redhat.

A4M36ISS: Docker

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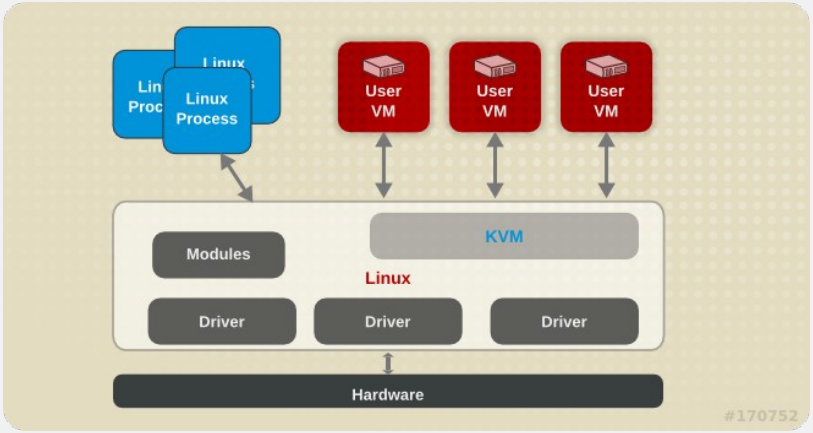
September 15th, 2015

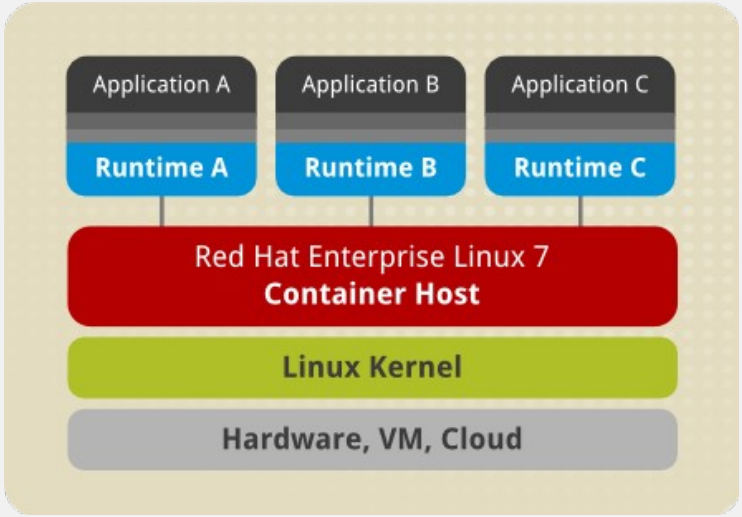
Agenda

- Docker architecture
- Docker commands
- Make your own image
  - Dockerfile
- Beyond Docker
  - Composition
  - Orchestration

