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Open.
Agile.
Cloud-Ready.

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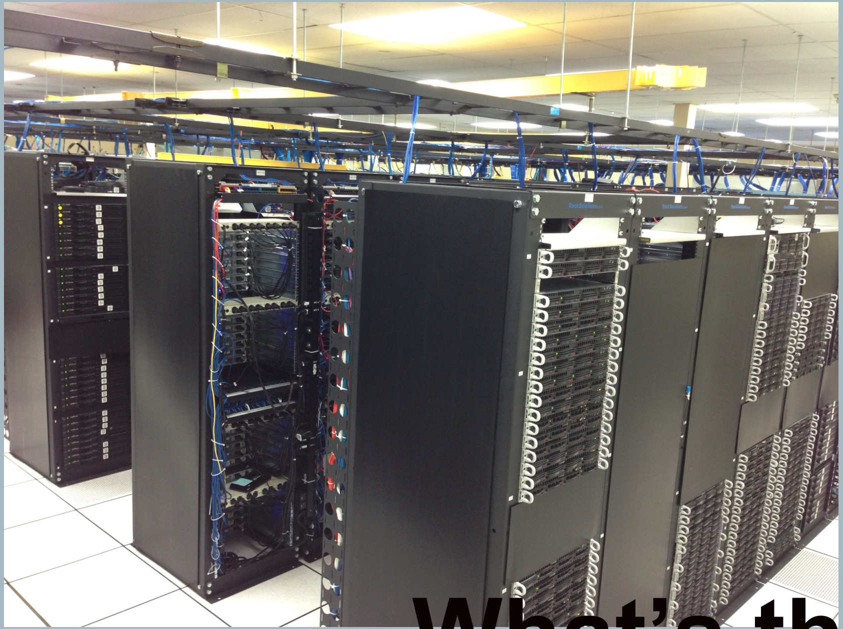
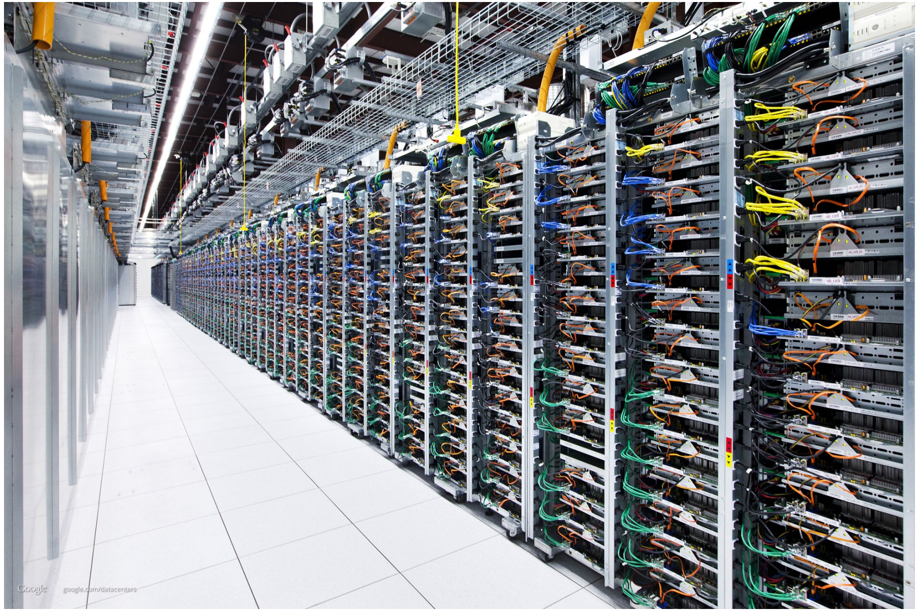
Pivotal Cloud Foundry

10 things every Operator should know about operating a platform

2nd Generation



3rd Generation



What’s the difference?

