Dockers

Docker CLI

- You can distribute your software or application in either Linux, Windows, or MAC and can run it on dockers
- **$ docker --version**

  displays the version of the docker

  ```
  C:\Users\Sanjuth>docker --version
  Docker version 20.10.20, build 9fdeb9c

  C:\Users\Sanjuth>_
  ```

- **$ docker run hello-world**
  1. Pull docker image hello-world locally
  2. First, check in the cache, if not present, get from docker hub.
  3. Then create a container for it and run

  ```
  C:\Users\Sanjuth>docker run hello-world
  docker: error during connect: This error may indicate that the docker daemon is not running.: Post "http://%2F%2F.%2Fpip
  e%2Fdocker_engine/v1.24/containers/create": open //./pipe/docker_engine: The system cannot find the file specified.
  See 'docker run --help'.

  C:\Users\Sanjuth>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/
  ```

- **docker images**

  Shows two images redis and hell-world image. Tag latest means it has downloaded latest version. It shows size of image

```
C:\Users\Sanjuth>docker images
REPOSITORY     TAG        IMAGE ID       CREATED         SIZE
ubuntu         latest     a8780b506fa4   4 weeks ago     77.8MB
hello-world    latest     feb5d9fea6a5   14 months ago   13.3kB

C:\Users\Sanjuth>
```

- **docker run redis**

  It starts image in the container as the container is running environment of image and get connect to Redis application

```
C:\Users\Sanjuth>docker run redis
Unable to find image 'redis:latest' locally
latest: Pulling from library/redis
a603fa5e3b41: Pull complete
77631c3ef092: Pull complete
ed3847cf62b8: Pull complete
261a8b530567: Pull complete
7d9005a8af6d: Pull complete
828da1afb5be: Pull complete
Digest: sha256:1e3207c292225b6dd21cb74d59255748a50e8f739dd983040df38fa913927cf1
Status: Downloaded newer image for redis:latest
1:C 04 Dec 2022 18:43:01.785 # oO0oO00oO00o Redis is starting oO0oO00oO00o
1:C 04 Dec 2022 18:43:01.785 # Redis version=7.0.5, bits=64, commit=00000000, modified=0, pid=1, just started
1:C 04 Dec 2022 18:43:01.785 # Warning: no config file specified, using the default config. In order to specify a confi
 file use redis-server /path/to/redis.conf
1:M 04 Dec 2022 18:43:01.785 * monotonic clock: POSIX clock_gettime
1:M 04 Dec 2022 18:43:01.786 * Running mode=standalone, port=6379.
1:M 04 Dec 2022 18:43:01.786 # Server initialized
1:M 04 Dec 2022 18:43:01.786 # WARNING overcommit_memory is set to 0! Background save may fail under low memory conditi
n. To fix this issue add 'vm.overcommit_memory = 1' to /etc/sysctl.conf and then reboot or run the command 'sysctl vm.c
ercommit_memory=1' for this to take effect.
1:M 04 Dec 2022 18:43:01.789 * Ready to accept connections
```

- Docker ps command shows all running images. Now open new terminal and type **docker ps**

  Shows container ID of image and port on which it is running

```
C:\Users\Sanjuth>docker ps
CONTAINER ID   IMAGE    COMMAND              CREATED         STATUS         PORTS      NAMES
e264a6b1990a   redis    "docker-entrypoint.s…"   35 seconds ago  Up 34 seconds  6379/tcp   intelligent_pascal

C:\Users\Sanjuth>
```

- Stop command: Stops running container

  $docker stop command

Here give your redis container ID

```
C:\Users\Sanjuth>docker ps
CONTAINER ID    IMAGE     COMMAND                CREATED          STATUS          PORTS        NAMES
e264a6b1990a    redis     "docker-entrypoint.s…" 35 seconds ago   Up 34 seconds   6379/tcp     intelligent_pascal

C:\Users\Sanjuth>docker stop e264a6b1990a
e264a6b1990a

C:\Users\Sanjuth>docker ps
CONTAINER ID    IMAGE     COMMAND     CREATED     STATUS     PORTS      NAMES

C:\Users\Sanjuth>
```

