Dockerize it all

About Me

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Agenda

TO THE NEW DIGITAL

- Understanding the problem of shipping code
- The solution
- What is Docker Container?
- Benefits of Docker
- Understanding Docker components & architecture.
- Installation
- Hello world demo
- Running Stack of services using Docker Compose
- Moving to Production

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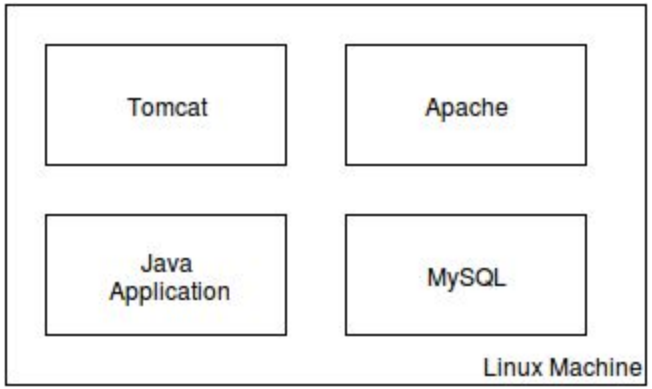
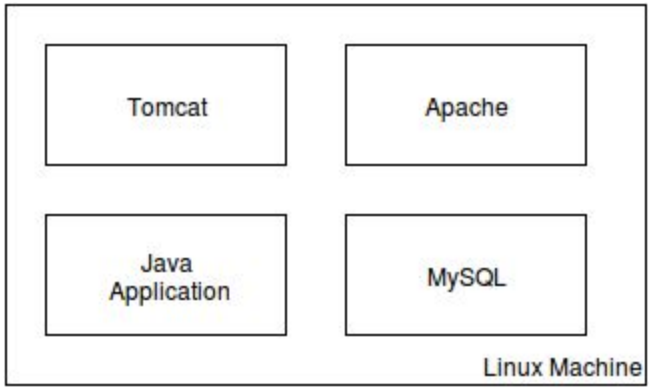
Let’s see how things can get complicated with shipping code??

A simple web application with one developer



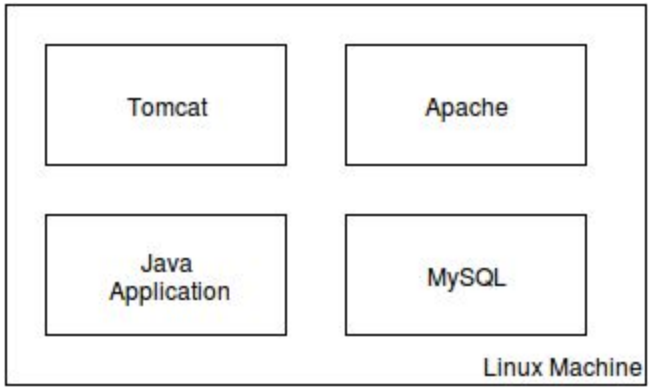
A Developer

Added more developers to team

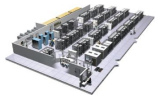


Multiple Developers

Setup QA & Production Environment



Multiple Developers

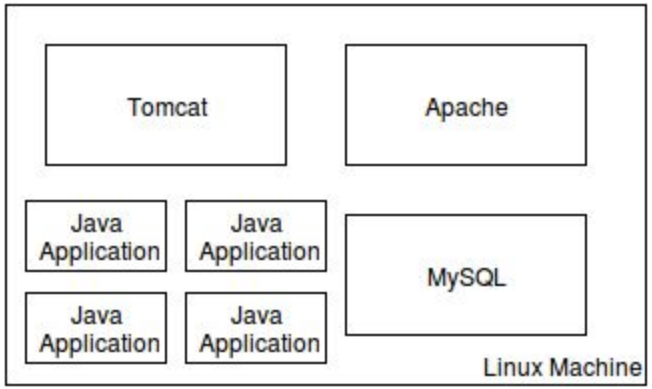


Public Cloud

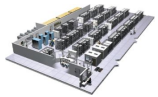
QA Server

Production Clusters

Created Background Workers



Multiple Developers



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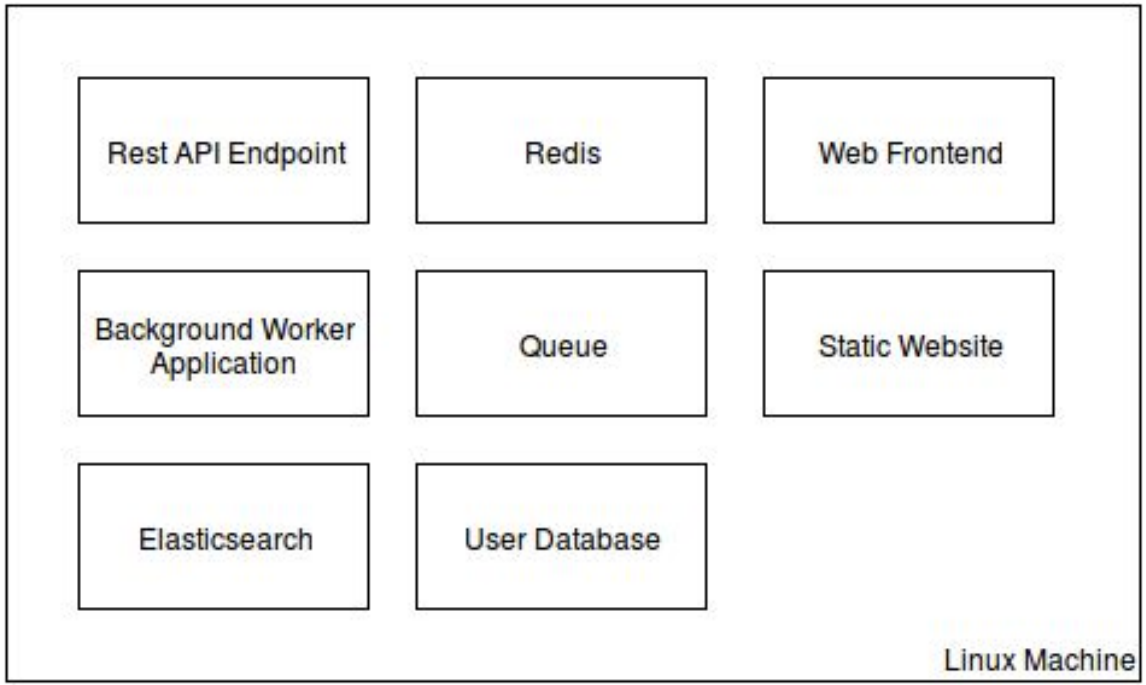
Refactored, Microservice Architecture



