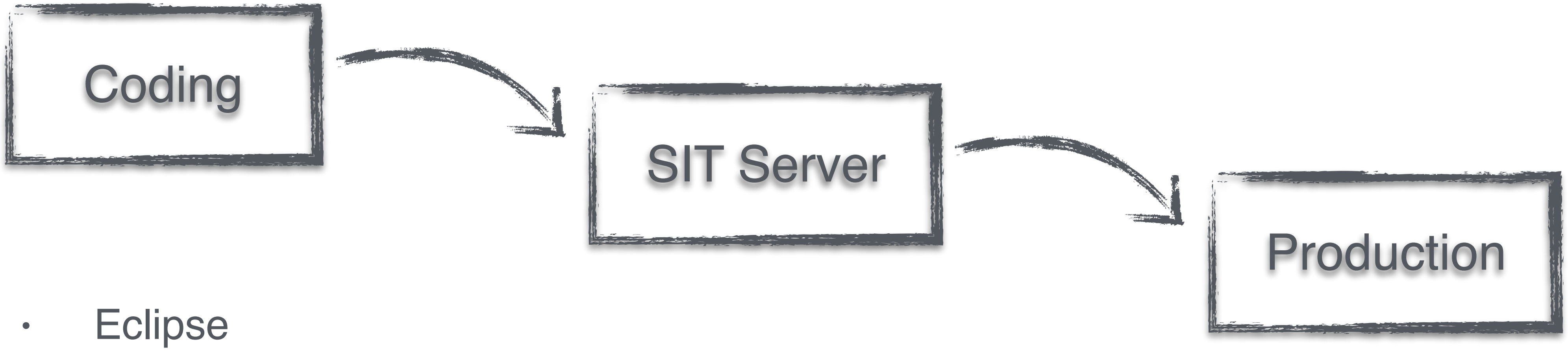
Introduction to Container & Docker

Container

Containers are a lightweight and portable store for an application and its dependencies.

