Teknologi Virtualisasi: Virtualisasi basis container dengan Docker

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Referensi

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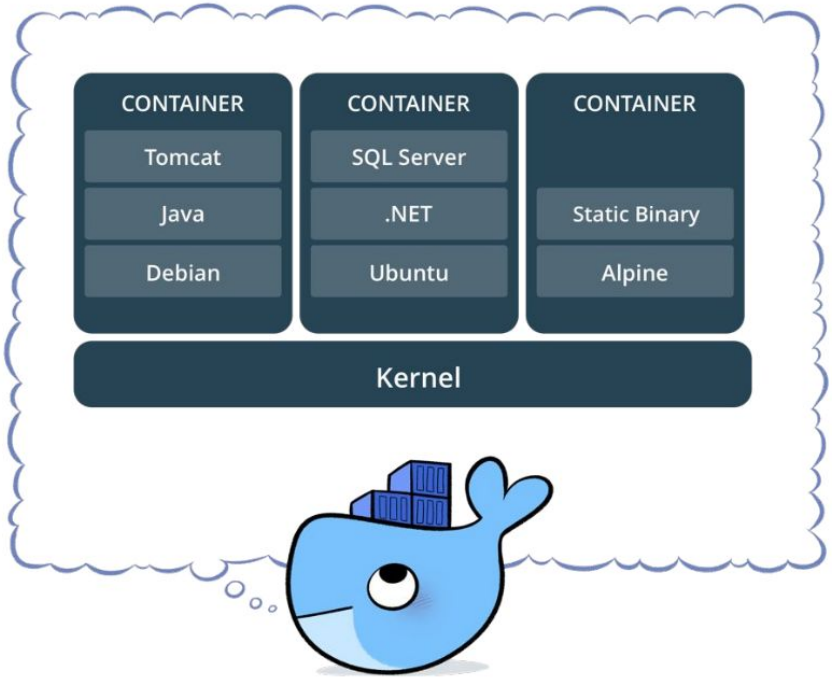
Apa itu Docker ?

- Docker containers bukan VM. Menerapkan virtualisasi sistem operasi atau container based virtualization, dimana setiap container menjadi wadah bagi aplikasi yang terisolasi satu dengan yang lainnya meskipun berjalan atau menjalankan sistem operasi bersama, yakni sistem operasi host
- Docker menyediakan rangkaian teknologi terintegrasi yang memungkinkan tim pengembangan dan tim operasi TI untuk membangun, mengirim, dan menjalankan **aplikasi** terdistribusi di mana saja.
- Disebuat juga sebagai teknologi untuk melakukan virtualisasi aplikasi (service)

VMs

Containers

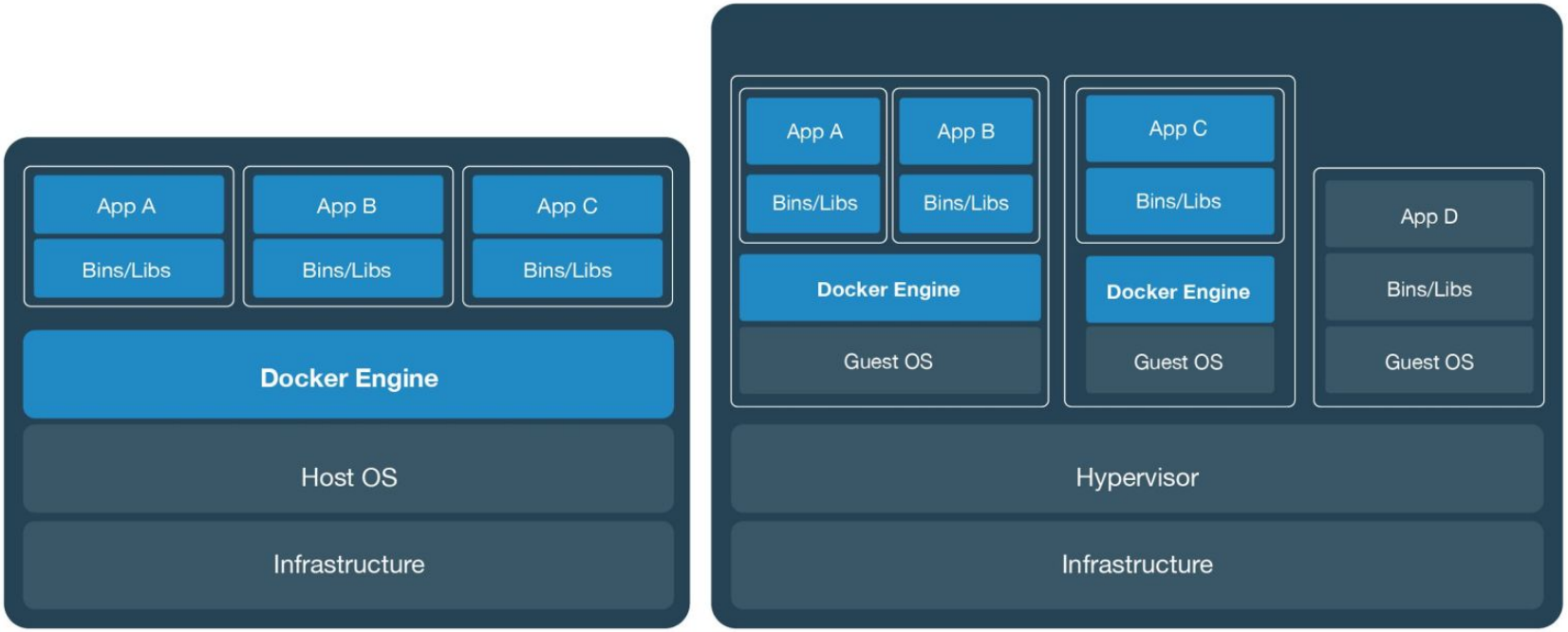
What is a container?



