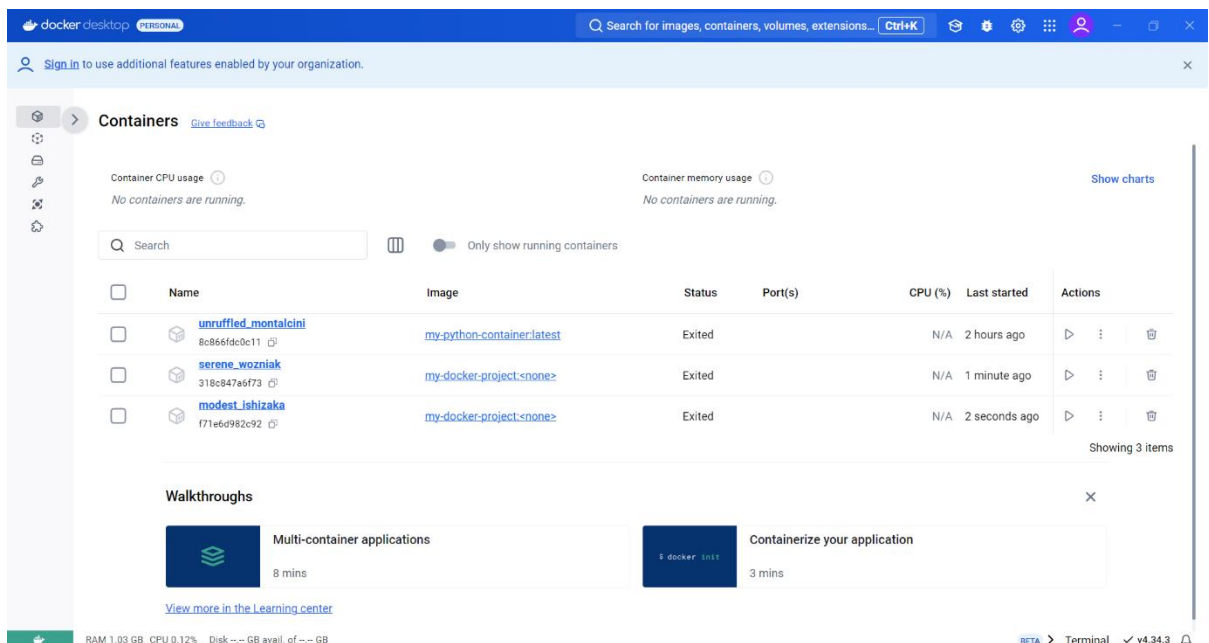
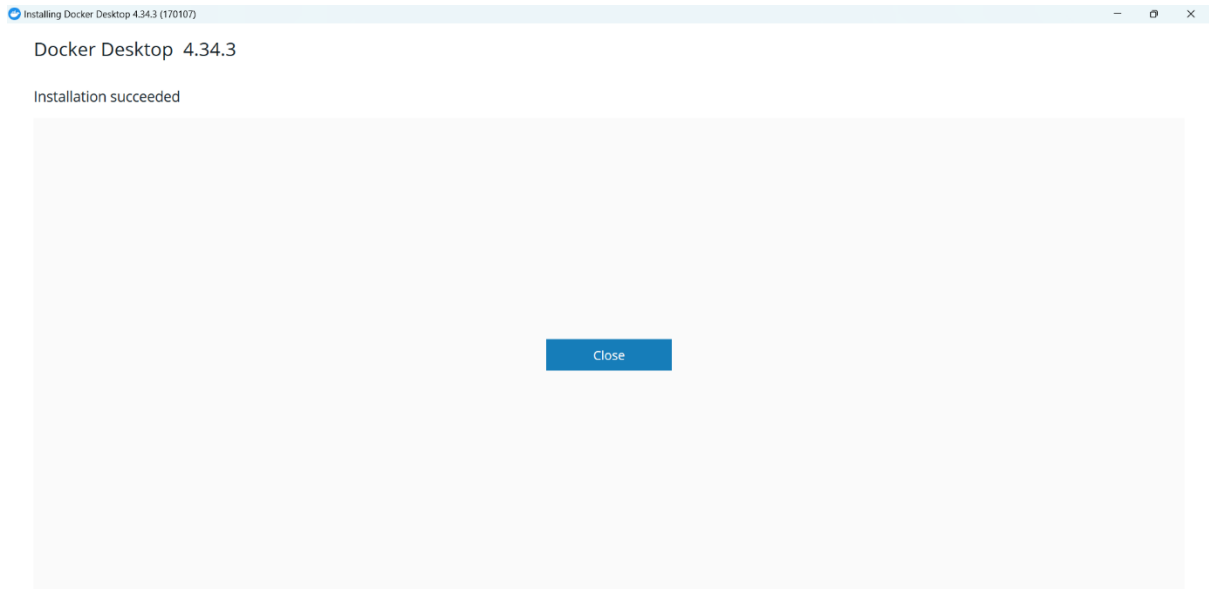


