Setup

```
hafelago@DESKTOP-208TC4I:~$ docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
c1ec31eb5944: Pull complete
Digest: sha256:a26bff933ddc26d5cdf7faa98b4ae1e3ec20c4985e6f87ac0973052224d24302
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/

hafelago@DESKTOP-208TC4I:~$ |
```

	Name	Tag	Status	Created	Size	Actions		
☐	**hello-world** d2c94e258dcb ⧉	latest	In use	1 year ago	13.25 KB	▶	⋮	🗑

1.0 Running your first Container

```
hafelago@DESKTOP-208TC4I:~$ docker pull alpine
Using default tag: latest
latest: Pulling from library/alpine
4abcf2066143: Pull complete
Digest: sha256:c5b1261d6d3e43071626931fc004f70149baeba2c8ec672bd4f27761f8e1ad6b
Status: Downloaded newer image for alpine:latest
docker.io/library/alpine:latest

What's Next?
  View a summary of image vulnerabilities and recommendations → docker scout quickview alpine
hafelago@DESKTOP-208TC4I:~$
```

	Name	Tag	Status	Created	Size	Actions
☐	alpine 05455a08881e 📋	latest	Unused	3 months ago	7.37 MB	▶ ⋮ 🗑
☐	hello-world d2c94e258dcb 📋	latest	In use	1 year ago	13.25 KB	▶ ⋮ 🗑

Docker Images to see all images

```
What's Next?
  View a summary of image vulnerabilities and recommendations → docker scout quickview alpine
hafelago@DESKTOP-208TC4I:~$ docker images
REPOSITORY     TAG        IMAGE ID       CREATED        SIZE
alpine         latest     05455a08881e   3 months ago   7.38MB
hello-world    latest     d2c94e258dcb   12 months ago  13.3kB
hafelago@DESKTOP-208TC4I:~$
```

Docker run

```
hafelago@DESKTOP-208TC4I:~$ docker  run alpine ls -l
total 56
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 bin
drwxr-xr-x    5 root     root           340 May 10 03:06 dev
drwxr-xr-x    1 root     root          4096 May 10 03:06 etc
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 home
drwxr-xr-x    7 root     root          4096 Jan 26 17:53 lib
drwxr-xr-x    5 root     root          4096 Jan 26 17:53 media
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 mnt
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 opt
dr-xr-xr-x  330 root     root             0 May 10 03:06 proc
drwx------    2 root     root          4096 Jan 26 17:53 root
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 run
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 sbin
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 srv
dr-xr-xr-x   11 root     root             0 May 10 03:06 sys
drwxrwxrwt    2 root     root          4096 Jan 26 17:53 tmp
drwxr-xr-x    7 root     root          4096 Jan 26 17:53 usr
drwxr-xr-x   12 root     root          4096 Jan 26 17:53 var
hafelago@DESKTOP-208TC4I:~$
```

docker run alpine echo "hello from alpine"

```
hafelago@DESKTOP-208TC4I:~$ docker  run alpine echo "hello from alpine"
hello from alpine
hafelago@DESKTOP-208TC4I:~$
```

docker run -it alpine /bin/sh.

```
hafelago@DESKTOP-208TC4I:~$ docker run -it alpine /bin/sh
/ # ls -l
total 56
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 bin
drwxr-xr-x    5 root     root           360 May 10 03:13 dev
drwxr-xr-x    1 root     root          4096 May 10 03:13 etc
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 home
drwxr-xr-x    7 root     root          4096 Jan 26 17:53 lib
drwxr-xr-x    5 root     root          4096 Jan 26 17:53 media
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 mnt
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 opt
dr-xr-xr-x  336 root     root             0 May 10 03:13 proc
drwx------    1 root     root          4096 May 10 03:13 root
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 run
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 sbin
drwxr-xr-x    2 root     root          4096 Jan 26 17:53 srv
dr-xr-xr-x   11 root     root             0 May 10 03:13 sys
drwxrwxrwt    2 root     root          4096 Jan 26 17:53 tmp
drwxr-xr-x    7 root     root          4096 Jan 26 17:53 usr
drwxr-xr-x   12 root     root          4096 Jan 26 17:53 var
/ #
```
```
angry_edison
hafelago@DESKTOP-208TC4I:~$ docker ps
CONTAINER ID    IMAGE       COMMAND     CREATED     STATUS      PORTS       NAMES
hafelago@DESKTOP-208TC4I:~$
```