- Standardized packaging for software and dependencies
- Isolate apps from each other
- Share the same OS kernel
- Works for all major Linux distributions
- Containers native to Windows Server 2016

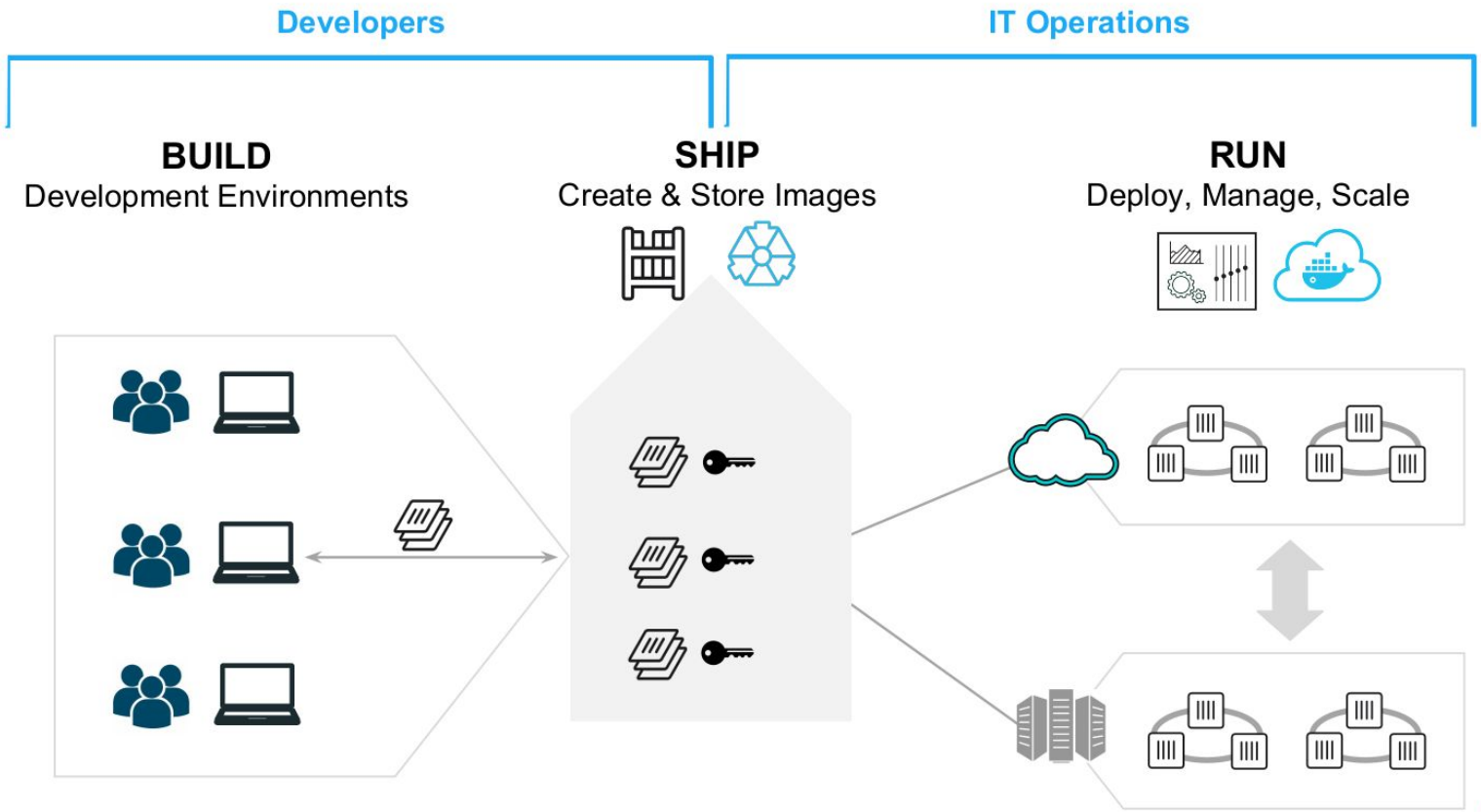
docker

They’re different, not mutually exclusive



docker

Using Docker: Build, Ship, Run Workflow



docker

Some Docker vocabulary

Docker Image

The basis of a Docker container. Represents a full application

Docker Container

The standard unit in which the application service resides and executes

Docker Engine

Creates, ships and runs Docker containers deployable on a physical or virtual, host locally, in a datacenter or cloud service provider

Registry Service (Docker Hub or Docker Trusted Registry)

Cloud or server based storage and distribution service for your images

Basic Docker Commands

```
$ docker image pull mikegcoleman/catweb:latest

$ docker image ls

$ docker container run –d –p 5000:5000 –-name catweb mikegcoleman/catweb:latest

$ docker container ps

$ docker container stop catweb (or <container id>)

$ docker container rm catweb (or <container id>)

$ docker image rm mikegcoleman/catweb:latest (or <image id>)

$ docker build –t mikegcoleman/catweb:2.0 .

$ docker image push mikegcoleman/catweb:2.0
```

Dockerfile – Linux Example

```
# our base image
FROM alpine:latest

# Install python and pip
RUN apk add --update py-pip

# upgrade pip
RUN pip install --upgrade pip