# CLOUD COMPUTING ASSIGNMENT – DOCKER

## 1) Docker Desktop Installation



## 2) Dockerfile Contents Showing Lightweight Base Image (python:3.9-slim)

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

PS C:\Users\HPCS> cd C:\Users\HPCS\Documents\MyDockerProject
PS C:\Users\HPCS\Documents\MyDockerProject> cat Dockerfile
# Use a lightweight base image
FROM python:3.9-slim

# Set the working directory
WORKDIR /home/data

# Copy the Python script and text files to the container
COPY script.py .
COPY IF.txt .
COPY AlwaysRememberUsThisWay.txt .

# Create an output directory inside the container
RUN mkdir -p /home/data/output

# Run the Python script
CMD ["python", "./script.py"]
PS C:\Users\HPCS\Documents\MyDockerProject> |
```

## PowerShell Output Displaying Docker Image Saved and Project Directory Structure

```
Windows PowerShell
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PS C:\Users\HPCS> cd "C:\Users\HPCS\Documents\MyDockerProject"
PS C:\Users\HPCS\Documents\MyDockerProject> docker save -o "my-python-container.tar" my-python-container
PS C:\Users\HPCS\Documents\MyDockerProject> ls

Directory: C:\Users\HPCS\Documents\MyDockerProject

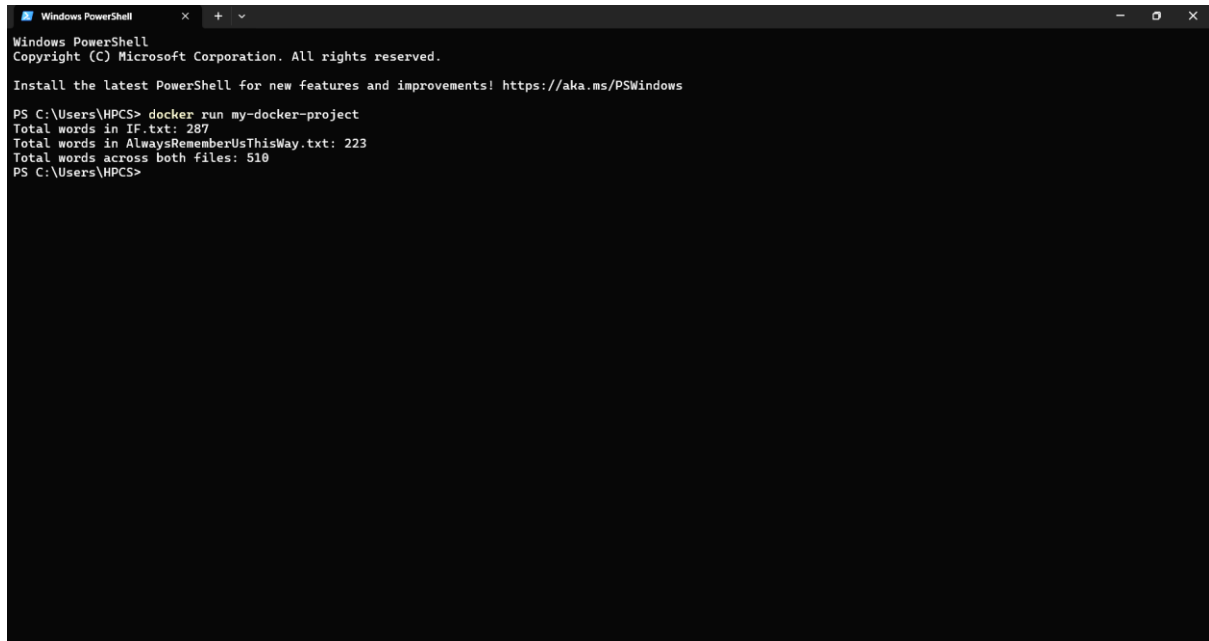
Mode                LastWriteTime         Length Name
----                -
d-----          19-10-2024   13:50             output
-a-----          19-10-2024   13:40             1123 AlwaysRememberUsThisWay.txt
-a-----          19-10-2024   13:38             377 Dockerfile
-a-----          19-10-2024   13:39             1549 IF.txt
-a-----          19-10-2024   14:17      47591424 my-python-container.tar
-a-----          19-10-2024   13:38             728 script.py