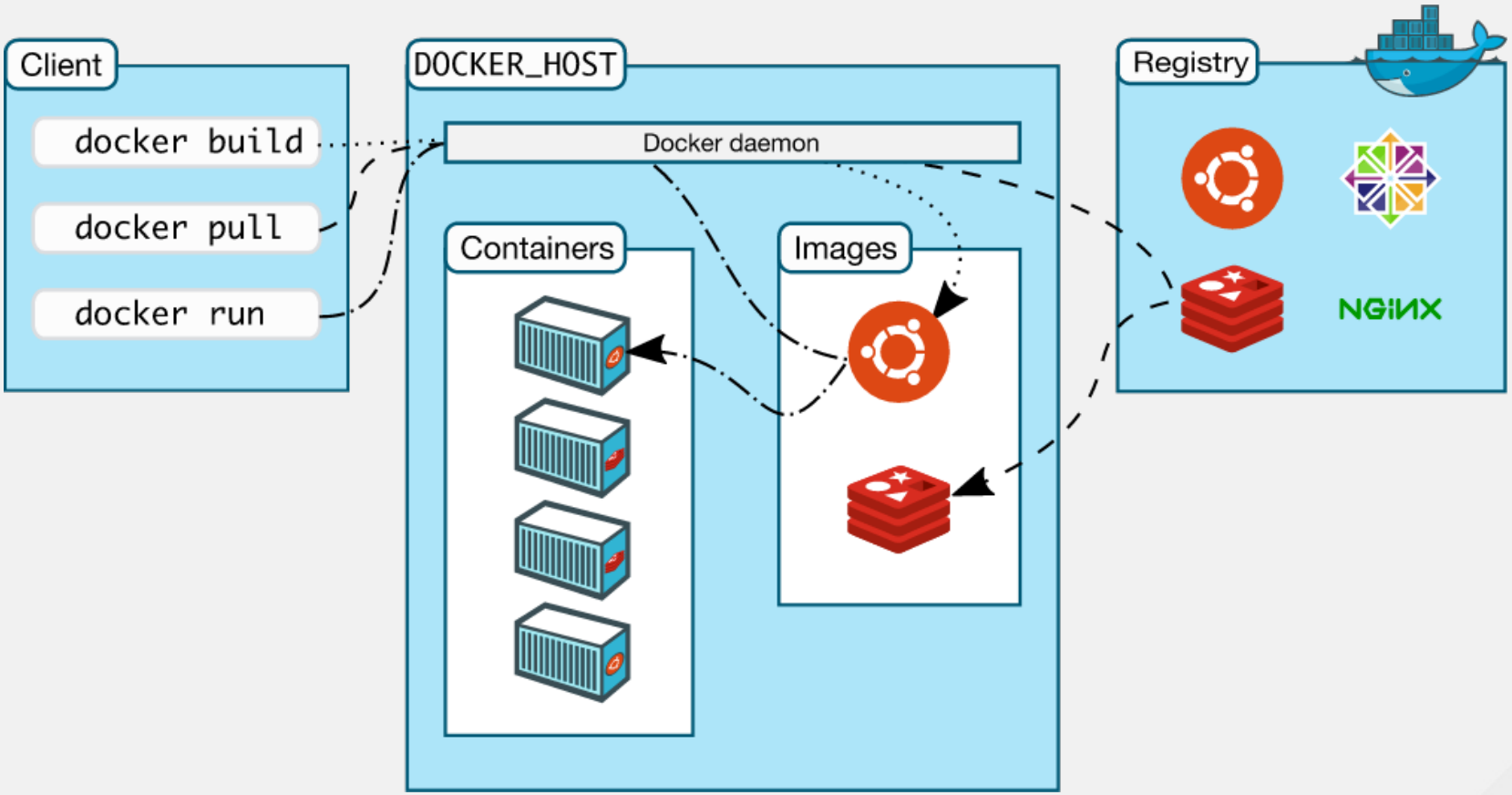
Docker architecture

Containers vs virtualization





Architecture



Image

- Read-only template
- Series of layers
- Union file system
- Structure
  - Base image
  - Instructions in Dockerfile
  - Each instruction create a layer
- Number of layers limited
  - Squashing

Registry

- Storage for images
- Public or private
  - Docker Hub
- Basic operations
  - pull
  - search
  - push

Container

- Composition
  - Operating system
  - User-added files
  - Meta-data
- Upon execution
  - Image is pulled if not present
  - Create container
  - Allocate FS and add R/W layer
  - Allocate network interface
    - Provide IP
  - Execute a process
  - Capture STDOUT/STDERR

Container - Technologies

- Namaspaces
  - pid, net, ipc, mnt, uts
- Control groups
  - Limit resources
- Union FS
  - AUFS, btrfs, vfs, DeviceMapper

Docker commands

Commands

- daemon, events, version
- create, attach, **exec**, **kill**, pause, rename, restart, rm, **run**, **start**, **stop**, unpause, wait
- info, inspect, logs, port, ps, stats, top
- build, commit, save
- cp, export, import, load, save
- diff
- history, images, rmi
- load, login, logout, pull, push, search, tag

Advanced concepts

- Persistent data
  - Volumes
    - Bypass UnionFS
    - VOLUME, -v <container_dir>
    - -v <host_dir>:<container_dir>
- Container co-operation
  - Port exposure
    - -p <container_port>:<host_port>
  - Linking
    - Name container 1
    - Link container 2 using --link <name>:<link_alias>
    - Exposed as environment variables (static) and /etc/hosts (dynamic)

