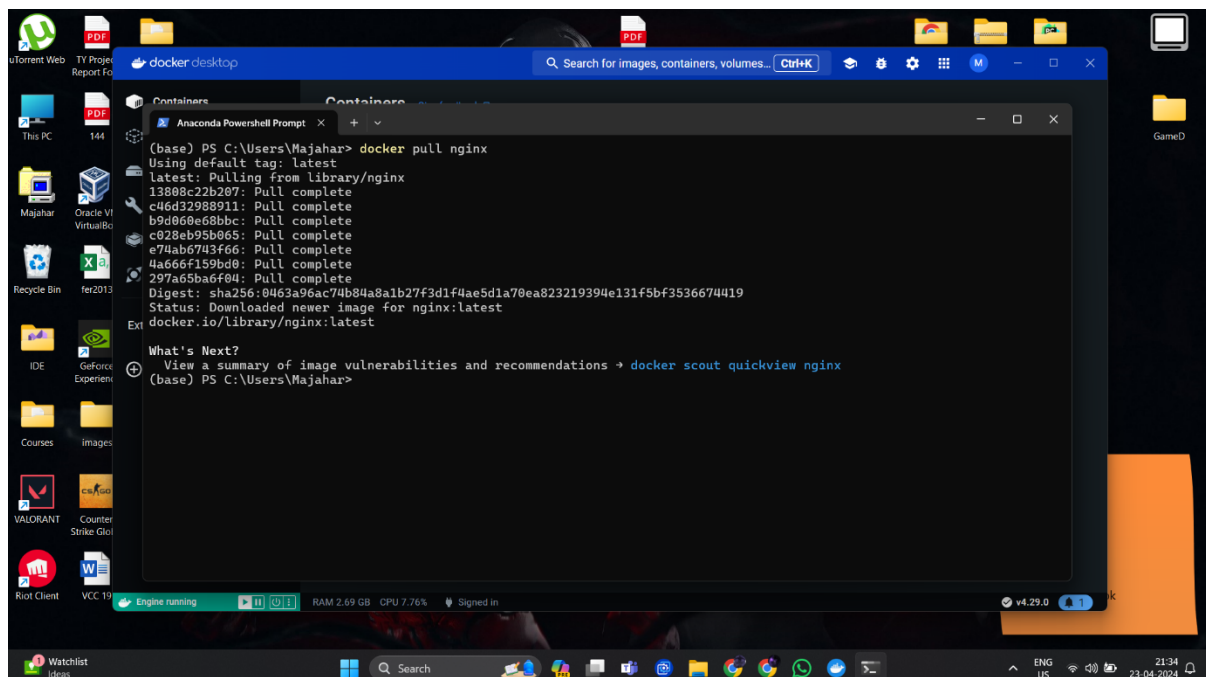
Step 1) visit to Docker hub web site: <https://hub.docker.com/>

Step 2) search for “nginx” image on site



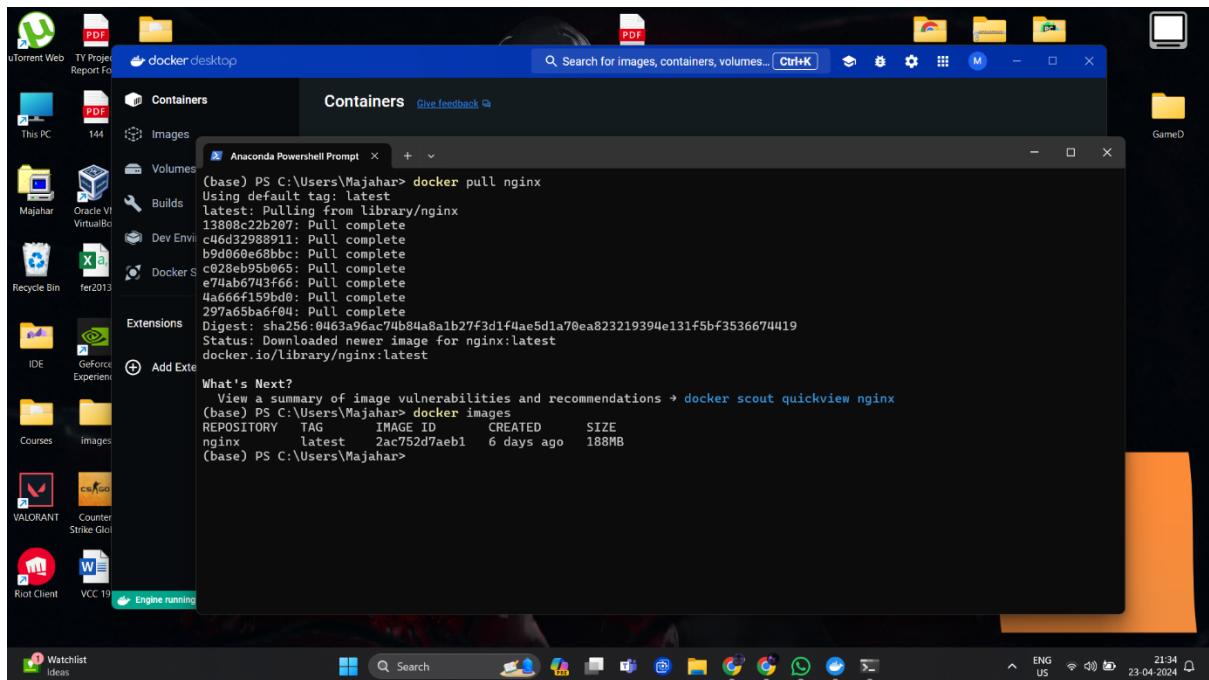
Step 3) pull the latest image of nginx using command