PS C:\Users\HPCS\Documents\MyDockerProject> |
```

## Code Shared via GitHub

Git HUB link - <https://github.com/niharikamg/my-docker-project/tree/master>

### 3) Docker Container Output Showing Word Counts for IF.txt and AlwaysRememberUsThisWay.txt



```
Windows PowerShell
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PS C:\Users\HPCS> docker run my-docker-project
Total words in IF.txt: 287
Total words in AlwaysRememberUsThisWay.txt: 223
Total words across both files: 510
PS C:\Users\HPCS>
```

🧩 The completed Python script (script.py) has been uploaded as a text file. You can also view the code in the GitHub repository at <https://github.com/niharikamg/my-docker-project/tree/master>

- 4) a. Count the total number of words in each text file located at `/home/data`
- b. Calculate the grand total of words across both files
- c. Identify the top 3 most frequent words and their respective counts in IF.txt Download IF.txt
- d. Handle contractions (e.g., I'm, can't, don't) by splitting them into individual words, then find the top 3 most frequent words and their respective counts in AlwaysRememberUsThisWay.txt Download AlwaysRememberUsThisWay.txt
- e. Determine the IP address of the machine running the container
- f. Write the results to a text file at `/home/data/output/result.txt`. When the container is executed, it should print the contents of `result.txt` to the console before exiting

screenshot output for all the above answers :-

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

PS C:\Users\WPCS> docker build -t my-docker-project .
[+] Building 0.8s (9/9) FINISHED
=> [internal] load build definition from Dockerfile
=> => transferring dockerfile: 350B
=> [internal] load metadata for docker.io/library/python:3.9
=> [internal] load .dockerignore
=> => transferring context: 66B
=> [1/4] FROM docker.io/library/python:3.9@sha256:ed8b9dd4e9f89c111f4bdb85a55f8c9f0e22796a298449380b15f627d9914095
=> => resolve docker.io/library/python:3.9@sha256:ed8b9dd4e9f89c111f4bdb85a55f8c9f0e22796a298449380b15f627d9914095
=> [internal] load build context
=> => transferring context: 28B
=> CACHED [2/4] WORKDIR /app
=> CACHED [3/4] COPY script.py /app/
=> CACHED [4/4] RUN pip install --no-cache-dir flask
=> exporting to image
=> => exporting layers
=> => exporting manifest sha256:cf1defbfe9b947c393e2fb9c7a9db38d50a9f6c3e16a91898802897b0f3fd797
=> => exporting config sha256:5c9b6c9080ababd6348f5d2599347e69997aad73a735c592919d5e69fc95b0d9
=> => exporting attestation manifest sha256:ce69e80c2f5f4e8ef67a18c3d353e8707855f18875b862cf50fc8142808f2e39
=> => exporting manifest list sha256:86f9697dab9046e8766d33d92dbfe6b87268097eab9160b8187beecbdc74cbf4
=> => naming to docker.io/library/my-docker-project:latest
=> => unpacking to docker.io/library/my-docker-project:latest

View build details: docker-desktop://dashboard/build/desktop-linux/desktop-linux/uo42mn3x9gb4ug8vid35gr5ka

What's next:
  View a summary of image vulnerabilities and recommendations → docker scout quickview

Total words in IF.txt: 287
Total words in AlwaysRememberUsThisWay.txt: 223
Grand total of words: 510
Top 3 words in IF.txt: [('you', 14), ('if', 13), ('can', 12)]
Top 3 words in AlwaysRememberUsThisWay.txt: [('the', 12), ('I', 8), ('and', 7)]
IP Address: 192.168.4.22
```

Commands utilized: docker build -t my-docker-project .

