

## UNIT 03 & 04 Assignment: DOCKER

The aim of the assignment is to “containerize” Git using Docker. We will do this in two ways.

1. Running a script non-interactively
2. Running a script interactively

Create the required containers to complete Part A | B | C

### INSTRUCTIONS

- You must create a document with screenshots to explain step by step that the two parts work. The filename format will be ***Units3-4\_Name\_Surname.pdf***.
- You must also submit the script required in a and b. The filename format will be ***Units3-4\_Name\_Surname.sh***.
- So, the submission will be a ZIP file containing: the document with screenshots and the script. The filename format will be ***Units3-4\_Name\_Surname.zip***.

**NOTE:** ALL THE EXPLANATIONS AND SCREENSHOTS MUST BE IN ENGLISH.

### PART A) RUNNING A SCRIPT NON-INTERACTIVELY

**For this part, you have to create a script without parameters which will take the next steps:**

1. Install Git.
2. Configure Git with your name and e-mail.
3. It creates a new folder called *systems\_initials* into */root* (if your name is John Doe, the folder will be */root/systems\_JD* as a result).
4. The folder should not be empty and will contain something which can be a blank file or subfolder.
5. This new content of */root/systems\_initials* will be used later to create a repository (you can create sample files or subfolders from the script with *touch* or *mkdir* respectively).
6. Then, we change the current directory to */root/systems\_initials* (remember that you must replace “initials” with the corresponding ones to your name and surnames).
7. Once there, we will create a repository (*git init*) and commit all sample files or subfolders created from the script (remember that we first need to run “*git add*” and then “*git commit*”).
8. The script output will be the current state running *git log*.

**Finally, the script will be executed in a container based on the Ubuntu image.**

1. For this purpose, you must create a Docker volume.
2. The script will be manually copied to the volume folder (run “docker inspect volume-name” to check the real folder).
3. Afterwards, the Ubuntu container will be run with the command bash which executes the script from the volume.
4. You can associate the volume with the Linux folder you want, for example /root (the command would be “bash /root/script.sh”) in this case.

**What happens?**

At this point, we have executed the script and we have the output of git log. But we cannot interact with the container. So, let’s move on the next part, which makes more sense.

**PART B) RUNNING A SCRIPT INTERACTIVELY****We will use the same script as in the previous part.**

1. Although this time we will run an interactive Ubuntu container with a shell bash.
2. The script will be in a volume too.
3. But we must manually run the script from the terminal.

**What happens?**

This alternative requires to manually execute the script from the container. If you “exit” from the interactive bash, the container will stop.

You can restart the container with docker start. You must also explain how to run the same container again with an interactive terminal.

**PART C) REMOVE ALL THE CONTAINERS AND IMAGES CREATED**

Explain the commands you need.

**STEP BY STEP Part A**

**Note:** Docker has been already installed.

Create and save the script name **script.sh** with code according to the instructions.

**The script.sh code**

To create the final code, each command was tested until the output was the required.

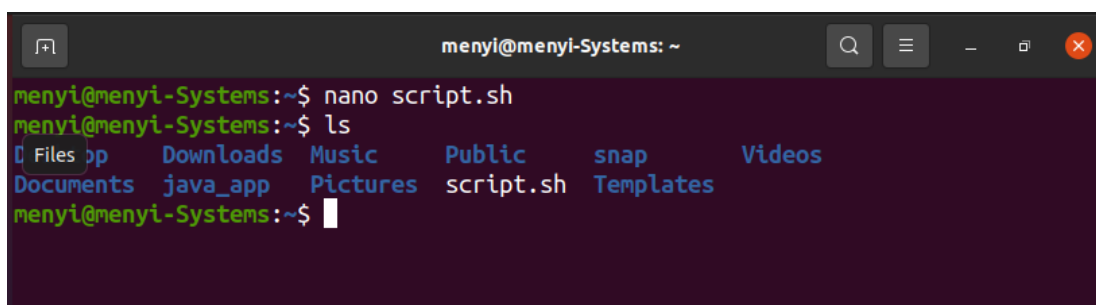
Confirmation dialogs will appear, and the answers to those must be yes. So, in order to continue the script running, the parameter **-y (yes)** is used.