`docker pull nginx`



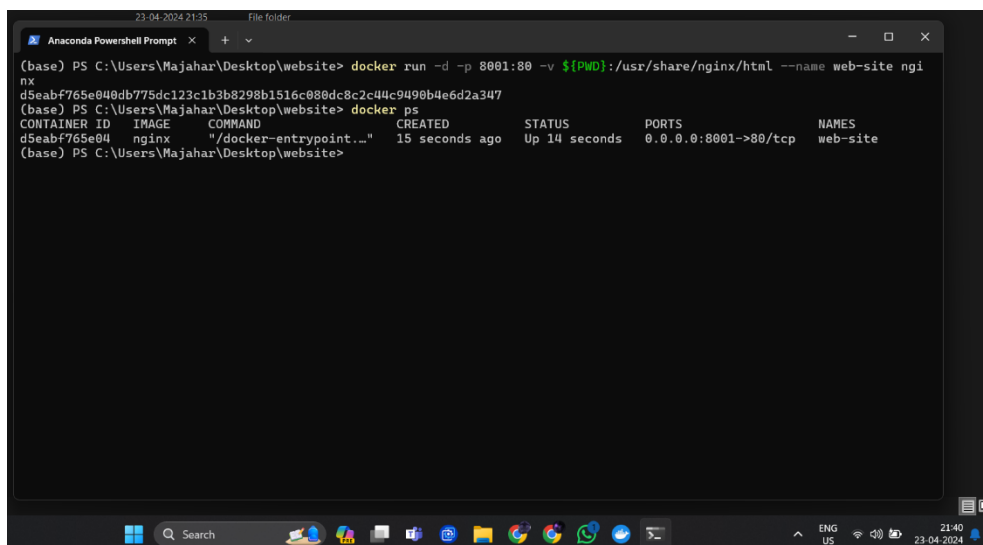
Step 4) check the docker images on your desktop by using command:

`docker image`



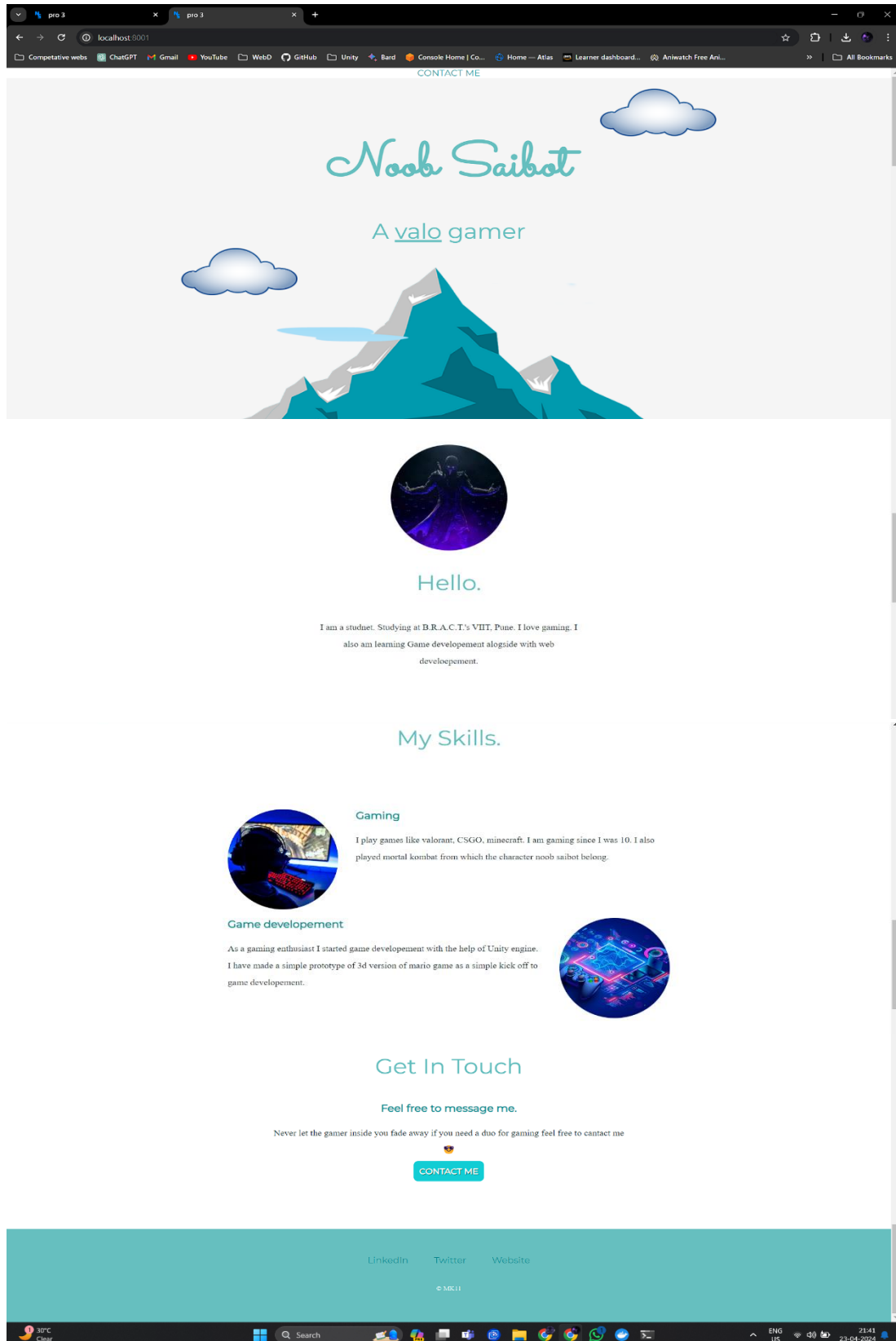
Step 5) go in the “SampleWebsite” folder and then Create a container using the docker command and sync the “SampleWebsite” folder with folder inside the container folder. (This is called Mount Bind”)

“docker run -d -p 8001:80 -v \${PWD}:/usr/share/nginx/html --name web-site nginx”



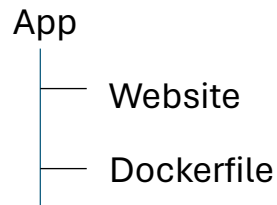
Step 6)verify the website open browser and chec “localhost:8001”. Now this

website is running inside your container.

