DOCKER

Approaching the Holy Grail for Software Distribution Pipelines

Ryan Smith
Sept 2018
Outline
Outline

- About Me
- Software Distribution Pipelines
- Docker
- Docker Compose
- Kubernetes
- Other Orchestrators
- Summary
- Q&A
- Ending Notes
About Me
Date Mike

Michael Scott
Me

Ryan Smith
Companies

Startups and small software shops
Software Distribution Pipelines
Definitions

Software Distribution:
The process of delivering software to the end user

Software Distribution Pipeline:
The processes supporting Software Distribution
Marc: Exactly. In fact, the general model for successful tech companies, contrary to myth and legend, is that they become distribution-centric rather than product-centric. They become a distribution channel, so they can get to the world. And then they put many new products through that distribution channel. One of the things that’s most frustrating for a startup is that it will sometimes have a better product but get beaten by a company that has a better distribution channel. In the history of the tech industry, that’s actually been a more common pattern. That has led to the rise of these giant companies over the last fifty, sixty, seventy years, like IBM, Microsoft, Cisco, and many others.

SD Pipeline: Components

End User Need Defines Product

- Ideation
- Developers
- Code
- Software
- Deployed Software
- End Users
SD Pipeline: Components

End User Need Defines Product

- Ideation
- Developers
- Code
- Software
- Deployed Software
- End Users

- C Level
- Engineers
- Product Mgmt
- Designers
- Architects
SD Pipeline: Components

End User Need Defines Product

Ideation → Developers → Code → Software → Deployed Software → End Users

- Engineers
- Sprints
- IDEs (VS Code)
- Tools
- Source Control (Github)
SD Pipeline: Components

End User Need Defines Product

- Tests
- Compilers
- Security Scans
- Bug fixes
- Documentation
SD Pipeline: Components

End User Need Defines Product

- Ideation
- Developers
- Code
- Software
- Deployed Software
- End Users

- Integration Tests
- User Acceptance Tests
- Deployment Pipelines
- Configuration Mgmt
- Secret Mgmt
SD Pipeline: Components

End User Need Defines Product

- Better find some users!
- User metrics
- SEO
- Advertising / Marketing
- Site Reliability Engineering
- Disaster Recovery
- Service Level Agreements
SD Pipeline: Goals

Get a working end-to-end deployment ASAP

- Prove the pipeline works with a dummy product
- Minimize the number of cooks in the kitchen
- Accept the product will never be perfect (it just has to provide value)
- Create abstractions
Abstractions

- Circuits abstracted away the physics of electrons in condensed matter
- Hardware abstracted away circuits and their components
- Operating systems abstracted away hardware
- Docker abstracts away operating systems
Docker

Build, Ship, Run, Any App Anywhere

From Dev

Any App

Any OS

Anywhere

Windows  Linux

Physical  Virtual  Cloud

To Ops
Why is this Important?

You must be stubborn in vision, but flexible in approach. Understanding where to be stubborn and where to allow a little wiggle room may be tough, but remember to keep the bigger picture in mind.

https://curiosity.com/topics/these-are-the-5-keys-to-success-in-business-according-to-billionaire-jeff-bezos-curiosity/
Flexibility

- Business requirements are going to fluctuate, so your engineering practices have to be adept at handling these changes.
- With abstractions at the proper places, changes can occur to sub systems and not affect your distribution pipeline.
- With Docker, you can write your code once and feel comfortable it will work in a majority of environments.
How do I get started?

- Download: docker.com/get-started
- Play: katacoda.com/courses/docker
Demos

docker run -p 5678:5678 hashicorp/http-echo -text="hello world"
Demos

```bash
GOOS=linux go build -o hello-world
docker build -t hello-world-server .
docker run -it --rm -p 8080:8080 hello-world-server
```

Dockerfile

```dockerfile
FROM scratch
COPY hello-world /hello-world
CMD ['/hello-world']
```
Docker

Docker helps teams across the board develop, manage, and deploy their applications
Docker Compose
What is Docker Compose?

Docker Compose lets your organize and manage a collection of Docker Containers on your machine.
Why is this Important?