Also, and **autoremove -y** command has been added to prevent an error from previous Git installations.



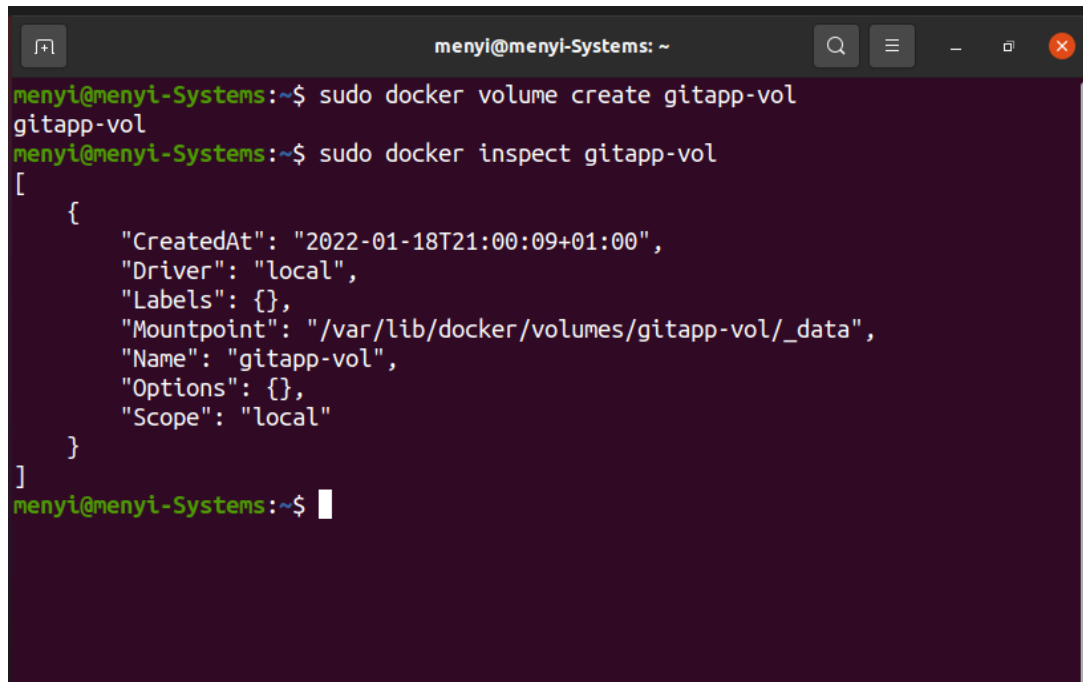
```
GNU nano 4.8 script.sh Modified
apt-get update -y
apt autoremove -y
apt-get install git -y
git config --global user.name "Menyi Daw"
git config --global user.email menyidaw@hotmail.com
mkdir -p /root/systems_MD/menyi_git
touch /root/systems_MD/menyi_test.txt
cd /root/systems_MD
git init
git add *
git commit -m "Hello. Testing the script"
git log
```

^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify  
^X Exit ^R Read File ^\ Replace ^U Paste Text ^T To Spell



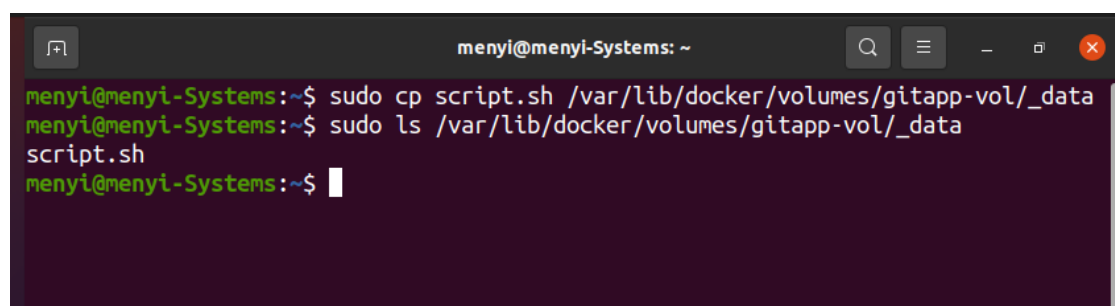
```
menyi@menyi-Systems: ~
menyi@menyi-Systems:~$ nano script.sh
menyi@menyi-Systems:~$ ls
Files  Downloads  Music  Public  snap  Videos
Documents  java_app  Pictures  script.sh  Templates
menyi@menyi-Systems:~$
```

