Docker workshop

January 2022

Docker is a virtualized platform for running and building applications

Reasons

1. **Softwares with mismatch versions**

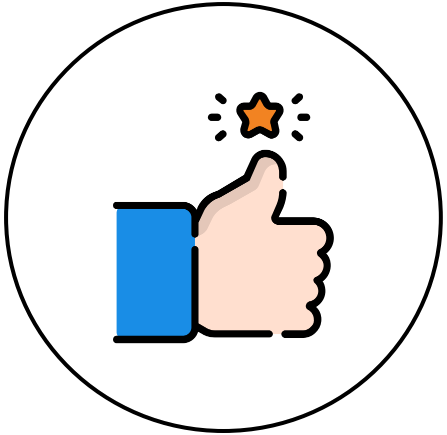
   Docker assures that the same softwares run with the correct versions in any computer.

2. **Makes configuration easier**

   Makes the configuration easier and all computers run with same.

3. **No missing files**

   All files are package inside the container.



Example - Versioning problem (1)

The prerequisites for running a project	In my machine, I have installed other versions since I work in other projects
Node 9	Node 14
SQLite 2	SQLite 3.3
App version 2	App version 5

Will I have to uninstall my current software versions to make this project work?

Example - Versioning problem (2)

Annie (python 2)

```
print “Hello
World”
```

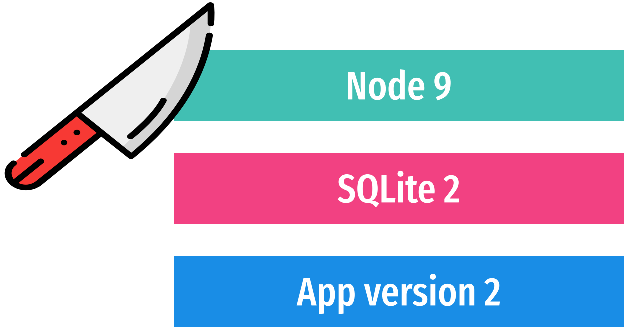
Bob (python 3)

```
print(“Hello World”)
```

Annie and bob have two different python versions installed in their computers. But python2 and python3 are not compatible.

Yet another reason

Running a project may require us to install many tools, libraries and occupy our with many other prerequisites. Sometimes uninstall all these tools one by one is not possible or is really hard.



Node 9

SQLite 2

App version 2

By deleting a docker container/image <u>we can remove all these tools in just one go!</u>

Docker vs Virtual Machines

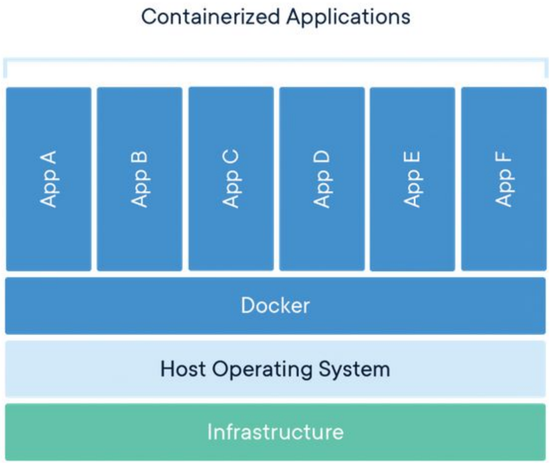
Docker vs Virtual Machines (1)

Docker	Virtual Machine
Virtualizes the OS A host machine with a Linux OS, can only run Linux docker containers.	**Virtualizes the underlying hardware** So that multiple operating systems (OS) can run in the same hardware.
Lightweight By not creating a new OS less space is allocated for a container.	**Consumes a lot of space** By creating a new OS, the virtual machines consumes a lot of disk space.
Start quickly Just one OS communicating with the hardware.	**Slow start and resource intense** Every OS in VMs needs to communicate with the hardware.

https://azure.microsoft.com/en-us/overview/what-is-a-container/#beyond-containers

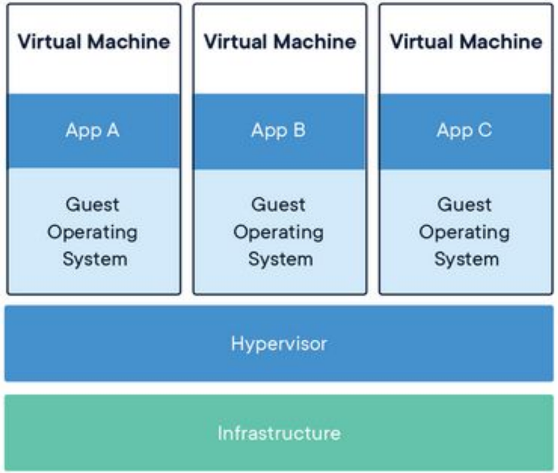
Docker vs Virtual Machines (2)