docker ps -a
```
hafelago@DESKTOP-208TC4I:~$ docker ps -a
CONTAINER ID    IMAGE          COMMAND              CREATED          STATUS
ORTS      NAMES
f88aea22611b    alpine         "/bin/sh"            2 minutes ago    Exited (127) 49 seconds ago
        pensive_hoover
b77bc845f6a2    alpine         "echo 'hello from al…"  5 minutes ago    Exited (0) 5 minutes ago
        jovial_carver
3d9ea50b8ecc    alpine         "ls -l"              9 minutes ago    Exited (0) 9 minutes ago
        suspicious_roentgen
b75ee6f5f068    hello-world    "/hello"             17 minutes ago   Exited (0) 17 minutes ago
        angry_edison
hafelago@DESKTOP-208TC4I:~$ docker ps -a
```

```
nafelago@DESKTOP-208TC4I:~$ docker run --help

Usage:  docker run [OPTIONS] IMAGE [COMMAND] [ARG...]

Create and run a new container from an image

Aliases:
  docker container run, docker run

Options:
      --add-host list                 Add a custom host-to-IP mapping (host:ip)
      --annotation map                Add an annotation to the container (passed through to
                                      the OCI runtime) (default map[])
  -a, --attach list                   Attach to STDIN, STDOUT or STDERR
      --blkio-weight uint16           Block IO (relative weight), between 10 and 1000, or 0
                                      to disable (default 0)
      --blkio-weight-device list      Block IO weight (relative device weight) (default [])
      --cap-add list                  Add Linux capabilities
      --cap-drop list                 Drop Linux capabilities
      --cgroup-parent string          Optional parent cgroup for the container
      --cgroupns string               Cgroup namespace to use (host|private)
                                      'host':    Run the container in the Docker host's
                                      cgroup namespace
                                      'private': Run the container in its own private cgrou
                                      namespace
                                      '':        Use the cgroup namespace as configured by
                                      the
                                                 default-cgroupns-mode option on the daemon
                                      (default)
      --cidfile string                Write the container ID to the file
      --cpu-period int                Limit CPU CFS (Completely Fair Scheduler) period
      --cpu-quota int                 Limit CPU CFS (Completely Fair Scheduler) quota
      --cpu-rt-period int             Limit CPU real-time period in microseconds
      --cpu-rt-runtime int            Limit CPU real-time runtime in microseconds
```

1.2 Terminology

```
hafelago@DESKTOP-208TC4I:~$ docker inspect alpine
[
    {
        "Id": "sha256:05455a08881ea9cf0e752bc48e61bbd71a34c029bb13df01e40e3e70e0d007bd",
        "RepoTags": [
            "alpine:latest"
        ],
        "RepoDigests": [
            "alpine@sha256:c5b1261d6d3e43071626931fc004f70149baeba2c8ec672bd4f27761f8e1ad6b"
        ],
        "Parent": "",
        "Comment": "",
        "Created": "2024-01-27T00:30:48.743965523Z",
        "ContainerConfig": {
            "Hostname": "",
            "Domainname": "",
            "User": "",
            "AttachStdin": false,
            "AttachStdout": false,
            "AttachStderr": false,
            "Tty": false,
            "OpenStdin": false,
            "StdinOnce": false,
            "Env": null,
            "Cmd": null,
            "Image": "",
            "Volumes": null,
            "WorkingDir": "",
            "Entrypoint": null,
            "OnBuild": null,
            "Labels": null
```

2.1 Run a static website in a container

```
hafelago@DESKTOP-208TC4I:~$ docker pull dockersamples/static-site
Using default tag: latest
latest: Pulling from dockersamples/static-site
fdd5d7827f33: Pull complete
a3ed95caeb02: Pull complete
716f7a5f3082: Pull complete
7b10f03a0309: Pull complete
aff3ab7e9c39: Pull complete
Digest: sha256:daa686c61d7d239b7977e72157997489db49f316b9b9af3909d9f10fd28b2dec
Status: Downloaded newer image for dockersamples/static-site:latest
docker.io/dockersamples/static-site:latest

What's Next?
  View a summary of image vulnerabilities and recommendations → docker scout quickview dockersamples/s
tatic-site
hafelago@DESKTOP-208TC4I:~$
```

	dockersamples/static-site	latest	Unused	8 years ago	190.52 MB	▶	⋮	🗑
	f589ccde7957 📋							