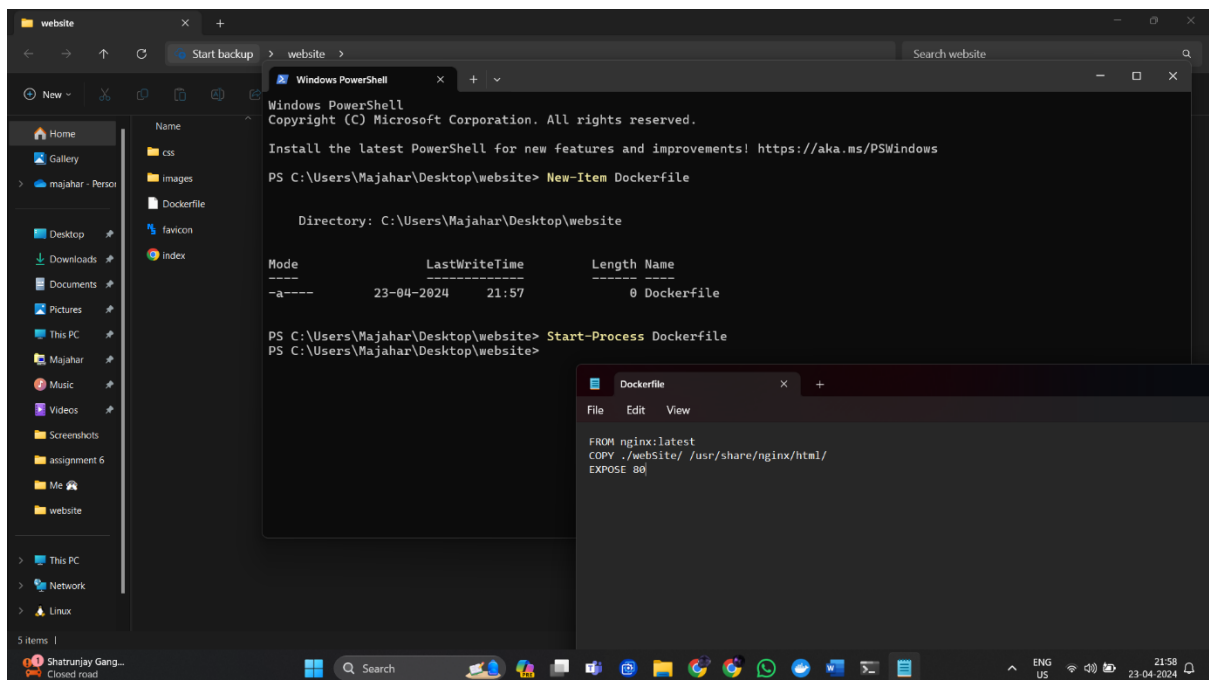


DockerFile

Step 1) Create a Directory structure like

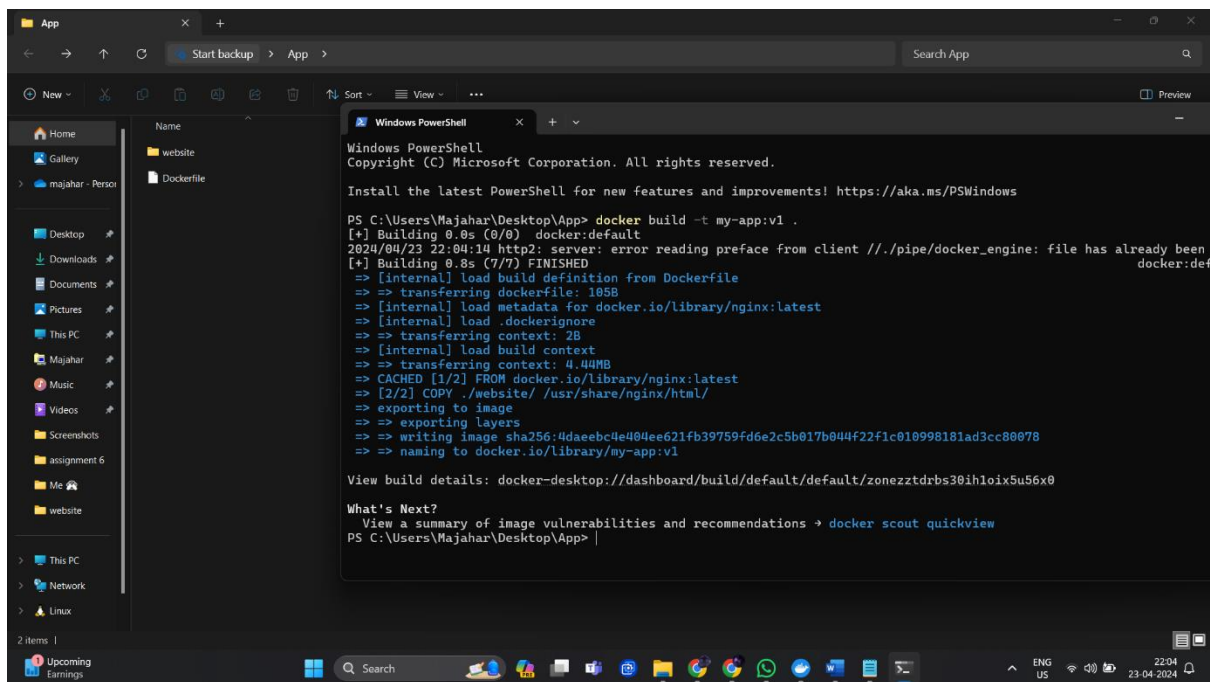


Step 2) Write a following script into “Dockerfile”



