

# TP/TD Docker

## 3. Dcoker sous Linux

1.

```

dio@lucky-theone:~$ docker -v
Docker version 26.1.0, build 9714adc

dio@lucky-theone:~$ systemctl status docker
● docker.service - Docker Application Container Engine
   Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor
  preset: enabled)
   Active: active (running) since Mon 2024-04-29 10:32:52 CEST; 1h 5min ago
 TriggeredBy: ● docker.socket
    Docs: https://docs.docker.com
   Main PID: 36896 (dockerd)
     Tasks: 18
    Memory: 31.9M
       CPU: 1.753s
    CGroup: /system.slice/docker.service
            └─36896 /usr/bin/dockerd -H fd:// --
 containerd=/run/containerd/containerd.sock

avril 29 10:32:51 lucky-theone dockerd[36896]: time="2024-04-
29T10:32:51.499656810+02:00" level=info msg="[graphdriver] using prior storage
driver: overlay2"
avril 29 10:32:51 lucky-theone dockerd[36896]: time="2024-04-
29T10:32:51.499933052+02:00" level=info msg="Loading containers: start."
avril 29 10:32:52 lucky-theone dockerd[36896]: time="2024-04-
29T10:32:52.112122407+02:00" level=info msg="Default bridge (docker0) is
assigned with an IP address 172.17.0.0/16. Daemon option --bip can be used to
avril 29 10:32:52 lucky-theone dockerd[36896]: time="2024-04-
29T10:32:52.208222966+02:00" level=info msg="Loading containers: done."
avril 29 10:32:52 lucky-theone dockerd[36896]: time="2024-04-
29T10:32:52.222050603+02:00" level=info msg="Docker daemon" commit=c8af8eb
containerd-snapshotter=false storage-driver=overlay2 version=26.1.0
avril 29 10:32:52 lucky-theone dockerd[36896]: time="2024-04-
29T10:32:52.222103345+02:00" level=info msg="Daemon has completed
initialization"
avril 29 10:32:52 lucky-theone dockerd[36896]: time="2024-04-
29T10:32:52.247484275+02:00" level=info msg="API listen on /run/docker.sock"
avril 29 10:32:52 lucky-theone systemd[1]: Started Docker Application Container
Engine.
avril 29 10:34:36 lucky-theone dockerd[36896]: time="2024-04-
29T10:34:36.206005972+02:00" level=info msg="ignoring event"
container=cb1f80b073ca288a8ecc66c86b928263bc18792501fa3b0144dc2a2323bf7696
module=libcon>
avril 29 11:16:27 lucky-theone dockerd[36896]: time="2024-04-
29T11:16:27.871109704+02:00" level=info msg="ignoring event"
container=6b742696e029cc8c51d5759335a623048680722fe36d944a66259c0582960252
module=libcon>
lines 1-22/22 (END)

```

2.

```
dio@lucky-theone:~$ docker run hello-world
```

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:

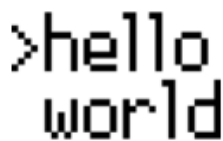
<https://hub.docker.com/>

For more examples and ideas, visit:

<https://docs.docker.com/get-started/>

a) Docker nous indique comment il a généré le message 'Hello from Docker'

b)



**hello-world**

 Docker Official Image ·  1B+ ·  2.2K

Hello World! (an example of minimal Dockerization)

*Lien*

[https://hub.docker.com/\\_/hello-world](https://hub.docker.com/_/hello-world)

c)