Software Development



Coding

SIT Server

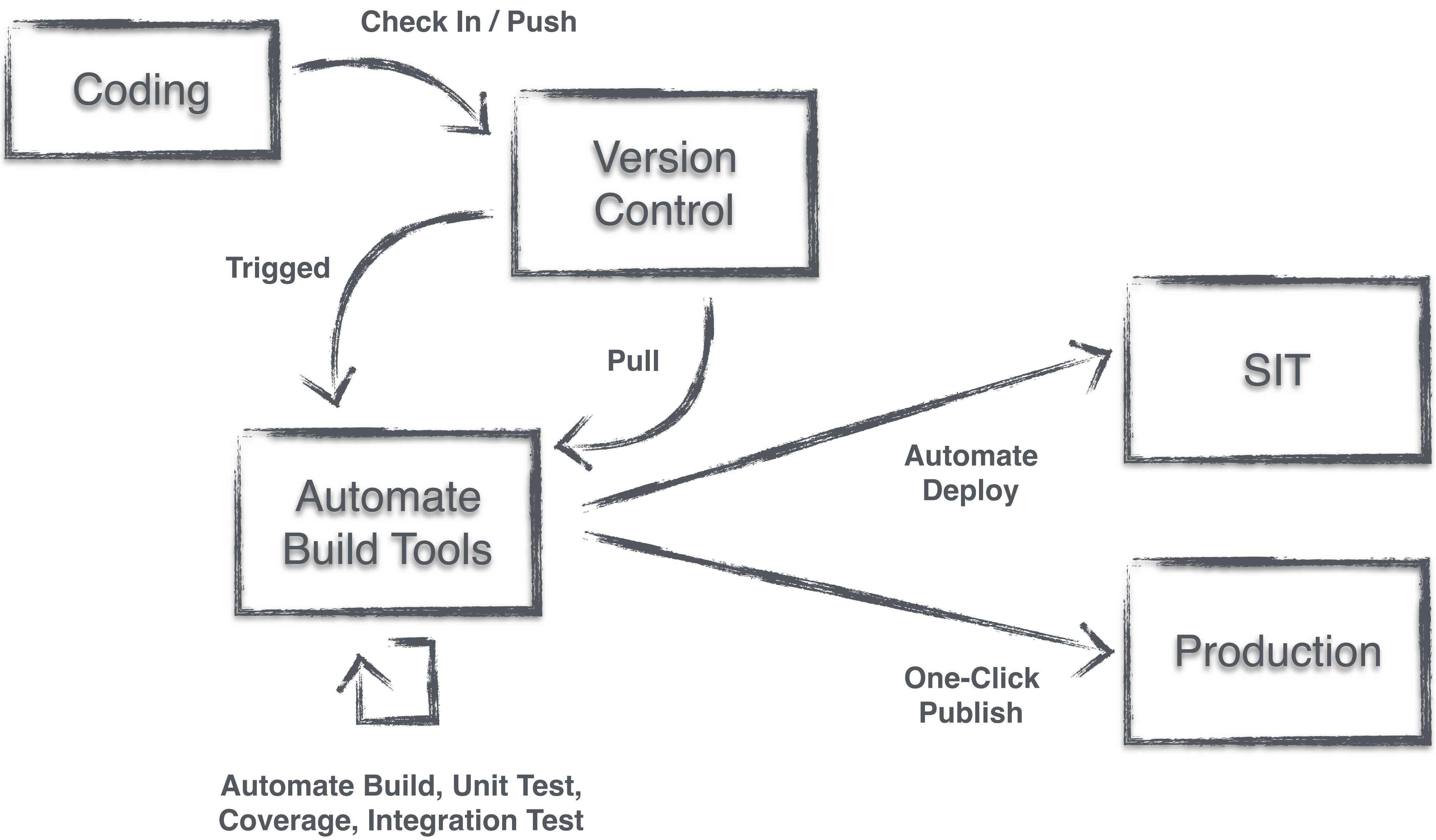
Production

- Eclipse
- JDK8
- Tomcat
- MySQL
- Marven
- …

- JDK8
- JBoss
- MYSQL

- JDK7
- WebSphere
- Oracle Client
  (DB is sunning
  in another machine)
- Other Apps
- Other Apps
- Other Apps
- …

Automate CI / CD Environment



Virtualization

- Install Everything, from OS to application libraries
- My app not requires graphic drivers, printer drivers, Windows Services, COM+, etc… I just want to run my app.
- Prepare by operation. Most developer has no permission to do it.
- Solve issues by emails, screen captures, … Lack of communication.
- On production server. Capacity is always full, but runtime usage only fews.

Docker

- Docker is the original author and primary sponsor of the Docker open source project.

- Together with the community of maintainers and contributors, Docker aims to deliver open tools to help developers build applications with open APIs to help sysadmins better manage these applications.

