Docker Technical Review

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1 Basics

In this section, the following how-to will be discussed :

* Install Docker for several platforms
* Run a software image in a container
* browse for an image on Docker Hub
* create your own image and run it in a container
* create a Docker Hub account and an image repository
* Create an Image of your own
* Push the image to Docker Hub

1.1 Installation

Step 1 Requirements

1. Exam supported Operating systems
2. Examine Requirement

Step 2 Installation

* Mac OS X : https://docs.docker.com/docker-for-mac/install/
* Windows : https://docs.docker.com/docker-for-windows/install/
* Linux : https://docs.docker.com/engine/getstarted/linux_install_help/

Step 3 : Verify the installation

```
1 docker version
2 docker ps -a
3
4 docker run hello-world
```

Listing 1: Verification Installation Docker

1.2 Images and Container

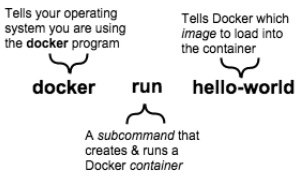


FIGURE 1 – Command Structure

* An Image is a filesystem and parameters to use at runtime, It doesn't have state and NEVER changes.
* A container is a running instance of an image.

```
docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world78445dd45222: Pull complete
Digest: sha256:c5515758d4c5e1e838e9cd307f6c6a0d620b5e07e6f927b07d05f6d12a1ac8d7
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.
 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.
```

Listing 2: Hello World Docker

1.3 Find and Run Whalesay Image

1.3.1 Locate Shared Image

1. go to Docker Hub
2. search for *docker/whalesay*
3. read about the details on this image. details

1.3.2 Run whalesay image

1. open *terminal*
2. run the commands : *docker run docker/whalesay cowsay boo*

```
MBP-de-XICUN $ docker run docker/whalesay cowsay boo$
Unable to find image 'docker/whalesay:latest' locally
latest: Pulling from docker/whalesay
e190868d63f8: Pull complete
909cd34c6fd7: Pull complete
0b9bfabab7c1: Pull complete
a3ed95caeb02: Pull complete
00bf65475aba: Pull complete
c57b6bcc83e3: Pull complete
8978f6879e2f: Pull complete
8eed3712d2cf: Pull complete
Digest: sha256:178598e51a26abbc958b8a2e48825c90bc22e641de3d31e18aaf55f3258ba93b
Status: Downloaded newer image for docker/whalesay:latest
 _____
< boo >
 -----
    \
     \
      \
                    ##        .
              ## ## ##       ==
           ## ## ## ##      ===
       /""""""""""""""""___/ ===
  ~~~ {~~ ~~~~ ~~~ ~~~~ ~~ ~ /  ===- ~~~
       \______ o          __/
        \    \        __/
          \____\______/
```

Listing 3: Result of Running whalesay image

3. To look at the images : *docker images*

```
MBP-de-XICUN:002_Docker_Learning xicunhan:$ docker images $
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
hello-world         latest              48b5124b2768        8 weeks ago         1.84 kB
centos              latest              67591570dd29        2 months ago        192 MB
ubuntu              16.04               4ca3a192ff2a        3 months ago        128 MB
docker/whalesay     latest              6b362a9f73eb        21 months ago       247 MB
```

Listing 4: Capture Running *Docker images*

4. Play with the *whalesay* with a word.

```
MBP-de-XICUN:002_Docker_Learning xicunhan\$ docker run docker/whalesay cowsay hello My Friends
 ------------------
< hello My Friends >
 ------------------
    \
     \
      \
                    ##        .
              ## ## ##       ==
           ## ## ## ##      ===
       /""""""""""""""""___/ ===
  ~~~ {~~ ~~~~ ~~~ ~~~~ ~~ ~ /  ===- ~~~
       \______ o          __/
        \    \        __/
          \____\______/
```

Listing 5: Play with WhaleSay

1.4 Build Your Own Image

1.4.1 Write a DockerFile

Dockerfile is a *recipe* which describes the :
- files
- environment
- commands that make up an image.