Create a **volume** named **gitapp-vol** to run the script already created, and check where it is really located at by using *docker inspect*



```
menyi@menyi-Systems: ~  
menyi@menyi-Systems:~$ sudo docker volume create gitapp-vol  
gitapp-vol  
menyi@menyi-Systems:~$ sudo docker inspect gitapp-vol  
[  
  {  
    "CreatedAt": "2022-01-18T21:00:09+01:00",  
    "Driver": "local",  
    "Labels": {},  
    "Mountpoint": "/var/lib/docker/volumes/gitapp-vol/_data",  
    "Name": "gitapp-vol",  
    "Options": {},  
    "Scope": "local"  
  }  
]  
menyi@menyi-Systems:~$
```

Notice that **mountpoint** is: `/var/lib/docker/volumes/gitapp-vol/_data`  
Copy the script file **script.sh** into the volume folder (mountpoint) and check it



```
menyi@menyi-Systems:~$ sudo cp script.sh /var/lib/docker/volumes/gitapp-vol/_data  
menyi@menyi-Systems:~$ sudo ls /var/lib/docker/volumes/gitapp-vol/_data  
script.sh  
menyi@menyi-Systems:~$
```

Also, check permissions to the script file, and grant permission to all users to execute the file.

```
root@menyi-Systems: /var/lib/docker/volumes/gitapp-vol/_data
root@menyi-Systems:/var/lib/docker/volumes/gitapp-vol/_data# chmod 777 script.sh
root@menyi-Systems:/var/lib/docker/volumes/gitapp-vol/_data# ls -l
total 4
-rwxrwxrwx 1 root root 378 ene 18 21:04 script.sh
root@menyi-Systems:/var/lib/docker/volumes/gitapp-vol/_data#
```

At this point, everything is ready to create the Ubuntu image, and to initialize a non-interactive test container named *testContainer* using the **--name** parameter. Then, check it's all working properly by using **docker ps -a** command.

```
root@menyi-Systems: /home/menyi
root@menyi-Systems:/home/menyi# docker run --name testContainer ubuntu echo 'Testing'
Testing
root@menyi-Systems:/home/menyi# docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS   NAMES
97f0975697ec   ubuntu   "echo Testing"          27 minutes ago Exited (0) 27 minutes ago           testContainer
root@menyi-Systems:/home/menyi#
```

Once the test is done, remove the container and all ready to run the script file created

```
root@menyi-Systems: /home/menyi
root@menyi-Systems:/home/menyi# docker rm testContainer
testContainer
root@menyi-Systems:/home/menyi# docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS   NAMES
root@menyi-Systems:/home/menyi#
```

Initialise a new non-interactive container based on Ubuntu image,  
named **menyiContainer** and run the script file named **script.sh**

```
root@menyi-Systems: ~  
root@menyi-Systems:~# docker run --name=menyiContainer --mount source=gitapp-vol,destination=/var/  
lib/docker/volumes/gitapp-vol/_data ubuntu bash /var/lib/docker/volumes/gitapp-vol/_data/script.sh
```