- Services :- Docker Cloud, Docker Datacenter

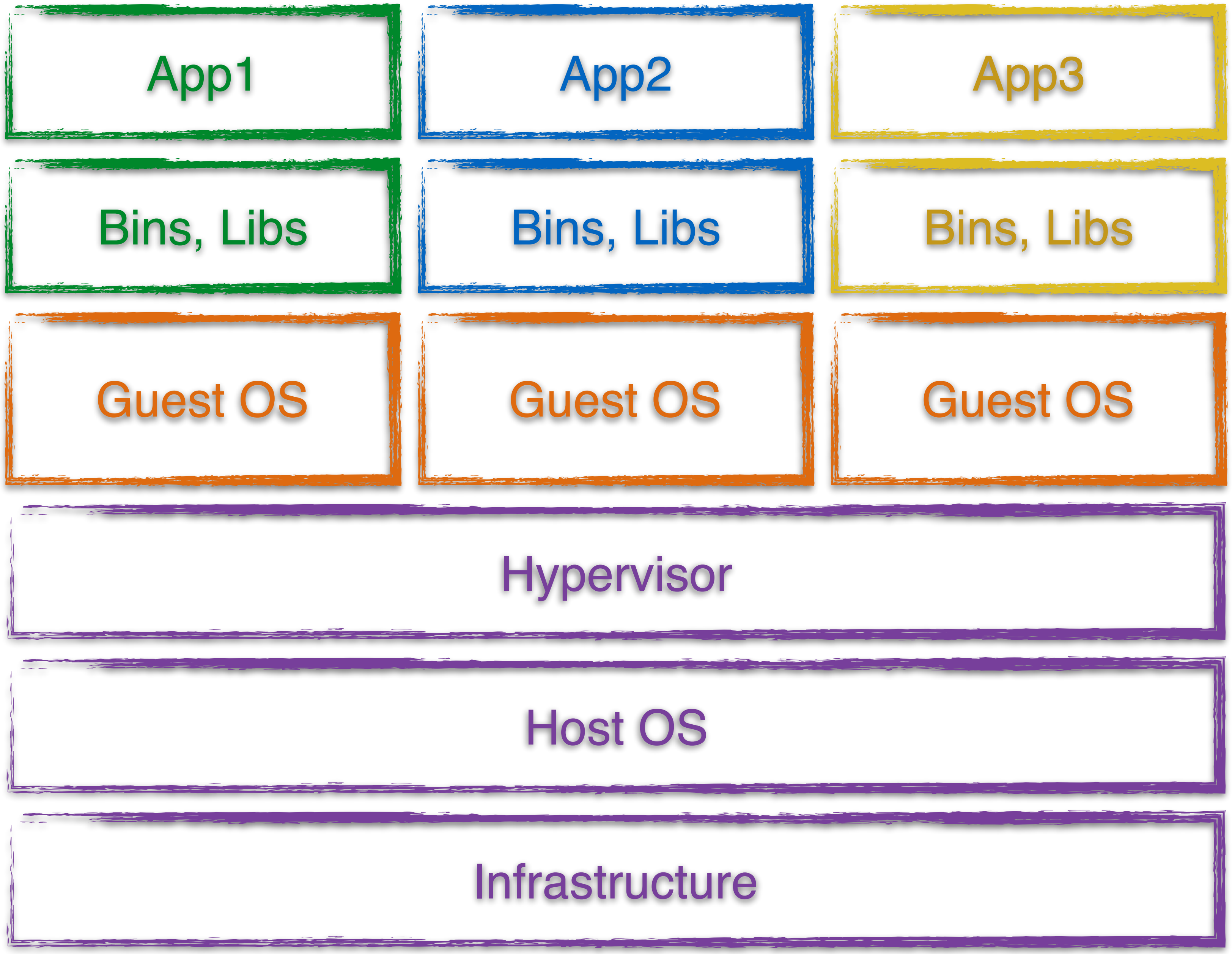
Container

- The docker project offers higher-level tools which work together, built on top of some Linux kernel features.
- Docker achieves this by creating safe, **LXC** (i.e. Linux Containers) based environments for applications called “docker containers”.
- Encapsulation of an application with its dependencies.
- At first glance, its appear to be just a lightweight form of VM. However, containers have several advantages.
- Container holds an isolated instance of an OS, which we can use to run applications.
- Containers are fundamentally changing the way we develop, distribute, and run software.

Container Benefits

- Share resources with host OS. That makes its an order more effective.
- Start and Stop in a second, incur little to no overhead compare to application running natively on the host OS.
- Containers has the potential to eliminate bugs cause by changed in the runtime environment. “**But it works on my machine**” stuff should be gone.
- Developers and operation can run dozens of containers at the same time. Making it possible to emulate a production-ready distributed system.
- Developers and operation can avoid differences in user environments and the availabilities of dependencies.
- Finally, you don’t need to run container all the time to execute your tasks. Start-execute-stop in seconds, with large scale of worker nodes scenario, is possible.