Make a new Dockerfile, then input the following texts :

```
FROM docker/whalesay:latest
RUN apt-get -y update && apt-get install -y fortunes
CMD /usr/games/fortune -a | cowsay
```

Listing 6: Docker File text

1.4.2 Build an image from the Dockerfile

In this part we are going to use the *docker build* command.

The param *-t* gives the image a tag, and the . pointed the current working folder.

```
MBP-de-XICUN:mydouckerbuild xicunhan\$ docker build -t docker-whale .
Sending build context to Docker daemon 2.048 kB
Step 1/3 : FROM docker/whalesay:latest
 ---> 6b362a9f73eb
Step 2/3 : RUN apt-get -y update && apt-get install -y fortunes
 ---> Running in c16171df9bca
Ign http://archive.ubuntu.com trusty InRelease
Get:1 http://archive.ubuntu.com trusty-updates InRelease [65.9 kB]
Get:2 http://archive.ubuntu.com trusty-security InRelease [65.9 kB]
....

Step 3/3 : CMD /usr/games/fortune -a | cowsay
 ---> Running in 85e777d419f8
 ---> bcffe7293416
Removing intermediate container 85e777d419f8
Successfully built bcffe7293416
```

Listing 7: Build An Image From The Dockerfile

1.4.3 Learn About The Build Process

1. Checking everything it needs to build.

```
Sending build context to Docker daemon 2.048 kB
```

2. Docker check the existence of image *docker/whalesay*, and the end of each step, an *ID* will be generated.

```
Step 1/3 : FROM docker/whalesay:latest
  ---> 6b362a9f73eb
```

3. Then docker start up a *temporary container* and *RUN* the commands

```
  Step 2/3 : RUN apt-get -y update && apt-get install -y fortunes
   ---> Running in c16171df9bca
  Ign http://archive.ubuntu.com trusty InRelease
  Get:1 http://archive.ubuntu.com trusty-updates InRelease [65.9 kB]
  ....
  Processing triggers for libc-bin (2.19-0ubuntu6.6) ...
 ---> aa68367539ea
Removing intermediate container c16171df9bca
```

When the RUN command finished a new layer is created and the intermediate temporary container is removed.

4. A new intermediate container is created and docker adds a layer for the *CMD line* and finally removes this intermediate container.

```
  Step 3/3 : CMD /usr/games/fortune -a | cowsay
   ---> Running in 85e777d419f8
   ---> bcffe7293416
  Removing intermediate container 85e777d419f8
  Successfully built bcffe7293416
```

1.4.4 Run the new docker-whale

We will take a look at all the images by command : *docker images*, then run the new image by typing : *docker run docker-whale* :

```
MBP-de-XICUN:002_Docker_Learning xicunhan\$ docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
docker-whale        latest              bcffe7293416        8 hours ago         275 MB
docker/whalesay     latest              6b362a9f73eb        21 months ago       247 MB
MBP-de-XICUN:002_Docker_Learning xicunhan\$ docker run docker-whale
 ----------------------------------------
/ We are not a loved organization, but we \
| are a respected one.                    |
|                                         |
\ -- John Fisher                          /
 ----------------------------------------
    \
     \
      \
                    ##        .
              ## ## ##       ==
           ## ## ## ##      ===
       /""""""""""""""""___/ ===
  ~~~ {~~ ~~~~ ~~~ ~~~~ ~~ ~ /  ===- ~~~
       \_____ o          __/
        \    \        __/
          \____\______/
MBP-de-XICUN:002_Docker_Learning xicunhan\$ docker run docker-whale
 ---------------------------------------
/ In Newark the laundromats are open 24 \
\ hours a day!                          /
 ---------------------------------------
    \
     \
      \
                    ##        .
              ## ## ##       ==
           ## ## ## ##      ===
       /""""""""""""""""___/ ===
  ~~~ {~~ ~~~~ ~~~ ~~~~ ~~ ~ /  ===- ~~~
       \_____ o          __/
        \    \        __/
          \____\______/
```

1.4.5 Pull or Push the Images

In order to push or pull the images, we should first sign in Docker Hub, then create the repository corresponded.

