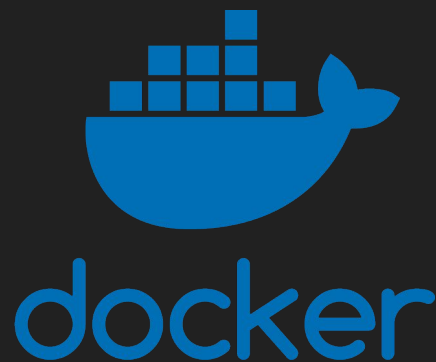




Docker vs. Vagrant

Docker

- Platform to develop, deploy and run applications inside containers
- Improves security, reproducibility and scalability
- Uses containerization to isolate an application and its dependencies



Containerization - a Physical Plastic Container?

- Holds things
- Is portable
- Has clear interfaces for access
- Can be obtained from a remote location



From Dockerfile to Running in Container

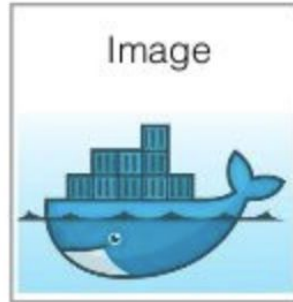
```
FROM ubuntu:16.04
MAINTAINER John Doe <john.doe@example.com>

RUN apt-get update \
    && apt-get install -y python3 \
    && rm -rf /var/lib/apt/lists/*

WORKDIR /app
COPY . /app
RUN python3 --help
```

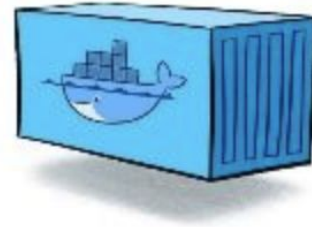
Dockerfile

build



Docker Image

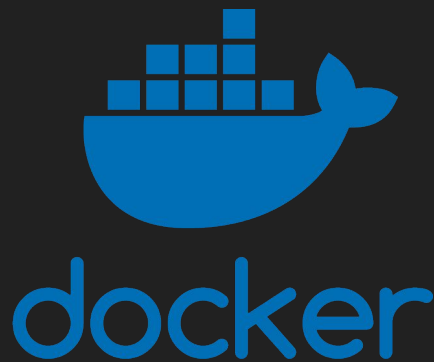
run



Docker Container

Other Docker Components

- Docker daemon - service for managing multiple containers
- Docker client - client program for interacting with Docker daemons
- Registries - push/pull Docker images to/from repos (ex. Docker Hub)



Vagrant

- Tool for working with virtual machine environments
- Lowers setup time, improves reproducibility
- Uses virtualization, not containerization



HashiCorp

Vagrant

How Vagrant works

- Machines are based on boxes
- Boxes contain different operating systems with different included software
- Backend built on top of other virtual machine providers
 - VirtualBox, VMware, AWS, ...



HashiCorp

Vagrant









Discover Vagrant Boxes

Search for boxes by operating system, included software, architecture and more



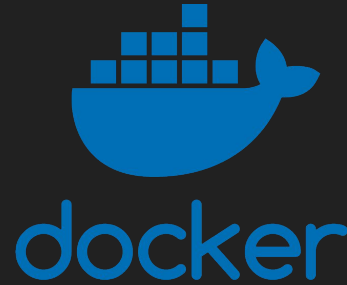
Provider **any** virtualbox vmware libvirt more ▾

