



## **Lab Experiment – 13**

### **Docker and its basic commands**

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## **Experiment for demonstrating docker and its basic commands**

A Docker container image is a lightweight, standalone, executable package of software that includes everything needed to run an application: code, runtime, system tools, system libraries and settings.

What it simply means is that, it can do everything which you need to run your application, code or anything with minimum amount of computing resources and in a completely isolated environment.

Docker images on running becomes Containers when they run on Docker Engine. It is available for Windows and Linux distributions such as CentOS, Ubuntu, Fedora as well as Debian and regardless of the infrastructure, the containerized applications will always run in the same way.

You can download Docker on your machine or you can also use Online Interactive Learning Platforms such as Katacoda for learning Docker commands.

Some of the basic commands are stated below:

1. To check the list of images downloaded in your local system

```
$ docker images
```

```
[root@localhost divyaanshjain]# docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
cnn	v1	22fb1a6d9895	5 months ago	2.79GB
sklearn	v1	31c6a71e783c	5 months ago	3.02GB
jenkinsimg	v2	0688202b36f1	6 months ago	915MB
mysql	5.7	f965319e89de	6 months ago	448MB
joomla	latest	52681e307145	6 months ago	458MB
httpd	latest	b2c2ab6dcf2e	7 months ago	166MB
continuumio/miniconda3	latest	b4adc22212f1	8 months ago	429MB
centos	latest	470671670cac	10 months ago	237MB
centos	7	5e35e350aded	12 months ago	203MB

2. To search for a docker image from Docker Hub

```
$ docker search <image_name>
```

```
[root@localhost divyaanshjain]# docker search redis
```

NAME	DESCRIPTION	STARS	OFFICIAL	AUTOMATED
redis	Redis is an open source key-value store that...	8784	[OK]	
bitnami/redis	Bitnami Redis Docker Image	167		[OK]
sameersbn/redis		82		[OK]
grokzen/redis-cluster	Redis cluster 3.0, 3.2, 4.0, 5.0, 6.0	72		
rediscommander/redis-commander	Alpine image for redis-commander - Redis man...	47		[OK]
kubeguide/redis-master	redis-master with "Hello World!"	33		
redislabs/redisearch	Redis With the RedisSearch module pre-loaded...	29		
redislabs/redis	Clustered in-memory database engine compatib...	27		
oliver006/redis-exporter	Prometheus Exporter for Redis Metrics. Supp...	22		
redislabs/rejson	RedisJSON - Enhanced JSON data type processi...	22		
arm32v7/redis	Redis is an open source key-value store that...	22		
bitnami/redis-sentinel	Bitnami Docker Image for Redis Sentinel	17		[OK]
redislabs/redisinsight	RedisInsight - The GUI for Redis	14		
redislabs/redisgraph	A graph database module for Redis	12		[OK]
webhippie/redis	Docker images for Redis	11		[OK]
s7anley/redis-sentinel-docker	Redis Sentinel	10		[OK]
arm64v8/redis	Redis is an open source key-value store that...	10		
insready/redis-stat	Docker image for the real-time Redis monitor...	9		[OK]
redislabs/redismod	An automated build of redismod - latest Redi...	7		[OK]
centos/redis-32-centos7	Redis in-memory data structure store, used a...	5		
circleci/redis	CircleCI images for Redis	5		[OK]
clearlinux/redis	Redis key-value data structure server with t...	3		
tiredofit/redis	Redis Server w/ Zabbix monitoring and S6 ove...	1		[OK]
wodby/redis	Redis container image with orchestration	1		[OK]
xetamus/redis-resource	Forked redis-resource	0		[OK]

3. To pull an image or a repository from a registry

```
$ docker pull <image_name>
```

```
[root@localhost divyaanshjain]# docker pull redis
Using default tag: latest
latest: Pulling from library/redis
852e50cd189d: Pull complete
76190fa64fb8: Pull complete
9cbb1b61e01b: Downloading [=====] 1.33MB/1.418MB
d048021f2aae: Download complete
6f4b2af24926: Download complete
1cf1d6922fba: Download complete
```

#### 4. To check the list of running containers

```
$ docker ps
```

```
File Edit View Search Terminal Help
[root@localhost divyaanshjain]# docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
5bdc404e58a	joomla	"/entrypoint.sh apache_"	6 months ago	Up 45 minutes	0.0.0.0:8081->80/tcp	compose-ws_joomla_1
7dd33ad391c8	mysql:5.7	"docker-entrypoint.s_"	6 months ago	Up 45 minutes	3306/tcp, 33060/tcp	compose-ws_webs_1