Showing 3 items

```
hafelago@DESKTOP-208TC4I:~$ docker pull dockersamples/static-site
Using default tag: latest
latest: Pulling from dockersamples/static-site
Digest: sha256:daa686c61d7d239b7977e72157997489db49f316b9b9af3909d9f10fd28b2dec
Status: Image is up to date for dockersamples/static-site:latest
docker.io/dockersamples/static-site:latest

What's Next?
  View a summary of image vulnerabilities and recommendations → docker scout quickview dockersamples/s
tatic-site
hafelago@DESKTOP-208TC4I:~$  docker run -d dockersamples/static-site
08231a2a77d90c2e01c4509d303ea11d024f0b086a74f55a747b911253243889
hafelago@DESKTOP-208TC4I:~$
```

```
hafelago@DESKTOP-208TC4I:~$ docker ps
CONTAINER ID    IMAGE                       COMMAND              CREATED         STATUS           POR
TS              NAMES
08231a2a77d9    dockersamples/static-site   "/bin/sh -c 'cd /usr…"  2 minutes ago   Up 2 minutes    80/
tcp, 443/tcp    hopeful_elbakyan
hafelago@DESKTOP-208TC4I:~$
```

```
hafelago@DESKTOP-208TC4I:~$ docker ps
CONTAINER ID    IMAGE                       COMMAND              CREATED         STATUS           POR
TS              NAMES
08231a2a77d9    dockersamples/static-site   "/bin/sh -c 'cd /usr…"  8 minutes ago   Up 8 minutes    80/
tcp, 443/tcp    hopeful_elbakyan
hafelago@DESKTOP-208TC4I:~$  docker stop 08231a2a77d9

^[[A^[[B08231a2a77d9
hafelago@DESKTOP-208TC4I:~$
hafelago@DESKTOP-208TC4I:~$ docker ps
CONTAINER ID    IMAGE       COMMAND       CREATED       STATUS       PORTS       NAMES
hafelago@DESKTOP-208TC4I:~$ docker rm 08231a2a77d9
08231a2a77d9
hafelago@DESKTOP-208TC4I:~$
```

Containers Give feedback 🗨

Your running containers show up here

A container is an isolated environment for your code

| 📦 ? | **What is a container?**<br><br>5 mins | ```
1 FROM node
2 RUN mkdir -p
3 WORKDIR /app
4 COPY packa
``` | **How do I run a container?**<br><br>6 mins |

View more in the Learning center

```
hafelago@DESKTOP-208TC4I:~$ docker ps
CONTAINER ID    IMAGE                    COMMAND              CREATED             STATUS
     PORTS                              NAMES
463d6ad9d940    dockersamples/static-site    "/bin/sh -c 'cd /usr…"    About a minute ago    Up About a mi
nute   0.0.0.0:32771->80/tcp, 0.0.0.0:32770->443/tcp    static-site
hafelago@DESKTOP-208TC4I:~$ docker run --name static-site -e AUTHOR="HAROLD" -d -P dockersamples/stati
c-site
3527657d328f8fcd4fcab66da958a2edc0a277d4676d075a12ece9d0042bf242
hafelago@DESKTOP-208TC4I:~$
```

```
3527657d328f8fcd4fcab66da958a2edc0a277d4676d075a12ece9d0c
hafelago@DESKTOP-208TC4I:~$ docker port static-site
80/tcp -> 0.0.0.0:32773
443/tcp -> 0.0.0.0:32772
hafelago@DESKTOP-208TC4I:~$
```

localhost:32773

Sign in to your IRC...   Cours et exercices...   Le Point du FLE - A...   Learn French at Law...   #1 Solidity Tutorial...   Extens

Hello HAROLD!

This is being served from a **docker**
container running Nginx.