Word count for IF.txt: 287

Word count for AlwaysRememberUsThisWay.txt: 223

Grand total of words: 510

Top 3 words in IF.txt: [('you', 14), ('if', 13), ('can', 12)]

Top 3 words in AlwaysRememberUsThisWay.txt: [('the', 12), ('I', 8), ('and', 7)]

Container IP Address: 192.168.4.22

```
Windows PowerShell
REPOSITORY TAG IMAGE ID CREATED SIZE
my-python-container latest 522c9842f897 2 hours ago 190MB
my-python-alpine-container latest 0c32323e1230 2 hours ago 190MB
my-docker-project latest 8ealee673076 2 hours ago 190MB
PS C:\Users\HPCS\Documents\MyDockerProject> docker run my-docker-project
Results written to result.txt
PS C:\Users\HPCS\Documents\MyDockerProject> docker save -o my-docker-project.tar my-docker-project
PS C:\Users\HPCS\Documents\MyDockerProject> ls

Directory: C:\Users\HPCS\Documents\MyDockerProject

Mode                LastWriteTime         Length Name
----                -
d-----          19-10-2024      14:19             output
-a-----          19-10-2024      13:40           1123 AlwaysRememberUsThisWay.txt
-a-----          19-10-2024      13:38           377 Dockerfile
-a-----          19-10-2024      13:39           1549 IF.txt
-a-----          19-10-2024      15:29      47591936 my-docker-project.tar
-a-----          19-10-2024      10:35      47591424 my-python-alpine-container.tar
-a-----          19-10-2024      10:17      47591424 my-python-container.tar
-a-----          19-10-2024      13:38           728 script.py

PS C:\Users\HPCS\Documents\MyDockerProject> docker run my-docker-project
Results written to result.txt
PS C:\Users\HPCS\Documents\MyDockerProject> ls output

Directory: C:\Users\HPCS\Documents\MyDockerProject\output

Mode                LastWriteTime         Length Name
----                -
d-----          19-10-2024      14:19             my-python-container
-a-----          19-10-2024      13:50      47591424 my-python-container.tar
-a-----          19-10-2024      13:45           95 result.txt

PS C:\Users\HPCS\Documents\MyDockerProject>
```