The script has been correctly executed, and the output shows the *git log*

```
root@menyi-Systems: ~  
Setting up perl (5.30.0-9ubuntu0.2) ...  
Setting up xauth (1:1.1-0ubuntu1) ...  
Setting up libkrb5-26-heimdal:amd64 (7.7.0+dfsg-1ubuntu1) ...  
Setting up libheimntlm0-heimdal:amd64 (7.7.0+dfsg-1ubuntu1) ...  
Setting up liberror-perl (0.17029-1) ...  
Setting up libgssapi3-heimdal:amd64 (7.7.0+dfsg-1ubuntu1) ...  
Setting up libldap-2.4-2:amd64 (2.4.49+dfsg-2ubuntu1.8) ...  
Setting up libcurl3-gnutls:amd64 (7.68.0-1ubuntu2.7) ...  
Setting up git (1:2.25.1-1ubuntu3.2) ...  
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...  
Processing triggers for ca-certificates (20210119~20.04.2) ...  
Updating certificates in /etc/ssl/certs...  
0 added, 0 removed; done.  
Running hooks in /etc/ca-certificates/update.d...  
done.  
Initialized empty Git repository in /root/systems_MD/.git/  
[master (root-commit) 67030c4] Hello. Testing the script  
1 file changed, 0 insertions(+), 0 deletions(-)  
create mode 100644 menyi_test.txt  
commit 67030c4bb056ae6ae5bb528088df9a16b50b5f5be  
Author: Menyi Daw <menyi.daw@hotmail.com>  
Date: Wed Jan 19 15:38:21 2022 +0000  
  
Hello. Testing the script  
root@menyi-Systems:~#
```

But interact with the container is not possible, check that status is *exited*

```
root@menyi-Systems: ~  
menyi@menyi-Systems: ~  
menyi@menyi-Systems:~$ sudo docker ps  
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES  
menyi@menyi-Systems:~$ sudo docker ps -a  
CONTAINER ID   IMAGE     COMMAND   CREATED          STATUS          PORTS   NAMES  
a2f40d0683aa  ubuntu   "bash /var/lib/docke..." 10 minutes ago  Exited (0) 9 minutes ago  menyiContainer  
menyi@menyi-Systems:~$
```

**STEP BY STEP Part B**

Using the volume created before *gitapp-vol*,  
run an interactive Ubuntu container (name *menyiContainerIT*) with a shell bash

```
menyi@menyi-Systems:~$ sudo docker run -it --name=menyiContainerIT --mount source=gitapp-vol,
destination=/var/lib/docker/volumes/gitapp-vol/_data ubuntu bash
root@ace9c9c111f1:/#
```

Notice: Log-in as a new user from the terminal, which id matches the id container *menyiContainerIT*

```
root@ace9c9c111f1: /var/lib/docker/volumes/gitapp-vol/_data x root@menyi-Systems: ~ x
root@menyi-Systems:~# docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS   NAMES
ace9c9c111f1   ubuntu   "bash"                  11 minutes ago Up 11 minutes               menyContainerIT
a2f40d0683aa   ubuntu   "bash /var/lib/docke..." About an hour ago Exited (0) About an hour ago menyContainer
```

Change directory to script directory and check file permissions.

```
root@ace9c9c111f1: /var/lib/docker/volumes/gitapp-vol/_data x root@menyi-Systems: ~ x
root@ace9c9c111f1:/# cd /var/lib/docker/volumes/gitapp-vol/_data
root@ace9c9c111f1:/var/lib/docker/volumes/gitapp-vol/_data# ls -l
total 4
-rwxrwxrwx 1 root root 324 Jan 19 15:35 script.sh
```

All ready to manually run the script from the terminal

```
root@ace9c9c111f1: /var/lib/docker/volumes/gitapp-vol/_data x root@menyi-Systems: ~ x
root@ace9c9c111f1:/var/lib/docker/volumes/gitapp-vol/_data# sh script.sh
Get:1 http://archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:3 http://archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:5 http://security.ubuntu.com/ubuntu focal/main amd64 Packages [1275 kB]
Get:6 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [889 kB]
Get:7 http://archive.ubuntu.com/ubuntu focal/universe amd64 Packages [11.3 MB]
Get:8 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [1468 kB]
Get:9 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [837 kB]
Get:10 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 Packages [30.1 kB]
Get:11 http://archive.ubuntu.com/ubuntu focal/restricted amd64 Packages [33.4 kB]
Get:12 http://archive.ubuntu.com/ubuntu focal/multiverse amd64 Packages [177 kB]
```