3. Voici la listes des images de Busybox :

```

dio@lucky-theone:~$ docker search busybox
NAME                                DESCRIPTION
STARS      OFFICIAL
busybox                                Busybox base image.
3243      [OK]
rancher/busybox
0
chainguard/busybox                    Build, ship and run secure software with
Cha...    0
openebs/busybox-client
1
antrea/busybox
1
airbyte/busybox
0
hugegraph/busybox                    test image
2
privatebin/chown                      Docker image providing busybox' chown,
stat...   1
yauritux/busybox-curl                 Busybox with CURL
25
radial/busyboxplus                    Full-chain, Internet enabled, busybox made
f...      56
vukomir/busybox                       busybox and curl
1
arm64v8/busybox                       Busybox base image.
8
odise/busybox-curl
4
busybox42/zimbra-docker-centos        A Zimbra Docker image, based in ZCS 8.8.9
an...     2
amd64/busybox                         Busybox base image.
1
busybox42/alpine-pod
0
joeshaw/busybox-nonroot                Busybox container with non-root user nobody
2
p7ppc64/busybox                       Busybox base image for ppc64.
2
ppc64le/busybox                       Busybox base image.
1
s390x/busybox                         Busybox base image.
3
i386/busybox                          Busybox base image.
3
arm32v7/busybox                       Busybox base image.
10
prom/busybox                          Prometheus Busybox Docker base images
2
busybox42/nginx_php-docker-centos     This is a nginx/php-fpm server running on
Ce...     1
spotify/busybox                       Spotify fork of
https://hub.docker.com/_/bus...      1

```

5. On constate que le docker est créé masi n'est pas vivant.

```

dio@lucky-theone:~$ docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED    STATUS    PORTS    NAMES
dio@lucky-theone:~$ docker ps -al
CONTAINER ID   IMAGE     COMMAND                  CREATED    STATUS    PORTS    NAMES
94e8fea343ba   debian   "bash"                  About a minute ago    Exited (0) About a minute ago    confident_lovelace

```

6. `dio@lucky-theone:~$ docker run -d debian bash -c "while ;; do echo "coucou" ; sleep 1; done"`  
`cd048a55dfa806aae37f1ef5f5a757ce3420eddbee4bd5c29dbe1ad26b5b2e7b`

Si on refait un 'docker ps', on constate que le docker est vivant :

```

dio@lucky-theone:~$ docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED    STATUS    PORTS    NAMES
cd048a55dfa8   debian   "bash -c 'while ;; d..." 2 minutes ago    Up 2 minutes    cranky_hofstadter

```

7. Pour arrêter puis redémarrer, on passe les commandes suivantes:

```

dio@lucky-theone:~$ docker stop cd
cd
dio@lucky-theone:~$ docker start cd
cd

```

- 8.

```

dio@lucky-theone:~$ docker rm cd
Error response from daemon: cannot remove container "/cranky_hofstadter":
container is running: stop the container before removing or force remove
dio@lucky-theone:~$ docker stop cd
cd
dio@lucky-theone:~$ docker rm cd
cd

```

9. Voici la commande avec -it:

[illegible]

10. Voici la commande :

```

dio@lucky-theone:~$ docker run -it --name DebianOne -h DebianOne debian
root@DebianOne:/#

```

11. Voici les commandes à utiliser :

```
dio@lucky-theone:~$ docker run -it --name DebianOne -h DebianOne debian
root@DebianOne:/# exit
exit
dio@lucky-theone:~$ docker start DebianOne
DebianOne
dio@lucky-theone:~$ docker attach DebianOne
root@DebianOne:/#
```

12.

```
dio@lucky-theone:~$ docker exec DebianOne echo a && echo b
a
b
```

13.

```
docker ps -l
```

14.