5) **Optimize your Docker image** to ensure that its size is as small as possible (target size: less than 200MB).

```
Windows PowerShell
REPOSITORY TAG IMAGE ID CREATED SIZE
my-python-container latest 522c9842f897 2 hours ago 190MB
my-python-alpine-container latest 0c32323e1230 2 hours ago 190MB
my-docker-project latest 8ealee673076 2 hours ago 190MB
PS C:\Users\HPCS\Documents\MyDockerProject> docker run my-docker-project
Results written to result.txt
PS C:\Users\HPCS\Documents\MyDockerProject> docker save -o my-docker-project.tar my-docker-project
PS C:\Users\HPCS\Documents\MyDockerProject> ls

Directory: C:\Users\HPCS\Documents\MyDockerProject

Mode                LastWriteTime         Length Name
----                -
d-----          19-10-2024      14:19             output
-a-----          19-10-2024      13:40           1123 AlwaysRememberUsThisWay.txt
-a-----          19-10-2024      13:38           377 Dockerfile
-a-----          19-10-2024      13:39           1549 IF.txt
-a-----          19-10-2024      15:29      47591936 my-docker-project.tar
-a-----          19-10-2024      10:35      47591424 my-python-alpine-container.tar
-a-----          19-10-2024      10:17      47591424 my-python-container.tar
-a-----          19-10-2024      13:38           728 script.py

PS C:\Users\HPCS\Documents\MyDockerProject> docker run my-docker-project
Results written to result.txt
PS C:\Users\HPCS\Documents\MyDockerProject> ls output

Directory: C:\Users\HPCS\Documents\MyDockerProject\output

Mode                LastWriteTime         Length Name
----                -
d-----          19-10-2024      14:19             my-python-container
-a-----          19-10-2024      13:50      47591424 my-python-container.tar
-a-----          19-10-2024      13:45           95 result.txt

PS C:\Users\HPCS\Documents\MyDockerProject>
```

```
Windows PowerShell
>> transferring context: 28 0.0s
> [1/6] FROM docker.io/library/python:3.9-slim@sha256:7a9cd42706c174cdcf578880ab9ae3b6551323a7ddbc2a89ad6e5b20a 0.0s
> resolve docker.io/library/python:3.9-slim@sha256:7a9cd42706c174cdcf578880ab9ae3b6551323a7ddbc2a89ad6e5b20a 0.0s
> [internal] load build context 0.0s
> transferring context: 104B 0.0s
> CACHED [2/6] WORKDIR /home/data 0.0s
> CACHED [3/6] COPY script.py . 0.0s
> CACHED [4/6] COPY IF.txt . 0.0s
> CACHED [5/6] COPY AlwaysRememberUsThisWay.txt . 0.0s
> CACHED [6/6] RUN mkdir -p /home/data/output 0.0s
> exporting to image 0.1s
> exporting layers 0.0s
> exporting manifest sha256:514cc2c3844662d7c62fff0924e3b9511183c626d65be46d6d4d716490f92525 0.0s
> exporting config sha256:20154fa08e8e767dd536d47a88a97949806571b9a8ee0e5ae658e46331b1e44 0.0s
> exporting attestation manifest sha256:954223f2ac2d3633707dbfd79b82cb32a4c39ac57bf3d1309236b95ad6ff8d 0.0s
> exporting manifest list sha256:f27cb2b8cd58d0610ea2e873576370ef06ecd4846a5e553db9d064b373822258 0.0s
> naming to docker.io/library/my-python-container-optimized:latest 0.0s
> unpacking to docker.io/library/my-python-container-optimized:latest 0.0s

View build details: docker-desktop://dashboard/build/desktop-linux/desktop-linux/40gnxpirhetzxxh7gmztf4sfc

What's next:
View a summary of image vulnerabilities and recommendations → docker scout quickview
PS C:\Users\HPCS\Documents\MyDockerProject> docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
my-docker-project latest 6b84467e231c 5 hours ago 190MB
my-python-container-optimized latest f27cb2b8cd58 5 hours ago 190MB
my-python-container latest e3afe2d42a9e 5 hours ago 190MB
my-python-alpine-container latest 0c32323e1230 5 hours ago 190MB
PS C:\Users\HPCS\Documents\MyDockerProject> docker run --name my-optimized-container my-python-container-optimized
Results written to result.txt
PS C:\Users\HPCS\Documents\MyDockerProject> docker cp my-optimized-container:/home/data/output/result.txt ./result.txt
Successfully copied 2.05kB to C:\Users\HPCS\Documents\MyDockerProject\result.txt
PS C:\Users\HPCS\Documents\MyDockerProject> docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
a7907f5f4a4c my-python-container-optimized "python ./script.py" 43 seconds ago Exited (0) 42 seconds ago my-optimized-container
9b8e0f208a8c my-python-container "python ./script.py" 11 minutes ago Exited (0) 11 minutes ago my-text-processing-container
f71e6d982c92 8ealee673076 "python ./script.py" 3 hours ago Exited (0) 41 minutes ago modest_ishizaka
318c847a6f73 8ealee673076 "python ./script.py" 3 hours ago Exited (0) 41 minutes ago serene_wozniak
8c866fdc0c11 522c9842f897 "python ./script.py" 5 hours ago Exited (0) 20 minutes ago unruffled_montalcini
PS C:\Users\HPCS\Documents\MyDockerProject> |
```