Virtual Machine



App1 App2 App3

Bins, Libs Bins, Libs Bins, Libs

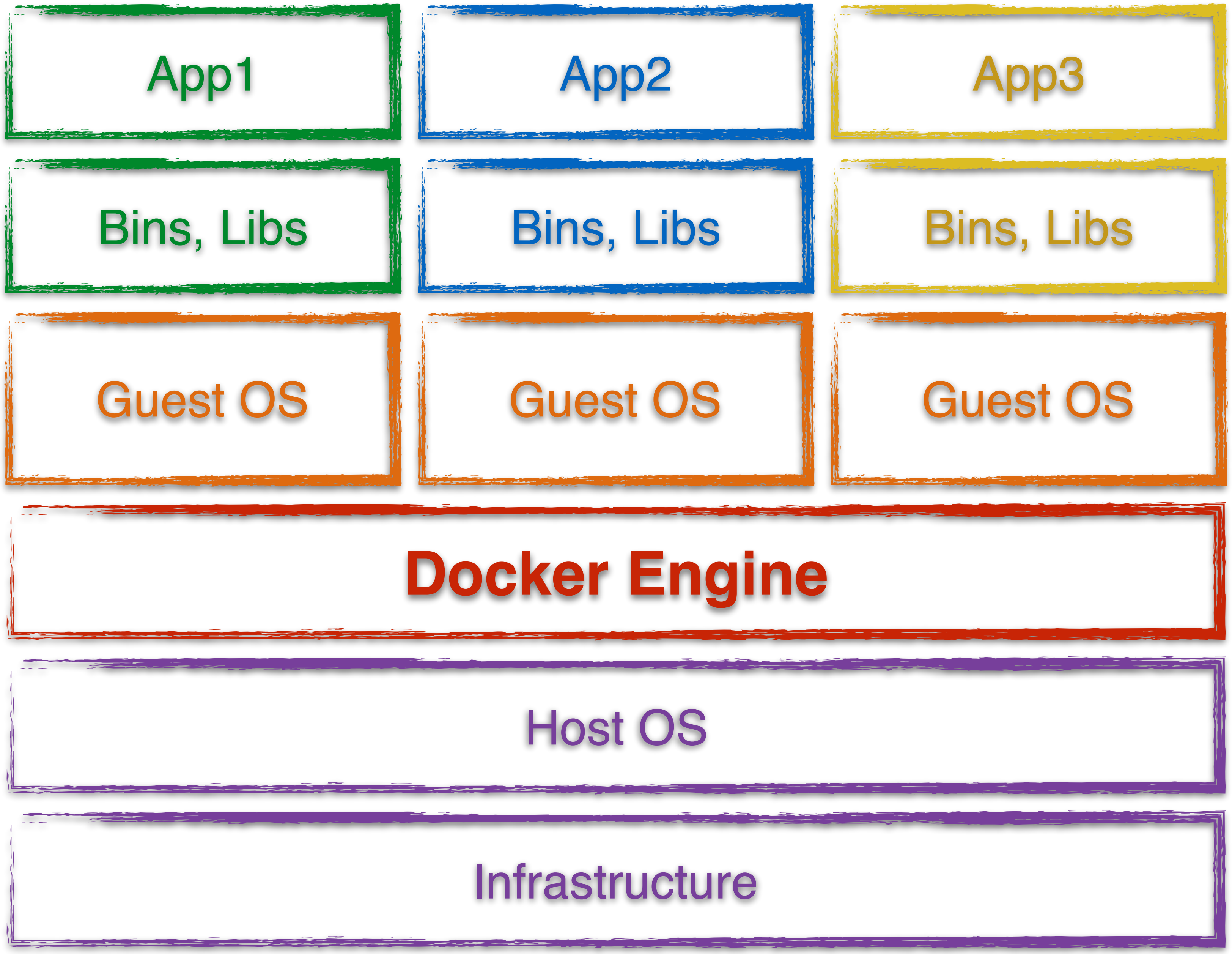
Guest OS Guest OS Guest OS

Hypervisor

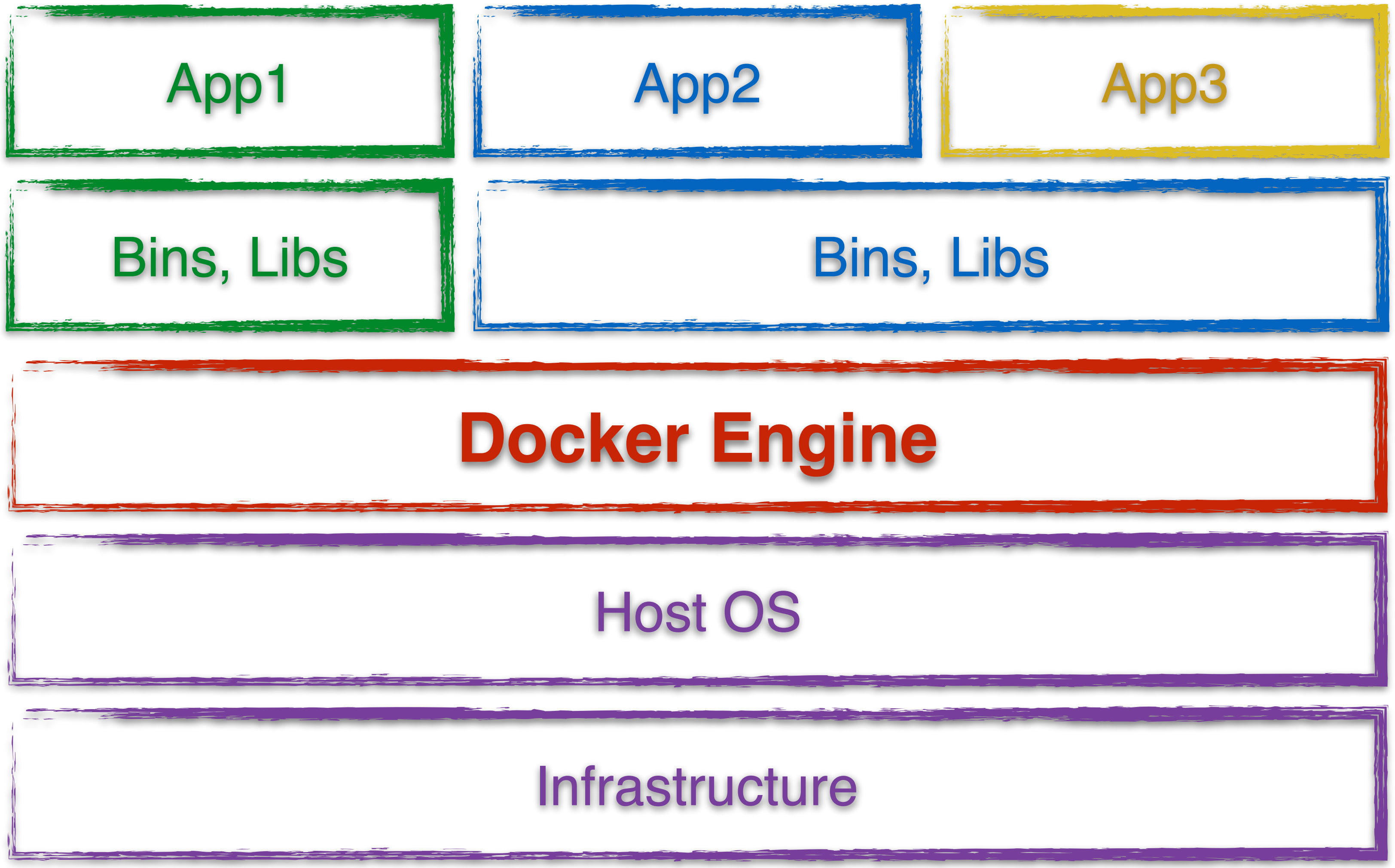
Host OS

Infrastructure

Container


App1
App2
App3
Bins, Libs
Bins, Libs
Bins, Libs
Guest OS
Guest OS
Guest OS
Docker Engine
Host OS
Infrastructure

Container


App1
App2
App3
Bins, Libs
Bins, Libs
Docker Engine
Host OS
Infrastructure

Docker Components

Docker Engine :-

Create Docker images and run Docker containers.
Including **Swarm** mode from 1.12.0-rc1

Docker Compose :-

Defines applications built using multiple containers.