Multiple Developers

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In Nutshell, what are the challenges?

- “Works on my machine” syndrome
- Hard disk crashed -> New Setup -> Nothing Works :(
- Adding new Developer in the team
- Going live? Please DO NOT break on production.
- Dependency Hell - Common dependency with different versions

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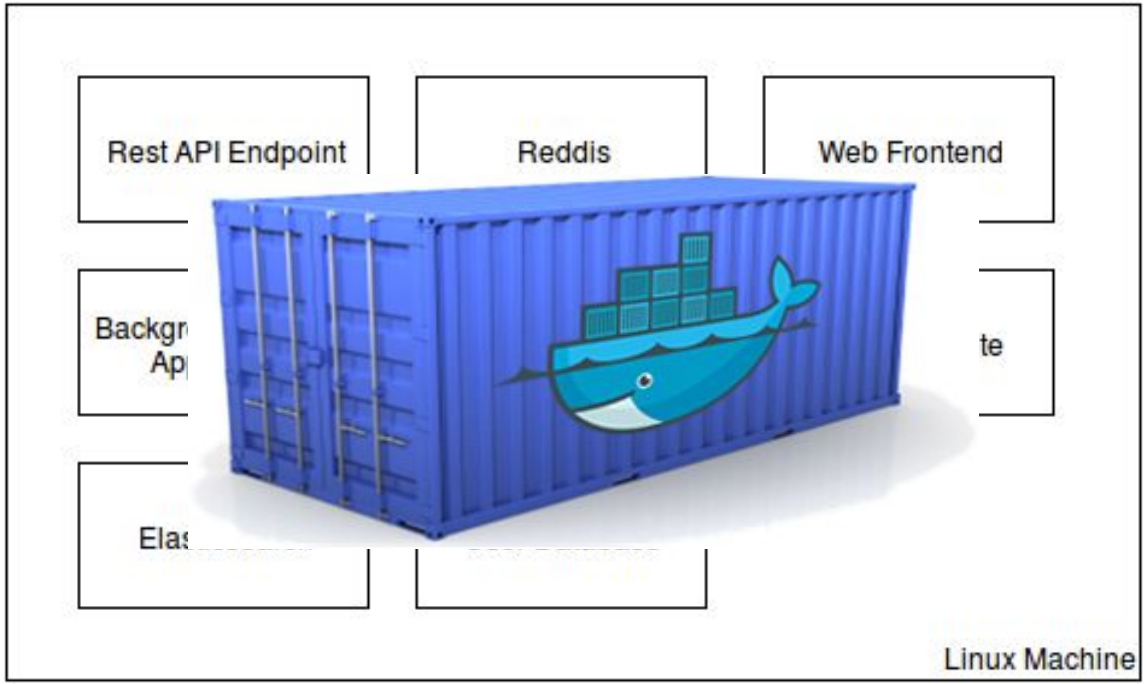
The Solution



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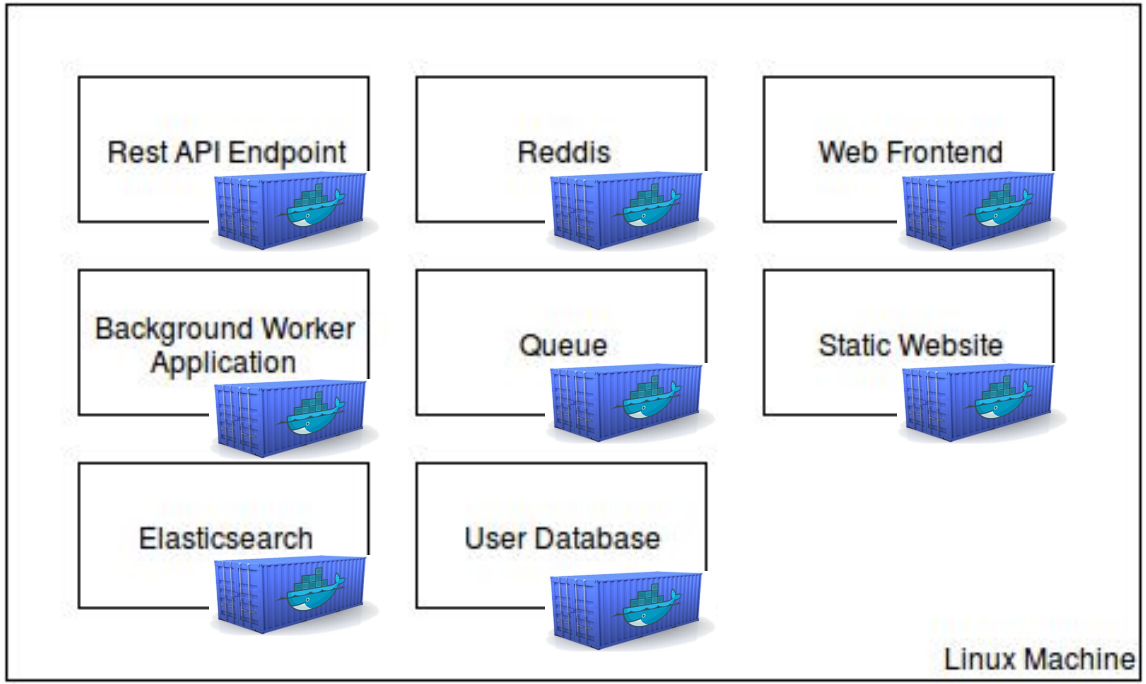
The Solution, Contd...