- **$docker ps –a**

   Shows both running and stopped containers

```
C:\Users\Sanjuth>docker ps
CONTAINER ID    IMAGE     COMMAND     CREATED     STATUS     PORTS      NAMES

C:\Users\Sanjuth>docker ps -a
CONTAINER ID    IMAGE        COMMAND                CREATED           STATUS                  PORTS     NAMES
e264a6b1990a    redis        "docker-entrypoint.s…" About a minute ago Exited (0) 33 seconds ago         intelli
gent_pascal
f296f42314a5    hello-world  "/hello"               3 minutes ago      Exited (0) 3 minutes ago          intelli
gent_einstein
78cb0b9e06f4    hello-world  "/hello"               3 weeks ago        Exited (0) 3 weeks ago            practic
al_wu
f5bdfe43de2a    hello-world  "/hello"               3 weeks ago        Exited (0) 3 weeks ago            awesome
_kepler

C:\Users\Sanjuth>
```

- **$docker start containerID**

   Used to restart the container if it has stopped due to
   application crash or if error occurred

```
C:\Users\Sanjuth>docker start e264a6b1990a
e264a6b1990a

C:\Users\Sanjuth>docker ps
CONTAINER ID    IMAGE     COMMAND                CREATED         STATUS         PORTS        NAMES
e264a6b1990a    redis     "docker-entrypoint.s…" 2 minutes ago   Up 6 seconds   6379/tcp     intelligent_pascal

C:\Users\Sanjuth>
```

- Creating same image with different version in one

application docker run redis:5.0

docker run redis:5.0

```
C:\Users\Sanjuth>docker run redis:5.0
Unable to find image 'redis:5.0' locally
5.0: Pulling from library/redis
a603fa5e3b41: Already exists
77631c3ef092: Already exists
ed3847cf62b8: Already exists
295236254fbb: Pull complete
1d25d6f70191: Pull complete
23acdbbf5eef: Pull complete
Digest: sha256:fc5ecd863862f89f04334b7cbb57e93c9790478ea8188a49f6e57b0967d38c75
Status: Downloaded newer image for redis:5.0
1:C 04 Dec 2022 18:46:31.387 # oO0Oo0O0oO0Oo Redis is starting oO0Oo0O0oO0Oo
1:C 04 Dec 2022 18:46:31.387 # Redis version=5.0.14, bits=64, commit=00000000, modified=0, pid=1, just started
1:C 04 Dec 2022 18:46:31.387 # Warning: no config file specified, using the default config. In order to specify a config
 file use redis-server /path/to/redis.conf
1:M 04 Dec 2022 18:46:31.388 * Running mode=standalone, port=6379.
1:M 04 Dec 2022 18:46:31.389 # Server initialized
1:M 04 Dec 2022 18:46:31.389 # WARNING overcommit_memory is set to 0! Background save may fail under low memory conditio
n. To fix this issue add 'vm.overcommit_memory = 1' to /etc/sysctl.conf and then reboot or run the command 'sysctl vm.ov
ercommit_memory=1' for this to take effect.
1:M 04 Dec 2022 18:46:31.389 # WARNING you have Transparent Huge Pages (THP) support enabled in your kernel. This will c
reate latency and memory usage issues with Redis. To fix this issue run the command 'echo never > /sys/kernel/mm/transpa
rent_hugepage/enabled' as root, and add it to your /etc/rc.local in order to retain the setting after a reboot. Redis mu
st be restarted after THP is disabled.
1:M 04 Dec 2022 18:46:31.389 * Ready to accept connections
```

- **docker logs 9fa4b573aff4** shows commands running in container with id **9fa4b573aff4**

```
C:\Users\Sanjuth>docker ps
CONTAINER ID   IMAGE        COMMAND               CREATED         STATUS              PORTS       NAMES
bc570a212828   redis:5.0    "docker-entrypoint.s…"  22 seconds ago  Up 20 seconds       6379/tcp    admiring_noether
e264a6b1990a   redis        "docker-entrypoint.s…"  3 minutes ago   Up About a minute   6379/tcp    intelligent_pascal

C:\Users\Sanjuth>docker logs bc570a212828
1:C 04 Dec 2022 18:46:31.387 # oO0Oo0O0oO0Oo Redis is starting oO0Oo0O0oO0Oo
1:C 04 Dec 2022 18:46:31.387 # Redis version=5.0.14, bits=64, commit=00000000, modified=0, pid=1, just started
1:C 04 Dec 2022 18:46:31.387 # Warning: no config file specified, using the default config. In order to specify a config
 file use redis-server /path/to/redis.conf
1:M 04 Dec 2022 18:46:31.388 * Running mode=standalone, port=6379.
1:M 04 Dec 2022 18:46:31.389 # Server initialized
1:M 04 Dec 2022 18:46:31.389 # WARNING overcommit_memory is set to 0! Background save may fail under low memory conditio
n. To fix this issue add 'vm.overcommit_memory = 1' to /etc/sysctl.conf and then reboot or run the command 'sysctl vm.ov
ercommit_memory=1' for this to take effect.
1:M 04 Dec 2022 18:46:31.389 # WARNING you have Transparent Huge Pages (THP) support enabled in your kernel. This will c
reate latency and memory usage issues with Redis. To fix this issue run the command 'echo never > /sys/kernel/mm/transpa
rent_hugepage/enabled' as root, and add it to your /etc/rc.local in order to retain the setting after a reboot. Redis mu
st be restarted after THP is disabled.
1:M 04 Dec 2022 18:46:31.389 * Ready to accept connections
```