## 4. Création d'images Docker

### 4.1 Build d'une image Docker Debian

1. Voici la commande :

```
docker build -t debian:md .
```

2. RUN permet de d'exécuter une commande, ENV, précise l'environnement, et FROM permet de créer une nouvelle image à partir d'une image déjà présente

3. Cela permet d'avoir qu'une seule couche pour les ressources apt

4. Voici le fichier Dockerfile

```
FROM debian:md

RUN apt -y install iputils-ping inetutils-traceroute

ENTRYPOINT ["/bin/ping"]

CMD ["-c 4", "www.iutbeziers.fr"]
```

Voici le build et le run

```

dio@lucky-theone:~/tpdocker/mycoker$ docker build -t debian:pingfour
~/tpdocker/mycoker/
[+] Building 1.2s (6/6) FINISHED
docker:default
=> [internal] load build definition from Dockerfile
0.0s
=> => transferring dockerfile: 169B
0.0s
=> [internal] load metadata for docker.io/library/debian:md
0.0s
=> [internal] load .dockerignore
0.0s
=> => transferring context: 2B
0.0s
=> CACHED [1/2] FROM docker.io/library/debian:md
0.0s
=> [2/2] RUN apt -y install iputils-ping inetutils-traceroute
1.1s
=> exporting to image
0.1s
=> => exporting layers
0.0s
=> => writing image
sha256:e75dfe1a6afe901f175114a37e1b5295ec5b9160a285090b6eb17b696c2fea13
0.0s
=> => naming to docker.io/library/debian:pingfour
0.0s
dio@lucky-theone:~/tpdocker/mycoker$ docker run debian:pingfour
PING www.iutbeziers.fr (146.59.209.152) 56(84) bytes of data.
64 bytes from cluster031.hosting.ovh.net (146.59.209.152): icmp_seq=1 ttl=44
time=19.7 ms
64 bytes from cluster031.hosting.ovh.net (146.59.209.152): icmp_seq=2 ttl=44
time=20.0 ms
64 bytes from cluster031.hosting.ovh.net (146.59.209.152): icmp_seq=3 ttl=44
time=19.9 ms
64 bytes from cluster031.hosting.ovh.net (146.59.209.152): icmp_seq=4 ttl=44
time=19.9 ms

--- www.iutbeziers.fr ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 19.748/19.888/20.010/0.095 ms

```

5. Le -rm permet de supprimer automatiquement le container après l'avoir quitter

6. Oui nous pouvons le changer en modifiant le fichier Dockerfile.

7. Voici la commande:

```

dio@lucky-theone:~$ docker run --entrypoint /usr/bin/traceroute debian:pingfour
www.iutbeziers.fr

```

8.

```

dio@lucky-theone:~/tpdocker/debian-ssh$ docker build -t debian:ssh
~/tpdocker/debian-ssh/
[+] Building 10.3s (9/9) FINISHED
docker:default
=> [internal] load build definition from Dockerfile
0.0s
=> => transferring dockerfile: 283B
0.0s
=> [internal] load metadata for docker.io/library/debian:latest
0.0s
=> [internal] load .dockerignore
0.0s
=> => transferring context: 2B
0.0s
=> [1/5] FROM docker.io/library/debian:latest
0.0s
=> [2/5] RUN apt-get update && apt-get install -y openssh-server
8.9s
=> [3/5] RUN mkdir /var/run/sshd
0.3s
=> [4/5] RUN echo "root:root-lucky" | chpasswd
0.3s
=> [5/5] RUN sed -i 's/#PermitRootLogin prohibit-password/PermitRootLogin
yes/' /etc/ssh/sshd_config
0.3s
=> exporting to image
0.3s
=> => exporting layers
0.3s
=> => writing image
sha256:3a6a37aeacea1df827cac440e5976933eab43a6d755cfe2f7f65c8ce99a02873
0.0s
=> => naming to docker.io/library/debian:ssh

```

10.

```

dio@lucky-theone:~$ docker image tag debian:md localhost:5000/the-one

```

## 4.2 Installation d'un "insecure registry" sur votre poste de travail

```

dio@lucky-theone:~$ docker run -d -p 5000:5000 --name lucky registry:2
Unable to find image 'registry:2' locally
2: Pulling from library/registry
619be1103602: Pull complete
5daf2fb85fb9: Pull complete
ca5f23059090: Pull complete
8f2a82336004: Pull complete
68c26f40ad80: Pull complete
Digest: sha256:fb9c9aef62af3955f6014613456551c92e88a67dcf1fc51f5f91bcbdb1832813f
Status: Downloaded newer image for registry:2
ea3b9c2ab7908cbd3116981fc1ceb68cad4296fd353de36ff9fe15efd111b232
dio@lucky-theone:~$ docker image tag ubuntu localhost:5000/myfirstimage