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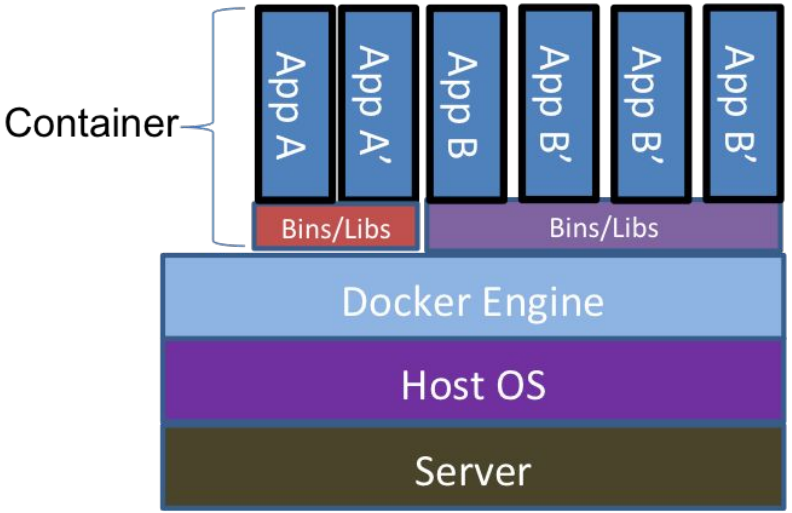
What is Docker Container?

A Docker Container allows application developer to package up their application with all it's dependencies they are associated with.



Okay! I understand Docker Containers now, they are like VM???

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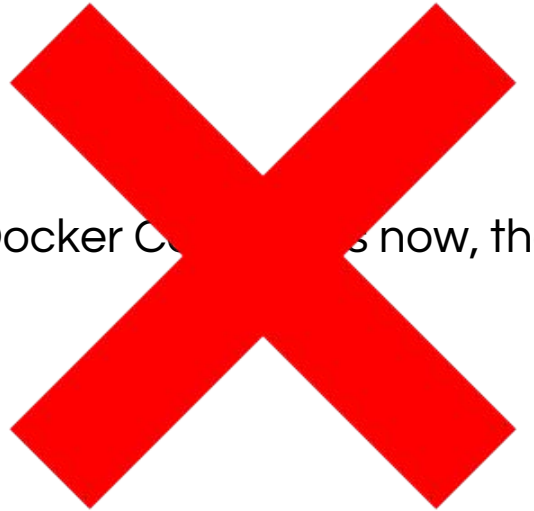
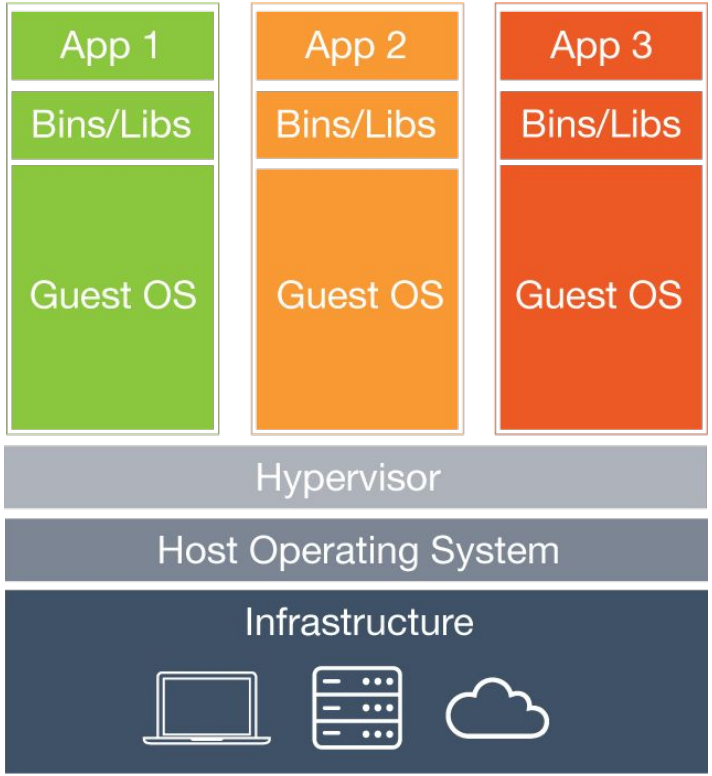


