

Version : **2021.01**

Dernière mise-à-jour : 2021/02/28 16:45

LRF410 - Démarrer avec Docker

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Présentation de Docker

Docker est une application de virtualisation légère qui utilise des **images** et des **conteneurs**.

Une **image** est un paquet exécutable contenant tout ce qu'il est nécessaire afin d'exécuter un logiciel donné, incluant :

- le code
- un runtime
- des bibliothèques,
- des variables d'environnement
- des fichiers de configuration

Un **conteneur** est une instance de l'image en cours d'exécution en mémoire. Elle est isolée de l'environnement de l'hôte par défaut mais peut accéder à des fichiers et de ports de l'hôte selon la configuration.

Les conteneurs exécutent des applications nativement en utilisant le noyau de la machine hôte. De ce fait les performances d'un conteneur sont supérieures à celles d'une machine virtuelle qui doit passer par un hyperviseur pour accéder aux ressources de la machine hôte.

Docker existe en deux versions **Docker-CE** (Docker Community Edition) et **Docker-EE** (Docker Enterprise Edition). Pour consulter les différences entre les deux versions, consultez le lien <https://docs.docker.com/engine/installation/>.

LAB #1 - Travailler avec Docker

1.1 - Installer docker

Installer Docker-CE sur **votre** ordinateur :

Mac

- Voir le lien <https://docs.docker.com/docker-for-mac/install/> ou le lien [kitematic](#).

Linux

- Ubuntu - voir le lien <https://docs.docker.com/engine/installation/linux/docker-ce/ubuntu/>,
- Debian - voir le lien <https://docs.docker.com/engine/installation/linux/docker-ce/debian/>,
- CentOS - voir le lien <https://docs.docker.com/engine/installation/linux/docker-ce/centos/>,
- Fedora - voir le lien <https://docs.docker.com/engine/installation/linux/docker-ce/fedora/>,

Windows 7, 8

- Téléchargez Docker Toolbox à partir de cette page https://docs.docker.com/toolbox/toolbox_install_windows/
- Fermez toutes les machines virtuelles ainsi que VirtualBox,
- Installez **DockerToolBox.exe** (décochez VirtualBox dans la liste de produits à installer),
- Exécutez Docker Toolbox et laissez l'application créer une machine virtuelle,
- Ouvrez VirtualBox. Vous verrez une machine virtuelle Default,
- Ouvrez **cmd**.

Windows 10

- Voir le lien <https://docs.docker.com/docker-for-windows/install/>.

1.2 - Démarrer un Conteneur

Démarrez un conteneur de l'image hello-world :

```
root@debian9:~# docker run hello-world
Unable to find image 'hello-world:latest' locally
```

```
latest: Pulling from library/hello-world
1b930d010525: Pull complete
Digest: sha256:2557e3c07ed1e38f26e389462d03ed943586f744621577a99efb77324b0fe535
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/>



Important - Notez que si l'image servant à générer le conteneur n'est pas présente sur le système hôte, celle-ci est téléchargée automatiquement depuis un dépôt (par défaut le dépôt **docker.io**) en utilisant la commande **docker pull**.

Démarrez un conteneur de l'image ubuntu:latest en mode interactif grâce à l'utilisation des options **-i** et **-t** en lui passant en argument **bash** pour que celui-ci soient lancé au démarrage du conteneur :

```

root@debian9:~# docker run -it ubuntu bash
Unable to find image 'ubuntu:latest' locally
latest: Pulling from library/ubuntu
898c46f3b1a1: Pull complete
63366dfa0a50: Pull complete
041d4cd74a92: Pull complete
6e1bee0f8701: Pull complete
Digest: sha256:017eef0b616011647b269b5c65826e2e2ebddbe5d1f8c1e56b3599fb14fabec8
Status: Downloaded newer image for ubuntu:latest
root@3a3f9bda6cbd:/# ls
bin boot dev etc home lib lib64 media mnt opt proc root run sbin srv sys tmp usr var
root@3a3f9bda6cbd:/# cat /etc/lsb-release
DISTRIB_ID=Ubuntu
DISTRIB_RELEASE=18.04
DISTRIB_CODENAME=bionic
DISTRIB_DESCRIPTION="Ubuntu 18.04.2 LTS"

```



Important - Notez que dans ce cas le conteneur est lancé avec comme argument **bash** qui lancera `/bin/bash` dans le conteneur.

Consulter la liste des paquets installés dans le conteneur ubuntu :