Image building

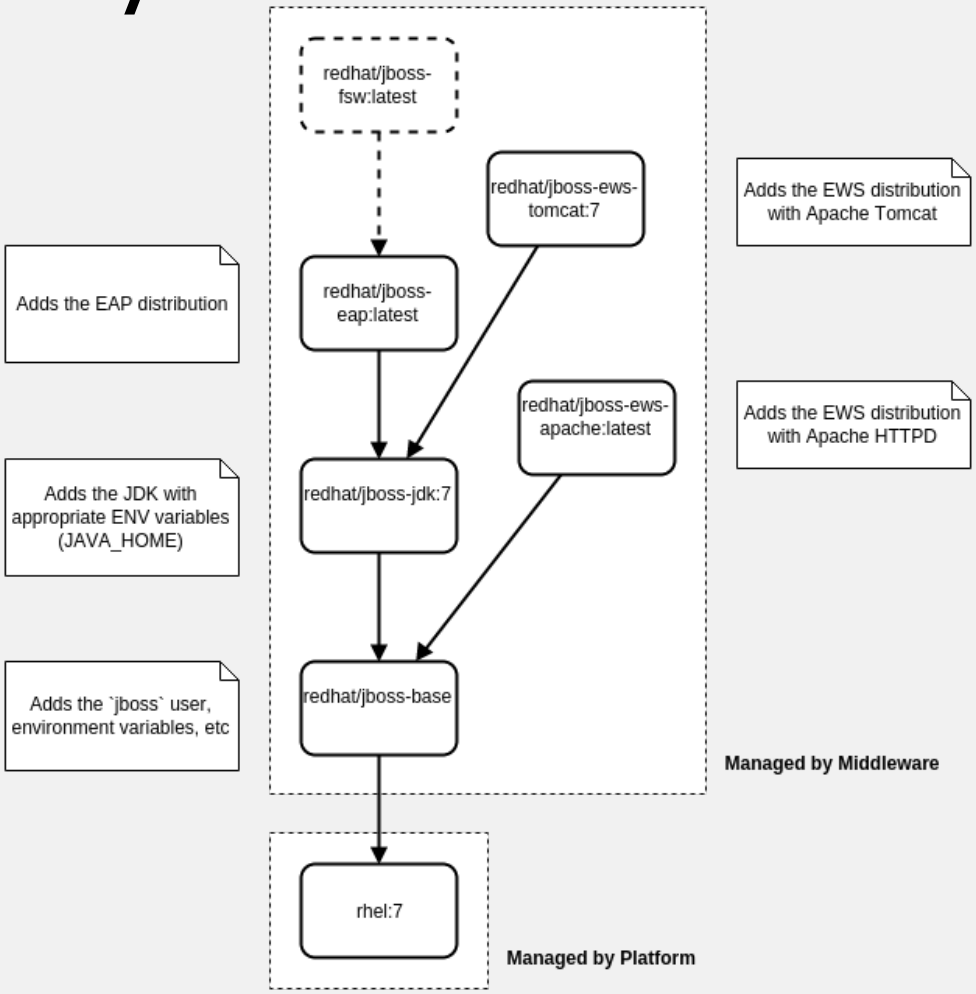
Docker build

- Build command
  - docker build -t <name> <dir>
- Dockerfile
  - Template with metadata
  - Format
    - INSTRUCTION arguments
  - Instructions
    - FROM, MAINTAINER, LABEL,ONBUILD
    - RUN, ENV, ADD, COPY, USER, WORKDIR
    - CMD, ENTRYPOINT, EXPOSE, VOLUME

Next steps

- JBoss images
  - http://www.jboss.org/docker/
- Best practices
  - https://docs.docker.com/articles/dockerfile_best-practices/
  - https://docs.openshift.org/latest/creating_images/guidelines.html

Hierarchy


redhat/jboss-fsw:latest
redhat/jboss-ews-tomcat:7
Adds the EWS distribution with Apache Tomcat
Adds the EAP distribution
redhat/jboss-eap:latest
redhat/jboss-ews-apache:latest
Adds the EWS distribution with Apache HTTPD
Adds the JDK with appropriate ENV variables (JAVA_HOME)
redhat/jboss-jdk:7
Adds the `jboss` user, environment variables, etc
redhat/jboss-base
Managed by Middleware
rhel:7
Managed by Platform

Beyond Docker

Composition

- Nulecule
  - http://www.projectatomic.io/docs/nulecule/
- Docker Compose
  - https://docs.docker.com/compose/

Orchestration

- Kubernetes
  - http://kubernetes.io/
  - OpenShift
    - http://www.openshift.org/
- Docker Swarm
  - https://docs.docker.com/swarm/

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Questions?

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