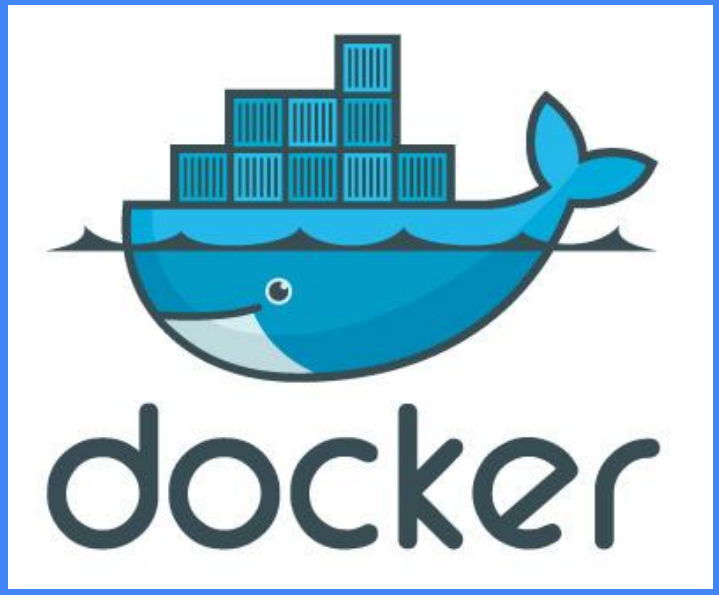


Fabrice Jammes

Docker

Novermber 2016

Agenda

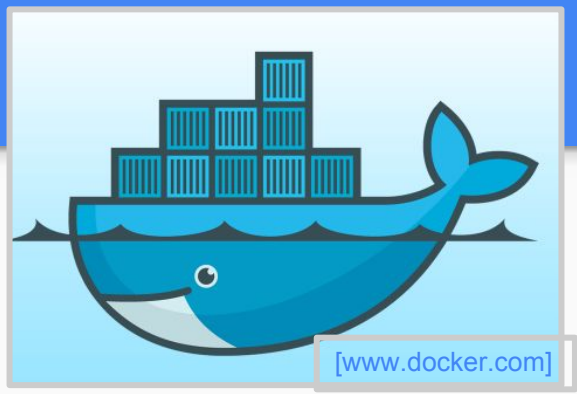
- What is Docker?
  - Docker vs. Virtual Machine
  - History, Status, Run Platforms
  - Hello World
- Images and Containers
- Volume Mounting, Port Publishing, Linking
- Around Docker, Docker Use Cases
- Hands-On Workshop

What is Docker?

Docker is an open-source project that automates the deployment of applications inside software containers, by providing an additional layer of abstraction and automation of operating system–level virtualization on Linux.

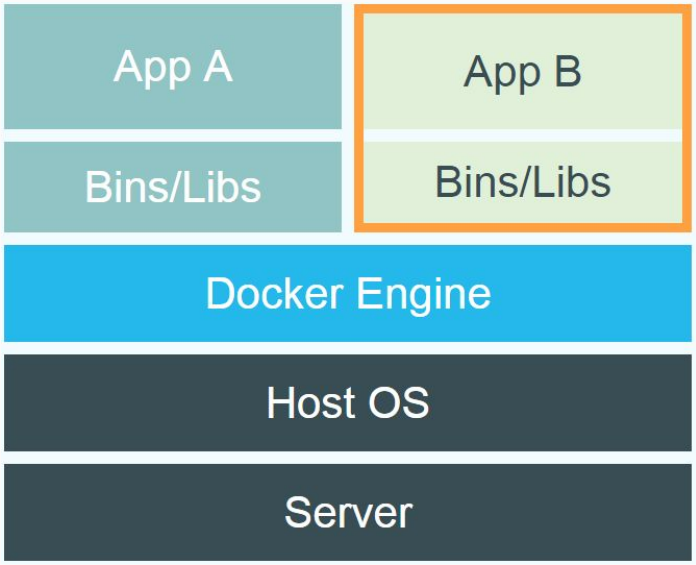
[Source: en.wikipedia.org]