# install Python modules needed by the Python app
COPY requirements.txt /usr/src/app/
RUN pip install --no-cache-dir -r /usr/src/app/requirements.txt

# copy files required for the app to run
COPY app.py /usr/src/app/
COPY templates/index.html /usr/src/app/templates/

# tell the port number the container should expose
EXPOSE 5000

# run the application
CMD ["python", "/usr/src/app/app.py"]
```

- Instructions on how to build a Docker image
- Looks very similar to “native” commands
- Important to optimize your Dockerfile

Dockerfile – Windows Example

19 lines (15 sloc) | 832 Bytes — Raw | Blame | History

```
1  FROM microsoft/windowsservercore
2
3  ENV NPM_CONFIG_LOGLEVEL info
4  ENV NODE_VERSION 6.5.0
5  ENV NODE_SHA256 0c0962800916c7104ce6643302b2592172183d76e34997823be3978b5ee34cf2
6
7  RUN powershell -Command \
8      $ErrorActionPreference = 'Stop' ; \
9      (New-Object System.Net.WebClient).DownloadFile('https://nodejs.org/dist/v%NODE_VERSION%/node-v%NODE_VERSION%-win-x64.zip',
10     if ((Get-FileHash node.zip -Algorithm sha256).Hash -ne $env:NODE_SHA256) {exit 1} ; \
11     Expand-Archive node.zip -DestinationPath C:\ ; \
12     Rename-Item 'C:\node-v%NODE_VERSION%-win-x64' 'C:\nodejs' ; \
13     New-Item '%APPDATA%\npm' ; \
14     $env:PATH = 'C:\nodejs;%APPDATA%\npm;' + $env:PATH ; \
15     [Environment]::SetEnvironmentVariable('PATH', $env:PATH, [EnvironmentVariableTarget]::Machine) ; \
16     Remove-Item -Path node.zip
17
18 CMD [ "node.exe" ]
```