```

root@835001339e79:/# dpkg -l
Desired=Unknown/Install/Remove/Purge/Hold
| Status=Not/Inst/Conf-files/Unpacked/halF-conf/Half-inst/trig-aWait/Trig-pend
|/ Err?=(none)/Reinst-required (Status,Err: uppercase=bad)
||/ Name                               Version                               Architecture             Description
+++-----
=====
ii  adduser                               3.116ubuntu1                         all                        add and remove users and
groups
ii  apt                                   1.6.8                                amd64                     commandline package

```

manager			
ii base-files	10.1ubuntu2.4	amd64	Debian base system
miscellaneous files			
ii base-passwd	3.5.44	amd64	Debian base system
master password and group files			
ii bash	4.4.18-2ubuntu1	amd64	GNU Bourne Again SHell
ii bsdtails	1:2.31.1-0.4ubuntu3.3	amd64	basic utilities from
4.4BSD-Lite			
ii bzip2	1.0.6-8.1	amd64	high-quality block-
sorting file compressor - utilities			
ii coreutils	8.28-1ubuntu1	amd64	GNU core utilities
ii dash	0.5.8-2.10	amd64	POSIX-compliant shell
ii debconf	1.5.66	all	Debian configuration
management system			
ii debianutils	4.8.4	amd64	Miscellaneous utilities
specific to Debian			
ii diffutils	1:3.6-1	amd64	File comparison
utilities			
ii dpkg	1.19.0.5ubuntu2.1	amd64	Debian package
management system			
ii e2fsprogs	1.44.1-1ubuntu1.1	amd64	ext2/ext3/ext4 file
system utilities			
ii fdisk	2.31.1-0.4ubuntu3.3	amd64	collection of
partitioning utilities			
ii findutils	4.6.0+git+20170828-2	amd64	utilities for finding
files--find, xargs			
ii gcc-8-base:amd64	8.2.0-1ubuntu2~18.04	amd64	GCC, the GNU Compiler
Collection (base package)			
ii gpgv	2.2.4-1ubuntu1.2	amd64	GNU privacy guard -
signature verification tool			
ii grep	3.1-2	amd64	GNU grep, egrep and
fgrep			
ii gzip	1.6-5ubuntu1	amd64	GNU compression
utilities			

ii hostname	3.20	amd64	utility to set/show the
host name or domain name			
ii init-system-helpers	1.51	all	helper tools for all
init systems			
ii libacl1:amd64	2.2.52-3build1	amd64	Access control list
shared library			
ii libapt-pkg5.0:amd64	1.6.8	amd64	package management
runtime library			
ii libattr1:amd64	1:2.4.47-2build1	amd64	Extended attribute
shared library			
ii libaudit-common	1:2.8.2-1ubuntu1	all	Dynamic library for
security auditing - common files			
ii libaudit1:amd64	1:2.8.2-1ubuntu1	amd64	Dynamic library for
security auditing			
ii libblkid1:amd64	2.31.1-0.4ubuntu3.3	amd64	block device ID library
ii libbz2-1.0:amd64	1.0.6-8.1	amd64	high-quality block-
sorting file compressor library - runtime			
ii libc-bin	2.27-3ubuntu1	amd64	GNU C Library: Binaries
ii libc6:amd64	2.27-3ubuntu1	amd64	GNU C Library: Shared
libraries			
ii libcap-ng0:amd64	0.7.7-3.1	amd64	An alternate POSIX
capabilities library			
ii libcom-err2:amd64	1.44.1-1ubuntu1.1	amd64	common error description
library			
ii libdb5.3:amd64	5.3.28-13.1ubuntu1	amd64	Berkeley v5.3 Database
Libraries [runtime]			
ii libdebconfclient0:amd64	0.213ubuntu1	amd64	Debian Configuration
Management System (C-implementation library)			
ii libext2fs2:amd64	1.44.1-1ubuntu1.1	amd64	ext2/ext3/ext4 file
system libraries			
ii libfdisk1:amd64	2.31.1-0.4ubuntu3.3	amd64	fdisk partitioning
library			
ii libffi6:amd64	3.2.1-8	amd64	Foreign Function
Interface library runtime			

ii libgcc1:amd64	1:8.2.0-1ubuntu2~18.04	amd64	GCC support library
ii libgcrypt20:amd64	1.8.1-4ubuntu1.1	amd64	LGPL Crypto library -
runtime library			
ii libgmp10:amd64	2:6.1.2+dfsg-2	amd64	Multiprecision
arithmetic library			
ii libgnutls30:amd64	3.5.18-1ubuntu1	amd64	GNU TLS library - main
runtime library			
ii libgpg-error0:amd64	1.27-6	amd64	library for common error
values and messages in GnuPG components			
ii libhogweed4:amd64	3.4-1	amd64	low level cryptographic
library (public-key cryptos)			
ii libidn2-0:amd64	2.0.4-1.1build2	amd64	Internationalized domain
names (IDNA2008/TR46) library			
ii liblz4-1:amd64	0.0~r131-2ubuntu3	amd64	Fast LZ compression
algorithm library - runtime			
ii liblzma5:amd64	5.2.2-1.3	amd64	XZ-format compression
library			
ii libmount1:amd64	2.31.1-0.4ubuntu3.3	amd64	device mounting library
ii libncurses5:amd64	6.1-1ubuntu1.18.04	amd64	shared libraries for
terminal handling			
ii libncursesw5:amd64	6.1-1ubuntu1.18.04	amd64	shared libraries for
terminal handling (wide character support)			
ii libnettle6:amd64	3.4-1	amd64	low level cryptographic
library (symmetric and one-way cryptos)			
ii libp11-kit0:amd64	0.23.9-2	amd64	library for loading and
coordinating access to PKCS#11 modules - runtime			
ii libpam-modules:amd64	1.1.8-3.6ubuntu2.18.04.	amd64	Pluggable Authentication
Modules for PAM			
ii libpam-modules-bin	1.1.8-3.6ubuntu2.18.04.	amd64	Pluggable Authentication
Modules for PAM - helper binaries			
ii libpam-runtime	1.1.8-3.6ubuntu2.18.04.	all	Runtime support for the
PAM library			
ii libpam0g:amd64	1.1.8-3.6ubuntu2.18.04.	amd64	Pluggable Authentication
Modules library			

ii libpcre3:amd64 Regular Expression Library - runtime files	2:8.39-9	amd64	Old Perl 5 Compatible
ii libprocps6:amd64 process information from /proc	2:3.3.12-3ubuntu1.1	amd64	library for accessing
ii libseccomp2:amd64 Linux seccomp filter	2.3.1-2.1ubuntu4	amd64	high level interface to
ii libselinux1:amd64 libraries	2.7-2build2	amd64	SELinux runtime shared
ii libsemanage-common policy management libraries	2.7-2build2	all	Common files for SELinux
ii libsemanage1:amd64 management library	2.7-2build2	amd64	SELinux policy
ii libsepol1:amd64 manipulating binary security policies	2.7-1	amd64	SELinux library for
ii libsmartcols1:amd64 alignment library	2.31.1-0.4ubuntu3.3	amd64	smart column output
ii libss2:amd64 parsing library	1.44.1-1ubuntu1.1	amd64	command-line interface
ii libstdc++6:amd64 v3	8.2.0-1ubuntu2~18.04	amd64	GNU Standard C++ Library
ii libsystemd0:amd64	237-3ubuntu10.13	amd64	systemd utility library
ii libtasn1-6:amd64 (runtime)	4.13-2	amd64	Manage ASN.1 structures
ii libtinfo5:amd64 terminfo library for terminal handling	6.1-1ubuntu1.18.04	amd64	shared low-level
ii libudev1:amd64	237-3ubuntu10.13	amd64	libudev shared library
ii libunistring2:amd64 for C	0.9.9-0ubuntu1	amd64	Unicode string library
ii libuuid1:amd64 library	2.31.1-0.4ubuntu3.3	amd64	Universally Unique ID
ii libzstd1:amd64 compression algorithm	1.3.3+dfsg-2ubuntu1	amd64	fast lossless
ii login	1:4.5-1ubuntu1	amd64	system login tools
ii lsb-base	9.20170808ubuntu1	all	Linux Standard Base init

```

script functionality
ii mawk                      1.3.3-17ubuntu3      amd64      a pattern scanning and
text processing language
ii mount                     2.31.1-0.4ubuntu3.3  amd64      tools for mounting and
manipulating filesystems
ii ncurses-base              6.1-1ubuntu1.18.04   all        basic terminal type
definitions
ii ncurses-bin               6.1-1ubuntu1.18.04   amd64      terminal-related
programs and man pages
ii passwd                    1:4.5-1ubuntu1        amd64      change and administer
password and group data
ii perl-base                 5.26.1-6ubuntu0.3     amd64      minimal Perl system
ii procps                    2:3.3.12-3ubuntu1.1   amd64      /proc file system
utilities
ii sed                       4.4-2                 amd64      GNU stream editor for
filtering/transforming text
ii sensible-utils            0.0.12                all        Utilities for sensible
alternative selection
ii sysvinit-utils            2.88dsf-59.10ubuntu1  amd64      System-V-like utilities
ii tar                       1.29b-2ubuntu0.1       amd64      GNU version of the tar
archiving utility
ii ubuntu-keyring            2018.09.18.1~18.04.0  all        GnuPG keys of the Ubuntu
archive
ii util-linux                2.31.1-0.4ubuntu3.3   amd64      miscellaneous system
utilities
ii zlib1g:amd64              1:1.2.11.dfsg-0ubuntu2 amd64      compression library -
runtime
root@835001339e79:/# exit
exit
root@debian9:~#

```

Les options de la commande docker run peuvent être visualisées avec la commande :