```
443/tcp -> 0.0.0.0:32772
hafelago@DESKTOP-208TC4I:~$ docker stop static-site
static-site
hafelago@DESKTOP-208TC4I:~$ docker rm static-site
static-site
hafelago@DESKTOP-208TC4I:~$ docker ps
CONTAINER ID   IMAGE     COMMAND    CREATED    STATUS     PORTS      NAMES
hafelago@DESKTOP-208TC4I:~$
```

2.2 Docker Images

```
hafelago@DESKTOP-208TC4I:~$ docker images
REPOSITORY                 TAG       IMAGE ID       CREATED         SIZE
alpine                     latest    05455a08881e   3 months ago    7.38MB
hello-world                latest    d2c94e258dcb   12 months ago   13.3kB
dockersamples/static-site  latest    f589ccde7957   8 years ago     191MB
hafelago@DESKTOP-208TC4I:~$ |
```

docker pull ubuntu:12.04

```
hafelago@DESKTOP-208TC4I:~$ docker pull ubuntu:12.04
12.04: Pulling from library/ubuntu
d8868e50ac4c: Pull complete
83251ac64627: Pull complete
589bba2f1b36: Pull complete
d62ecaceda39: Pull complete
6d93b41cfc6b: Pull complete
Digest: sha256:18305429afa14ea462f810146ba44d4363ae76e4c8dfc38288cf73aa07485005
Status: Downloaded newer image for ubuntu:12.04
docker.io/library/ubuntu:12.04
```

```
dockersamples/static-site    latest    f589ccde7957    8 years ago    191MB
hafelago@DESKTOP-208TC4I:~$ docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
49b384cc7b4a: Pull complete
Digest: sha256:3f85b7caad41a95462cf5b787d8a04604c8262cdcdf9a472b8c52ef83375fe15
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest

What's Next?
  View a summary of image vulnerabilities and recommendations → docker scout quickview ubuntu
hafelago@DESKTOP-208TC4I:~$ docker images
REPOSITORY                   TAG       IMAGE ID        CREATED         SIZE
ubuntu                       latest    bf3dc08bfed0    11 days ago     76.2MB
alpine                       latest    05455a08881e    3 months ago    7.38MB
hello-world                  latest    d2c94e258dcb    12 months ago   13.3kB
ubuntu                       12.04     5b117edd0b76    7 years ago     104MB
dockersamples/static-site    latest    f589ccde7957    8 years ago     191MB
hafelago@DESKTOP-208TC4I:~$
```

2.3.1


```
hafelago@DESKTOP-208TC4I:~/flask-app$ ls
Dockerfile  app.py  requirements.txt  templates
hafelago@DESKTOP-208TC4I:~/flask-app$
```

2.3.2 write a dockerfile

2.3.3 Build the image

CAT GIF OF THE DAY

This image is no longer available.

Courtesy: Buzzfeed

Push the image

```
hafelago@DESKTOP-208TC4I:~/flask-app$ docker tag hafelago hafelago/flask-app:latest
hafelago@DESKTOP-208TC4I:~/flask-app$ docker push  hafelago/flask-app:latest
The push refers to repository [docker.io/hafelago/flask-app]
106b903ee992: Pushed
9e4d3b700542: Pushed
f3612fe1c909: Pushed
702634fcd87e: Pushed
abbe2f6b6712: Pushed
aa9d6dba5958: Pushed
d4fc045c9e3a: Mounted from library/alpine
latest: digest: sha256:73d830afaeead86fce7334b0e62704a71a248daa776df2a4fa464088f4b97224 size: 1783
hafelago@DESKTOP-208TC4I:~/flask-app$
```

3.0 Deploying an app to a Swarm

```
hafelago@DESKTOP-208TC4I:~$ git clone https://github.com/docker/example-voting-app.git
cd example-voting-app
Cloning into 'example-voting-app'...
remote: Enumerating objects: 1140, done.
remote: Counting objects: 100% (8/8), done.
remote: Compressing objects: 100% (8/8), done.
remote: Total 1140 (delta 1), reused 3 (delta 0), pack-reused 1132
Receiving objects: 100% (1140/1140), 1.21 MiB | 4.38 MiB/s, done.
Resolving deltas: 100% (435/435), done.
hafelago@DESKTOP-208TC4I:~/example-voting-app$
```

```
hafelago@DESKTOP-208TC4I:~/example-voting-app$ docker swarm init
Swarm initialized: current node (jylrnoljch3qc2ifocuaf9nls) is now a manager.

To add a worker to this swarm, run the following command:

    docker swarm join --token SWMTKN-1-2bcbmv0np0kobnrf5vfsk46vgqrwaiqgp2l8jvbf43xphvmmyo-aptpf45b5jc9b63n34ba0qukh 192.
168.65.3:2377

To add a manager to this swarm, run 'docker swarm join-token manager' and follow the instructions.

hafelago@DESKTOP-208TC4I:~/example-voting-app$
```

```
hafelago@DESKTOP-208TC4I:~/example-voting-app$ docker swarm init
Swarm initialized: current node (jylrnoljch3qc2ifocuaf9nls) is now a manager.