- **$docker login**

  Login to docker hub with required credentials

  ```
  C:\Users\Sanjuth>docker login
  Authenticating with existing credentials...
  Login Succeeded

  Logging in with your password grants your terminal complete access to your account.
  For better security, log in with a limited-privilege personal access token. Learn more at https://docs.docker.com/go/acc
  ess-tokens/

  C:\Users\Sanjuth>
  ```

- **$ docker kill 11cdc4e85037**

  Kills container that is running and does not stop

  ```
  C:\Users\Sanjuth>docker kill e264a6b1990a
  e264a6b1990a

  C:\Users\Sanjuth>docker ps
  CONTAINER ID   IMAGE       COMMAND              CREATED          STATUS         PORTS       NAMES
  bc570a212828   redis:5.0   "docker-entrypoint.s…"   2 minutes ago   Up 2 minutes   6379/tcp    admiring_noether

  C:\Users\Sanjuth>
  ```

Pull image from docker hub repository and run the image as a container using run command

- **$ docker pull ubuntu-upstart**

  It pulls this feature from docker repository on our virtual machine. Later
  we can run it locally

  ```
  C:\Users\Sanjuth>docker pull ubuntu-upstart
  Using default tag: latest
  latest: Pulling from library/ubuntu-upstart
  Image docker.io/library/ubuntu-upstart:latest uses outdated schema1 manifest format. Please upgrade to a schema2 image f
  or better future compatibility. More information at https://docs.docker.com/registry/spec/deprecated-schema-v1/
  8387d9ff0016: Pull complete
  3b52deaaf0ed: Pull complete
  4bd501fad6de: Pull complete
  a3ed95caeb02: Pull complete
  a6dc1658c730: Pull complete
  9ed623dca71b: Pull complete
  998ee72febf9: Pull complete
  437038dc2fba: Pull complete
  da0ee05a1a1d: Pull complete
  1e1c3e99deb1: Pull complete
  4fcc22d7b2a1: Pull complete
  6c7dda5571e4: Pull complete
  Digest: sha256:597dfb1868012dcd04a705572dbc1542cb7598bce0eaa1c2656eb3acfc8b51d2
  Status: Downloaded newer image for ubuntu-upstart:latest
  docker.io/library/ubuntu-upstart:latest
  ```

- Now run inside container, command **#apt-get update** Press ^c to stop and exit to exit

```
C:\Users\Sanjuth>docker images
REPOSITORY        TAG       IMAGE ID       CREATED         SIZE
redis             5.0       99ee9af2b6b1   2 weeks ago     110MB
redis             latest    3358aea34e8c   2 weeks ago     117MB
ubuntu            latest    a8780b506fa4   4 weeks ago     77.8MB
hello-world       latest    feb5d9fea6a5   14 months ago   13.3kB
ubuntu-upstart    latest    b28219773b9b   6 years ago     253MB
```

```
C:\Users\Sanjuth>docker run -it 99ee9af2b6b1 /bin/bash
root@f19274b88ad5:/data# apt-get update
Get:1 http://deb.debian.org/debian bullseye InRelease [116 kB]
Get:2 http://deb.debian.org/debian-security bullseye-security InRelease [48.4 kB]
Get:3 http://deb.debian.org/debian bullseye-updates InRelease [44.1 kB]
Get:4 http://deb.debian.org/debian bullseye/main amd64 Packages [8184 kB]
Get:5 http://deb.debian.org/debian-security bullseye-security/main amd64 Packages [208 kB]
Get:6 http://deb.debian.org/debian bullseye-updates/main amd64 Packages [14.6 kB]
Fetched 8615 kB in 7s (1164 kB/s)
Reading package lists... Done
root@f19274b88ad5:/data# exit
exit

C:\Users\Sanjuth>
```