```



## 4.3 Création d'un Dockerfile afin de générer une image debian ssh

Pour la création d'un Dockerfile je vais tout d'abord créer un Dockerfile qui a pour contenu ceci :

```
FROM debian:latest

RUN apt-get update && apt-get install -y openssh-server

RUN mkdir /var/run/sshd
RUN echo "root:root-lucky" | chpasswd

RUN sed -i 's/#PermitRootLogin prohibit-password/PermitRootLogin yes/'
/etc/ssh/sshd_config

EXPOSE 22
```

Puis on build et on réalise la redirection:

```
dio@lucky-theone:~/tpdocker/debian-ssh$ docker build -t debian:ssh
~/tpdocker/debian-ssh/
[+] Building 12.5s (7/7) FINISHED
docker:default
=> [internal] load build definition from Dockerfile
0.0s
=> => transferring dockerfile: 220B
0.0s
=> [internal] load metadata for docker.io/library/debian:latest
0.0s
=> [internal] load .dockerignore
0.0s
=> => transferring context: 2B
0.0s
=> [1/3] FROM docker.io/library/debian:latest
0.0s
=> [2/3] RUN apt-get update && apt-get install -y openssh-server
11.8s
=> [3/3] RUN sed -i 's/#PermitRootLogin prohibit-password/PermitRootLogin
yes/' /etc/ssh/sshd_config
0.3s
=> exporting to image
0.3s
=> => exporting layers
0.3s
=> => writing image
sha256:369b5266c7c62cd16a761fdf7c198e7f392ede438851dbed48181b2ada7888ec
0.0s
=> => naming to docker.io/library/debian:ssh

dio@lucky-theone:~/tpdocker/debian-ssh$ docker run -d -p 2222:22 debian:ssh
```

## 4.4 Dockérisation d'une application Python

4.4.1 Sans le container lancez l'appliquette suivante fonctionnant avec Python3

## 5. Réseaux Docker

1. Pour visualiser les réseaux docker présent sur la machnie, voici la commande :

```
docker network ls
```

2. Voici la commande:

```
docker network create -d bridge bridge-tp
```

- 3.

```
docker run -d --name=the-one -h the-one --network=bridge-tp debian
docker run -d --name=the-two -h the-two --network=bridge-tp debian
```

Ils peuvent accéder au réseau grâce au bridge précédement créer.

4. Voici la configuration de mon macvlan:

```
docker network create -d macvlan \
  --subnet=192.168.32.0/24 \
  --ip-range=192.168.32.128/25 \
  --gateway=192.168.32.254 \
  --aux-address="my-router=192.168.32.129" \
  -o parent=enx7cc2c61cac5a macnet32
```

5. Voici la configuration de mon ipvlan:

```
docker network create -d ipvlan \
  --subnet=192.168.1.0/24 \
  --gateway=192.168.1.1 \
  -o ipvlan_mode=l2 \
  -o parent=enx7cc2c61cac5a db_net
```

6. IPVLAN: Réseau vrituelle qui permet de rattacher des adresses aux interface de manière automatique.

MACVLAN: Réseau virtuelle qui permet de rattacher les adresses MAC des containers à une adresses IP. Utile lorsque l'on veut que nos containers apparaissent comme des machines physique.

7. Les containers utilisent la chaine de résolution donné par le réseau. Pour modifier le DNS lors du lancement du container, la commande est :

```
docker run --dns=8.8.8.8
```

## 6. Tips & Tricks

### 6.1 Connexion à distance au daemon Docker

- 1.