Easy for developers to write, share and test docker systems
What does this look like?

version: '3'
services:
  dummy-golang-project:
    image: rms1000watt/dummy-golang-project
    ports:
      - 9999:9999

hello-world-server:
  image: hello-world-server
  ports:
    - 8080:8080
Demo

docker-compose up
Docker Compose

The only catch is.. Docker Compose only runs locally

WHEN YOU TRY TO DEPLOY YOUR WHOLE STACK

TO DOCKER COMPOSE
Kubernetes
What is Kubernetes?

Kubernetes is an open-source system for automating deployment, scaling, and management of containerized applications.

It groups containers that make up an application into logical units for easy management and discovery. Kubernetes builds upon 15 years of experience of running production workloads at Google, combined with best-of-breed ideas and practices from the community.
Kubernetes Origin

Kubernetes was birthed at Google as the third iteration of their container management systems

https://ai.google/research/pubs/pub44843
Who uses Kubernetes?
Pokémon Go

![Graph showing data comparison]

- Original Launch Target
- Estimated Worst Case
- Actual Traffic
Pokémon Go

Cloud Datastore Transactions Per Second

1X
Target Traffic

5X
Worst Case Estimate

50X
Actual Traffic

Kubernetes System

K8s Federated Cluster (Global)

K8s Cluster (VA)

K8s Cluster (CA)

K8s Cluster (London)

K8s Cluster (Mumbai)
Running Kubernetes in the Cloud

Kubernetes

Google Cloud Platform

AWS

Azure
Running Kubernetes Locally

Just install Docker for Windows/OS X
apiVersion: apps/v1
kind: Deployment
metadata:
  name: test-echo
spec:
  selector:
    matchLabels:
      app: test-echo
  replicas: 2
template:
  metadata:
    labels:
      app: test-echo
  spec:
    containers:
    - name: test-echo
Demo

```bash
cubectl apply -f hello-world.yml
```
Helm

Package manager for Kubernetes
Demo

helm install stable/tensorflow-notebook
Demo

```
helm install rms1000watt/monochart -f values.yaml
```

**values.yaml**

```
image:
  repository: rms1000watt/dummy-golang-project

deployment:
  enabled: true

service:
  enabled: true
  internalPort: 9999
  externalPort: 9999
```
Kubernetes
Extremely popular and battle-tested, distributed system for deploying containers
Other Orchestrators
Docker Swarm

Distributed Docker container orchestrator built by the Docker team
Docker Swarm

- 😊 Easy to use (smaller learning curve)
- 😊 Enterprise support
- 🤔 Cloud managed offerings??
- 🤔 Don't see many articles, blogs, videos about massive deployments
Nomad

Distributed orchestrator built by Hashicorp

High-Level Overview

Looking at only a single region, at a high level Nomad looks like this:
Nomad

- 😊 Million container challenge (1,000,000 containers on 5000 hosts in 5 minutes)
- 😊 Easy to install (single binary)
- 😊 Fairly easy to use
- 😊 Can run more than just Docker images
- 😊 Enterprise support
- 😊 Cluster federation
- 😞 Cloud managed offerings??
Summary
Software Distribution Pipelines

Here's how Docker + Kubernetes fits in to the Software Distribution Pipeline
Recommendations

- Dockerize all immutable servers
- Use cloud hosted Kubernetes
- Use cloud hosted Databases
- Use automation to build and deploy (CI/CD)
- Don't believe the fear of "Cloud Lock-in"
- If need be, move to more regulated cloud
- Worst case, migrate Kubernetes to On-Prem
Questions
Questions

- rms1000watt@gmail.com
- github.com/rms1000watt
- linkedin.com/in/ryanmatthewsmith
Ending Notes
Relearn How to be Man

The Stoic Emperor
@TheStoicEmperor

For a few centuries man has tried to make himself like a machine.

He's learned to arrive on time.

He's learned to repeat after teacher.

He's learned to do repetitious tasks reliably.

Machines are now better at being machines than man is.

Man must now relearn how to be man.

7:01 PM - 12 Aug 2018

2,012 Retweets 5,807 Likes

https://twitter.com/TheStoicEmperor/status/1028831254119161856
Chick fil A

Chick fil A has "Edge Processing" in their restaurants each with a Kubernetes cluster

https://medium.com/@cfatechblog/edge-computing-at-chick-fil-a-7d67242675e2
IBM Ads

IBM Watson ads spam me on Instagram