2nd Generation

Managed under-utilized physical servers

Wasted floor space

Heavy process in ITIL

Run books for Disaster

3rd Generation

Fully automated lifecycle

Dramatically increased utilization

Decreased wait times

Reduced dependency on process

1 Platforms change our mindset

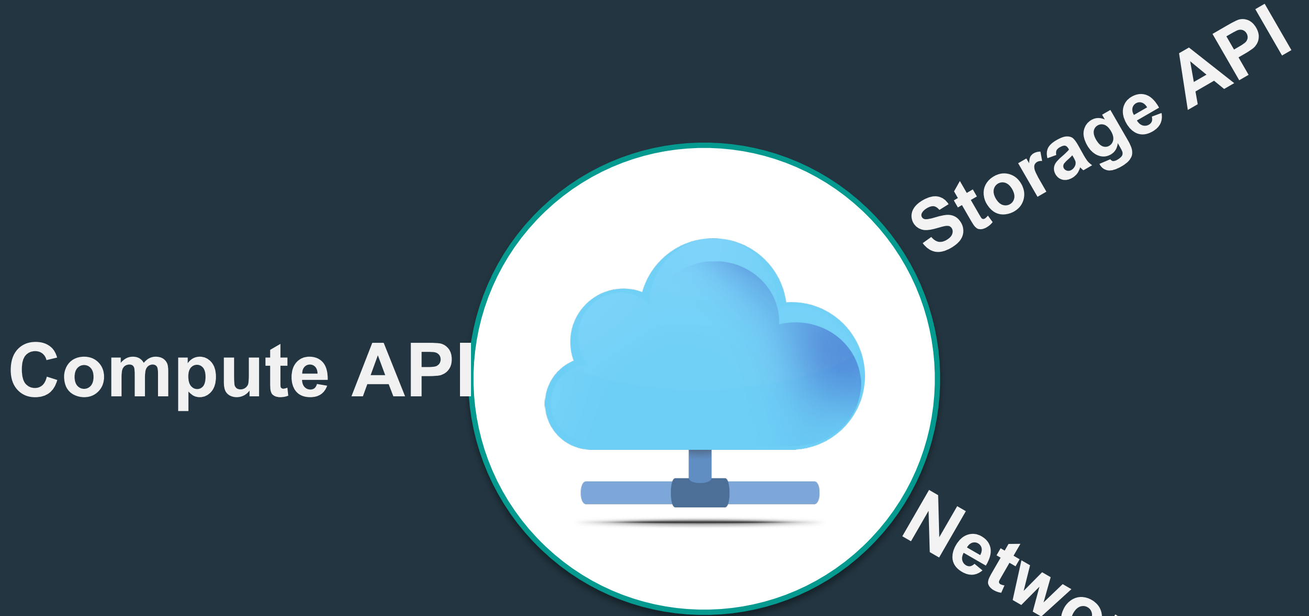
Cloud Scale

Automation over Process

Services vs Types (Dev, Prod)