## 5. To check the list of stopped as well as running containers

```
$ docker ps -a
```

```
[root@localhost divyaanshjain]# docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS
14b899b3ffbc	cnn:v1	"python3 /dataset/cn..."	5 months ago	Exited (0) 5 months ago	
5bdc404e58a	joomla	"/entrypoint.sh apac..."	6 months ago	Up 45 minutes	0.0.0.0:808
7dd33ad391c8	mysql:5.7	"docker-entrypoint.s..."	6 months ago	Up 45 minutes	3306/tcp, 3

## 6. To run a container in detached mode or in background

```
$ docker run -d <image_name>
```

```
[root@localhost divyaanshjain]# docker run -d redis
1a6fe3943fb1001dee973f9119ced542aaa27ac578168451a88f2aff57906ace
```

## 7. To run a container with an interactive terminal of the image

```
$ docker run -it <image_name>
```

```
[root@localhost divyaanshjain]# docker run -it redis
1:~ 20 Nov 2020 07:03:06.430 # o00c000c000c Redis is starting o00c000c000c
1:~ 20 Nov 2020 07:03:06.430 # Redis version=6.0.9, bits=64, commit=00000000, modified=0, pid=1, just started
1:~ 20 Nov 2020 07:03:06.430 # Warning: no config file specified, using the default config. In order to specify a config file use redis-server /path/to/redis.conf

Redis 6.0.9 (00000000/0) 64 bit

Running in standalone mode
Port: 6379
PID: 1

http://redis.io

1:~ 20 Nov 2020 07:03:06.431 # WARNING: The TCP backlog setting of 511 cannot be enforced because /proc/sys/net/core/somaxconn is set to the lower value of 128.
1:~ 20 Nov 2020 07:03:06.431 # Server initialized
1:~ 20 Nov 2020 07:03:06.431 # WARNING overcommit_memory is set to 0! Background save may fail under low memory condition. To fix this issue add 'vm.overcommit_memory'
run the command 'sysctl vm.overcommit_memory=1' for this to take effect.
1:~ 20 Nov 2020 07:03:06.432 # WARNING you have Transparent Huge Pages (THP) support enabled in your kernel. This will create latency and memory usage issues with Red
advise > /sys/kernel/mm/transparent_hugepage/enabled' as root, and add it to your /etc/rc.local in order to retain the setting after a reboot. Redis must be restarted
never').
1:~ 20 Nov 2020 07:03:06.432 * Ready to accept connections
```

## 8. To return low-level information on Docker objects

```
$ docker inspect <container_id>
```

```
[root@localhost divyaanshjain]# docker inspect 1a6f
[
  {
    "Id": "1a6fe3943fb1001dee973f9119ced542aaa27ac578168451a88f2aff57906ace",
    "Created": "2020-11-20T07:02:14.801968323Z",
    "Path": "docker-entrypoint.sh",
    "Args": [
      "redis-server"
    ],
    "State": {
      "Status": "running",
      "Running": true,
      "Paused": false,
      "Restarting": false,
      "OOMKilled": false,
      "Dead": false,
      "Pid": 11779,
      "ExitCode": 0,
      "Error": "",
      "StartedAt": "2020-11-20T07:02:15.865498441Z",
      "FinishedAt": "0001-01-01T00:00:00Z"
    },
    "Image": "sha256:74d107221092875724ddb06821416295773bee553bbaf8d888ababe9be7f",
    "ResolvConfPath": "/var/lib/docker/containers/1a6fe3943fb1001dee973f9119ced542aaa27ac578168451a88f2aff57906ace/resolv.conf",
    "HostnamePath": "/var/lib/docker/containers/1a6fe3943fb1001dee973f9119ced542aaa27ac578168451a88f2aff57906ace/hostname",
    "HostsPath": "/var/lib/docker/containers/1a6fe3943fb1001dee973f9119ced542aaa27ac578168451a88f2aff57906ace/hosts",
    "LogPath": "/var/lib/docker/containers/1a6fe3943fb1001dee973f9119ced542aaa27ac578168451a88f2aff57906ace/json-log",
    "Name": "/friendly_cori",
    "RestartCount": 0,
    "Driver": "overlay2",
    "Platform": "linux",
    "MountLabel": "",
    "ProcessLabel": "",
    "AppArmorProfile": "",
    "ExecIDs": null,
    "HostConfig": {
      "Binds": null,
      "ContainerIDFile": "",
      "LogConfig": {
        "Type": "json-file",
        "Config": {}
      }
    }
  }
]
```

**Note:** Here, we can give initial 3–5 characters of container id since every id is different or we can also give container name.

## 9. To run the container and publish the container port to host port

```
$ docker run -p [container_application_port_no]:[host_port_no]
<image name>
```

