Homework 1- Docker Core Concepts

Exercise 1

1. Install Docker Engine using the official Docker APT repository.

```
ubuntu@k8s-instance-13:~$ sudo docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
e6590344b1a5: Pull complete
Digest: sha256:c41088499908a59aae84b0a49c70e86f4731e588a737f1637e73c8c09d995654
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/
```

2. Enable and start the Docker service.

```
ubuntu@k8s-instance-13:~$ sudo systemctl enable docker
Synchronizing state of docker.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable docker
ubuntu@k8s-instance-13:~$ sudo systemctl start docker
```

3. Print the info of the Docker Client and Server

```
ubuntu@k8s-instance-13:~$ docker info
Client: Docker Engine - Community
 Version:    28.1.1
 Context:    default
 Debug Mode: false
 Plugins:
  buildx: Docker Buildx (Docker Inc.)
    Version:  v0.23.0
    Path:     /usr/libexec/docker/cli-plugins/docker-buildx
  compose: Docker Compose (Docker Inc.)
    Version:  v2.35.1
    Path:     /usr/libexec/docker/cli-plugins/docker-compose

Server:
permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.s
ock/v1.49/info": dial unix /var/run/docker.sock: connect: permission denied
```

4. Extra: Agregar usuario al grupo Docker con sudo.

```
ubuntu@k8s-instance-13:~$ sudo usermod -aG docker ubuntu
ubuntu@k8s-instance-13:~$ logout
```

```
ubuntu@k8s-instance-13:~$ docker info
Client: Docker Engine - Community
 Version:    28.1.1
 Context:    default
 Debug Mode: false
 Plugins:
  buildx: Docker Buildx (Docker Inc.)
    Version:  v0.23.0
    Path:     /usr/libexec/docker/cli-plugins/docker-buildx
  compose: Docker Compose (Docker Inc.)
    Version:  v2.35.1
    Path:     /usr/libexec/docker/cli-plugins/docker-compose

Server:
 Containers: 1
  Running: 0
  Paused: 0
  Stopped: 1
 Images: 1
 Server Version: 28.1.1
 Storage Driver: overlay2
  Backing Filesystem: extfs
  Supports d_type: true
  Using metacopy: false
  Native Overlay Diff: true
  userxattr: false
 Logging Driver: json-file
 Cgroup Driver: systemd
 Cgroup Version: 2
```

Exercise 2

1. Search for the official repos of Ubuntu, Alpine, Nginx.

```
ubuntu@k8s-instance-13:~$ docker search --filter is-official=true ubuntu
NAME      DESCRIPTION                                    STARS      OFFICIAL
ubuntu    Ubuntu is a Debian-based Linux operating sys…  17551      [OK]
ubuntu@k8s-instance-13:~$ docker search --filter is-official=true alpine
NAME      DESCRIPTION                                    STARS      OFFICIAL
alpine    A minimal Docker image based on Alpine Linux…  11265      [OK]
ubuntu@k8s-instance-13:~$ docker search --filter is-official=true nginx
NAME      DESCRIPTION                    STARS      OFFICIAL
nginx     Official build of Nginx.       20756      [OK]
```

2. Run a Nginx container using the image from the official repo.

```
ubuntu@k8s-instance-13:~$ docker pull nginx
Using default tag: latest
latest: Pulling from library/nginx
8a628cdd7ccc: Pull complete
b0c073cda91f: Pull complete
e6557c42ebea: Pull complete
ec74683520b9: Pull complete
6c95adab80c5: Pull complete
ad8a0171f43e: Pull complete
32ef64864ec3: Pull complete
Digest: sha256:5ed8fcc66f4ed123c1b2560ed708dc148755b6e4cbd8b943fab094f2c6bfa91e
Status: Downloaded newer image for nginx:latest
docker.io/library/nginx:latest
ubuntu@k8s-instance-13:~$ docker run --name nginx-container -d -p 8080:80 nginx
04981dc26ed65125e16ba96354f000a27a67ea4cac40e0fa56578d3c1e45d9d6
```

Exercise 3

1. Check Docker daemon status

2. Stop the Docker daemon

3. Run a container while it's stopped.

4. Restart the Docker daemon and run a container again.

```
ubuntu@k8s-instance-13:~$ sudo systemctl start docker
```

```
ubuntu@k8s-instance-13:~$ docker run hello-world

Hello from Docker!
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    (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
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For more examples and ideas, visit:
 https://docs.docker.com/get-started/
```