Mindset

② Platform installs are different

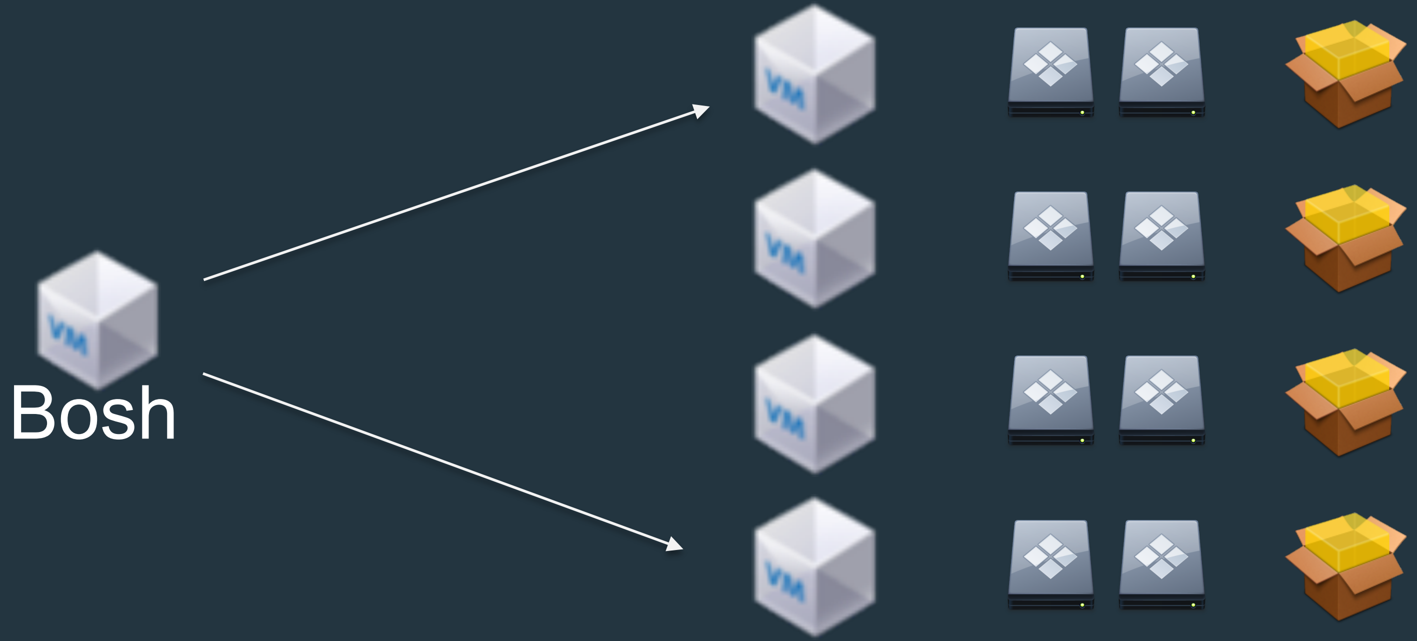


Compute API

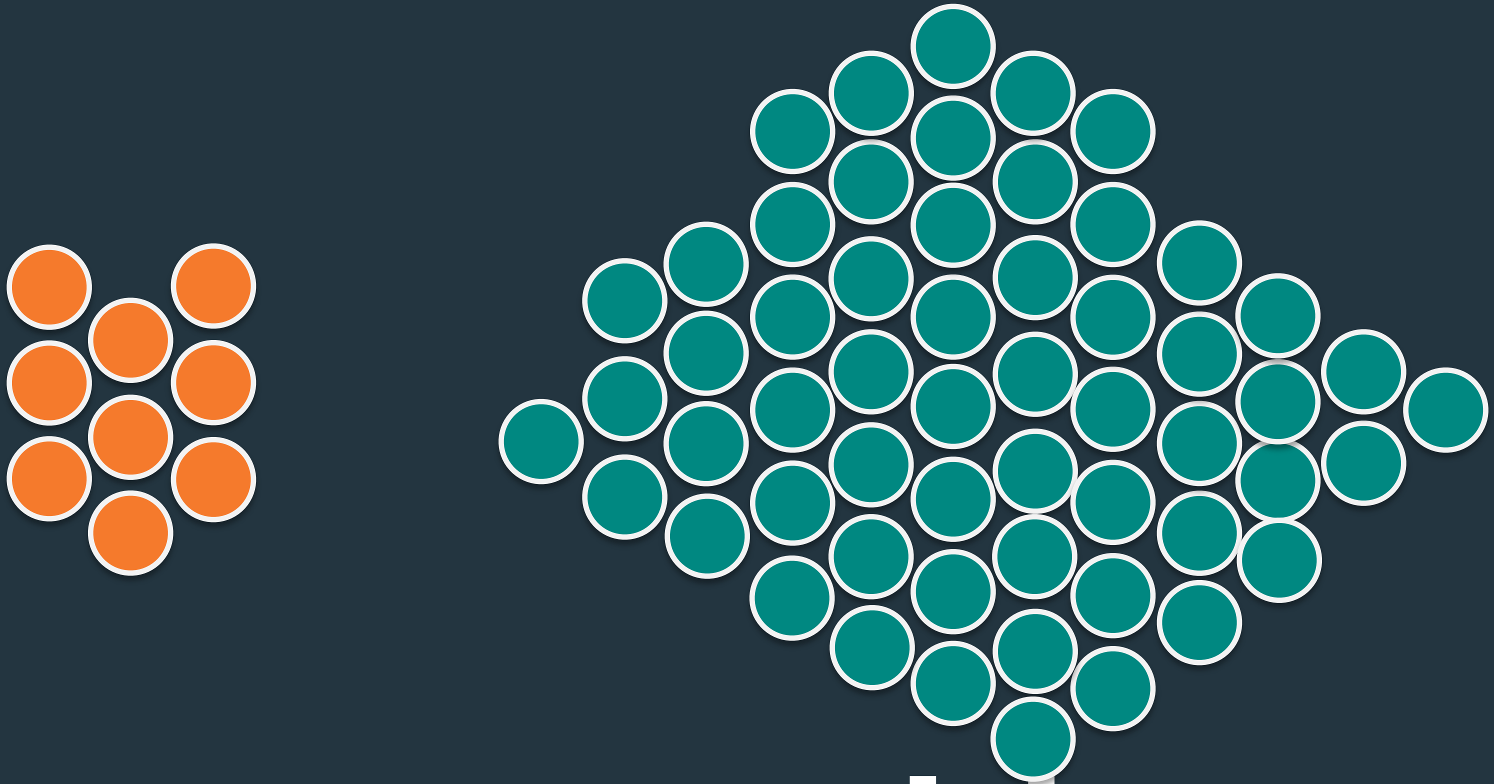
Storage API

Network API

clouds are code



clouds are automated



clouds build **big** things

but … not Cloud Foundry

BOSH

For any Cloud or IaaS provider API

To manage complete lifecycle of all resources

For any small or large scale deployment or release e

3 Platforms support many deployments

Clusters of compute of HA

Single or Multiple Networks

Shared storage

Basic

and then …

Multiple Networks for Apps

Availability zones for HA

Specialized deployments (DMZ)