```

[root@localhost divyaanshjain]# docker run -d --name redisHostPort -p 6379:6379 redis
809b1da326a0d5cfb6098c996df232746ffbb23ec20b6bfe32ce15acd41627d
[root@localhost divyaanshjain]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS
809b1da326a        redis              "docker-entrypoint.s..." 12 seconds ago     Up 11 seconds      0.0.0.0:6379->6379/tcp
1a6fe3943fb1       redis              "docker-entrypoint.s..." 2 minutes ago      Up 2 minutes       6379/tcp
5bdcc404e58a       joomla            "/entrypoint.sh apac..." 6 months ago       Up About an hour    0.0.0.0:8081->80/tcp
7dd33ad391c8       mysql:5.7         "docker-entrypoint.s..." 6 months ago       Up About an hour    3306/tcp, 33060/tcp
[root@localhost divyaanshjain]# netstat -tnlp
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp        0      0 192.168.122.1:53        0.0.0.0:*               LISTEN      1452/dnsmasq
tcp        0      0 0.0.0.0:22             0.0.0.0:*               LISTEN      871/sshd
tcp        0      0 127.0.0.1:631          0.0.0.0:*               LISTEN      872/cupsd
tcp        0      0 0.0.0.0:111           0.0.0.0:*               LISTEN      1/systemd
tcp6       0      0 :::22                  :::*                    LISTEN      871/sshd
tcp6       0      0 :::1:631                :::*                    LISTEN      872/cupsd
tcp6       0      0 :::6379                 :::*                    LISTEN      12210/docker-proxy
tcp6       0      0 :::111                  :::*                    LISTEN      1/systemd
tcp6       0      0 :::8080                 :::*                    LISTEN      2622/java
tcp6       0      0 :::80                   :::*                    LISTEN      876/httpd
tcp6       0      0 :::8081                 :::*                    LISTEN      3557/docker-proxy

```

**Note:** Here, host port number can be any port number which is not in use by the host and if this port number is not given, then any port number is dynamically assigned.

10. To run a container and create a link between host directory and container directory

```
$ docker run -v [host_directory_path]:[container_directory_path] <image_name>
```

```

[root@localhost divyaanshjain]# docker run -d --name redisMapped -v /opt/docker/data/redis:/data redis
560c53892312cdcc81cc547e7c297a6d5707fa259a4482e97ca763c565814dd9
[root@localhost divyaanshjain]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS
560c53892312       redis              "docker-entrypoint.s..." 7 seconds ago       Up 5 seconds        6379/tcp
d58e854e9d4b       redis              "docker-entrypoint.s..." 3 minutes ago       Up 3 minutes        0.0.0.0:6379->6379/tcp
6809b1da326a       redis              "docker-entrypoint.s..." 9 minutes ago       Up 9 minutes        0.0.0.0:6379->6379/tcp
1a6fe3943fb1       redis              "docker-entrypoint.s..." 12 minutes ago      Up 12 minutes       6379/tcp
5bdcc404e58a       joomla            "/entrypoint.sh apac..." 6 months ago        Up About an hour    0.0.0.0:8081->80/tcp
7dd33ad391c8       mysql:5.7         "docker-entrypoint.s..." 6 months ago        Up About an hour    3306/tcp, 33060/tcp

```

11. To run a container and assigning specific name to it

```
$ docker run --name [NAME] <image_name>
```

```

[root@localhost divyaanshjain]# docker run -d --name redisDynamic -p 6379 redis
d58e854e9d4b2c753bd8736e1b37767ef3d0e569aceaea2321bf7cc8acee8390
[root@localhost divyaanshjain]# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS
d58e854e9d4b       redis              "docker-entrypoint.s..." 4 seconds ago       Up 4 seconds        6379/tcp
6809b1da326a       redis              "docker-entrypoint.s..." 5 minutes ago       Up 5 minutes        0.0.0.0:6379->6379/tcp
1a6fe3943fb1       redis              "docker-entrypoint.s..." 8 minutes ago       Up 8 minutes        6379/tcp
5bdcc404e58a       joomla            "/entrypoint.sh apac..." 6 months ago        Up About an hour    0.0.0.0:8081->80/tcp
7dd33ad391c8       mysql:5.7         "docker-entrypoint.s..." 6 months ago        Up About an hour    3306/tcp, 33060/tcp

```

12. To start a stopped container

```
$ docker start <container_id>
```

```
[root@localhost divyaanshjain]# docker start 0b20c70b20c7
```

13. To stop a running container

```
$ docker stop <container_id>
```

```
[root@localhost divyaanshjain]# docker stop 1a6f1a6f
[root@localhost divyaanshjain]#
```

14. To attach local standard input, output, and error streams to a running container

```
$ docker attach <container_id>
```

```
[root@localhost divyaanshjain]# docker attach 0b20
root@0b20c7fc262e:/# ls
abcd  bin  boot  dev  etc  home  lib  lib32  lib64  libx32
root@0b20c7fc262e:/# cd abcd
root@0b20c7fc262e:/abcd# ls
```