Step 3) build image from docker file using command

“docker build -t my-app:v1 .”



```
Windows PowerShell
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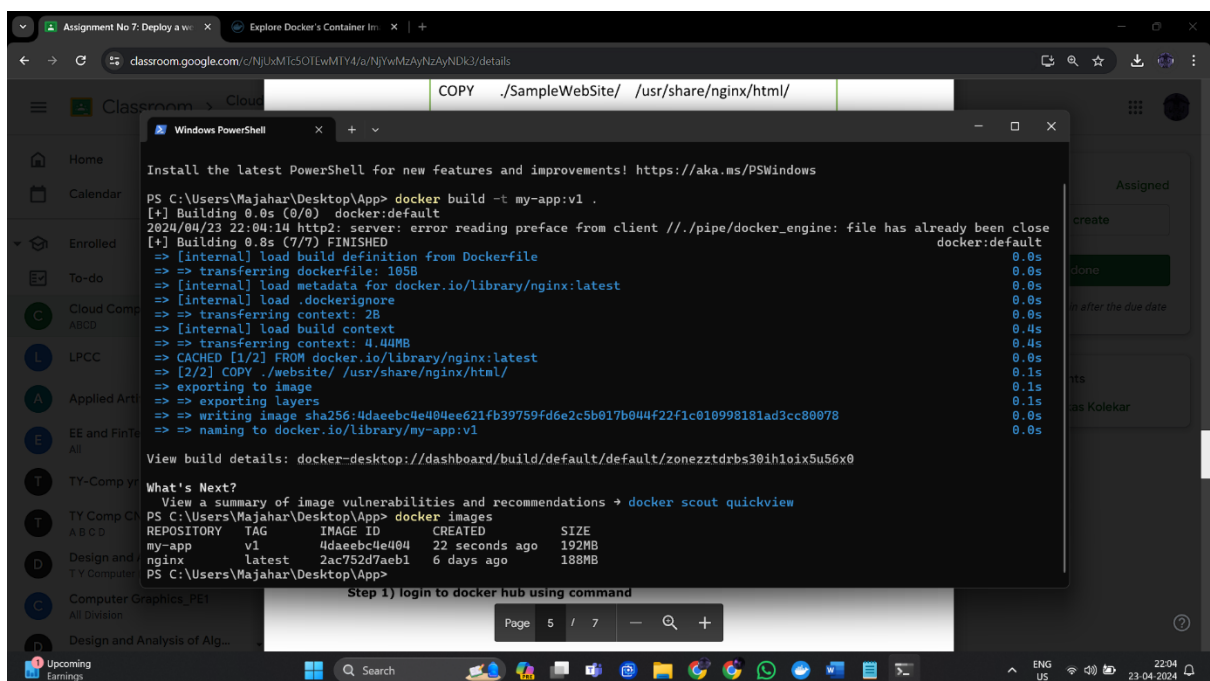
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\Majahar\Desktop\App> docker build -t my-app:v1 .
[*] Building 0.0s (0/0) docker:default
2024/04/23 22:04:14 http2: server: error reading preface from client //./pipe/docker_engine: file has already been
[*] Building 0.8s (7/7) FINISHED
=> [internal] load build definition from Dockerfile
=> => transferring dockerfile: 105B
=> [internal] load metadata for docker.io/library/nginx:latest
=> [internal] load .dockerignore
=> => transferring context: 2B
=> [internal] load build context
=> => transferring context: 4.44MB
=> CACHED [1/2] FROM docker.io/library/nginx:latest
=> [2/2] COPY ./website/ /usr/share/nginx/html/
=> exporting to image
=> => exporting layers
=> writing image sha256:4daeebc4e404ee621fb39759fd6e2c5b017b044f22f1c010998181ad3cc80078
=> naming to docker.io/library/my-app:v1

View build details: docker-desktop://dashboard/build/default/default/zonezztdrbs30ihloix5u56x0

What's Next?
View a summary of image vulnerabilities and recommendations → docker scout quickview
PS C:\Users\Majahar\Desktop\App>
```

Step 4) check images using command: docker images

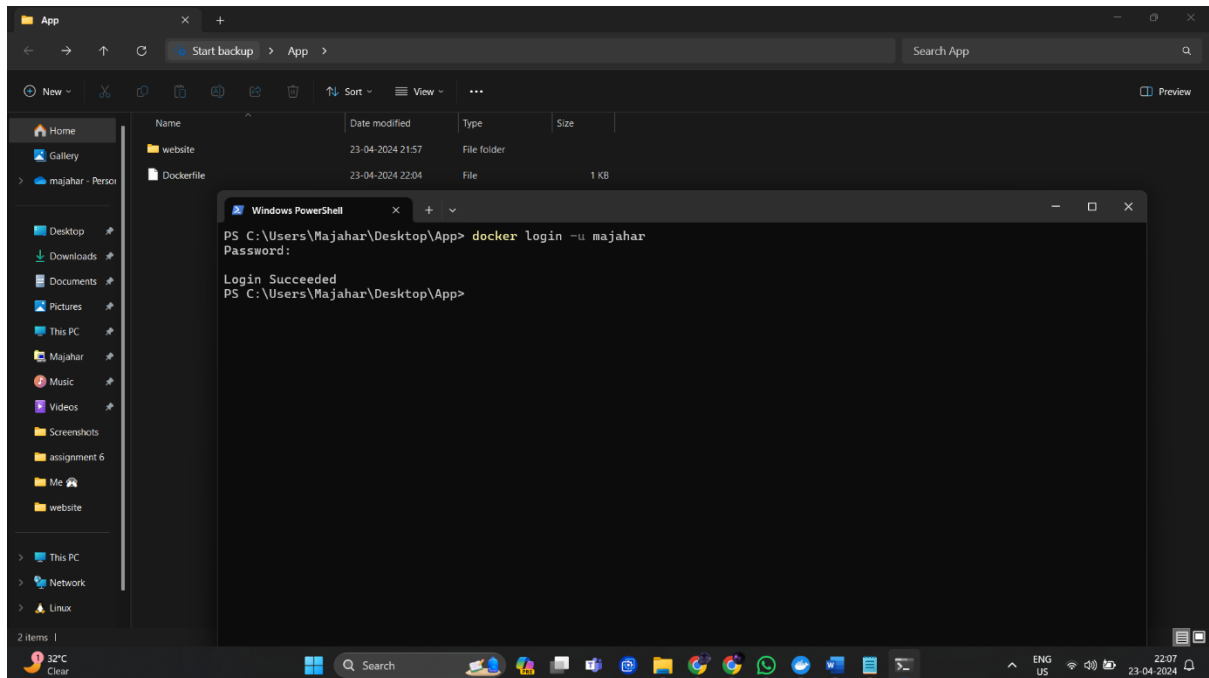


```
PS C:\Users\Majahar\Desktop\App> docker images
REPOSITORY          TAG             IMAGE ID        CREATED         SIZE
my-app              v1             4daeebc4e404   22 seconds ago 192MB
nginx               latest         2ac752d7aeb1   6 days ago    188MB
```