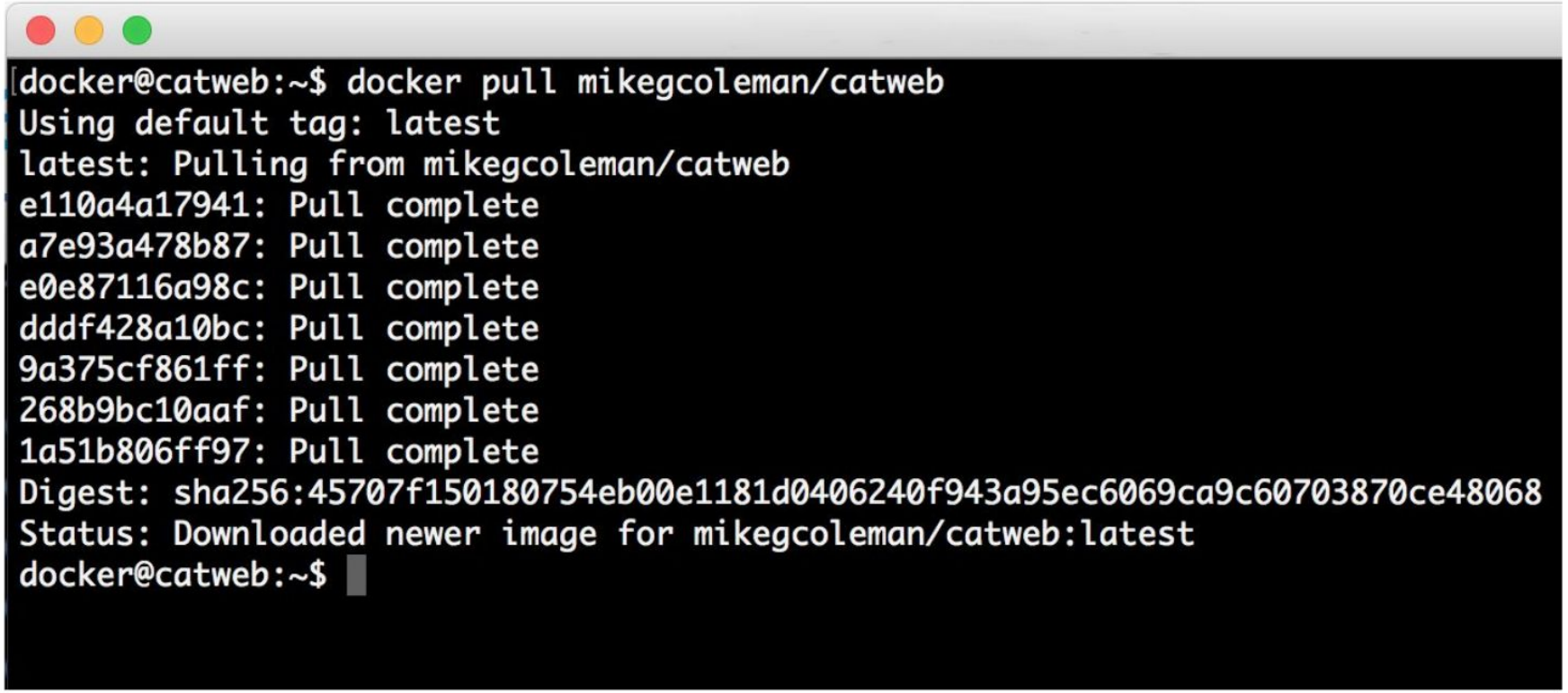
docker

Let's Go Back to Our Dockerfile

```
1  # our base image
2  FROM alpine:latest
3
4  # Install python and pip
5  RUN apk add --update py-pip
6
7  # upgrade pip
8  RUN pip install --upgrade pip
9
10 # install Python modules needed by the Python app
11 COPY requirements.txt /usr/src/app/
12 RUN pip install --no-cache-dir -r /usr/src/app/requirements.txt
13
14 # copy files required for the app to run
15 COPY app.py /usr/src/app/
16 COPY templates/index.html /usr/src/app/templates/
17
18 # tell the port number the container should expose
19 EXPOSE 5000
20
21 # run the application
22 CMD ["python", "/usr/src/app/app.py"]
```

Each Dockerfile Command Creates a Layer

Docker Image Pull: Pulls Layers



Layers on the Physical Disk

- Logical file system by grouping different file system primitives into branches (directories, file systems, subvolumes, snapshots)
- Each branch represents a layer in a Docker image
- Containers will share common layers on the host
- Allows images to be constructed / deconstructed as needed vs. a huge monolithic image (ala traditional virtual machines)
- When a container is started a writeable layer is added to the “top” of the file system

Docker Volumes

- Volumes mount a directory on the host into the container at a specific location

```
$ docker volume create hello
hello
$ docker run -d -v hello:/world busybox ls /world
```

- Can be used to share (and persist) data between containers
  - Directory persists after the container is deleted
    - Unless you explicitly delete it

- Can be created in a Dockerfile or via CLI

Why Use Volumes

- Mount local source code into a running container

```
docker container run -v $(pwd):/usr/src/app/
mikegcoleman/catweb
```

- Improve performance
  - As directory structures get complicated traversing the tree can slow system performance
- Data persistence

Praktek /Demo Menggunakan Doker Container

Instalasi Docker

Sebelum menggunakan docker untuk membuat container , Anda ikuti terlebih dahulu langkah langkah instalasi docker melalui referensi berikut:

https://www.digitalocean.com/community/tutorials/how-to-install-and-use-docker-on-ubuntu-20-04

Atau

https://docs.docker.com/engine/install/ubuntu/