6) a) Compress the image into a tar file named with email username

```
Windows PowerShell
Directory: C:\Users\HPCS\Documents\MyDockerProject

Mode                LastWriteTime         Length Name
----                -
d-----          19-10-2024      14:19          output
-a-----          19-10-2024      13:40          1123 AlwaysRememberUsThisWay.txt
-a-----          19-10-2024      18:17          377 Dockerfile
-a-----          19-10-2024      13:39          1549 IF.txt
-a-----          19-10-2024      19:00      47591936 my-docker-project.tar
-a-----          19-10-2024      14:35      47591424 my-python-alpine-container.tar
-a-----          19-10-2024      14:17      47591424 my-python-container.tar
-a-----          19-10-2024      18:47          95 result.txt
-a-----          19-10-2024      19:20      2438 script.py
-a-----          19-10-2024      19:07      2443 script.py- point 4.py

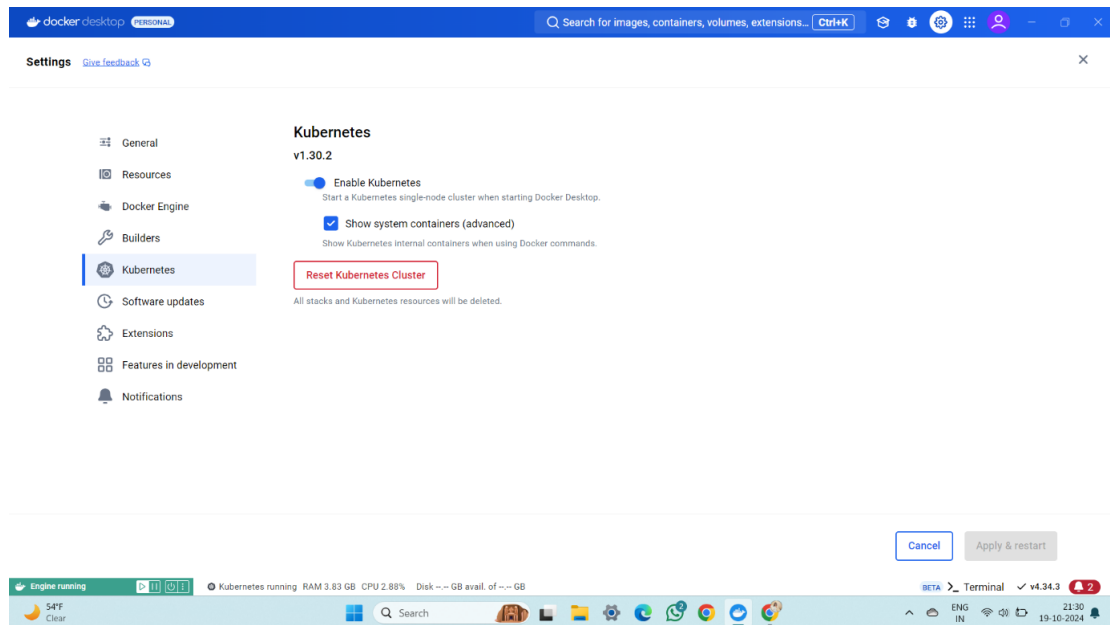
PS C:\Users\HPCS\Documents\MyDockerProject> docker save -o niharikamysoregowda.tar my-docker-project
PS C:\Users\HPCS\Documents\MyDockerProject> ls

Directory: C:\Users\HPCS\Documents\MyDockerProject

Mode                LastWriteTime         Length Name
----                -
d-----          19-10-2024      14:19          output
-a-----          19-10-2024      13:40          1123 AlwaysRememberUsThisWay.txt
-a-----          19-10-2024      18:17          377 Dockerfile
-a-----          19-10-2024      13:39          1549 IF.txt
-a-----          19-10-2024      19:00      47591936 my-docker-project.tar
-a-----          19-10-2024      14:35      47591424 my-python-alpine-container.tar
-a-----          19-10-2024      14:17      47591424 my-python-container.tar
-a-----          19-10-2024      21:10      47592448 niharikamysoregowda.tar
-a-----          19-10-2024      18:47          95 result.txt
-a-----          19-10-2024      19:20      2438 script.py
-a-----          19-10-2024      19:07      2443 script.py- point 4.py

PS C:\Users\HPCS\Documents\MyDockerProject>
```