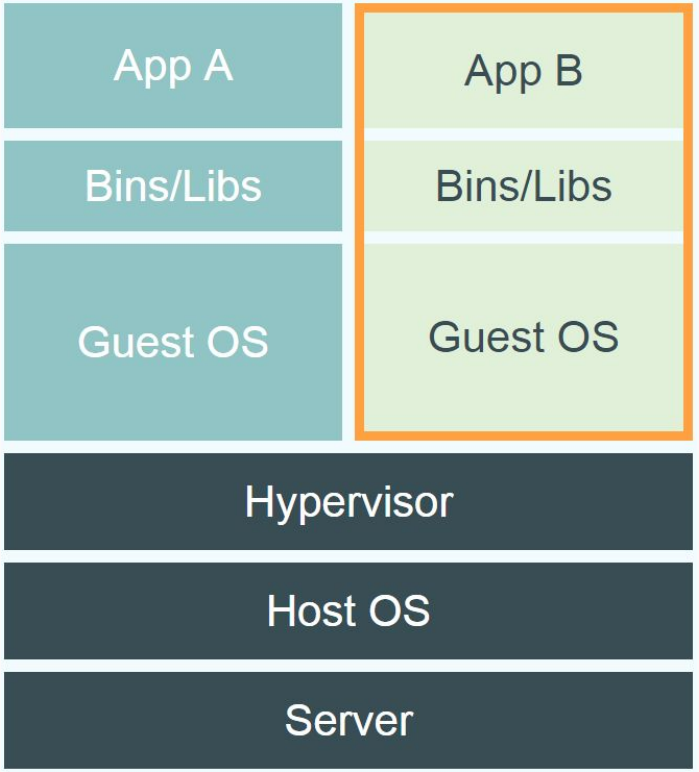
Docker: Name



- Provide a uniformed wrapper around a software package: *«Build, Ship and Run Any App, Anywhere»* [www.docker.com]
  - Similar to shipping containers: The container is always the same, regardless of the contents and thus fits on all trucks, cranes, ships, ...

Docker vs. Virtual Machine

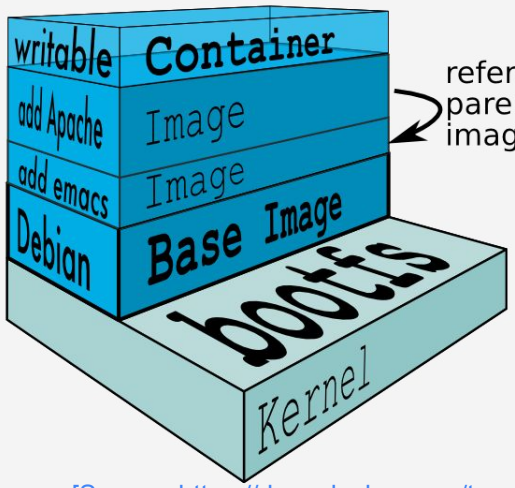




Source: https://www.docker.com/whatisdocker/

Docker Technology

- runC: The universal container runtime: **https://runc.io/**
- Open Containers Initiative: https://www.opencontainers.org/
- Layered File System https://docs.docker.com/engine/userguide/storagedriver/imagesandcontainers/



[Source: https://docs.docker.com/terms/layer/]

Run Platforms

- Various Linux distributions (Ubuntu, Fedora, RHEL, Centos, openSUSE, ...)
- Cloud (Amazon EC2, Google Compute Engine, Rackspace, Microsoft Azure)

Hello world

Simple Command - Ad-Hoc Container

- `docker run ubuntu echo Hello World`
  - `docker images [-a]`
  - `docker ps -a`