```
root@debian9:~# docker run --help
```

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

Run a command in a new container

Options:

<code>--add-host list</code>	Add a custom host-to-IP mapping (host:ip)
<code>-a, --attach list</code>	Attach to STDIN, STDOUT or STDERR
<code>--blkio-weight uint16</code>	Block IO (relative weight), between 10 and 1000, or 0 to disable (default 0)
<code>--blkio-weight-device list</code>	Block IO weight (relative device weight) (default [])
<code>--cap-add list</code>	Add Linux capabilities
<code>--cap-drop list</code>	Drop Linux capabilities
<code>--cgroup-parent string</code>	Optional parent cgroup for the container
<code>--cidfile string</code>	Write the container ID to the file
<code>--cpu-period int</code>	Limit CPU CFS (Completely Fair Scheduler) period
<code>--cpu-quota int</code>	Limit CPU CFS (Completely Fair Scheduler) quota
<code>--cpu-rt-period int</code>	Limit CPU real-time period in microseconds
<code>--cpu-rt-runtime int</code>	Limit CPU real-time runtime in microseconds
<code>-c, --cpu-shares int</code>	CPU shares (relative weight)
<code>--cpus decimal</code>	Number of CPUs
<code>--cpuset-cpus string</code>	CPUs in which to allow execution (0-3, 0,1)
<code>--cpuset-mems string</code>	MEMs in which to allow execution (0-3, 0,1)
<code>-d, --detach</code>	Run container in background and print container ID
<code>--detach-keys string</code>	Override the key sequence for detaching a container
<code>--device list</code>	Add a host device to the container
<code>--device-cgroup-rule list</code>	Add a rule to the cgroup allowed devices list
<code>--device-read-bps list</code>	Limit read rate (bytes per second) from a device (default [])
<code>--device-read-iops list</code>	Limit read rate (IO per second) from a device (default [])
<code>--device-write-bps list</code>	Limit write rate (bytes per second) to a device (default [])
<code>--device-write-iops list</code>	Limit write rate (IO per second) to a device (default [])
<code>--disable-content-trust</code>	Skip image verification (default true)
<code>--dns list</code>	Set custom DNS servers
<code>--dns-option list</code>	Set DNS options
<code>--dns-search list</code>	Set custom DNS search domains

--entrypoint string	Overwrite the default ENTRYPOINT of the image
-e, --env list	Set environment variables
--env-file list	Read in a file of environment variables
--expose list	Expose a port or a range of ports
--group-add list	Add additional groups to join
--health-cmd string	Command to run to check health
--health-interval duration	Time between running the check (ms s m h) (default 0s)
--health-retries int	Consecutive failures needed to report unhealthy
--health-start-period duration	Start period for the container to initialize before starting health-
retries countdown (ms s m h) (default 0s)	
--health-timeout duration	Maximum time to allow one check to run (ms s m h) (default 0s)
--help	Print usage
-h, --hostname string	Container host name
--init	Run an init inside the container that forwards signals and reaps processes
-i, --interactive	Keep STDIN open even if not attached
--ip string	IPv4 address (e.g., 172.30.100.104)
--ip6 string	IPv6 address (e.g., 2001:db8::33)
--ipc string	IPC mode to use
--isolation string	Container isolation technology
--kernel-memory bytes	Kernel memory limit
-l, --label list	Set meta data on a container
--label-file list	Read in a line delimited file of labels
--link list	Add link to another container
--link-local-ip list	Container IPv4/IPv6 link-local addresses
--log-driver string	Logging driver for the container
--log-opt list	Log driver options
--mac-address string	Container MAC address (e.g., 92:d0:c6:0a:29:33)
-m, --memory bytes	Memory limit
--memory-reservation bytes	Memory soft limit
--memory-swap bytes	Swap limit equal to memory plus swap: '-1' to enable unlimited swap
--memory-swappiness int	Tune container memory swappiness (0 to 100) (default -1)
--mount mount	Attach a filesystem mount to the container
--name string	Assign a name to the container
--network string	Connect a container to a network (default "default")

--network-alias list	Add network-scoped alias for the container
--no-healthcheck	Disable any container-specified HEALTHCHECK
--oom-kill-disable	Disable OOM Killer
--oom-score-adj int	Tune host's OOM preferences (-1000 to 1000)
--pid string	PID namespace to use
--pids-limit int	Tune container pids limit (set -1 for unlimited)
--privileged	Give extended privileges to this container
-p, --publish list	Publish a container's port(s) to the host
-P, --publish-all	Publish all exposed ports to random ports
--read-only	Mount the container's root filesystem as read only
--restart string	Restart policy to apply when a container exits (default "no")
--rm	Automatically remove the container when it exits
--runtime string	Runtime to use for this container
--security-opt list	Security Options
--shm-size bytes	Size of /dev/shm
--sig-proxy	Proxy received signals to the process (default true)
--stop-signal string	Signal to stop a container (default "SIGTERM")
--stop-timeout int	Timeout (in seconds) to stop a container
--storage-opt list	Storage driver options for the container
--sysctl map	Sysctl options (default map[])
--tmpfs list	Mount a tmpfs directory
-t, --tty	Allocate a pseudo-TTY
--ulimit ulimit	Ulimit options (default [])
-u, --user string	Username or UID (format: <name uid>[:<group gid>])
--usersns string	User namespace to use
--uts string	UTS namespace to use
-v, --volume list	Bind mount a volume
--volume-driver string	Optional volume driver for the container
--volumes-from list	Mount volumes from the specified container(s)
-w, --workdir string	Working directory inside the container

1.3 - Consulter la Liste des Conteneurs et Images

Pour consulter tous les conteneurs, utilisez la commande **docker ps** avec l'option **-a** :

```
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
3a3f9bda6cbd	ubuntu	"bash"	About a minute ago	Exited (127) 3 seconds ago
wizardly_buck				
26ef17bd115d	hello-world	"/hello"	8 minutes ago	Exited (0) 8 minutes ago
angry_chaplygin				



Important - Notez que chaque conteneur peut être référencé par son **CONTAINER ID** ou par son **NAME**.

Pour consulter la liste des images, utilisez la commande **docker images** :

```
root@debian9:~# docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
ubuntu	latest	94e814e2efa8	4 weeks ago	88.9MB
hello-world	latest	fce289e99eb9	3 months ago	4.84kB



Important - Notez que chaque image est référencée par son IMAGE ID.

1.4 - Rechercher une Image dans un Dépôt

Pour rechercher une image docker dans le dépôt par défaut, utilisez la commande **docker search** :

```
root@debian9:~# docker search --filter=stars=5 centos
```

NAME	DESCRIPTION	STARS	OFFICIAL
AUTOMATED			
centos	The official build of CentOS.	5288	[OK]
ansible/centos7-ansible	Ansible on Centos7	121	
[OK]			
jdeathe/centos-ssh	CentOS-6 6.10 x86_64 / CentOS-7 7.5.1804 x86...	107	
[OK]			
consol/centos-xfce-vnc	Centos container with "headless" VNC session...	84	
[OK]			
imagine10255/centos6-lnmp-php56	centos6-lnmp-php56	53	
[OK]			
centos/mysql-57-centos7	MySQL 5.7 SQL database server	50	
tutum/centos	Simple CentOS docker image with SSH access	44	
gluster/gluster-centos	Official GlusterFS Image [CentOS-7 + Glust...	40	
[OK]			
openshift/base-centos7	A CentOS7 derived base image for Source-To-I...	40	
centos/postgresql-96-centos7	PostgreSQL is an advanced Object-Relational ...	37	
centos/python-35-centos7	Platform for building and running Python 3.5...	34	
kinogmt/centos-ssh	CentOS with SSH	26	
[OK]			
centos/httpd-24-centos7	Platform for running Apache httpd 2.4 or bui...	22	
centos/php-56-centos7	Platform for building and running PHP 5.6 ap...	20	
openshift/jenkins-2-centos7	A CentOS7 based Jenkins v2.x image for use w...	20	
pivotaldata/centos-gpdb-dev	CentOS image for GPDB development. Tag names...	10	
openshift/wildfly-101-centos7	A CentOS7 based WildFly v10.1 image for use ...	6	



Important - Notez que chaque image est référencée par la colonne NAME. Le NAME est sous le format **repository/mainteneur/nom** sauf dans le cas où il s'agit de l'image "officielle" de l'éditeur au quel cas le format est simplement **repository/nom**. La notion de STARS (étoiles) vient de Docker Hub et est une indication de la satisfaction de la communauté.

1.5 - Supprimer un Conteneur d'une Image

Pour supprimer un conteneur d'une image, il convient d'utiliser la commande **docker rm** en référencant le conteneur soit par son **NAME** soit par son **CONTAINER ID** :

```
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS
3a3f9bda6cbd	ubuntu	"bash"	7 minutes ago	Exited (127) 5 minutes ago	
wizardly_buck	hello-world	"/hello"	13 minutes ago	Exited (0) 13 minutes ago	

```
angry_chaplygin
root@debian9:~# docker rm wizardly_buck
wizardly_buck
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS
26ef17bd115d	hello-world	"/hello"	14 minutes ago	Exited (0) 14 minutes ago	

```
angry_chaplygin
root@debian9:~# docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
ubuntu	latest	94e814e2efa8	4 weeks ago	88.9MB
hello-world	latest	fce289e99eb9	3 months ago	4.84kB



Important - Notez que dans le cas de l'utilisation du **CONTAINER ID**, il n'est pas nécessaire d'utiliser la totalité de l'ID. Par exemple, dans le cas ci-dessus, le **CONTAINER ID** du conteneur **wizardly_buck** était **3a3f9bda6cbd**. La commande de suppression aurait pu utiliser **3a3f9bda6cbd**, **3a3f9b** ou même **3a3**.

1.6 -Créer une Image à partir d'un Conteneur Modifié

Modifier un conteneur d'une image :

```
root@debian9:~# docker run -it ubuntu
root@54b0dae2f3a9:/# ls
bin boot dev etc home lib lib64 media mnt opt proc root run sbin srv sys tmp usr var
root@54b0dae2f3a9:/# rm -rf /home
root@54b0dae2f3a9:/# ls
bin boot dev etc lib lib64 media mnt opt proc root run sbin srv sys tmp usr var
root@54b0dae2f3a9:/# exit
exit
root@debian9:~#
```



Important - Notez ici la suppression du répertoire **home** dans le conteneur **54b0dae2f3a9**.

Consultez la différence entre le conteneur et l'image de base :

```
root@debian9:~# docker ps -a
CONTAINER ID      IMAGE               COMMAND             CREATED             STATUS
PORTS            NAMES
54b0dae2f3a9      ubuntu             "/bin/bash"         About a minute ago   Exited (0) About a minute ago
tender_mendelev     26ef17bd115d       hello-world         18 minutes ago      Exited (0) 18 minutes ago
angry_chaplygin
root@debian9:~# docker diff tender_mendelev
C /root
A /root/.bash_history
D /home
```



Important - La sortie de la commande **docker diff** comporte des lettres dont les significations sont les suivantes : C = Create, D = Delete, A = Add.