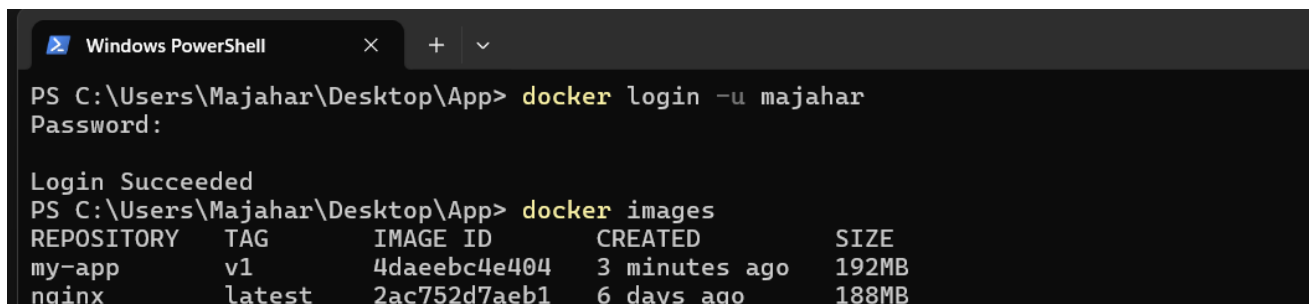


PUSH Image to “DockerHub”