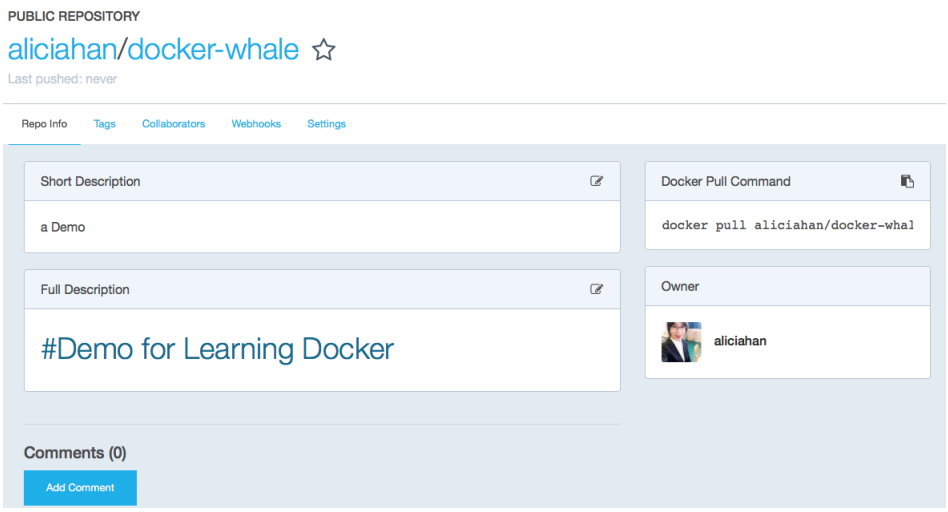


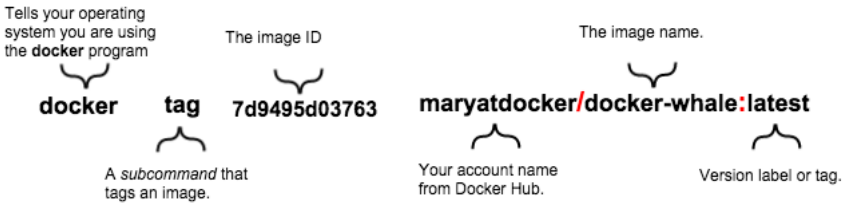
FIGURE 2 – Repository Docker Hub

To Push an Image :

1. Use *docker login* to Login.

```
MBP-de-XICUN:002_Docker_Learning xicunhan\$ docker login
Login with your Docker ID to push and pull images from Docker Hub. If you
don't have a Docker ID, head over to https://hub.docker.com to create one.
Username: aliciahan
Password:
Login Succeeded
```

2. Find the ID and add *namespace* to the image using *docker tag* command.




```
MBP-de-XICUN xicunhan\$ docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
docker-whale        latest              bcffe7293416        10 hours ago        275 MB

MBP-de-XICUN xicunhan\$ docker tag bcffe7293416 aliciahan/docker-whale:latest
MBP-de-XICUN xicunhan\$ docker images
REPOSITORY               TAG                 IMAGE ID            CREATED             SIZE
aliciahan/docker-whale   latest              bcffe7293416        10 hours ago        275 MB
docker-whale             latest              bcffe7293416        10 hours ago        275 MB
```

3. Using the *docker push aliciahan/docker-whale* to Push.

To Pull an Image :

1. firstly, remove the images already existe by *docker rmi -f < ID >* or *docker image rm -f < ID >*.

```
MBP-de-XICUN:xicunhan\$ docker image rm -f bcffe7293416
Untagged: aliciahan/docker-whale:latest
Untagged: aliciahan/docker-whale@sha256:1fe4c62848f029b8df04da746031ce1ad586f370769739f011a0035bed036e2f
Untagged: docker-whale:latest
Deleted: sha256:bcffe72934167a3147674c250ba59e8de88d8fb947730937ed828489de132677
Deleted: sha256:aa68367539ea507f7d26d8e0dab3b8a05dd0911a964ccbdc3ec759cfe53a001f
```

2. Using *Docker run [nameSpace]/[nameRepository]* to load the image from the Internet.