The script has worked, *git log* is output, and the container is still running (notice user id)

```

root@ace9c9c111f1: /var/lib/docker/volumes/gitapp-vol/_data x root@menyi-Systems: ~
Setting up libldap-2.4-2:amd64 (2.4.49+dfsg-2ubuntu1.8) ...
Setting up libcurl3-gnutls:amd64 (7.68.0-1ubuntu2.7) ...
Setting up git (1:2.25.1-1ubuntu3.2) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
Processing triggers for ca-certificates (20210119~20.04.2) ...
Updating certificates in /etc/ssl/certs...
0 added, 0 removed; done.
Running hooks in /etc/ca-certificates/update.d...
done.
Initialized empty Git repository in /root/systems_MD/.git/
[master (root-commit) 99bdc7b] Hello. Testing the script
1 file changed, 0 insertions(+), 0 deletions(-)
create mode 100644 meny_i_test.txt
commit 99bdc7bfe304ee10f2cdcb4b0817423d6af5ca9a (HEAD -> master)
Author: Meny_i Daw <menyi.daw@hotmail.com>
Date: Wed Jan 19 16:37:39 2022 +0000

Hello. Testing the script
root@ace9c9c111f1:/var/lib/docker/volumes/gitapp-vol/_data#

```

By using *docker ps* and *docker ps -a*, check the difference between the interactive and non-interactive container status

```

root@ace9c9c111f1: /var/lib/docker/volumes/gitapp-vol/_data x root@menyi-Systems: ~
root@menyi-Systems:~# docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
ace9c9c111f1   ubuntu   "bash"    About an hour ago   Up About an hour           meniContainerIT
root@menyi-Systems:~# docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
ace9c9c111f1   ubuntu   "bash"    About an hour ago   Up About an hour           meniContainerIT
a2f40d0683aa   ubuntu   "bash /var/lib/docke..." 2 hours ago   Exited (0) 2 hours ago     meniContainer
root@menyi-Systems:~#

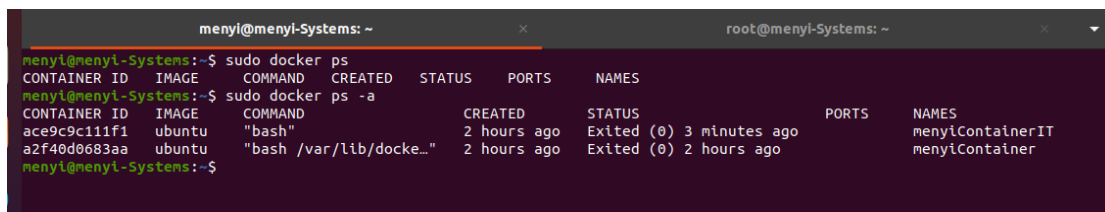
```



To exit from interactive bash, just type *exit* and also the container will stop.

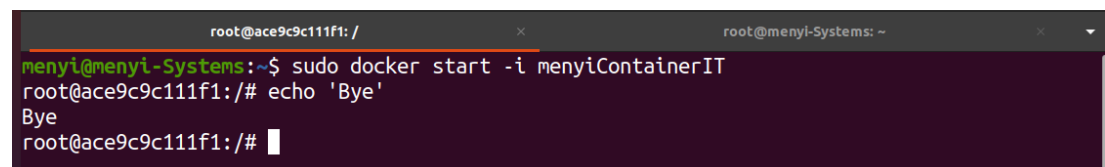


```
menyi@menyi-Systems: ~  
root@ace9c9c111f1:/home# exit  
exit  
menyi@menyi-Systems:~$
```



```
menyi@menyi-Systems:~$ sudo docker ps  
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES  
menyi@menyi-Systems:~$ sudo docker ps -a  
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES  
ace9c9c111f1   ubuntu   "bash"    2 hours ago   Exited (0) 3 minutes ago   meniContainerIT  
a2f40d0683aa   ubuntu   "bash /var/lib/docke..." 2 hours ago   Exited (0) 2 hours ago     meniContainer
```

Easily, restart the container with *docker start*, however the terminal will run on the background,  
We can use restart and then attach or directly the *-i* parameter when restarting the container



```
root@ace9c9c111f1: /  
menyi@menyi-Systems:~$ sudo docker start -i meniContainerIT  
root@ace9c9c111f1:/# echo 'Bye'  
Bye  
root@ace9c9c111f1:/#
```