Step 1) login to docker hub using command

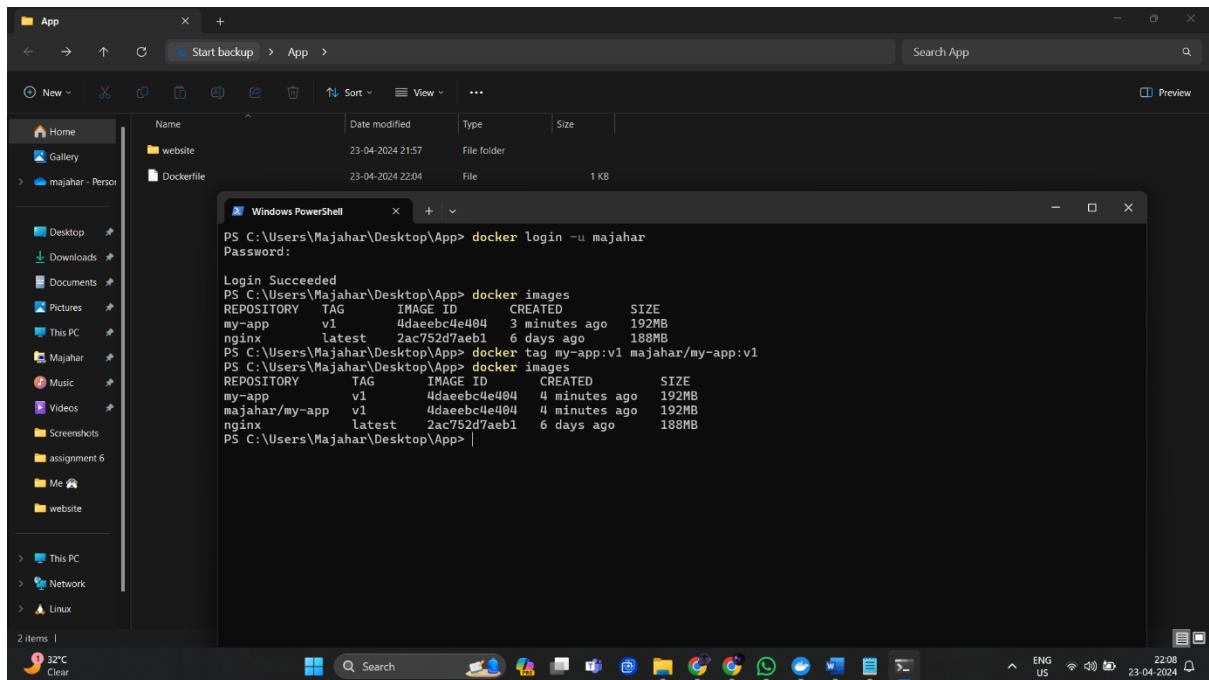


Step 2) docker images



Step 3) docker tag (old image name) majahar/newname

docker tag my-web:v1 majahar/newapp

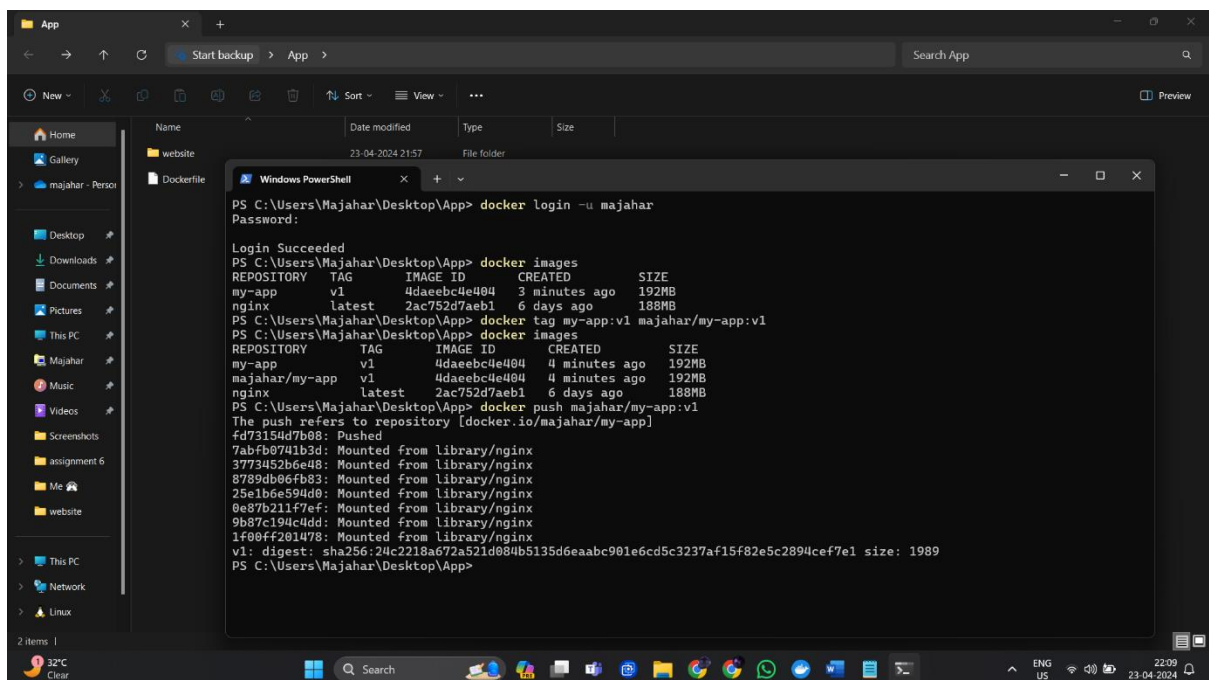


The screenshot shows a Windows File Explorer window with a sidebar on the left and a main pane displaying a file named 'Dockerfile' (1 KB) in a folder named 'App'. Overlaid on the File Explorer is a Windows PowerShell terminal window. The terminal shows the following commands and output:

```
PS C:\Users\Majahar\Desktop\App> docker login -u majahar
Password:

Login Succeeded
PS C:\Users\Majahar\Desktop\App> docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
my-app v1 4daeebc4e404 3 minutes ago 192MB
nginx latest 2ac752d7aeb1 6 days ago 188MB
PS C:\Users\Majahar\Desktop\App> docker tag my-app:v1 majahar/my-app:v1
PS C:\Users\Majahar\Desktop\App> docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
my-app v1 4daeebc4e404 4 minutes ago 192MB
majahar/my-app v1 4daeebc4e404 4 minutes ago 192MB
nginx latest 2ac752d7aeb1 6 days ago 188MB
PS C:\Users\Majahar\Desktop\App> |
```