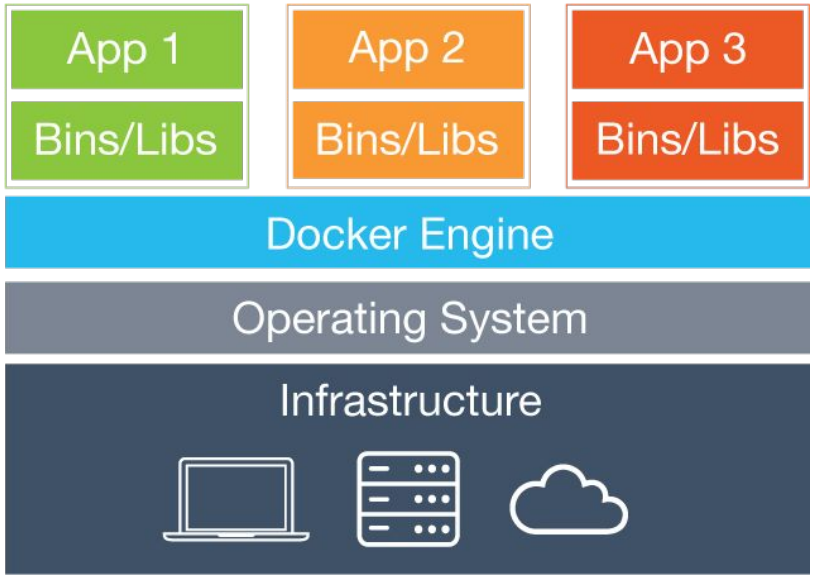
Hmmm...

Let’s see what is the difference between application running on VM v/s Docker?

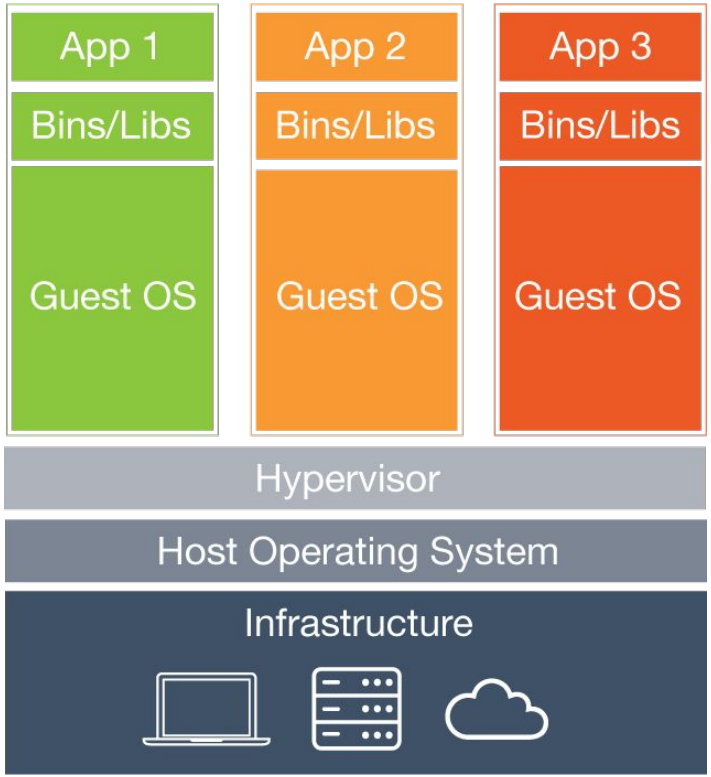
Application Running On VM v/s Container

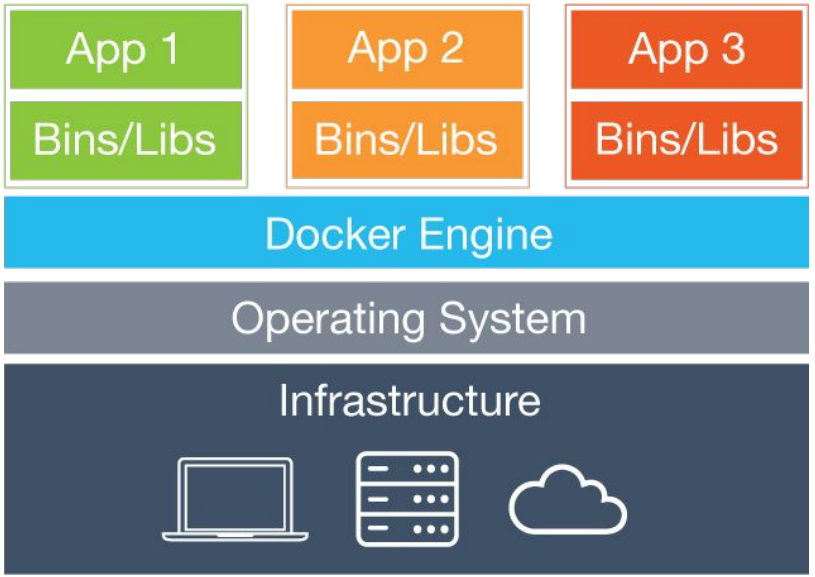


Application Running On Docker Container



Application Running On VM v/s Container





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- Portability - *just pull the image and start container.*
- Deployment - *because containers can run almost anywhere we can deploy to Desktop, Physical Server, Virtual Machine, Public/Private Cloud etc.*
- Efficient Resource Utilization - *Multiple isolated containers sharing* resources.

Why Developers Care?

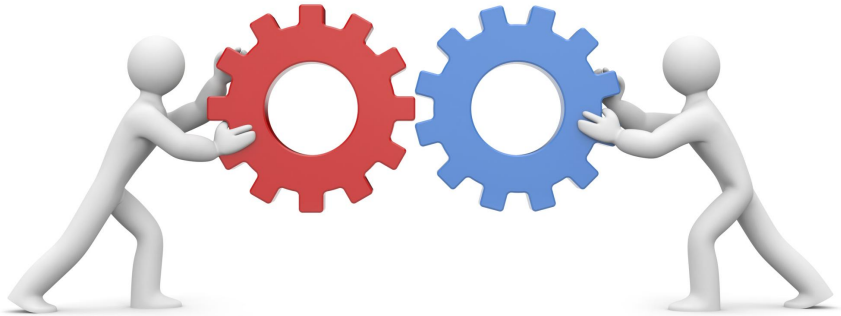
Why Developers Care?