Docker



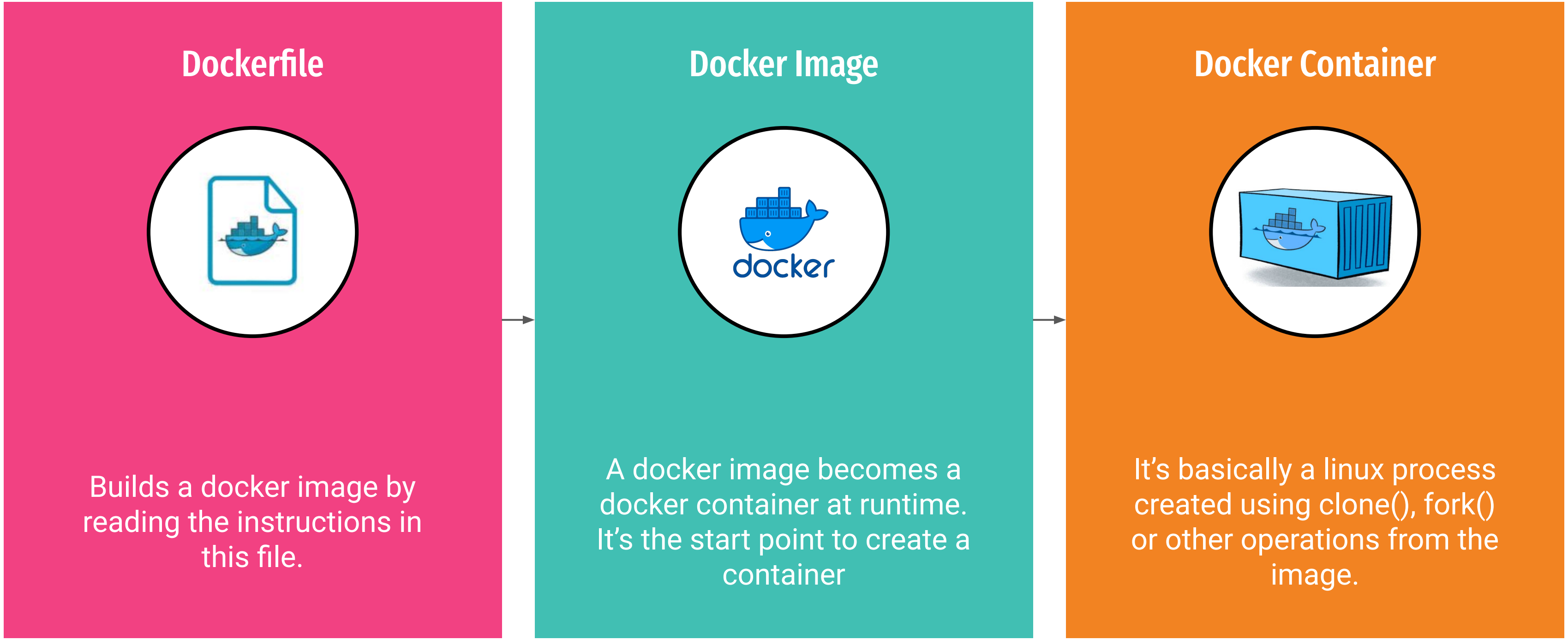
https://www.docker.com/resources/what-container

Virtual Machine



https://www.docker.com/resources/what-container

Docker Container vs Docker Container Image



Dockerfile

Builds a docker image by reading the instructions in this file.

Docker Image

A docker image becomes a docker container at runtime. It’s the start point to create a container

Docker Container

It’s basically a linux process created using clone(), fork() or other operations from the image.

https://developers.redhat.com/blog/2018/02/22/container-terminology-practical-introduction#container_engine

Exploring docker (1)

1

Getting a docker image

At this point let's not work with dockerfiles for creating images. Let's get one from DockerHub.

```
» docker pull hello-world
Using default tag: latest
latest: Pulling from library/hello-world
2db29710123e: Pull complete
Digest: sha256:2498fce14358aa50ead0cc6c19990fc6ff866ce72aeb5546e1d59caac3d0d60f
Status: Downloaded newer image for hello-world:latest
docker.io/library/hello-world:latest
```

2

Listing images

How can we assure that our image is stored?

```
» docker image ls
REPOSITORY    TAG          IMAGE ID      CREATED         SIZE
hello-world   latest       feb5d9fea6a5   3 months ago  13.3kB
```

3

Running a container

A new container was created from the image we've just downloaded. It was executed and then stopped.

```
» docker run hello-world

Hello from Docker!
This message shows that your installation appears to be working correctly
…
```

Exploring docker (2)

1

Visualizing running containers

No container is running in our computer. The container created from **hello-world** executed and stopped!

```
» docker ps
CONTAINER ID    IMAGE          COMMAND     CREATED     STATUS PORTS   NAMES
```

2

Listing all of our containers (including stopped ones)

The container created by hello world still exists! Notice that we

```
» docker ps -a
CONTAINER ID   IMAGE          COMMAND    CREATED          STATUS                       PORTS   NAMES
bf592bc8267d   hello-world   "/hello"    11 minutes ago   Exited (0) 11 minutes ago            condescending_rosalind
```