## Extra Credit –



## - Docker Swarm Output Showing Container States and Replica Management

```
Windows PowerShell
-19-10-2024 21:59 47592448 my-docker-project.tar
-a-----19-10-2024 14:35 47591424 my-python-alpine-container.tar
-a-----19-10-2024 14:17 47591424 my-python-container.tar
-a-----19-10-2024 21:10 47592448 niharikanysolegowda.tar
-a-----19-10-2024 18:47 95 result.txt
-a-----19-10-2024 19:20 2438 script.py
-a-----19-10-2024 19:07 2443 script.py- point 4.py

PS C:\Users\HPCS\Documents\MyDockerProject> kubectl apply -f deployment.yaml
deployment.apps/my-docker-deployment unchanged
PS C:\Users\HPCS\Documents\MyDockerProject> kubectl get pods
NAME READY STATUS RESTARTS AGE
my-docker-deployment-7fd94684fc-b961z 0/1 ImagePullBackOff 0 21m
my-docker-deployment-7fd94684fc-qvdfw 0/1 ImagePullBackOff 0 21m
PS C:\Users\HPCS\Documents\MyDockerProject> kubectl describe pod my-docker-deployment-7fd94684fc-b961z
Error from server (NotFound): pods "my-docker-deployment-7fd94684fc-b961z" not found
PS C:\Users\HPCS\Documents\MyDockerProject> kubectl describe pod my-docker-deployment-7fd94684fc-b961z
Error from server (NotFound): pods "my-docker-deployment-7fd94684fc-b961z" not found
PS C:\Users\HPCS\Documents\MyDockerProject> kubectl get pods
NAME READY STATUS RESTARTS AGE
my-docker-deployment-7fd94684fc-b961z 0/1 ImagePullBackOff 0 23m
my-docker-deployment-7fd94684fc-qvdfw 0/1 ImagePullBackOff 0 23m
PS C:\Users\HPCS\Documents\MyDockerProject> docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
my-docker-project latest 364cfed3c6a9 3 hours ago 190MB
my-python-alpine-container latest 0c32323e1230 9 hours ago 190MB
docker/desktop-kubernetes kubernet-es-v1.30.2-cni-v1.4.0-critools-v1.29.0-cri-dockerd-v0.3.11-1-debian c86a2c396272 3 months ago 625MB
registry.k8s.io/kube-apiserver v1.30.2 349ab44dc66a 4 months ago 153MB
registry.k8s.io/kube-controller-manager v1.30.2 4c412be1fc58 4 months ago 146MB
registry.k8s.io/kube-scheduler v1.30.2 0ed75a333704 4 months ago 84.6M
registry.k8s.io/kube-proxy v1.30.2 8a44c6e094af 4 months ago 118MB
registry.k8s.io/etcd 3.5.12-0 44a8e24dcbba 8 months ago 211MB
registry.k8s.io/coredns/coredns v1.11.1 1eeb4c7316ba 14 months ago 82MB
docker/desktop-vpnkit-controller dc331cb22850be0cdd97c84a9cfecaf44a1afb6e 7ecf567ea870 17 months ago 47MB
registry.k8s.io/pause 3.9 7031c1b28338 2 years ago 1.07M
B
docker/desktop-storage-provisioner v2.0 115d77efe6e2 3 years ago 59.2M
B
PS C:\Users\HPCS\Documents\MyDockerProject>
```

```
Windows PowerShell
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PS C:\Users\HPCS> cat swarm_output.txt
ID            NAME                IMAGE                                NODE           DESIRED STATE   CURRENT STATE      ERROR      PORTS
TS
yt9x3att334i  my-docker-app.1     niharikansoregowda/my-docker-project:latest  docker-desktop Ready           Ready 3 seconds ago
4nXLm1qa3vu   \. my-docker-app.1  niharikansoregowda/my-docker-project:latest  docker-desktop Shutdown        Complete 4 seconds ago
b058l88vg426  \. my-docker-app.1  niharikansoregowda/my-docker-project:latest  docker-desktop Shutdown        Complete 10 seconds ago
lyphht1m99h6  \. my-docker-app.1  niharikansoregowda/my-docker-project:latest  docker-desktop Shutdown        Complete 16 seconds ago
k7xzd9xkph5h  \. my-docker-app.1  niharikansoregowda/my-docker-project:latest  docker-desktop Shutdown        Complete 22 seconds ago
dv9qp1v2oc5v  my-docker-app.2     niharikansoregowda/my-docker-project:latest  docker-desktop Ready           Ready 1 second ago
ytw5ayd7z1g9  \. my-docker-app.2  niharikansoregowda/my-docker-project:latest  docker-desktop Shutdown        Complete 2 seconds ago
0vajgkikebng  \. my-docker-app.2  niharikansoregowda/my-docker-project:latest  docker-desktop Shutdown        Complete 8 seconds ago
g0gdtdf3whkuf \. my-docker-app.2  niharikansoregowda/my-docker-project:latest  docker-desktop Shutdown        Complete 14 seconds ago
xbypgllb1s61  \. my-docker-app.2  niharikansoregowda/my-docker-project:latest  docker-desktop Shutdown        Complete 21 seconds ago
PS C:\Users\HPCS> |
```



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