Create Docker Image using Dockerfile

- **Create Dockerfile**
- **Add instructions to Dockerfile**

- Build Dockerfile to create image

  docker build -t sanju01img:01 .

```
Dockerfile ×

Dockerfile
  1   FROM alpine
  2   RUN apk add --update redis
  3   CMD ["redis-server"]


PROBLEMS  13    OUTPUT    DEBUG CONSOLE    TERMINAL

PS C:\Users\Sanjuth\OneDrive\Desktop\demo> docker build -t sanju01img:01 .
[+] Building 12.9s (7/7) FINISHED
 => [internal] load build definition from Dockerfile                              0.3s
 => => transferring dockerfile: 99B                                               0.0s
 => [internal] load .dockerignore                                                 0.2s
 => => transferring context: 2B                                                   0.0s
 => [internal] load metadata for docker.io/library/alpine:latest                 4.0s
 => [auth] library/alpine:pull token for registry-1.docker.io                    0.0s
 => [1/2] FROM docker.io/library/alpine@sha256:8914eb54f968791faf6a8638949e480f  4.0s
 => => resolve docker.io/library/alpine@sha256:8914eb54f968791faf6a8638949e480f  0.1s
 => => sha256:8914eb54f968791faf6a8638949e480fef81e697984fba772 1.64kB / 1.64kB  0.0s
 => => sha256:c0d488a800e4127c334ad20d61d7bc21b4097540327217dfab522 528B / 528B  0.0s
 => => sha256:49176f190c7e9cdb51ac85ab6c6d5e4512352218190cd69b0 1.47kB / 1.47kB  0.0s
 => => sha256:c158987b05517b6f2c5913f3acef1f2182a32345a304fe357 3.37MB / 3.37MB  3.1s
 => => extracting sha256:c158987b05517b6f2c5913f3acef1f2182a32345a304fe357e3ace  0.6s
 => [2/2] RUN apk add --update redis                                              4.3s
 => exporting to image                                                           0.2s
 => => exporting layers                                                          0.2s
 => => writing image sha256:ffdb04c032cf9c1defe6fed3e03b920e05abd1ce9a85612be93  0.0s
 => => naming to docker.io/library/sanju01img:01                                 0.0s
```

- **$docker images**
  Here image with sanju01img created

```
C:\Users\Sanjuth>docker images
REPOSITORY        TAG       IMAGE ID       CREATED              SIZE
sanju01img        01        ffdb04c032cf   About a minute ago   12.8MB
redis             5.0       99ee9af2b6b1   2 weeks ago          110MB
redis             latest    3358aea34e8c   2 weeks ago          117MB
ubuntu            latest    a8780b506fa4   4 weeks ago          77.8MB
hello-world       latest    feb5d9fea6a5   14 months ago        13.3kB
ubuntu-upstart    latest    b28219773b9b   6 years ago          253MB

C:\Users\Sanjuth>
```

- Run the image with image ID 1a9e35ea73f2 to create a container
  $docker run ffdb04c032cf

```
C:\Users\Sanjuth>docker run ffdb04c032cf
1:C 04 Dec 2022 18:58:15.809 # oO0oO00oO0Oo Redis is starting oO0oO00oO0Oo
1:C 04 Dec 2022 18:58:15.809 # Redis version=7.0.5, bits=64, commit=00000000, modified=0, pid=1, just started
1:C 04 Dec 2022 18:58:15.809 # Warning: no config file specified, using the default config. In order to specify a config
 file use redis-server /path/to/redis.conf
1:M 04 Dec 2022 18:58:15.810 * monotonic clock: POSIX clock_gettime
1:M 04 Dec 2022 18:58:15.813 * Running mode=standalone, port=6379.
1:M 04 Dec 2022 18:58:15.814 # Server initialized
1:M 04 Dec 2022 18:58:15.814 # WARNING overcommit_memory is set to 0! Background save may fail under low memory conditio
n. To fix this issue add 'vm.overcommit_memory = 1' to /etc/sysctl.conf and then reboot or run the command 'sysctl vm.ov
ercommit_memory=1' for this to take effect.
1:M 04 Dec 2022 18:58:15.819 * Ready to accept connections
```