**STEP BY STEP Part C****Remove all the containers and images created.**

There are different ways to remove containers either interactive or non-interactive  
but first list all the containers created

```

root@menyi-Systems: /home/menyi
root@menyi-Systems: /home/menyi# docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED    STATUS    PORTS    NAMES
ace9c9c111f1   ubuntu   "bash"                  2 hours ago  Exited (0) 15 seconds ago
a2f40d0683aa   ubuntu   "bash /var/lib/docke..." 3 hours ago  Exited (0) 3 hours ago
menyiContainerIT
menyiContainer

```

To remove a container directly after finished we need the `--rm` parameter when creating the container

```

root@menyi-Systems: /home/menyi
root@menyi-Systems:~# docker container run --rm -it ubuntu bash
root@bd8707b19eb8:/# exit
exit
root@menyi-Systems:~# docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED    STATUS    PORTS    NAMES
ace9c9c111f1   ubuntu   "bash"                  2 hours ago  Exited (0) 6 minutes ago
a2f40d0683aa   ubuntu   "bash /var/lib/docke..." 3 hours ago  Exited (0) 3 hours ago
menyiContainerIT
menyiContainer

```

**Remove one container by its name**

```

root@menyi-Systems: /home/menyi
root@menyi-Systems:~# docker rm menyiContainer
menyiContainer
root@menyi-Systems:~# docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED    STATUS    PORTS    NAMES
ace9c9c111f1   ubuntu   "bash"                  2 hours ago  Exited (0) 7 minutes ago
menyiContainerIT

```

Remove one container by its id

```

root@menyi-Systems: /home/menyi
root@menyi-Systems:~# docker container run -it ubuntu bash
root@42d806b2e95e:/# exit
exit
root@menyi-Systems:~# docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
42d806b2e95e   ubuntu   "bash"    14 seconds ago    Exited (0) 9 seconds ago           beautiful_kapitsa
ace9c9c111f1   ubuntu   "bash"    2 hours ago      Exited (0) 8 minutes ago         menyContainerIT
root@menyi-Systems:~# docker rm 42d806b2e95e
42d806b2e95e
root@menyi-Systems:~# docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
ace9c9c111f1   ubuntu   "bash"    2 hours ago    Exited (0) 9 minutes ago         menyContainerIT
root@menyi-Systems:~#

```

Remove and stop it if it is running using `-f` parameter

```

root@menyi-Systems: /home/menyi
root@menyi-Systems:/home/menyi# docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
5c1c22716fed   ubuntu   "bash"    13 seconds ago    Up 12 seconds                    elated_noyce
94e852582b3b   ubuntu   "bash"    20 seconds ago    Exited (0) 17 seconds ago        sad_hamilton
8a9dd1721fce   ubuntu   "bash"    3 minutes ago     Exited (127) About a minute ago  exciting_albattani
ace9c9c111f1   ubuntu   "bash"    2 hours ago      Exited (0) 16 minutes ago        menyContainerIT
root@menyi-Systems:/home/menyi# docker rm 5c1c22716fed
Error response from daemon: You cannot remove a running container 5c1c22716fed61926a1363bbde931538eb5e2a65c6c0245cbc7e9ef1a197792. Stop the container before attempting removal or force remove
root@menyi-Systems:/home/menyi# docker rm -f 5c1c22716fed
5c1c22716fed
root@menyi-Systems:/home/menyi# docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
94e852582b3b   ubuntu   "bash"    About a minute ago    Exited (0) 57 seconds ago        sad_hamilton
8a9dd1721fce   ubuntu   "bash"    3 minutes ago         Exited (127) 2 minutes ago       exciting_albattani
ace9c9c111f1   ubuntu   "bash"    2 hours ago          Exited (0) 17 minutes ago        menyContainerIT
root@menyi-Systems:/home/menyi#