Créez un autre conteneur à partir de l'image de base :

```
root@debian9:~# docker run -it ubuntu
root@92f0d4bb7967:/# ls
bin boot dev etc home lib lib64 media mnt opt proc root run sbin srv sys tmp usr var
root@92f0d4bb7967:/# exit
exit
root@debian9:~#
```



Important - Dans ce nouveau conteneur, le répertoire **/home** est présent compte tenu du fait qu'il a été généré à partir de l'image d'origine, inchangée depuis sa compilation.

Créez maintenant l'image **ubuntu_1** à partir du conteneur **competent_pasteur** en utilisant la commande **docker commit** :

```
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS
92f0d4bb7967	ubuntu	"/bin/bash"	39 seconds ago	Exited (0) 32 seconds ago	
musing_benz					
54b0dae2f3a9	ubuntu	"/bin/bash"	3 minutes ago	Exited (0) 3 minutes ago	
tender_mendeleev					
26ef17bd115d	hello-world	"/hello"	19 minutes ago	Exited (0) 19 minutes ago	
angry_chaplygin					

```
root@debian9:~# docker commit tender_mendeleev ubuntu_1
sha256:2ba8e0ec5e38332c8ab15c4b33fd140a9c74d72231d05a6965c40a39fbb44584
```

```
root@debian9:~# docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
ubuntu_1	latest	2ba8e0ec5e38	15 seconds ago	88.9MB
ubuntu	latest	94e814e2efa8	4 weeks ago	88.9MB
hello-world	latest	fce289e99eb9	3 months ago	4.84kB

1.7 - Supprimer une Image

Créez maintenant un conteneur à partir de la nouvelle image **ubuntu_1** :

```
root@debian9:~# docker run -it ubuntu_1
root@904215fb79b4:/# ls
bin boot dev etc lib lib64 media mnt opt proc root run sbin srv sys tmp usr var
root@904215fb79b4:/# exit
exit
root@debian9:~#
```



Important - Notez l'absence du répertoire **home** dans le conteneur **904215fb79b4**.

Essayez de supprimer l'image **ubuntu_1** :

```
root@debian9:~# docker rmi ubuntu_1
Error response from daemon: conflict: unable to remove repository reference "ubuntu_1" (must force) - container
904215fb79b4 is using its referenced image 2ba8e0ec5e38
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
904215fb79b4	ubuntu_1	"/bin/bash"	About a minute ago	Exited (0) 49 seconds ago
priceless_swirles	ubuntu	"/bin/bash"	2 minutes ago	Exited (0) 2 minutes ago

musing_benz	ubuntu	"/bin/bash"	6 minutes ago	Exited (0) 5 minutes ago
54b0dae2f3a9				
tender_mendeleev	hello-world	"/hello"	22 minutes ago	Exited (0) 22 minutes ago
26ef17bd115d				
angry_chaplygin				



Important - Notez qu'il n'est pas possible de supprimer l'image **ubuntu_1** tant que le conteneur **priceless_swirles** soit actif.

Supprimez donc le conteneur **priceless_swirles** ainsi que l'image **ubuntu_1** :

```
root@debian9:~# docker rm priceless_swirles
priceless_swirles
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS
92f0d4bb7967	ubuntu	"/bin/bash"	4 minutes ago	Exited (0) 3 minutes ago	
musing_benz					
54b0dae2f3a9	ubuntu	"/bin/bash"	7 minutes ago	Exited (0) 6 minutes ago	
tender_mendeleev					
26ef17bd115d	hello-world	"/hello"	23 minutes ago	Exited (0) 23 minutes ago	
angry_chaplygin					

```
root@debian9:~# docker rmi ubuntu_1
Untagged: ubuntu_1:latest
Deleted: sha256:2ba8e0ec5e38332c8ab15c4b33fd140a9c74d72231d05a6965c40a39fbb44584
Deleted: sha256:308e9761a8fc84661e46eff564b0bbca12b458e71bdf77bf4abbb59b21efdbbe
root@debian9:~# docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
ubuntu	latest	94e814e2efa8	4 weeks ago	88.9MB
hello-world	latest	fce289e99eb9	3 months ago	1.84kB

Pour pouvoir supprimer tous les conteneurs, listez-les par leur **Container ID** :

```
root@debian9:~# docker ps -aq
92f0d4bb7967
54b0dae2f3a9
26ef17bd115d
```

Supprimer toutes les conteneurs :

```
root@debian9:~# docker rm `docker ps -aq`
92f0d4bb7967
54b0dae2f3a9
26ef17bd115d
root@debian9:~# docker ps -aq
root@debian9:~#
```

Pour supprimer un conteneur dès la fin de son exécution, utilisez l'option **-rm** :

```
root@debian9:~# docker run -it --rm ubuntu
root@d123b0112fc2:/# ls
bin boot dev etc home lib lib64 media mnt opt proc root run sbin srv sys tmp usr var
root@d123b0112fc2:/# exit
exit
root@debian9:~# docker ps -aq
root@debian9:~#
```

1.8 - Créer un Conteneur avec un Nom Spécifique

Créez maintenant un conteneur avec un nom spécifique :

```
root@debian9:~# docker run -it --name=i2tch ubuntu
root@04b5ab87539a:/# ls
bin boot dev etc home lib lib64 media mnt opt proc root run sbin srv sys tmp usr var
root@04b5ab87539a:/# exit
```

```
exit
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS
04b5ab87539a	ubuntu	"/bin/bash"	11 seconds ago	Exited (0) 4 seconds ago	

```
i2tch
```

