PostgreSQL in Containers at Scale

Presented by:

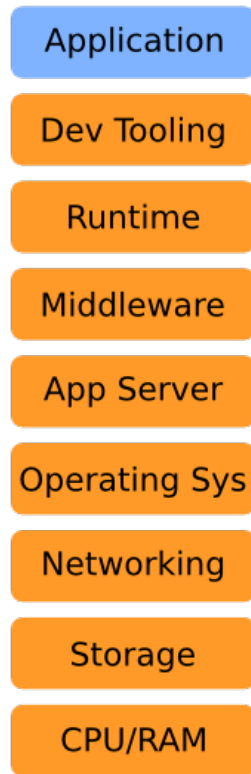## Steven Pousty @TheSteve0

and

Jeff McCormick

Goals

- Introduction to containers, kubernetes, and OpenShift
- Watch the easiest replication and scaling in your life

PaaS

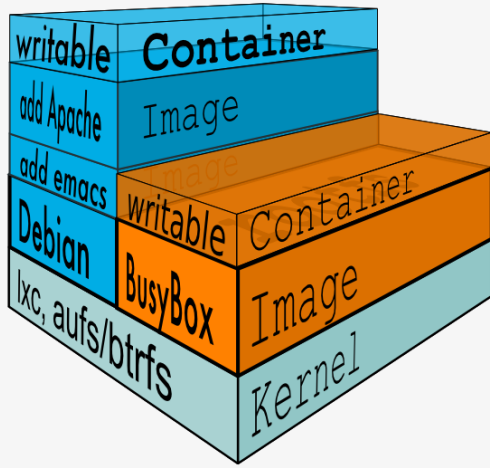| Infrastructure as a Service (IaaS)	Platform as a Service (PaaS)	Software as a Service (SaaS)
Application	Application	Application
Dev Tooling	Dev Tooling	Dev Tooling
Runtime	Runtime	Runtime
Middleware	Middleware	Middleware
App Server	App Server	App Server
Operating Sys	Operating Sys	Operating Sys
Networking	Networking	Networking
Storage	Storage	Storage
CPU/RAM	CPU/RAM	CPU/RAM

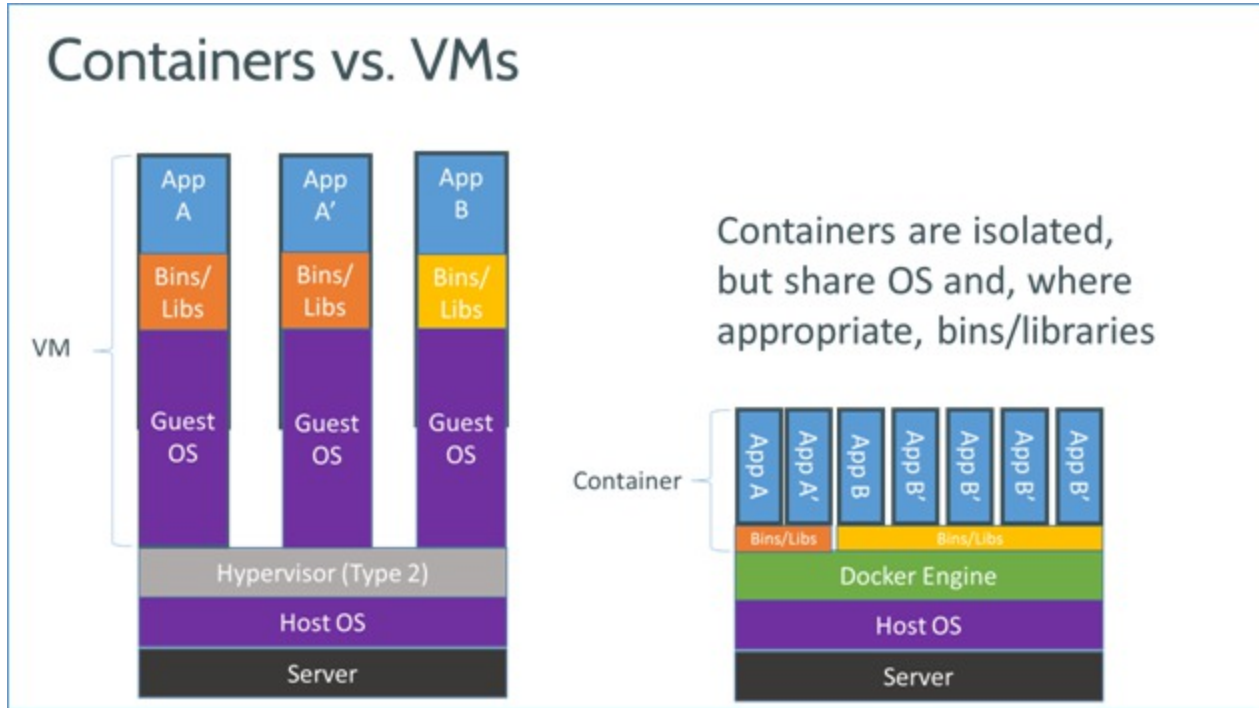■ Managed by consumer   ■ Managed by provider