- Build any application in any language using any stack.
- Dockerize application can run anywhere on anything.
- No longer need to cross our fingers when we deploy to production
- Helps improving application design

Why Devops Care?

Why Devops Care?

- Easy migrations to different infrastructure
- Replication of different environments is very easy.
- Fix an issue once, it’s fixed everywhere
- Less conflicts with developers,



Why Business Care?

Why Business Care?

- Boost Productivity

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- Boost Productivity
- Reduce Risk

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- Boost Productivity
- Reduce Risk
- Reduce Cost

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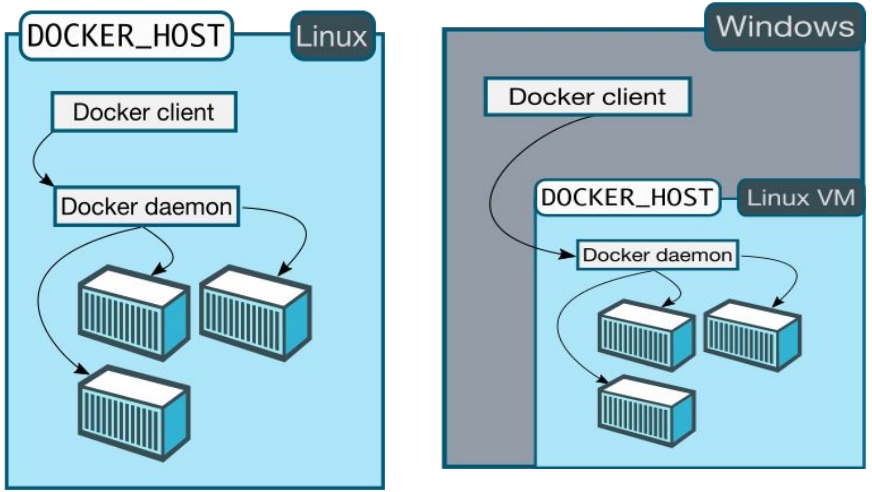
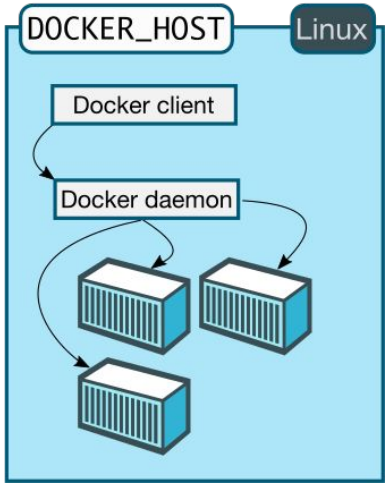
Docker Core Components

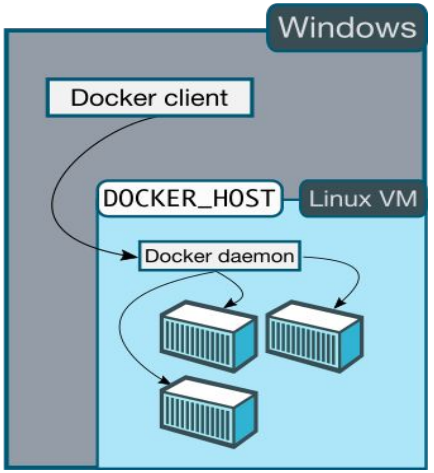
- Docker Daemon



Docker Core Components

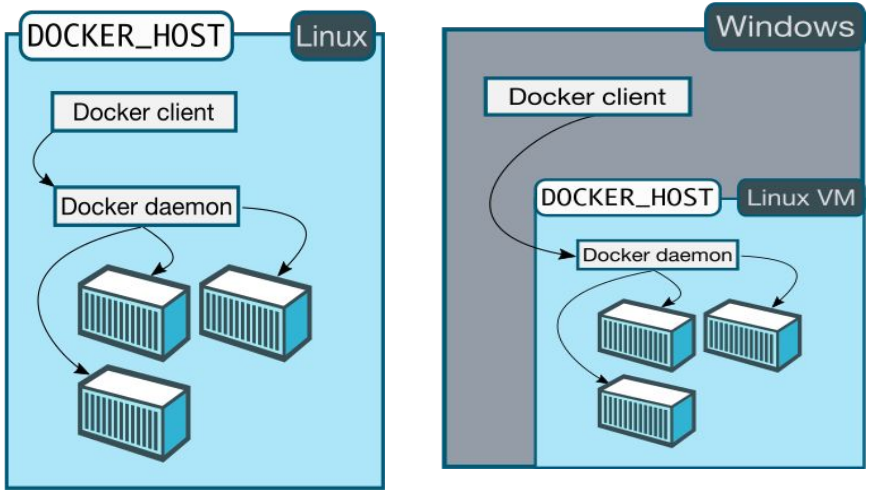
- **Docker Daemon**
  The Docker daemon runs on a host machine. The user does not directly interact with the daemon, but instead through the Docker client.