Pour obtenir de l'information concernant un conteneur, utilisez la commande **docker inspect** :

```
root@debian9:~# docker inspect i2tch
[
  {
    "Id": "04b5ab87539aed114cbfc3ba15d10be61cd88b9cffc88c6de9bd26e203b363b5",
    "Created": "2019-04-09T14:22:45.623162229Z",
    "Path": "/bin/bash",
    "Args": [],
    "State": {
      "Status": "exited",
      "Running": false,
      "Paused": false,
      "Restarting": false,
      "OOMKilled": false,
      "Dead": false,
      "Pid": 0,
      "ExitCode": 0,
      "Error": "",
      "StartedAt": "2019-04-09T14:22:46.301514689Z",
      "FinishedAt": "2019-04-09T14:22:51.91071787Z"
    },
    "Image": "sha256:94e814e2efa8845d95b2112d54497fbad173e45121ce9255b93401392f538499",
    "ResolvConfPath":
"/var/lib/docker/containers/04b5ab87539aed114cbfc3ba15d10be61cd88b9cffc88c6de9bd26e203b363b5/resolv.conf",
    "HostnamePath":
"/var/lib/docker/containers/04b5ab87539aed114cbfc3ba15d10be61cd88b9cffc88c6de9bd26e203b363b5/hostname",
```

```
    "HostsPath":  
    "/var/lib/docker/containers/04b5ab87539aed114cbfc3ba15d10be61cd88b9cffc88c6de9bd26e203b363b5/hosts",  
    "LogPath":  
    "/var/lib/docker/containers/04b5ab87539aed114cbfc3ba15d10be61cd88b9cffc88c6de9bd26e203b363b5/04b5ab87539aed114cbfc3ba15d10be61cd88b9cffc88c6de9bd26e203b363b5-json.log",  
    "Name": "/i2tch",  
    "RestartCount": 0,  
    "Driver": "overlay2",  
    "Platform": "linux",  
    "MountLabel": "",  
    "ProcessLabel": "",  
    "AppArmorProfile": "",  
    "ExecIDs": null,  
    "HostConfig": {  
        "Binds": null,  
        "ContainerIDFile": "",  
        "LogConfig": {  
            "Type": "json-file",  
            "Config": {}  
        },  
        "NetworkMode": "default",  
        "PortBindings": {},  
        "RestartPolicy": {  
            "Name": "no",  
            "MaximumRetryCount": 0  
        },  
        "AutoRemove": false,  
        "VolumeDriver": "",  
        "VolumesFrom": null,  
        "CapAdd": null,  
        "CapDrop": null,  
        "Dns": [],  
        "DnsOptions": [],  
        "DnsSearch": [],
```

```
"ExtraHosts": null,
"GroupAdd": null,
"IpcMode": "shareable",
"Cgroup": "",
"Links": null,
"OomScoreAdj": 0,
"PidMode": "",
"Privileged": false,
"PublishAllPorts": false,
"ReadonlyRootfs": false,
"SecurityOpt": null,
"UTSMode": "",
"UsernsMode": "",
"ShmSize": 67108864,
"Runtime": "runc",
"ConsoleSize": [
    0,
    0
],
"Isolation": "",
"CpuShares": 0,
"Memory": 0,
"NanoCpus": 0,
"CgroupParent": "",
"BlkioWeight": 0,
"BlkioWeightDevice": [],
"BlkioDeviceReadBps": null,
"BlkioDeviceWriteBps": null,
"BlkioDeviceReadIOps": null,
"BlkioDeviceWriteIOps": null,
"CpuPeriod": 0,
"CpuQuota": 0,
"CpuRealtimePeriod": 0,
"CpuRealtimeRuntime": 0,
```

```
"CpusetCpus": "",
"CpusetMems": "",
"Devices": [],
"DeviceCgroupRules": null,
"DiskQuota": 0,
"KernelMemory": 0,
"MemoryReservation": 0,
"MemorySwap": 0,
"MemorySwappiness": null,
"OomKillDisable": false,
"PidsLimit": 0,
"Ulimits": null,
"CpuCount": 0,
"CpuPercent": 0,
"IOMaximumIOps": 0,
"IOMaximumBandwidth": 0,
"MaskedPaths": [
    "/proc/asound",
    "/proc/acpi",
    "/proc/kcore",
    "/proc/keys",
    "/proc/latency_stats",
    "/proc/timer_list",
    "/proc/timer_stats",
    "/proc/sched_debug",
    "/proc/scsi",
    "/sys/firmware"
],
"ReadonlyPaths": [
    "/proc/bus",
    "/proc/fs",
    "/proc/irq",
    "/proc/sys",
    "/proc/sysrq-trigger"
```

```
    ]
  },
  "GraphDriver": {
    "Data": {
      "LowerDir":
"/var/lib/docker/overlay2/1151d32cdd4dda25ee299fe2c2a8df9dcb1b7fc4c47701c2925c437fb7c3a616-
init/diff:/var/lib/docker/overlay2/84bcc6977e49ee3d477255450d69b98195b721b017124194b376f6e6c0645233/diff:/var/lib
/docker/overlay2/eee0d6bc849e0c074de73e17eaf11b296dd860a0fb17097f37f9af86d28dcf9b/diff:/var/lib/docker/overlay2/0
deb30449649adfed4d1abb678939b2409c4804976ceea4cb75508d0fdf415b6/diff:/var/lib/docker/overlay2/a156bf77423d93e38ef
326b3ca6ald0248ce801733800dad2767070380d682b6/diff",
      "MergedDir":
"/var/lib/docker/overlay2/1151d32cdd4dda25ee299fe2c2a8df9dcb1b7fc4c47701c2925c437fb7c3a616/merged",
      "UpperDir":
"/var/lib/docker/overlay2/1151d32cdd4dda25ee299fe2c2a8df9dcb1b7fc4c47701c2925c437fb7c3a616/diff",
      "WorkDir":
"/var/lib/docker/overlay2/1151d32cdd4dda25ee299fe2c2a8df9dcb1b7fc4c47701c2925c437fb7c3a616/work"
    },
    "Name": "overlay2"
  },
  "Mounts": [],
  "Config": {
    "Hostname": "04b5ab87539a",
    "Domainname": "",
    "User": "",
    "AttachStdin": true,
    "AttachStdout": true,
    "AttachStderr": true,
    "Tty": true,
    "OpenStdin": true,
    "StdinOnce": true,
    "Env": [
      "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin"
    ],
    "Cmd": [
```

```
        "/bin/bash"
    ],
    "ArgsEscaped": true,
    "Image": "ubuntu",
    "Volumes": null,
    "WorkingDir": "",
    "Entrypoint": null,
    "OnBuild": null,
    "Labels": {}
},
"NetworkSettings": {
    "Bridge": "",
    "SandboxID": "304fc54e6d23247d4faf08995b65646967670def542812d902d2ee33d178794d",
    "HairpinMode": false,
    "LinkLocalIPv6Address": "",
    "LinkLocalIPv6PrefixLen": 0,
    "Ports": {},
    "SandboxKey": "/var/run/docker/netns/304fc54e6d23",
    "SecondaryIPAddresses": null,
    "SecondaryIPv6Addresses": null,
    "EndpointID": "",
    "Gateway": "",
    "GlobalIPv6Address": "",
    "GlobalIPv6PrefixLen": 0,
    "IPAddress": "",
    "IPPrefixLen": 0,
    "IPv6Gateway": "",
    "MacAddress": "",
    "Networks": {
        "bridge": {
            "IPAMConfig": null,
            "Links": null,
            "Aliases": null,
            "NetworkID": "f2d947904cba4a871af3e50d6e1ec0a3a055849185bf7ba473b2e028880bd8a9",
```

```
        "EndpointID": "",
        "Gateway": "",
        "IPAddress": "",
        "IPPrefixLen": 0,
        "IPv6Gateway": "",
        "GlobalIPv6Address": "",
        "GlobalIPv6PrefixLen": 0,
        "MacAddress": "",
        "DriverOpts": null
    }
}
}
```

1.9 - Exécuter une Commande dans un Conteneur

Pour exécuter une commande spécifique dans un conteneur, passez la commande en argument :

```
root@debian9:~# docker run --rm ubuntu env
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin
HOSTNAME=77bb110031aa
HOME=/root
root@debian9:~#
```

1.10 - Injecter des Variables d'Environnement dans un Conteneur

Pour injecter une ou des variables d'environnement dans un conteneur, utilisez un fichier pré-établi :

```
root@debian9:~# vi env.list
root@debian9:~# cat env.list
```

```
EDITOR=vim
HOSTNAME=ubuntudocker
```

```
root@debian9:~# docker run --rm --env-file=env.list ubuntu env
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin
HOSTNAME=ubuntudocker
EDITOR=vim
HOME=/root
root@debian9:~#
```

1.11 - Modifier le Nom d'Hôte d'un Conteneur

Pour modifier le nom d'hôte d'un conteneur, utilisez l'option **-h** :

```
root@debian9:~# docker run -it --rm -h ubuntudocker ubuntu
root@ubuntudocker:/# hostname
ubuntudocker
root@ubuntudocker:/# exit
exit
root@debian9:~#
```

1.12 - Mapper des Ports d'un Conteneur

Démarrer un conteneur de nginx sur le port localhost 81 :

```
root@debian9:~# docker run -it -p 81:80 nginx
Unable to find image 'nginx:latest' locally
latest: Pulling from library/nginx
27833a3ba0a5: Pull complete
e83729dd399a: Pull complete
ebc6a67df66d: Pull complete
```

```
Digest: sha256:c8a861b8a1eeef6d48955a6c6d5dff8e2580f13ff4d0f549e082e7c82a8617a2
Status: Downloaded newer image for nginx:latest
^Croot@debian9:~#
```

Notez que c'est bloquant. Le fait d'avoir utiliser ^C a interrompu le processus du conteneur :

```
^Croot@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
4f157e179134	nginx	"nginx -g 'daemon of...'"	32 seconds ago	Exited (0) 21 seconds ago
stoic_roentgen				
04b5ab87539a	ubuntu	"/bin/bash"	5 minutes ago	Exited (0) 5 minutes ago
i2tch				

1.13 - Démarrer un Conteneur en mode Détaché

Démarrez maintenant le conteneur de nginx en mode détaché grâce à l'utilisation de l'option **-d** :

```
root@debian9:~# docker run -d -p 81:80 nginx
aabb064d4b0ade1f19216b6174631fa32a2053f6aa9d59bd724ea90ce534b004
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
aabb064d4b0a	nginx	"nginx -g 'daemon of...'"	12 seconds ago	Up 11 seconds
0.0.0.0:81->80/tcp	eager_lewin			
4f157e179134	nginx	"nginx -g 'daemon of...'"	About a minute ago	Exited (0) About a minute ago
stoic_roentgen				
04b5ab87539a	ubuntu	"/bin/bash"	6 minutes ago	Exited (0) 6 minutes ago
i2tch				