To add a worker to this swarm, run the following command:

    docker swarm join --token SWMTKN-1-2bcbmv0np0kobnrf5vfsk46vgqrwaiqgp2l8jvbf43xphvmmyo-aptpf45b5jc9b63n34ba0qukh 192.
168.65.3:2377

To add a manager to this swarm, run 'docker swarm join-token manager' and follow the instructions.

hafelago@DESKTOP-208TC4I:~/example-voting-app$ docker stack deploy --compose-file docker-stack.yml vote
Since --detach=false was not specified, tasks will be created in the background.
In a future release, --detach=false will become the default.
Creating network vote_frontend
Creating network vote_backend
Creating service vote_worker
Creating service vote_redis
Creating service vote_db
Creating service vote_vote
Creating service vote_result
```

```yaml
version: "3"
services:

  redis:
    image: redis:alpine
    ports:
      - "6379"
    networks:
      - frontend
    deploy:
      replicas: 2
      update_config:
        parallelism: 2
        delay: 10s
      restart_policy:
        condition: on-failure
  db:
    image: postgres:9.4
    volumes:
      - db-data:/var/lib/postgresql/data
    networks:
      - backend
    deploy:
      placement:
        constraints: [node.role == manager]
  vote:
    image: dockersamples/examplevotingapp_vote:before
    ports:
      - 5000:80
    networks:
      - frontend
    depends_on:
      - redis
    deploy:
      replicas: 2
      update_config:
        parallelism: 2
      restart_policy:
        condition: on-failure
  result:
    image: dockersamples/examplevotingapp_result:before
    ports:
      - 5001:80
    networks:
      - backend
    depends_on:
      - db
    deploy:
```

Verify


```
hafelago@DESKTOP-208TC4I:~/example-voting-app$ docker stack deploy --compose-file docker-stack.yml vote
Since --detach=false was not specified, tasks will be created in the background.
In a future release, --detach=false will become the default.
Creating network vote_frontend
Creating network vote_backend
Creating service vote_worker
Creating service vote_redis
Creating service vote_db
Creating service vote_vote
Creating service vote_result
hafelago@DESKTOP-208TC4I:~/example-voting-app$ docker stack services vote
ID             NAME          MODE         REPLICAS   IMAGE                                              PORTS
mf7txonlifv6   vote_db       replicated   1/1        postgres:15-alpine
e4wadw1z0x9r   vote_redis    replicated   1/1        redis:alpine
flyp19y97z6l   vote_result   replicated   1/1        dockersamples/examplevotingapp_result:latest      *:5001->80/tcp
xeex7dns81xu   vote_vote     replicated   2/2        dockersamples/examplevotingapp_vote:latest        *:5000->80/tcp
p3x7l8y24r2y   vote_worker   replicated   2/2        dockersamples/examplevotingapp_worker:latest
hafelago@DESKTOP-208TC4I:~/example-voting-app$
```

Localhost:5000

Cats vs Dogs!

CATS

DOGS

(Tip: you can change your vote)

Processed by container ID
a80313c0e6bb

CATS	DOGS
0.0%	100.0%

1 vote

```
hafelago@DESKTOP-208TC4I:~/example-voting-app$ docker stack deploy --compose-file docker-stack.yml vote
Since --detach=false was not specified, tasks will be created in the background.
In a future release, --detach=false will become the default.
Updating service vote_redis (id: e4wadw1z0x9r6ohsp4725eozh)
Updating service vote_db (id: mf7txonlifv66w2fkxlbwkbxp)
Updating service vote_vote (id: xeex7dns81xuanrbjps0cbhh0)
Updating service vote_result (id: flyp19y97z6lk2zvl4tczlea2)
Updating service vote_worker (id: p3x7l8y24r2yv35vip1j1hfgs)
hafelago@DESKTOP-208TC4I:~/example-voting-app$
```

Cats vs Dogs!

CATS ✓

DOGS

(Tip: you can change your vote)

CATS	DOGS
100.0%	0.0%

```
hafelago@DESKTOP-208TC4I:~/example-voting-app$ docker stack rm vote
Removing service vote_db
Removing service vote_redis
Removing service vote_result
Removing service vote_vote
Removing service vote_worker
Removing network vote_backend
Removing network vote_frontend
hafelago@DESKTOP-208TC4I:~/example-voting-app$
```