Docker Core Components

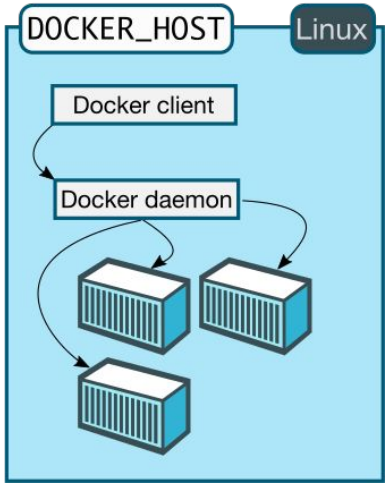
- Docker Daemon
- Docker Client

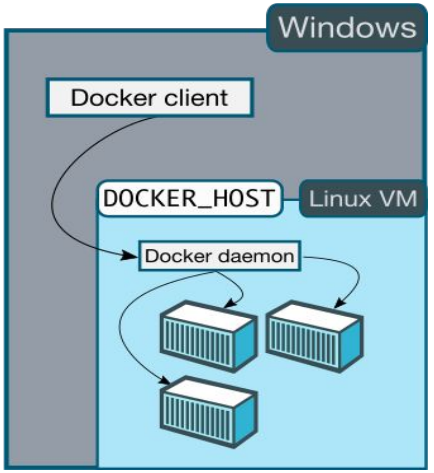


Docker Core Components

- **Docker Daemon**

- **Docker Client**
  The Docker client, in the form of the docker binary, is the primary user interface to Docker. It accepts commands from the user and communicates back and forth with a Docker daemon.





Docker Workflow Components

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- **Docker Image**
  A Docker image is a read-only template to build Docker Containers

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- **Docker Registries**
  Docker registries hold images. These are public or private stores from where you upload or download images.

Docker Workflow Components

- **Docker Image**
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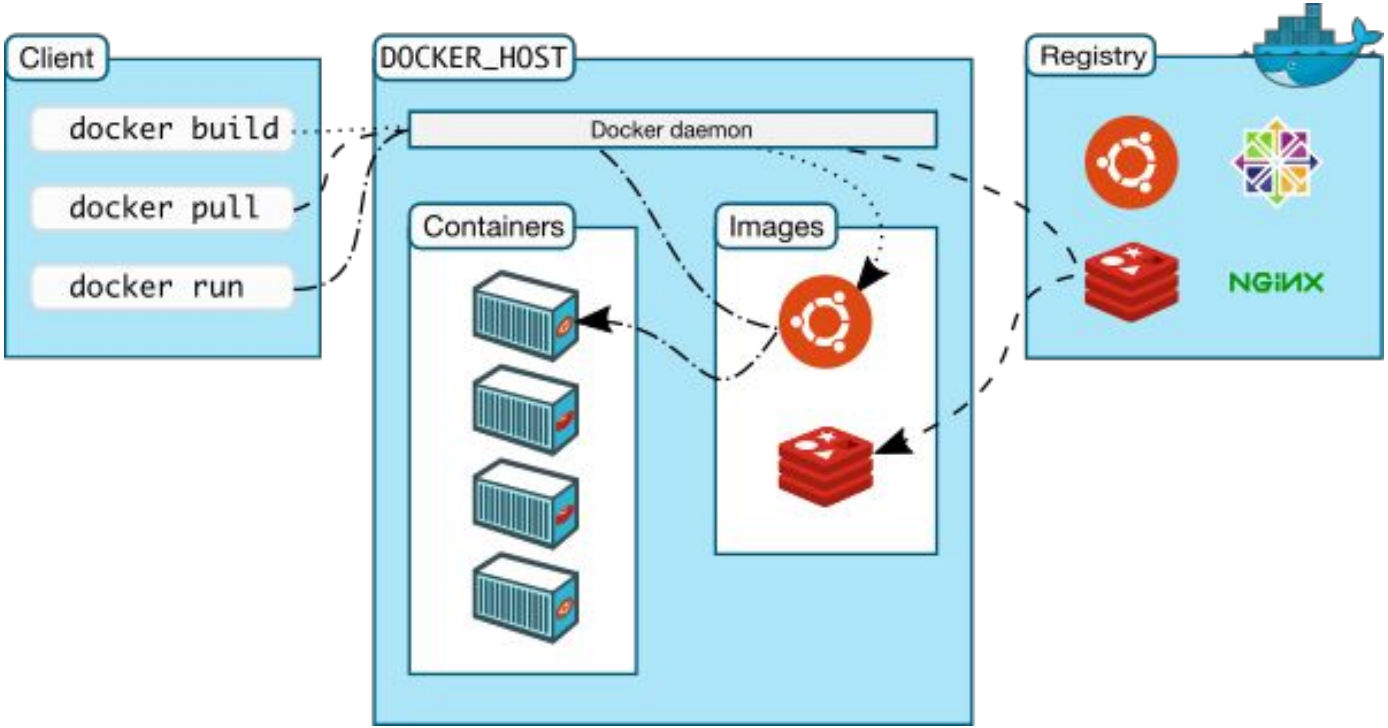
- **Docker Registries**
  Docker registries hold images. These are public or private stores from where you upload or download images.

- **Docker Container**
  Created from images. start, stop, run

Docker Architecture



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Installation

- Linux
  Follow steps for your version of linux
  https://docs.docker.com/engine/installation/

  `apt-get install docker-engine`

  `yum install docker-engine`

- Mac or Windows OS
  Use docker toolbox isntaller : https://www.docker.com/docker-toolbox

Installations : Docker toolbox

Download (Mac) Download (Windows)