1.14 - Accéder aux Services d'un Conteneur de l'Extérieur

Installez le navigateur texte **lynx** :

```
root@debian9:~# apt-get install lynx
Lecture des listes de paquets... Fait
Construction de l'arbre des dépendances
Lecture des informations d'état... Fait
The following additional packages will be installed:
  lynx-common
Les NOUVEAUX paquets suivants seront installés :
  lynx lynx-common
0 mis à jour, 2 nouvellement installés, 0 à enlever et 94 non mis à jour.
Il est nécessaire de prendre 1 730 ko dans les archives.
Après cette opération, 5 590 ko d'espace disque supplémentaires seront utilisés.
Souhaitez-vous continuer ? [0/n] o
Réception de:1 http://ftp.fr.debian.org/debian stretch/main amd64 lynx-common all 2.8.9dev11-1 [1 098 kB]
Réception de:2 http://ftp.fr.debian.org/debian stretch/main amd64 lynx amd64 2.8.9dev11-1 [632 kB]
1 730 ko réceptionnés en 6s (283 ko/s)
Sélection du paquet lynx-common précédemment désélectionné.
(Lecture de la base de données... 113082 fichiers et répertoires déjà installés.)
Préparation du dépaquetage de .../lynx-common_2.8.9dev11-1_all.deb ...
Dépaquetage de lynx-common (2.8.9dev11-1) ...
Sélection du paquet lynx précédemment désélectionné.
Préparation du dépaquetage de .../lynx_2.8.9dev11-1_amd64.deb ...
Dépaquetage de lynx (2.8.9dev11-1) ...
Traitement des actions différées (« triggers ») pour mime-support (3.60) ...
Traitement des actions différées (« triggers ») pour man-db (2.7.6.1-2) ...
Paramétrage de lynx-common (2.8.9dev11-1) ...
Paramétrage de lynx (2.8.9dev11-1) ...
update-alternatives: utilisation de « /usr/bin/lynx » pour fournir « /usr/bin/www-browser » (www-browser) en mode automatique
```

Vérifiez que nginx répond aux requêtes :

```
root@debian9:~# lynx --dump http://localhost:81
Welcome to nginx!

If you see this page, the nginx web server is successfully installed
and working. Further configuration is required.

For online documentation and support please refer to [1]nginx.org.
Commercial support is available at [2]nginx.com.

Thank you for using nginx.
```

Références

1. <http://nginx.org/>
2. <http://nginx.com/>

1.15 - Arrêter et Démarrer un Conteneur

Arrêtez le conteneur nginx :

```
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
aabb064d4b0a	nginx	"nginx -g 'daemon of..."	2 minutes ago	Up 2 minutes
0.0.0.0:81->80/tcp	eager_lewin			
4f157e179134	nginx	"nginx -g 'daemon of..."	4 minutes ago	Exited (0) 3 minutes ago
stoic_roentgen				
04b5ab87539a	ubuntu	"/bin/bash"	8 minutes ago	Exited (0) 8 minutes ago
i2tch				

```
root@debian9:~# docker stop aabb
aabb
```

```
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
aabb064d4b0a	nginx	"nginx -g 'daemon of...'"	2 minutes ago	Exited (0) 2 seconds ago
eager_lewin	nginx	"nginx -g 'daemon of...'"	4 minutes ago	Exited (0) 4 minutes ago
stoic_roentgen	ubuntu	"/bin/bash"	8 minutes ago	Exited (0) 8 minutes ago

Démarrez de nouveau le conteneur de nginx :

```
root@debian9:~# docker start aabb
aabb
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
aabb064d4b0a	nginx	"nginx -g 'daemon of...'"	3 minutes ago	Up 3 seconds
0.0.0.0:81->80/tcp	eager_lewin			
4f157e179134	nginx	"nginx -g 'daemon of...'"	4 minutes ago	Exited (0) 4 minutes ago
stoic_roentgen	ubuntu	"/bin/bash"	9 minutes ago	Exited (0) 8 minutes ago

1.16 - Utiliser des Signaux avec un Conteneur

Utilisez un signal pour tuer le processus du conteneur de nginx :

```
root@debian9:~# docker kill -s 9 aabb
aabb
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS

aabb064d4b0a	nginx	"nginx -g 'daemon of..."	2 hours ago	Exited (137) 2 seconds ago
eager_lewin				
4f157e179134	nginx	"nginx -g 'daemon of..."	2 hours ago	Exited (0) 2 hours ago
stoic_roentgen				
04b5ab87539a	ubuntu	"/bin/bash"	2 hours ago	Exited (0) 2 hours ago
i2tch				

Redémarrez un conteneur en cours :

```

root@debian9:~# docker start aabb
aabb
root@debian9:~# docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS
PORTS              NAMES
aabb064d4b0a        nginx              "nginx -g 'daemon of..." 2 hours ago        Up 1 second
0.0.0.0:81->80/tcp    eager_lewin
4f157e179134        nginx              "nginx -g 'daemon of..." 2 hours ago        Exited (0) 2 hours ago
stoic_roentgen
04b5ab87539a        ubuntu            "/bin/bash"         2 hours ago        Exited (0) 2 hours ago
i2tch
root@debian9:~# docker restart aabb
aabb
root@debian9:~# docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS
PORTS              NAMES
aabb064d4b0a        nginx              "nginx -g 'daemon of..." 2 hours ago        Up 2 seconds
0.0.0.0:81->80/tcp    eager_lewin
4f157e179134        nginx              "nginx -g 'daemon of..." 2 hours ago        Exited (0) 2 hours ago
stoic_roentgen
04b5ab87539a        ubuntu            "/bin/bash"         2 hours ago        Exited (0) 2 hours ago
i2tch

```

1.17 - Forcer la Suppression d'un Conteneur en cours d'Exécution

Supprimez un conteneur en cours d'exécution :

```
root@debian9:~# docker rm aabb
Error response from daemon: You cannot remove a running container
aabb064d4b0ade1f19216b6174631fa32a2053f6aa9d59bd724ea90ce534b004. Stop the container before attempting removal or
force remove
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
aabb064d4b0a	nginx	"nginx -g 'daemon of...'"	2 hours ago	Up About a minute
0.0.0.0:81->80/tcp	eager_lewin			
4f157e179134	nginx	"nginx -g 'daemon of...'"	2 hours ago	Exited (0) 2 hours ago
stoic_roentgen				
04b5ab87539a	ubuntu	"/bin/bash"	2 hours ago	Exited (0) 2 hours ago
i2tch				

```
root@debian9:~# docker rm -f aabb
aabb
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
4f157e179134	nginx	"nginx -g 'daemon of...'"	2 hours ago	Exited (0) 2 hours ago
stoic_roentgen				
04b5ab87539a	ubuntu	"/bin/bash"	2 hours ago	Exited (0) 2 hours ago
i2tch				

1.18 - Utilisation Simple d'un Volume

Créez le fichier index.html et placez-le dans le répertoire /root/www :

```
root@debian9:~# mkdir /root/www
```

```
root@debian9:~# vi index.html
root@debian9:~# cat index.html
<html>
<body>
<center>Accueil du site nginx</center>
</body>
</html>
root@debian9:~# mv index.html www/
```

Indiquez au conteneur que son répertoire **/usr/share/nginx/html/** est remplacé par le répertoire **/root/www/** de la machine hôte :

```
root@debian9:~# docker run -d -p 81:80 -v /root/www:/usr/share/nginx/html:ro nginx
c080793965de8a6a60db212d7e4d96de84b55352c224c054dced75b409e39bf2
root@debian9:~# lynx --dump http://localhost:81
                Accueil du site nginx

root@debian9:~#
```



Important - Notez ici l'utilisation de **ro** - lecture seule.