Exercise 4

1. Run an Ubuntu container interactively.

```
ubuntu@k8s-instance-13:~$ docker run -it --name ubuntu_container ubuntu bash
Unable to find image 'ubuntu:latest' locally
latest: Pulling from library/ubuntu
2726e237d1a3: Pull complete
Digest: sha256:1e622c5f073b4f6bfad6632f2616c7f59ef256e96fe78bf6a595d1dc4376ac02
Status: Downloaded newer image for ubuntu:latest
root@d15933aef7c3:/#
```

2. Use apt update && apt install curl inside the container.

3. Exit the container.

Exercise 5

1. List running containers → (imagen conjunta)
2. List all containers (including exited)

Exercise 6

1. Run a container in the background → (imagen conjunta)
2. Then Pause it → (imagen conjunta)
3. Unpause it → (imagen conjunta)
4. Stop it → (imagen conjunta)
5. Restart it → (imagen conjunta)
6. Kill it → (imagen conjunta)

Exercise 7

1. Remove a running container.

```
ubuntu@k8s-instance-13:~$ docker rm -f lifecycle
lifecycle
ubuntu@k8s-instance-13:~$ docker ps -a --filter "name=lifecycle" --format "table {{.Nam
es}}\t{{.Status}}"
NAMES     STATUS
```

Exercise 8

1. Pull the alpine and ubuntu images.

```
ubuntu@k8s-instance-13:~$ docker pull alpine
docker pull ubuntu
Using default tag: latest
latest: Pulling from library/alpine
Digest: sha256:a8560b36e8b8210634f77d9f7f9efd7ffa463e380b75e2e74aff4511df3ef88c
Status: Image is up to date for alpine:latest
docker.io/library/alpine:latest
Using default tag: latest
latest: Pulling from library/ubuntu
Digest: sha256:1e622c5f073b4f6bfad6632f2616c7f59ef256e96fe78bf6a595d1dc4376ac02
Status: Image is up to date for ubuntu:latest
docker.io/library/ubuntu:latest
```

2. List all the container images in your Docker Host.

```
ubuntu@k8s-instance-13:~$ docker images
REPOSITORY     TAG       IMAGE ID       CREATED        SIZE
nginx          latest    4e1b6bae1e48   6 days ago     192MB
ubuntu         latest    602eb6fb314b   2 weeks ago    78.1MB
alpine         latest    aded1e1a5b37   2 months ago   7.83MB
hello-world    latest    74cc54e27dc4   3 months ago   10.1kB
```

Exercise 9

1. Run alpine and execute echo "hello from alpine"

```
ubuntu@k8s-instance-13:~$ docker run --name alpine_hello alpine echo "hello from alpine"
hello from alpine
ubuntu@k8s-instance-13:~$
```

2. Run busybox and execute uname -a

```
ubuntu@k8s-instance-13:~$ docker run --rm busybox uname -a
Unable to find image 'busybox:latest' locally
latest: Pulling from library/busybox
97e70d161e81: Pull complete
Digest: sha256:37f7b378a29ceb4c551b1b5582e27747b855bbfaa73fa11914fe0df028dc581f
Status: Downloaded newer image for busybox:latest
Linux c8cbb3572ce0 6.8.0-52-generic #53-Ubuntu SMP PREEMPT_DYNAMIC Sat Jan 11 00:06:25 UTC 20
25 x86_64 GNU/Linux
```

3. List all the container.

```
ubuntu@k8s-instance-13:~$ docker ps -a
CONTAINER ID   IMAGE         COMMAND                  CREATED           STATUS                      PORTS     NAMES
7a7f92307bd5   alpine        "echo 'hello from al…"   2 minutes ago     Exited (0) 2 minutes ago              alpine_hello
d15933aef7c3   ubuntu        "bash"                   45 minutes ago    Exited (0) 39 minutes ago             ubuntu_container
aae060224c21   hello-world   "/hello"                 52 minutes ago    Exited (0) 52 minutes ago             hardcore_saha
af5b74fc1761   hello-world   "/hello"                 59 minutes ago    Exited (0) 59 minutes ago             keen_black
04981dc26ed6   nginx         "/docker-entrypoint.…"   About an hour ago Exited (0) About an hour ago          nginx-container
1eda51f1aaf8   hello-world   "/hello"                 2 hours ago       Exited (0) 2 hours ago                suspicious_brattain
```