Compatible with Mac OS X 10.8+ and Windows 7+

Docker Engine

Docker Machine

Docker Compose

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A Spring Boot application

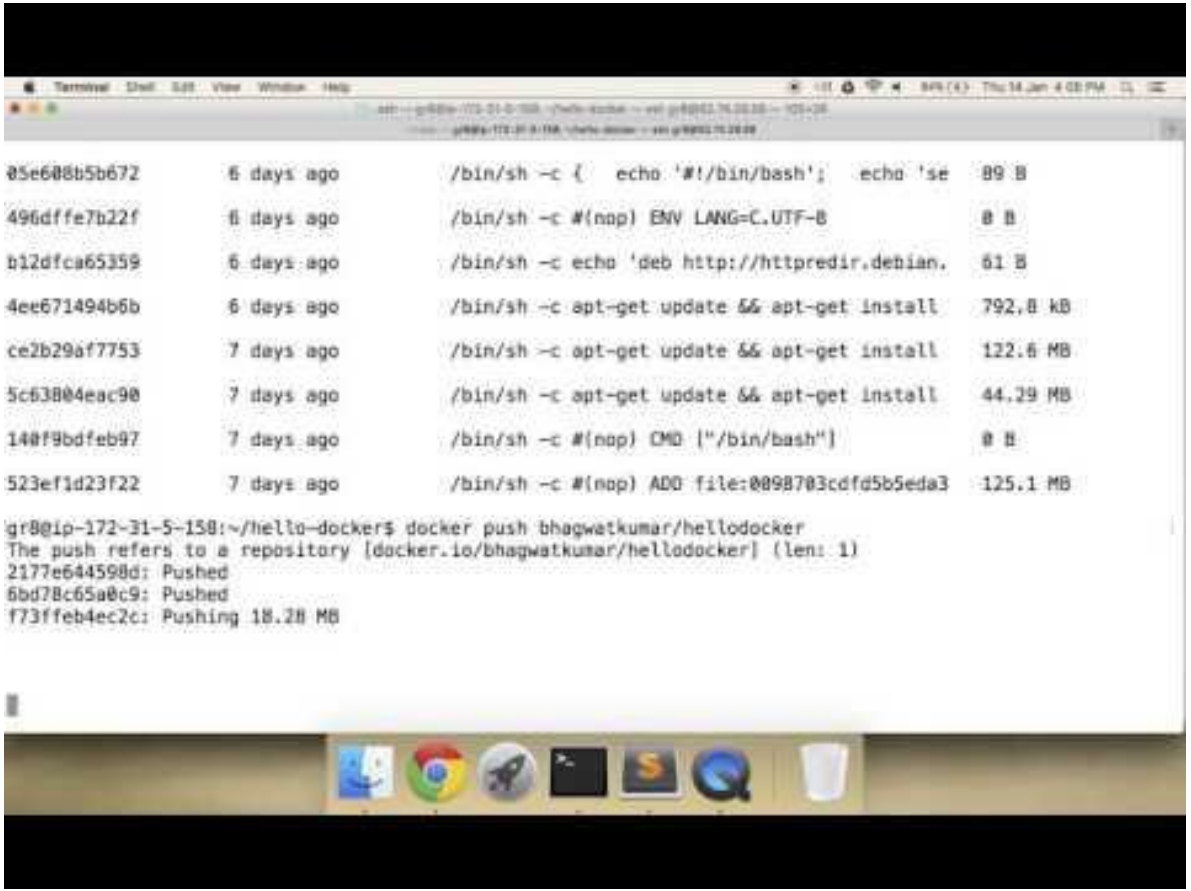
```
@RestController
class Application{
    @RequestMapping(path="/")
    public Map hello(){
        return [
            "Topic": "Dockerize it all",
            "Message": "Welcome to GR8Conf-IN 2016!!!"
        ]
    }
}
```

$ (spring jar hello.jar hello.groovy) && (java -jar hello.jar)

Build Image Using Dockerfile

```
FROM java:8

MAINTAINER Puneet Behl "puneet.behl@tothenew.com"

ADD hello.jar /app/hello.jar

EXPOSE 8080

CMD ["java", "-jar", "/app/hello.jar"]
```

Build Docker image and push to Docker Hub



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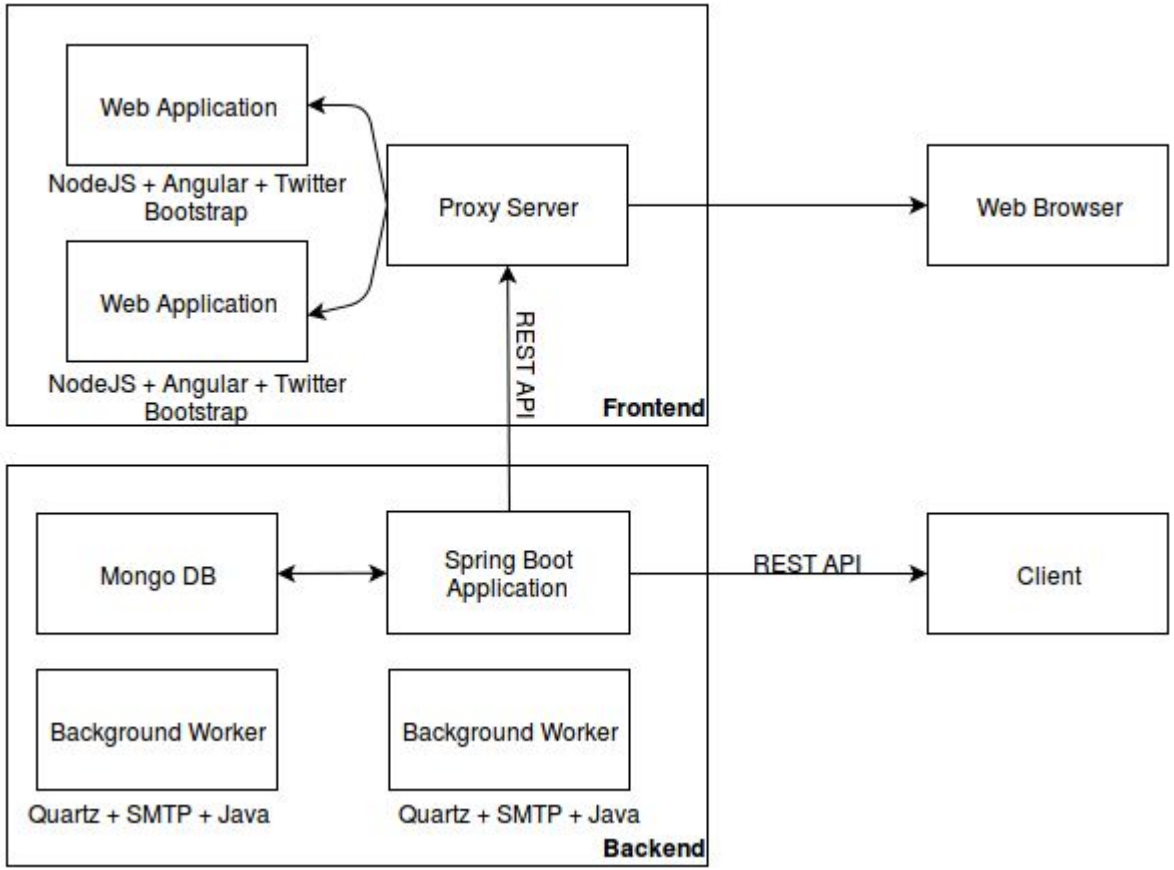
A Complicated application architecture