1.19 - Télécharger une image sans créer un conteneur

Téléchargez l'image de centos sans créer un conteneur :

```
root@debian9:~# docker pull centos
Using default tag: latest
latest: Pulling from library/centos
8ba884070f61: Pull complete
Digest: sha256:8d487d68857f5bc9595793279b33d082b03713341ddec91054382641d14db861
```

Status: Downloaded newer image for centos:latest

Vérifiez le contenu de l'image en créant un conteneur :

```
root@debian9:~# docker run -it centos bash
[root@86252a3f00f4 /]# cat /etc/redhat-release
CentOS Linux release 7.6.1810 (Core)
[root@86252a3f00f4 /]# rpm -qa | more
bind-license-9.9.4-73.el7_6.noarch
bash-4.2.46-31.el7.x86_64
glibc-common-2.17-260.el7_6.3.x86_64
nss-softokn-freebl-3.36.0-5.el7_5.x86_64
filesystem-3.2-25.el7.x86_64
glibc-2.17-260.el7_6.3.x86_64
nspr-4.19.0-1.el7_5.x86_64
popt-1.13-16.el7.x86_64
libcom_err-1.42.9-13.el7.x86_64
libcap-2.22-9.el7.x86_64
libstdc++-4.8.5-36.el7.x86_64
info-5.1-5.el7.x86_64
gawk-4.0.2-4.el7_3.1.x86_64
libselinux-2.5-14.1.el7.x86_64
grep-2.20-3.el7.x86_64
keyutils-libs-1.5.8-3.el7.x86_64
libverto-0.2.5-4.el7.x86_64
p11-kit-trust-0.23.5-3.el7.x86_64
openssl-libs-1.0.2k-16.el7.x86_64
krb5-libs-1.15.1-37.el7_6.x86_64
xz-libs-5.2.2-1.el7.x86_64
libdb-5.3.21-24.el7.x86_64
libgpg-error-1.12-3.el7.x86_64
libgcrypt-1.5.3-14.el7.x86_64
lua-5.1.4-15.el7.x86_64
libuuid-2.23.2-59.el7.x86_64
```

```

libmount-2.23.2-59.el7.x86_64
shared-mime-info-1.8-4.el7.x86_64
gzip-1.5-10.el7.x86_64
findutils-4.5.11-6.el7.x86_64
diffutils-3.3-4.el7.x86_64
expat-2.1.0-10.el7_3.x86_64
audit-libs-2.8.4-4.el7.x86_64
pam-1.1.8-22.el7.x86_64
nss-softokn-3.36.0-5.el7_5.x86_64
nss-3.36.0-7.1.el7_6.x86_64
libassuan-2.1.0-3.el7.x86_64
nss-tools-3.36.0-7.1.el7_6.x86_64
gobject-introspection-1.56.1-1.el7.x86_64
--More--

```

1.20 - S'attacher à un conteneur en cours d'exécution

Arrêtez le conteneur. Démarrez le conteneur puis rattachez-vous au conteneur :

```

[root@86252a3f00f4 /]# exit
exit
root@debian9:~# docker ps -a

```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
86252a3f00f4	centos	"bash"	About a minute ago	Exited (127) 6 seconds ago
vibrant_mccarthy	nginx	"nginx -g 'daemon of...'"	4 minutes ago	Up 4 minutes
c080793965de	suspicious_sanderson	"nginx -g 'daemon of...'"	3 hours ago	Exited (0) 3 hours ago
0.0.0.0:81->80/tcp	nginx	"nginx -g 'daemon of...'"	3 hours ago	Exited (0) 3 hours ago
4f157e179134	ubuntu	"/bin/bash"	3 hours ago	Exited (0) 3 hours ago
stoic_roentgen				
04b5ab87539a				
i2tch				

```

root@debian9:~# docker start 8625

```

```
8625
root@debian9:~# docker attach 8625
[root@86252a3f00f4 /]# ls
anaconda-post.log bin dev etc home lib lib64 media mnt opt proc root run sbin srv sys tmp usr
var
[root@86252a3f00f4 /]#
```

1.21 - Installer un logiciel dans le conteneur

Créez le fichier **/etc/yum.repos.d/mongodb-org-4.2.repo** :

```
[root@86252a3f00f4 /]# vi /etc/yum.repos.d/mongodb-org-4.2.repo
[root@86252a3f00f4 /]# cat /etc/yum.repos.d/mongodb-org-4.2.repo
[mongodb-org-4.2]
name=MongoDB Repository
baseurl=https://repo.mongodb.org/yum/redhat/$releasever/mongodb-org/4.2/x86_64/
gpgcheck=1
enabled=1
gpgkey=https://www.mongodb.org/static/pgp/server-4.2.asc
[root@86252a3f00f4 /]#
```

Installez mongo :

```
[root@86252a3f00f4 /]# yum install -y mongodb-org
```

Démarrez mongod :

```
[root@86252a3f00f4 /]# mongod --config /etc/mongod.conf &
[1] 82
[root@86252a3f00f4 /]# about to fork child process, waiting until server is ready for connections.
forked process: 84
child process started successfully, parent exiting
```

```
[1]+  Done                  mongod --config /etc/mongod.conf
[root@86252a3f00f4 /]#
```

Vérifiez que mongod est démarré :

```
[root@86252a3f00f4 /]# ps aux
USER      PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root         1   0.0  0.1  11828   2996 pts/0    Ss   16:57   0:00 bash
root        84   1.2  2.2 294692  46716 ?        Sl   17:16   0:00 mongod --config /etc/mongod.conf
root       103   0.0  0.1  51748   3444 pts/0    R+   17:17   0:00 ps aux
```

Utilisez le client mongo pour se connecter au serveur :

```
[root@86252a3f00f4 /]# mongo
MongoDB shell version: 4.2.2
connecting to: test
Welcome to the MongoDB shell.
For interactive help, type "help".
For more comprehensive documentation, see
  http://docs.mongodb.org/
Questions? Try the support group
  http://groups.google.com/group/mongodb-user
Server has startup warnings:
2019-04-09T17:16:26.951+0000 I CONTROL  [initandlisten] ** WARNING: You are running this process as the root
user, which is not recommended.
2019-04-09T17:16:26.951+0000 I CONTROL  [initandlisten]
>
```

Sortez de mongo et du conteneur :

```
> exit
bye
[root@86252a3f00f4 /]# exit
exit
```

```
root@debian9:~#
```

1.22 - Utilisation de la commande docker commit

Créez maintenant une nouvelle image à partir de votre conteneur :

```
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
86252a3f00f4	centos	"bash"	23 minutes ago	Exited (0) 56 seconds ago
vibrant_mccarthy				
c080793965de	nginx	"nginx -g 'daemon of...'"	26 minutes ago	Up 26 minutes
0.0.0.0:81->80/tcp	suspicious_sanderson			
4f157e179134	nginx	"nginx -g 'daemon of...'"	3 hours ago	Exited (0) 3 hours ago
stoic_roentgen				
04b5ab87539a	ubuntu	"/bin/bash"	3 hours ago	Exited (0) 3 hours ago
i2tch				

```
root@debian9:~# docker commit 8625 i2tch/mongodb  
sha256:67afc80e1424a6d99179911ee499f6bf264faf2bc3c7ff4ac4a01ff9c23050a9
```

Supprimez le conteneur utilisé pour créer l'image :

```
root@debian9:~# docker rm 8625  
8625  
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
8625				
c080793965de	nginx	"nginx -g 'daemon of...'"	28 minutes ago	Up 28 minutes
0.0.0.0:81->80/tcp	suspicious_sanderson			
4f157e179134	nginx	"nginx -g 'daemon of...'"	3 hours ago	Exited (0) 3 hours ago
stoic_roentgen				
04b5ab87539a	ubuntu	"/bin/bash"	3 hours ago	Exited (0) 3 hours ago

i2tch

Utilisez la nouvelle image pour lancer un conteneur nommé **mongo** :

```
root@debian9:~# docker run -it --name mongo i2tch/mongodb
[root@d20fb56a38b0 /]# ls /usr/bin/mongo*
/usr/bin/mongo      /usr/bin/mongodump      /usr/bin/mongofiles      /usr/bin/mongooplog      /usr/bin/mongorestore
/usr/bin/mongostat
/usr/bin/mongod      /usr/bin/mongoexport      /usr/bin/mongoimport      /usr/bin/mongoperf      /usr/bin/mongos
/usr/bin/mongotop
[root@d20fb56a38b0 /]# ps aux
USER          PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root           1  0.1  0.1  11828  2972 pts/0    Ss   17:22   0:00 bash
root          15  0.0  0.1  51748  3468 pts/0    R+   17:23   0:00 ps aux
```

Editez le fichier /etc/bashrc :

```
[root@d20fb56a38b0 /]# echo "/usr/bin/mongod --config /etc/mongod.conf &" >> /etc/bashrc
[root@d20fb56a38b0 /]# tail /etc/bashrc
    . "$i" >/dev/null
fi
fi
done

unset i
unset -f pathmunge
fi
# vim:ts=4:sw=4
/usr/bin/mongod --config /etc/mongod.conf &
```