Sort by **Downloads** Recently Created Recently Updated

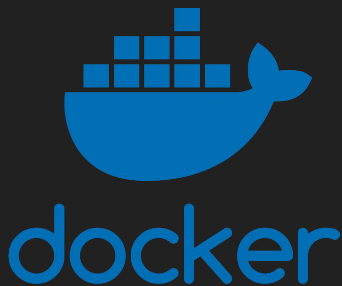
	ubuntu/trusty64 20190425.0.0 Official Ubuntu Server 14.04 LTS (Trusty Tahr) builds	virtualbox	Downloads 30,369,293	Released 1 day ago
	laravel/homestead 7.2.1 Official Laravel local development box.	hyperv parallels virtualbox vmware_desktop	Downloads 13,467,134	Released 11 days ago
	hashicorp/precise64 1.1.0 A standard Ubuntu 12.04 LTS 64-bit box.	hyperv virtualbox vmware_fusion	Downloads 6,732,010	Released about 5 years ago
	centos/7 1902.01 CentOS Linux 7 x86_64 Vagrant Box	hyperv libvirt virtualbox vmware and 3 more providers	Downloads 4,937,186	Released about 2 months ago
	ubuntu/xenial64 20190430.0.0 Official Ubuntu 16.04 LTS (Xenial Xerus) Daily Build	virtualbox	Downloads 3,231,138	Released about 12 hours ago
	puphpet/ubuntu1404-x64 20161102 Ubuntu Trusty 14.04 LTS x64	parallels virtualbox vmware_desktop	Downloads 2,508,332	Released over 2 years ago
	debian/jessie64 8.11.0 Vanilla Debian 8 "Jessie"	libvirt lxc virtualbox	Downloads 2,350,693	Released 10 months ago
	hashicorp/precise32 1.0.0	virtualbox	Downloads 2,272,248	Released about 5 years ago

Docker and Vagrant - Differences

- Scopes of app isolation
- Security levels
- Speed of launch
- Resource consumption
- Operational limitations

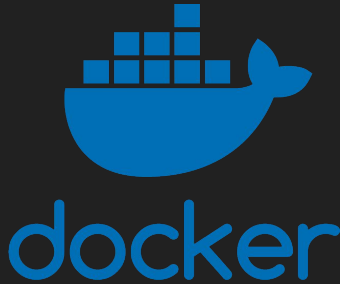


Scopes of App Isolation



- Code package with everything needed
- One container → one app
- Emulates OS
- Can run multiple interacting apps

Security Levels

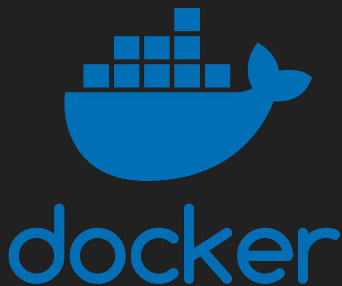


- Uses machine kernel
- Malware can spread



- Users must ensure security themselves with firewalls

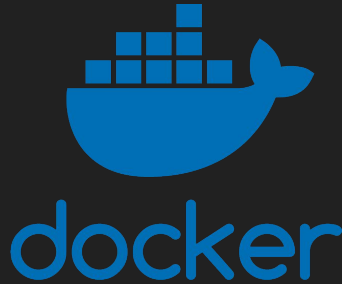
Speed of Launch



- Separate code packages →
launched within a minute

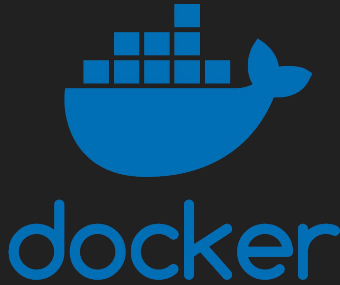
- Launch an entire OS
- Can save running state to speed up
launch

Resource Consumption



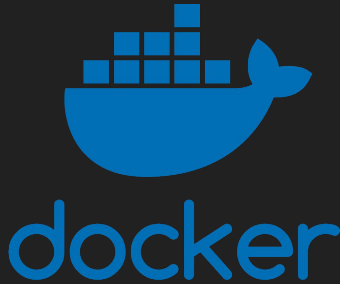
- Runs directly atop host OS → 300% more resource efficient than VMs
- Launched upon existing host OS → very resource consuming

Operational Limitations



- Must launch a VM on MacOS
- Exiting the development and testing environments might cause inconsistency problems

Pros and Cons



- + More lightweight
- + Easier to use for deployment
- Can be harder to understand and set up
- No native Mac support
- Only supports some Windows versions

- + Runs environments independent of the host machine
- + Containers can be used inside a Vagrant VM
- More overhead
- Can take up a lot of space

Take-home Message

- Docker seems to be a production-ready environment that provides consistency.
- Vagrant seems to be more appropriate for software development, and not for production because of the large overhead.

Sources

<https://www.vagrantup.com/intro/getting-started/index.html>

<https://docs.docker.com/engine/docker-overview/>

<https://www.vagrantup.com/intro/index.html>

<https://dzone.com/articles/vagrant-vs-docker-which-is-better-for-software-dev>