Step 4) docker push majahar/newapp



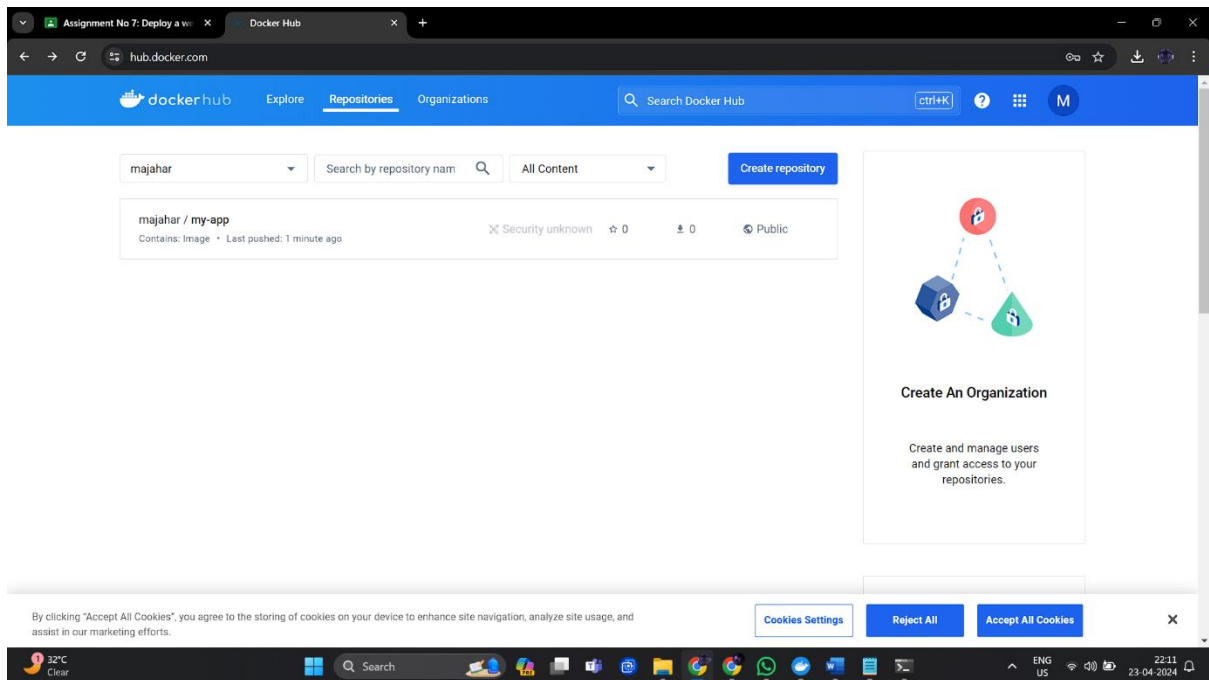
The screenshot shows a Windows File Explorer window with a sidebar on the left and a main pane displaying a file named 'Dockerfile' (1 KB) in a folder named 'App'. Overlaid on the File Explorer is a Windows PowerShell terminal window. The terminal shows the following commands and output:

```
PS C:\Users\Majahar\Desktop\App> docker login -u majahar
Password:

Login Succeeded
PS C:\Users\Majahar\Desktop\App> docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
my-app v1 4daeebc4e404 3 minutes ago 192MB
nginx latest 2ac752d7aeb1 6 days ago 188MB
PS C:\Users\Majahar\Desktop\App> docker tag my-app:v1 majahar/my-app:v1
PS C:\Users\Majahar\Desktop\App> docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
my-app v1 4daeebc4e404 4 minutes ago 192MB
majahar/my-app v1 4daeebc4e404 4 minutes ago 192MB
nginx latest 2ac752d7aeb1 6 days ago 188MB
PS C:\Users\Majahar\Desktop\App> docker push majahar/my-app:v1
The push refers to repository [docker.io/majahar/my-app]
fd73154d7b08: Pushed
7abfb8741b3d: Mounted from library/nginx
3775452b6e48: Mounted from library/nginx
8789db06fb83: Mounted from library/nginx
25e1b6e594d0: Mounted from library/nginx
0e87b211f7ef: Mounted from library/nginx
9b87c194c4dd: Mounted from library/nginx
1f00ff201478: Mounted from library/nginx
v1: digest: sha256:24c2218a672a521d084b5135d6eaabc901e6cd5c3237af15f82e5c2894cef7e1 size: 1989
PS C:\Users\Majahar\Desktop\App>
```



Step 5) Login to Docker Hub and check the repository



Congratulations!!!!

Now you can share this image with anyone with running nginx
and your web application.

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