Consultez la liste des conteneurs et relevez le CONTAINER ID du conteneur **mongo** :

```
[root@d20fb56a38b0 /]# exit
exit
```

```
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
d20fb56a38b0	i2tch/mongodb	"bash"	2 minutes ago	Exited (0) 4 seconds ago
c080793965de	nginx	"nginx -g 'daemon of...'"	32 minutes ago	Up 32 minutes
0.0.0.0:81->80/tcp	suspicious_sanderson			
4f157e179134	nginx	"nginx -g 'daemon of...'"	3 hours ago	Exited (0) 3 hours ago
stoic_roentgen				
04b5ab87539a	ubuntu	"/bin/bash"	3 hours ago	Exited (0) 3 hours ago

Utilisez la commande commit pour “sauvegarder” la modification dans l'image :

```
root@debian9:~# docker commit d20f i2tch/mongodb
sha256:620057baa411b78a0030e192fdbde0bb0c5ceae7bdeb115892d9946e542ee07
```

Démarrez de nouveau le conteneur pour vérifier que mongod fonctionne :

```
root@debian9:~# docker rm d20f
d20f
root@debian9:~# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
c080793965de	nginx	"nginx -g 'daemon of...'"	33 minutes ago	Up 33 minutes
0.0.0.0:81->80/tcp	suspicious_sanderson			
4f157e179134	nginx	"nginx -g 'daemon of...'"	3 hours ago	Exited (0) 3 hours ago
stoic_roentgen				
04b5ab87539a	ubuntu	"/bin/bash"	3 hours ago	Exited (0) 3 hours ago

```
i2tch
root@debian9:~# docker run -it --name mongo i2tch/mongodb
[root@bcec3f27ed58 /]# about to fork child process, waiting until server is ready for connections.
forked process: 16
child process started successfully, parent exiting
```

```
[1]+  Done                  /usr/bin/mongod --config /etc/mongod.conf
[root@bcec3f27ed58 /]# ps aux
USER      PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root         1  0.0  0.1  11828  2920 pts/0    Ss   17:26   0:00 bash
root        16  2.0  2.4 298788 49276 ?        Sl   17:26   0:01 /usr/bin/mongod --config /etc/mongod.conf
root        39  0.0  0.1  51748  3476 pts/0    R+   17:27   0:00 ps aux
[root@bcec3f27ed58 /]#
```

1.23 - Se connecter au serveur du conteneur de l'extérieur

Pour pouvoir se connecter à mongodb depuis la machine hôte, il convient d'éditer le fichier /etc/mongod.conf :

```
[root@bcec3f27ed58 /]# vi /etc/mongod.conf
[root@bcec3f27ed58 /]# cat /etc/mongod.conf | grep bindIp
bindIp: 0.0.0.0
```

Sortez du conteneur, re-créez une image, supprimez le conteneur utilisé et relancez de nouveau le conteneur :

```
[root@bcec3f27ed58 /]# exit
exit
root@debian9:~# docker commit mongo i2tch/mongod
sha256:eca7835d4fe6a3a769046bd735ef4ad7534ac1f9bb37832d6da5db3b938d258f
root@debian9:~# docker rm mongo
mongo
root@debian9:~# docker run -it --name mongo i2tch/mongod
[root@d2ddb4f8ca8a /]# about to fork child process, waiting until server is ready for connections.
forked process: 16
[root@d2ddb4f8ca8a /]# child process started successfully, parent exiting

[1]+  Done                  /usr/bin/mongod --config /etc/mongod.conf
[root@d2ddb4f8ca8a /]#
```

Dans votre machine hôte, configurez le dépôt de mongodb :

```
[root@f5b45072b831 /]# exit
root@debian9:~#
root@debian9:~# apt-get install dirmngr
root@debian9:~#
root@debian9:~# apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 --recv
9DA31620334BD75D9DCB49F368818C72E52529D4
Executing: /tmp/apt-key-gpghome.xMuszKS6JM/gpg.1.sh --keyserver hkp://keyserver.ubuntu.com:80 --recv
9DA31620334BD75D9DCB49F368818C72E52529D4
gpg: key 68818C72E52529D4: public key "MongoDB 4.0 Release Signing Key <packaging@mongodb.com>" imported
gpg: Total number processed: 1
gpg:          imported: 1
root@debian9:~#
root@debian9:~# echo "deb http://repo.mongodb.org/apt/debian stretch/mongodb-org/4.0 main" | tee
/etc/apt/sources.list.d/mongodb-org-4.0.list
deb http://repo.mongodb.org/apt/debian stretch/mongodb-org/4.0 main
root@debian9:~#
root@debian9:~# apt-get update
```

Cette fois, installez uniquement le client de mongodb :

```
root@debian9:~# apt-get install mongodb-org-shell
Lecture des listes de paquets... Fait
Construction de l'arbre des dépendances
Lecture des informations d'état... Fait
Les NOUVEAUX paquets suivants seront installés :
  mongodb-org-shell
0 mis à jour, 1 nouvellement installés, 0 à enlever et 95 non mis à jour.
Il est nécessaire de prendre 9 809 ko dans les archives.
Après cette opération, 39,8 Mo d'espace disque supplémentaires seront utilisés.
Réception de:1 http://repo.mongodb.org/apt/debian stretch/mongodb-org/4.0/main amd64 mongodb-org-shell amd64
4.0.8 [9 809 kB]
9 809 ko réceptionnés en 7s (1 245 ko/s)
```

```
Sélection du paquet mongodb-org-shell précédemment désélectionné.  
(Lecture de la base de données... 91513 fichiers et répertoires déjà installés.)  
Préparation du dépaquetage de .../mongodb-org-shell_4.0.8_amd64.deb ...  
Dépaquetage de mongodb-org-shell (4.0.8) ...  
Paramétrage de mongodb-org-shell (4.0.8) ...  
Traitement des actions différées (« triggers ») pour man-db (2.7.6.1-2) ...
```

Notez qu'à ce stade le conteneur ne possède pas d'adresse IP car il n'est pas démarré :

```
root@debian9:~# docker inspect mongo | grep IP  
    "LinkLocalIPv6Address": "",  
    "LinkLocalIPv6PrefixLen": 0,  
    "SecondaryIPAddresses": null,  
    "SecondaryIPv6Addresses": null,  
    "GlobalIPv6Address": "",  
    "GlobalIPv6PrefixLen": 0,  
    "IPAddress": "",  
    "IPPrefixLen": 0,  
    "IPv6Gateway": "",  
    "IPAMConfig": null,  
    "IPAddress": "",  
    "IPPrefixLen": 0,  
    "IPv6Gateway": "",  
    "GlobalIPv6Address": "",  
    "GlobalIPv6PrefixLen": 0,
```

Démarrez donc le conteneur et cherchez l'adresse IP de celui-ci :

```
root@debian9:~# docker start mongo  
mongo  
root@debian9:~# docker inspect mongo | grep IP  
    "LinkLocalIPv6Address": "",  
    "LinkLocalIPv6PrefixLen": 0,  
    "SecondaryIPAddresses": null,
```

```
"SecondaryIPv6Addresses": null,  
"GlobalIPv6Address": "",  
"GlobalIPv6PrefixLen": 0,  
"IPAddress": "172.17.0.3",  
"IPPrefixLen": 16,  
"IPv6Gateway": "",  
  "IPAMConfig": null,  
  "IPAddress": "172.17.0.3",  
  "IPPrefixLen": 16,  
  "IPv6Gateway": "",  
  "GlobalIPv6Address": "",  
  "GlobalIPv6PrefixLen": 0,
```

Connectez-vous maintenant à votre mongodb à partir de la machine hôte :

```
root@debian9:~# mongo --host 172.17.0.3  
MongoDB shell version v4.0.8  
connecting to: mongodb://172.17.0.3:27017/?gssapiServiceName=mongodb  
WARNING: No implicit session: Logical Sessions are only supported on server versions 3.6 and greater.  
Implicit session: dummy session  
MongoDB server version: 4.2.2  
WARNING: shell and server versions do not match  
Welcome to the MongoDB shell.  
For interactive help, type "help".  
For more comprehensive documentation, see  
  http://docs.mongodb.org/  
Questions? Try the support group  
  http://groups.google.com/group/mongodb-user  
Server has startup warnings:  
2019-04-09T17:31:33.827+0000 I CONTROL  [initandlisten] ** WARNING: You are running this process as the root  
user, which is not recommended.  
2019-04-09T17:31:33.827+0000 I CONTROL  [initandlisten]  
>
```

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