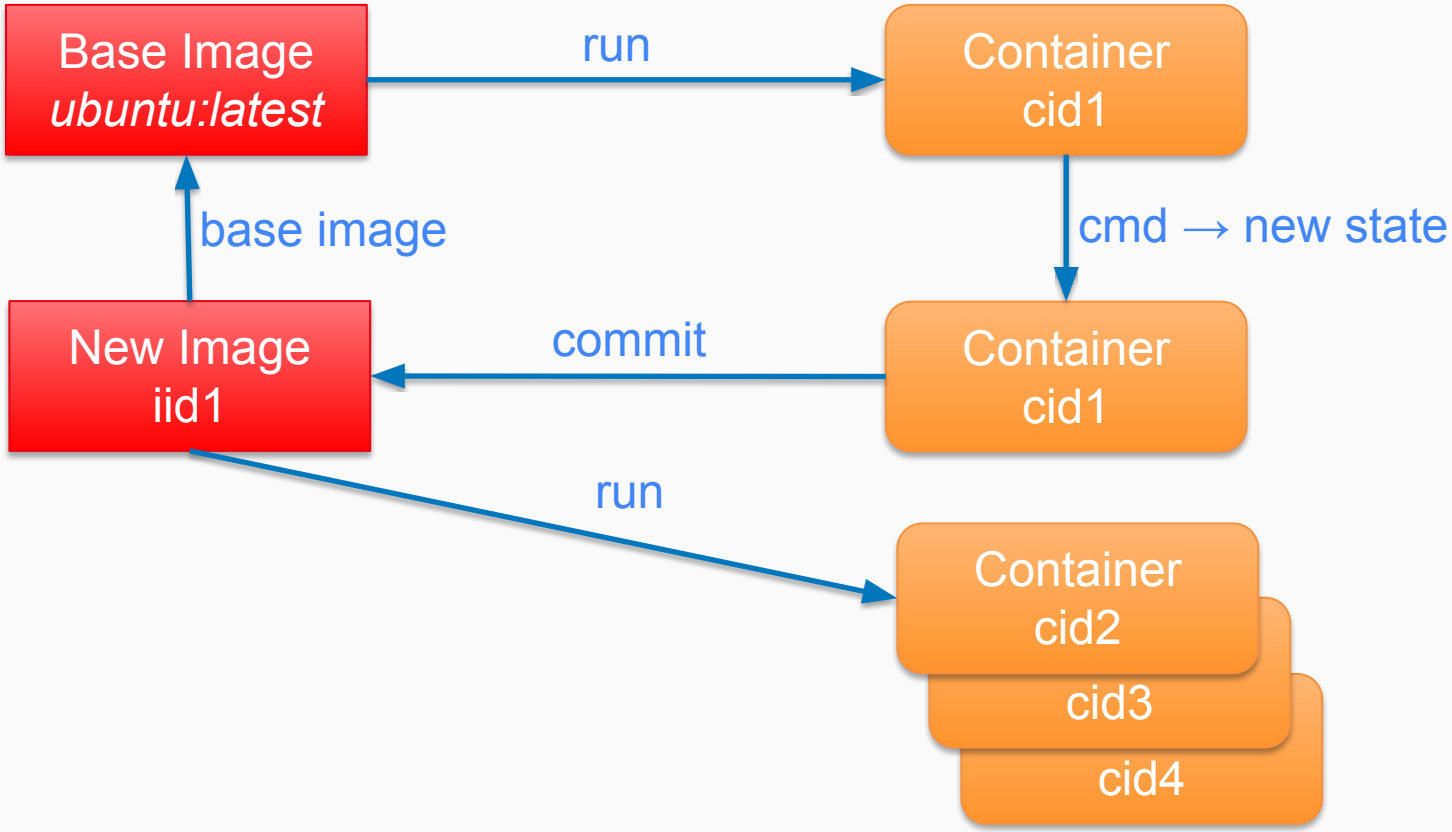
Terminology - Image

- Persisted snapshot that can be run
  - *images:* List all local images
  - *run*: Create a container from an image and execute a command in it
  - *tag*: Tag an image
  - *pull*: Download image from repository
  - *rmi*: Delete a local image
    - This will also remove intermediate images if no longer used

Terminology - Container

- Runnable instance of an image
  - *ps:* List all running containers
  - *ps –a*: List all containers (incl. stopped)
  - *top*: Display processes of a container
  - *start*: Start a stopped container
  - *stop*: Stop a running container
  - *pause*: Pause all processes within a container
  - *rm*: Delete a container
  - *commit*: Create an image from a container

Image vs. Container



Dockerfile

- Create images automatically using a build script: «Dockerfile»
- Can be versioned in a version control system like Git or SVN, along with all dependencies
- Docker Hub can automatically build images based on dockerfiles on Github

Dockerfile Example

- Dockerfile:
  - ```
    FROM ubuntu
    ENV DOCK_MESSAGE Hello My World
    ADD dir /files
    CMD ["bash", "someScript"]
    ```
- `docker build [DockerFileDir]`
- `docker inspect [imageId]`
    ```

Mount Volumes

- `docker run -ti` **`-v /hostLog:/log`** `ubuntu`
- Run second container: Volume can be shared
  - `docker run -ti --volumes-from firstContainerName ubuntu`

Publish Port

- `docker run -t -p 8080:80 ubuntu nc -l 80`
  - Map container port 80 to host port 8080
  - Check on host: nc localhost 8080
- Link with other docker container
  - `docker run -ti --link containerName:alias ubuntu`
  - See link info with `set`

Around Docker

- Docker Images: Docker Hub
- Vagrant: «Docker for VMs»
- Automated Setup
  - Puppet, Chef, Ansible, ...
- Docker Ecosystem
  - swarm, kubernetes, mesos
  - compose

Docker Hub

- Public repository of Docker images
  - https://hub.docker.com/
  - docker search [term]
- Automated: Has been automatically built from Dockerfile
  - Source for build is available on GitHub

Resource Usage

- top / ps / free -m
- Start 100 WebServer containers
  - docker run -d -p $hostPort:5000 -e "PROVIDER=$provider" training/webapp
- docker ps [containerId]
- top / ps / free -m

Docker Use Cases

- Development Environment
- Environments for Integration Tests
- Quick evaluation of software
- Microservices
- Multi-Tenancy
- Unified execution environment (dev → test → prod (local, VM, cloud, ...)

Documentation

- Docker homepage: https://www.docker.com/
  - Introduction: https://www.docker.com/whatisdocker/
  - Online tutorial: https://docker.github.io/engine/understanding-docker/
  - Installation and user guide: https://docs.docker.com/

Hands On

- Docker basis: https://docs.docker.com/engine/getstarted/step_two/
- La piscine: https://gitlab.in2p3.fr/MaitresNageurs/PiscineJl/tree/master
- Docker labs: https://github.com/docker/labs/tree/master/beginner