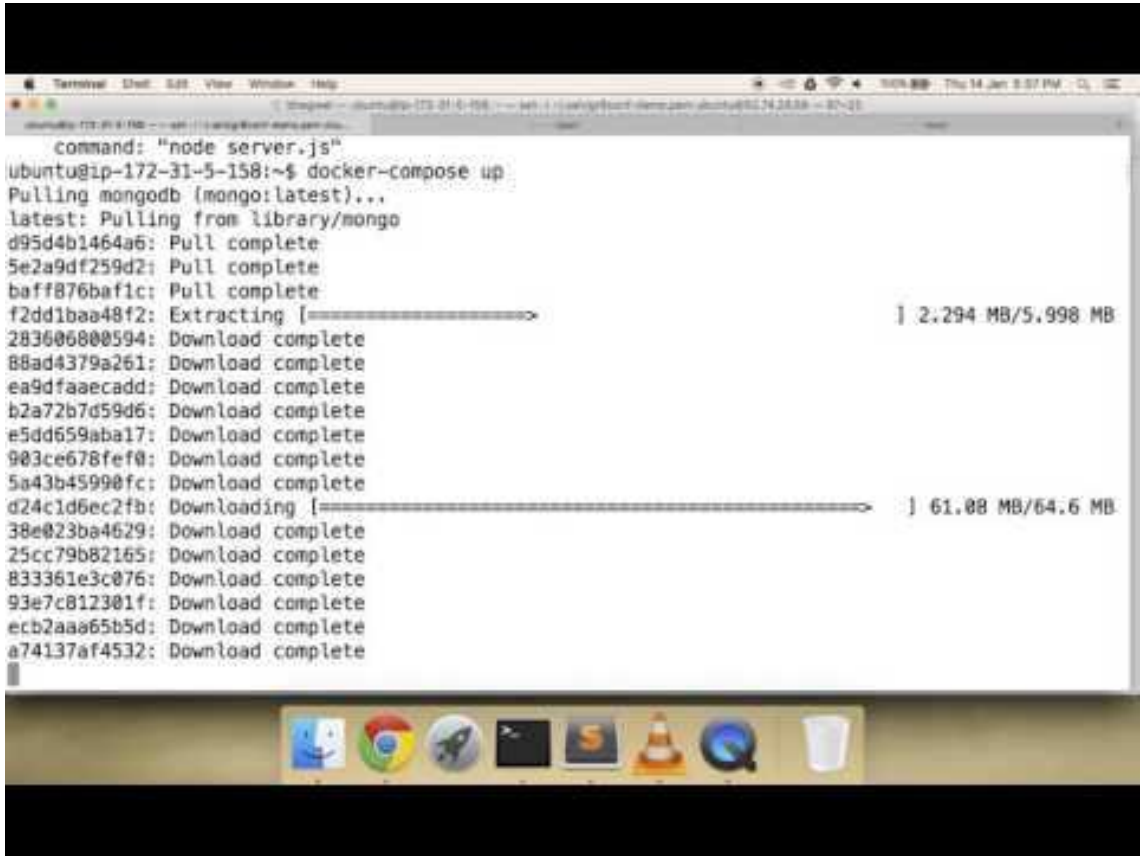


Docker Compose

```
mongodb:
    image: mongo
backend:
    image: pbehl/backend
    links:
        - mongodb
    environment:
        "spring.data.mongodb.host": "mongodb"
        "logging.level.org.springframework.web": "DEBUG"
    ports:
        - "8080:8080"
```

```
frontend:
    image: pbehl/frontend
    ports:
        - "3000:3000"
    links:
        - backend
    environment:
        backendServerUrl: "http://backend:8080"
    command: "node server.js"
```

Build using Docker Compose



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Moving to Production

Orchestration tools needed for docker cluster environment

- **Provision servers**
- **Deploy**
- **Manage servers**

Some of the available orchestration tools

- **Docker swarm**
- **Centurion**
- **Amazon EC2 container service**

Questions???

Thank you

References

Sample Demo: https://github.com/puneetbehl/gr8conf-docker-demo

Docker documentation: https://docs.docker.com

Docker tool-box https://www.docker.com/docker-toolbox

Docker hub: https://hub.docker.com/

Docker up and running from O'Reilly publication Authors: Karl Matthias & Sean P. Kane

Union file system : https://en.wikipedia.org/wiki/UnionFS

http://stackoverflow.com/questions/16047306/how-is-docker-different-from-a-normal-virtual-machine

Build and push images to docker hub https://youtu.be/QCEWQs6LwAk

Docker-compose https://youtu.be/kn_dUA6f29I