```

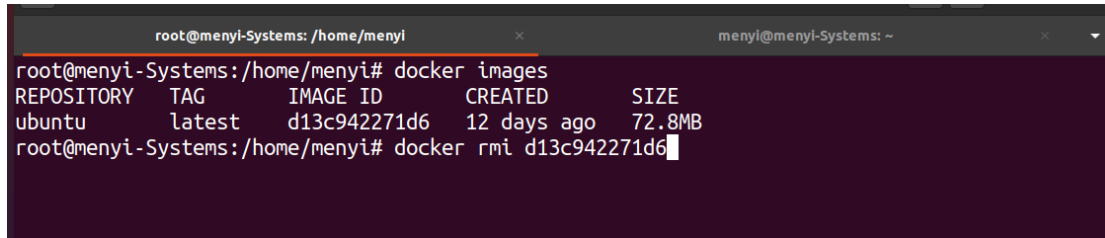
Remove all containers at the same time with just one command

```

root@menyi-Systems: /home/menyi
root@menyi-Systems:/home/menyi# docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
94e852582b3b   ubuntu   "bash"    About a minute ago    Exited (0) About a minute ago        sad_hamilton
8a9dd1721fce   ubuntu   "bash"    4 minutes ago         Exited (127) 3 minutes ago           exciting_albattani
ace9c9c111f1   ubuntu   "bash"    2 hours ago          Exited (0) 18 minutes ago            menyContainerIT
root@menyi-Systems:/home/menyi# docker rm -fv `docker ps -aq`
94e852582b3b
8a9dd1721fce
ace9c9c111f1
root@menyi-Systems:/home/menyi# docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
root@menyi-Systems:/home/menyi#

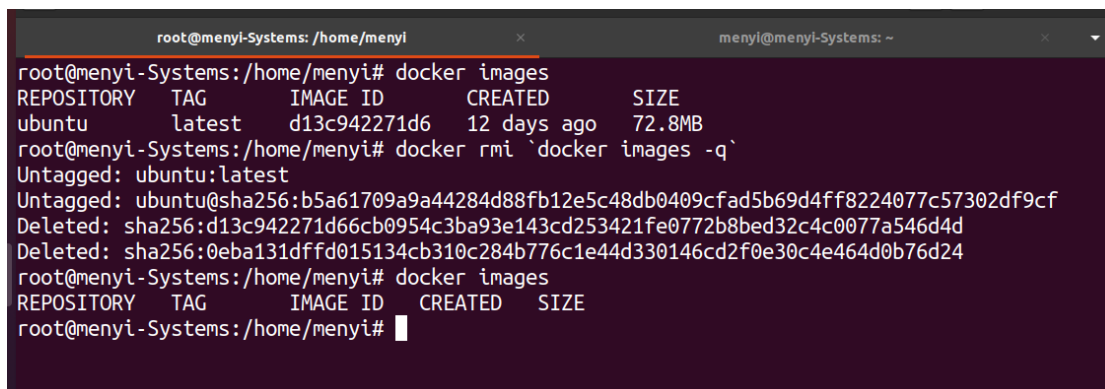
```

There are also different ways to **remove an image** from Docker: remove one image by its id

A terminal window with two tabs: 'root@menyi-Systems: /home/menyi' and 'menyi@menyi-Systems: ~'. The first tab is active. The user runs 'docker images' and then 'docker rmi d13c942271d6'.

```
root@menyi-Systems: /home/menyi# docker images
REPOSITORY TAG      IMAGE ID      CREATED      SIZE
ubuntu     latest    d13c942271d6  12 days ago  72.8MB
root@menyi-Systems: /home/menyi# docker rmi d13c942271d6
```

**Remove all images** at the same time with one command, then check it with *docker images*

A terminal window with two tabs: 'root@menyi-Systems: /home/menyi' and 'menyi@menyi-Systems: ~'. The first tab is active. The user runs 'docker images', then 'docker rmi `docker images -q`', and finally 'docker images' again.

```
root@menyi-Systems: /home/menyi# docker images
REPOSITORY TAG      IMAGE ID      CREATED      SIZE
ubuntu     latest    d13c942271d6  12 days ago  72.8MB
root@menyi-Systems: /home/menyi# docker rmi `docker images -q`
Untagged: ubuntu:latest
Deleted: sha256:d13c942271d66cb0954c3ba93e143cd253421fe0772b8bed32c4c0077a546d4d
Deleted: sha256:0eba131dff015134cb310c284b776c1e44d330146cd2f0e30c4e464d0b76d24
root@menyi-Systems: /home/menyi# docker images
REPOSITORY TAG      IMAGE ID      CREATED      SIZE
root@menyi-Systems: /home/menyi#
```