Exercise 10

1. Remove all stopped containers.


```
ubuntu@k8s-instance-13:~$ docker ps -a
CONTAINER ID   IMAGE         COMMAND                  CREATED           STATUS
7a7f92307bd5   alpine        "echo 'hello from al…"   8 minutes ago     Exited (0) 8 minutes ago
d15933aef7c3   ubuntu        "bash"                   52 minutes ago    Up 42 seconds
aae060224c21   hello-world   "/hello"                 58 minutes ago    Exited (0) 58 minutes ago
af5b74fc1761   hello-world   "/hello"                 About an hour ago Exited (0) About an hour ago
04981dc26ed6   nginx         "/docker-entrypoint.…"   About an hour ago Up 34 seconds
1eda51f1aaf8   hello-world   "/hello"                 2 hours ago       Exited (0) 2 hours ago
```

```
ubuntu@k8s-instance-13:~$ docker container prune
WARNING! This will remove all stopped containers.
Are you sure you want to continue? [y/N] y
Deleted Containers:
7a7f92307bd59e4c0b4f233d2e6a583b2a831e94f63f1e300f009012b8e2c5a1
aae060224c21b0e9c9db87226ce7344f0295071ba8feabe098c3399d1330b48f
af5b74fc17614b2443a897803f085b4374d0ea7e0ff43738b83fb65ede49f008
1eda51f1aaf8c436bcad55300a3271c975935c10a42d56afd7e452aa63d79032

Total reclaimed space: 0B
ubuntu@k8s-instance-13:~$ docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED           STATUS         PORTS                                         NAMES
d15933aef7c3   ubuntu    "bash"                   53 minutes ago    Up 2 minutes                                                 ubuntu_container
04981dc26ed6   nginx     "/docker-entrypoint.…"   About an hour ago Up 2 minutes   0.0.0.0:8080→80/tcp, [::]:8080→80/tcp         nginx-container
ubuntu@k8s-instance-13:~$
```

2. Remove unused images.


```
ubuntu@k8s-instance-13:~$ docker images
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
nginx         latest    4e1b6bae1e48   6 days ago     192MB
ubuntu        latest    602eb6fb314b   2 weeks ago    78.1MB
alpine        latest    aded1e1a5b37   2 months ago   7.83MB
hello-world   latest    74cc54e27dc4   3 months ago   10.1kB
busybox       latest    ff7a7936e930   6 months ago   4.28MB
ubuntu@k8s-instance-13:~$ docker image prune -a
WARNING! This will remove all images without at least one container associated to them.
Are you sure you want to continue? [y/N] y
Deleted Images:
untagged: hello-world:latest
untagged: hello-world@sha256:c41088499908a59aae84b0a49c70e86f4731e588a737f1637e73c8c09d995654
deleted: sha256:74cc54e27dc41bb10dc4b2226072d469509f2f22f1a3ce74f4a59661a1d44602
deleted: sha256:63a41026379f4391a306242eb0b9f26dc3550d863b7fdbb97d899f6eb89efe72
untagged: alpine:latest
untagged: alpine@sha256:a8560b36e8b8210634f77d9f7f9efd7ffa463e380b75e2e74aff4511df3ef88c
deleted: sha256:aded1e1a5b3705116fa0a92ba074a5e0b0031647d9c315983ccba2ee5428ec8b
deleted: sha256:08000c18d16dadf9553d747a58cf44023423a9ab010aab96cf263d2216b8b350
untagged: busybox:latest
untagged: busybox@sha256:37f7b378a29ceb4c551b1b5582e27747b855bbfaa73fa11914fe0df028dc581f
deleted: sha256:ff7a7936e9306ce4a789cf5523922da5e585dc1216e400efb3b6872a5137ee6b
deleted: sha256:068f50152bbc6e10c9d223150c9fbd30d11bcfd7789c432152aa0a99703bd03a

Total reclaimed space: 12.12MB
ubuntu@k8s-instance-13:~$ docker images
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
nginx         latest    4e1b6bae1e48   6 days ago     192MB
ubuntu        latest    602eb6fb314b   2 weeks ago    78.1MB
ubuntu@k8s-instance-13:~$
```

3. Inspect Docker disk usage.

```
ubuntu@k8s-instance-13:~$ docker system df
TYPE            TOTAL     ACTIVE    SIZE        RECLAIMABLE
Images          2         2         270.6MB     0B (0%)
Containers      2         2         56.84MB     0B (0%)
Local Volumes   0         0         0B          0B
Build Cache     0         0         0B          0B
ubuntu@k8s-instance-13:~$
```