- We will tag image saik01img with tag 01 as
  $ docker tag sanju01img:01 sanjuth/firstimage
  $ docker images shows tagged image sanjuth/firstimage

```
C:\Users\Sanjuth>docker tag sanju01img:01 sanjuth/firstimage

C:\Users\Sanjuth>docker images
REPOSITORY           TAG        IMAGE ID        CREATED          SIZE
sanju01img           01         ffdb04c032cf    3 minutes ago    12.8MB
sanjuth/firstimage   latest     ffdb04c032cf    3 minutes ago    12.8MB
redis                5.0        99ee9af2b6b1    2 weeks ago      110MB
redis                latest     3358aea34e8c    2 weeks ago      117MB
ubuntu               latest     a8780b506fa4    4 weeks ago      77.8MB
hello-world          latest     feb5d9fea6a5    14 months ago    13.3kB
ubuntu-upstart       latest     b28219773b9b    6 years ago      253MB

C:\Users\Sanjuth>
```

- **$ docker push sanjuth/firstimage** Pushes image into

  docker repo with id sanjuth

```
C:\Users\Sanjuth>docker push sanjuth/firstimage
Using default tag: latest
The push refers to repository [docker.io/sanjuth/firstimage]
6dd03725d3a1: Pushed
ded7a220bb05: Mounted from library/alpine
latest: digest: sha256:4b2cf573d16221ce63b7bf667cd702e0c495c5def347355a0f7f2264cbaca379 size: 738

C:\Users\Sanjuth>
```

- Open another terminal in Visual Studio Code Paste Pull command
  docker pull sanjuth/firstimage

```
C:\Users\Sanjuth>docker pull sanjuth/firstimage
Using default tag: latest
latest: Pulling from sanjuth/firstimage
Digest: sha256:4b2cf573d16221ce63b7bf667cd702e0c495c5def347355a0f7f2264cbaca379
Status: Image is up to date for sanjuth/firstimage:latest
docker.io/sanjuth/firstimage:latest

C:\Users\Sanjuth>
```

- Run pulled image

  docker run -it sanjuth/firstimage:latest

```
Command Prompt - docker  run -it sanjuth/firstimage:latest                                      —    □    ✕
C:\Users\Sanjuth>docker run -it sanjuth/firstimage:latest
1:C 04 Dec 2022 19:02:57.395 # oO0oO00oO00o Redis is starting oO0oO00oO00Oo
1:C 04 Dec 2022 19:02:57.395 # Redis version=7.0.5, bits=64, commit=00000000, modified=0, pid=1, just started
1:C 04 Dec 2022 19:02:57.395 # Warning: no config file specified, using the default config. In order to specify a config
 file use redis-server /path/to/redis.conf
1:M 04 Dec 2022 19:02:57.396 * monotonic clock: POSIX clock_gettime
                _._
           _.-``__ ''-._
      _.-``    `.  `_.  ''-._           Redis 7.0.5 (00000000/0) 64 bit
  .-`` .-```.  ```\/    _.,_ ''-._
 (    '      ,       .-`  | `,    )     Running in standalone mode
 |`-._`-...-` __...-.``-._|'` _.-'|     Port: 6379
 |    `-._   `._    /     _.-'    |     PID: 1
  `-._    `-._  `-./  _.-'    _.-'
 |`-._`-._    `-.__.-'    _.-'_.-'|
 |    `-._`-._        _.-'_.-'    |           https://redis.io
  `-._    `-._`-.__.-'_.-'    _.-'
 |`-._`-._    `-.__.-'    _.-'_.-'|
 |    `-._`-._        _.-'_.-'    |
  `-._    `-._`-.__.-'_.-'    _.-'
      `-._    `-.__.-'    _.-'
          `-._        _.-'
              `-.__.-'

1:M 04 Dec 2022 19:02:57.398 # Server initialized
1:M 04 Dec 2022 19:02:57.400 # WARNING overcommit_memory is set to 0! Background save may fail under low memory conditio
n. To fix this issue add 'vm.overcommit_memory = 1' to /etc/sysctl.conf and then reboot or run the command 'sysctl vm.ov
ercommit_memory=1' for this to take effect.
1:M 04 Dec 2022 19:02:57.400 * Ready to accept connections
```