OPENSHIFT
by Red Hat

openshift.com

Defining Containers

- In Docker parlance, a *container* is a running instance of an *image*
- Based on Linux containers (namespaces, control groups)
- Combines file system *layers* into a "Union File System"
- Includes all of the components necessary to run a process, store persistent data, or both

Containers

Containers vs. VMs

Containers are isolated, but share OS and, where appropriate, bins/libraries

openshift.com

Containers are Not Enough
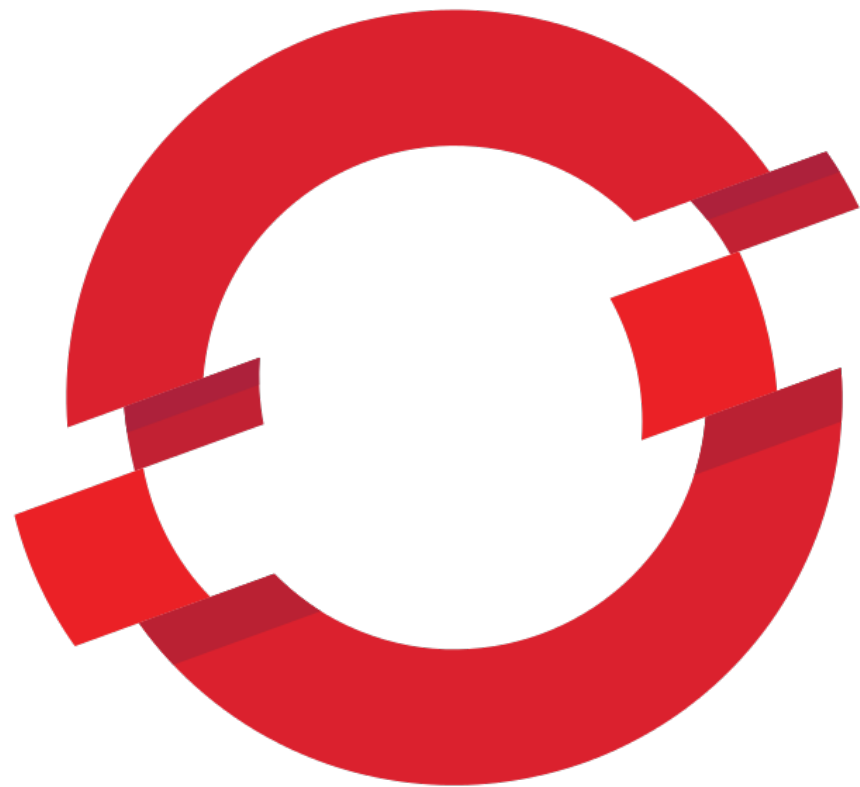
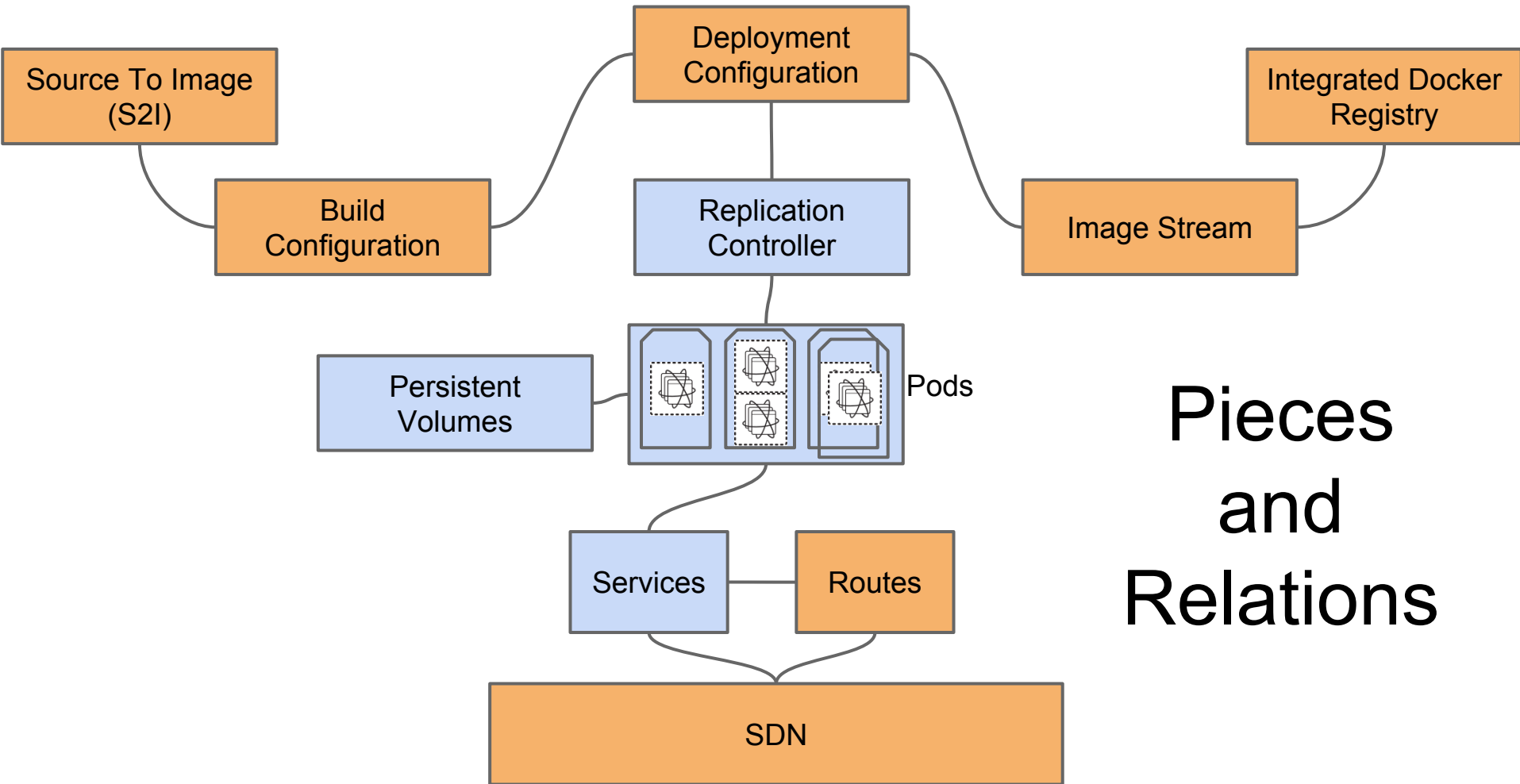# Orchestration, Scheduling, Isolation are Still Needed