Docker Hub :-

A hosted registry service for managing and building images.

Docker Cloud :-

A hosted service for building, testing, and deploying Docker images to your hosts.

Docker Trusted Registry :-

(DTR) stores and signs your images.

Docker Universal Control Panel :-

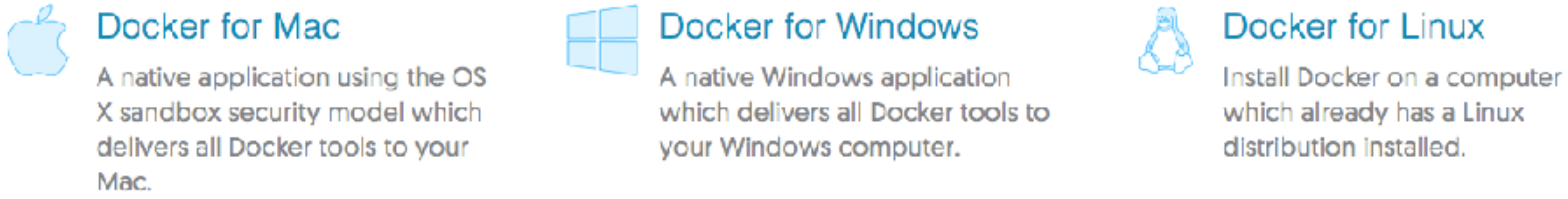
(UCP) Manage a cluster of on-premises Docker hosts as if they were a single machines.

Docker Machine :-

Automate container provisioning on your network or in the cloud. Available for Windows, Mac OS X, or Linux

References :- https://docs.docker.com

Platforms Supported



Docker for Mac

A native application using the OS X sandbox security model which delivers all Docker tools to your Mac.

Docker for Windows

A native Windows application which delivers all Docker tools to your Windows computer.

Docker for Linux

Install Docker on a computer which already has a Linux distribution installed.

- OS X 10.10.3 Yosemite or newer
- Mac 2010 or newer
- Intel’s hardware support for MMU virtualization
- At lease 4GB Memory
- VirtualBox prior to version 4.3.30 must NOT be installed

- 64bit Windows 10 Pro, Enterprise or Education
  (Build 10586 or later)
- Support Microsoft Hypervisor
- VirtualBox will no longer work

- Arch Linux, CentOS, CRUX, Debian, Fedora, FrugalWare, Gentoo, Oracle Linux, RHEL, openSUSE / SUSE Ent., Ubuntu
- 64bit
- Kernel version 3.10 or later

Lab Resources

- 3 Laptops per team.
  4GB Memory, 8GB recommend. 2.5GB - 4GB free memory remains after boot.
  16GB free storage space.

- VMWare Workstation or VMWare Player.
  https://goo.gl/rZTnVn

- Visual Studio Code with Dockerfile plugins
  https://code.visualstudio.com/download
  Atom or Sublime should be ok.

- Ubuntu 16.04.1 LTS VMWare Guest Image (1.13GB)
  download: http://download.somewhere.com/img.zip

- Handouts
  download: http://download.somewhere.com/handouts

References

- Docker Official Website :-
  https://www.docker.com

- Documents :- https://docs.docker.com
  Overview :- https://goo.gl/vnVJGT
  Getting Start :- https://goo.gl/pbfSjq
  Learn by Example :- https://goo.gl/F5ZTQS

- Github :-
  https://github.com/docker/docker
  https://github.com/docker

- Some Interesting Books :-
  Using Docker :- http://amzn.to/2aYflh5
  Docker Up & Running :- http://amzn.to/2aYeBIC