History

- Comes out of Borg and Omega
- ~7000 containers a second inside Google
- Next iteration they wanted to Open Source

BUT...

Developer Experience, Managing Applications, And SysAdmin Experience

Source To Image (S2I)

Deployment Configuration

Integrated Docker Registry

Build Configuration

Replication Controller

Image Stream

Persistent Volumes

Pods

Services

Routes

SDN

Pieces and Relations

OpenShift Demo

- Postgresql 9.4 + PostGIS Container at https://github.com/CrunchyData/crunchy-postgres-container-94
- Example of OpenShift templates - replication controller, standalone
- Volumes - emptyDir and NFS
- OpenShift console

Build Example

- requires docker is installed, builds a Centos7 or RHEL 7 docker image
  ```
  mkdir test
  git clone git@github.com:CrunchyData/crunchy-postgres-container-94.git
  cd crunchy-postgres-container-94
  make
  ```
- install openshift (see openshift/origin github project for details)
  ```
  cd crunchy-postgresql-container-94/openshift
  oc login <<username is test, password is test>>
  oc new-project pgproject
  oc process -f standalone.json | oc create -f -
  oc get pods
  oc get services
  ```
- https://localhost:8443
  ```
  ping pg-standalone.pgproject.svc.cluster.local
  ```

Crunchy PostgreSQL Manager Demo

- Uses Docker for provisioning
- golang + angular.js + PostgreSQL 9.4
- multi-host
- Prometheus, monitoring
- extensible
- open-sourced at https://github.com/CrunchyData/crunchy-postgresql-manager
- creating a port to OpenShift
- jeff.mccormick@crunchydata.com

CPM Architecture
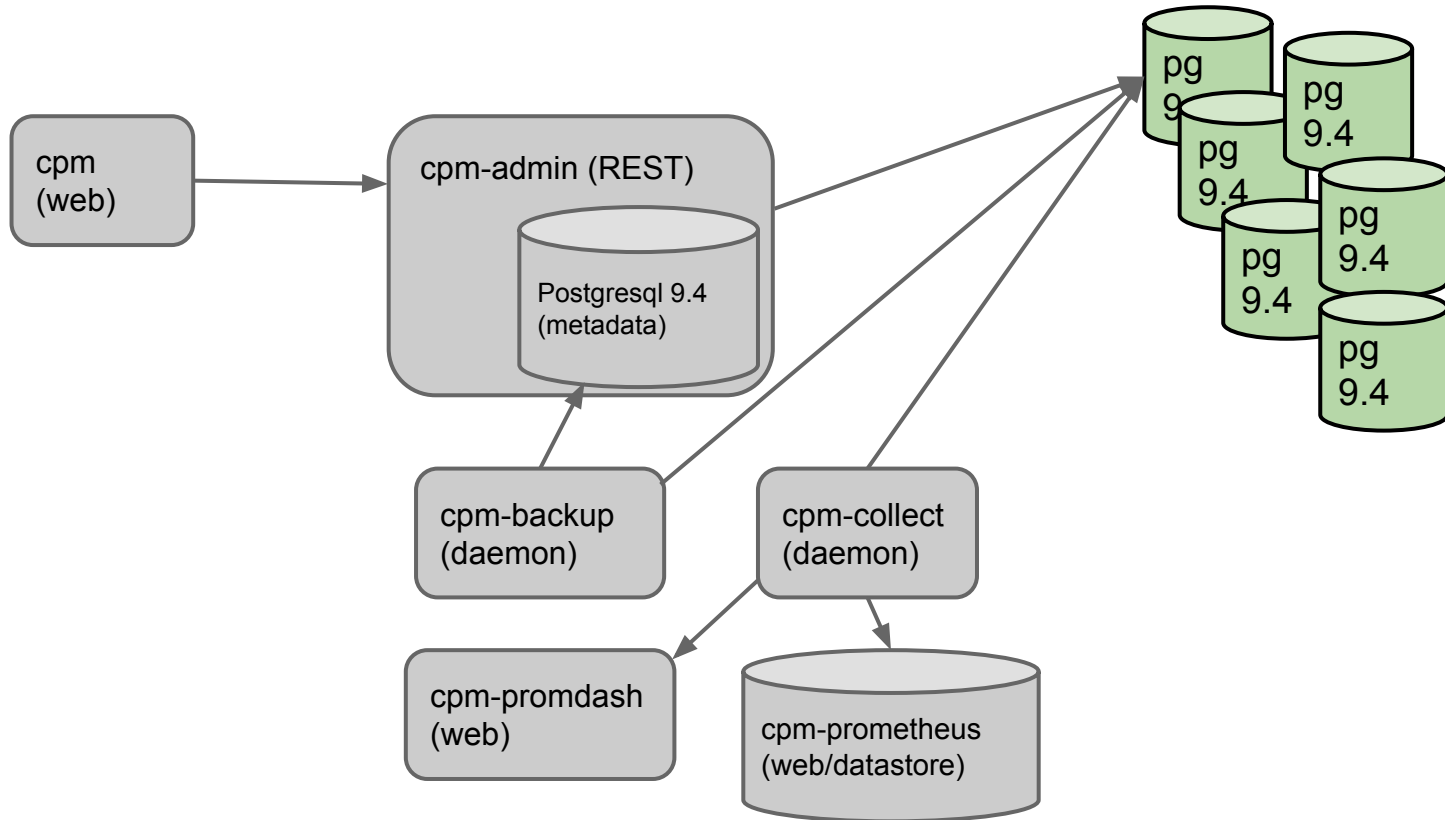
Community Powered Innovation

Take homes

- We are in a time of explosion
- Kubernetes And OpenShift get you beyond containers
- There is a long runway in front of V3.
- Upstream FIRST!!!