Enterprise Driven Deployment

and then …

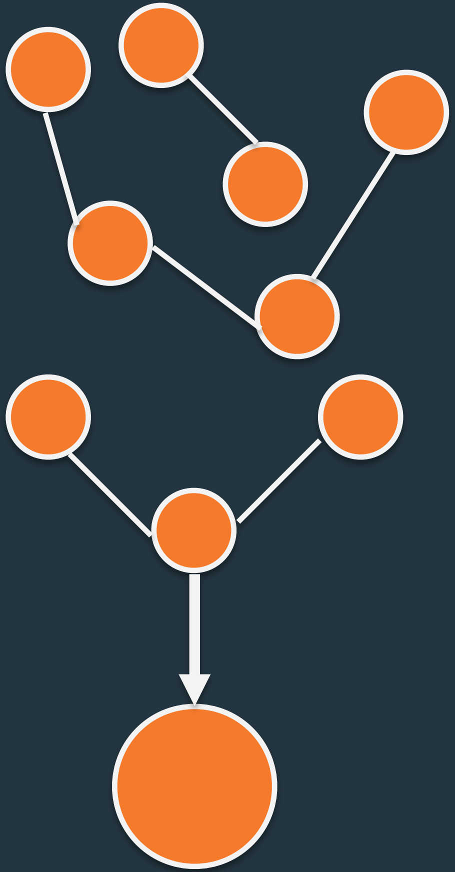
Multiple Clouds for Apps

Cloud bursting to meet demand

Single management

Business Driven Deployment

4 Logging, Metrics and Health Management are different in a platform



Distributed systems working together

Verbose and cloud scale logging

Easy integration or PCF Dashboards

Drained for collection & analysis

Logging

Measurement of performance and health (490+ metrics)

Platform Capacity

Everything is measured (Etsy)

Drained for collection & analysis

Metrics

How?

Firehose

Logs and metrics delivered via firehose

Scaled to meet log and metric volume

Nozzle’s provide integration, CF nozzle

Support for multi-cloud

Application Instances

Platform processes

Virtual Machines

Rack Aware Deployments (AZs)

Health Management

5 No Services, No 😃 from Devs

Fully automated lifecycle (API Driven)

User chooses lifetime and availability

Operator decides on plan and cost

Cloud Managed Services

Existing Enterprise infrastructure

External managed by existing tools

Exposed as an endpoint with URL and credentials by operations

Applications can bind to during deployment

User Managed Services

6 Size and Availability Matters

Scaling for Capacity

Capacity is determined by # of App Instances

Consolidation is determined by memory consumption

Memory can be set by users

Operators can use quotas to limit

Multiple PCF components

Availability Zones

Multiple Clouds

Scaling for Availability

7 Platforms don’t have service windows

Pivotal network for packing, stemcells and CVEs

Fully automated with zero downtime

Buildpacks for application upgrades and patching

Upgrades

8 Its an App centric world in the platform

Applications maintain their independence

Platform matches application to a buildpack to operationalize it

JIT build of a container

Support for OCI containers

Buildpacks and Containers

9 CI/CD Pipelines are the secret sauce

Automates deliver of applications to platform

Removes snowflakes configurations

Increases software quality

Align developers, rel eng and operations

Pipelines

10 Platform is all about agility

Platform routing increase agility and reduces deployment risk

Side-by-side deployments

Blue/green and A/B testing

Policy and rate limiting

Dynamic Routes

Platform
Demo

What am I going to see?

Pivotal Ops Manager

BOSH Tasks

Pivotal Ops Metrics and Datadog

- cf login
- cf push

Pivotal Cloud Foundry Upgrade

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if x ≥ 0
otherwise
$X_0 = 6$
$\frac{dx}{dt} = 1$
$x = \int dt$
$X_H = 1 + \frac{1}{2} X_0$
$P\{x(t) = j|x(s)\} = P\{x(t-s) = j|x(0)\}$

Appendix

Additional Slides

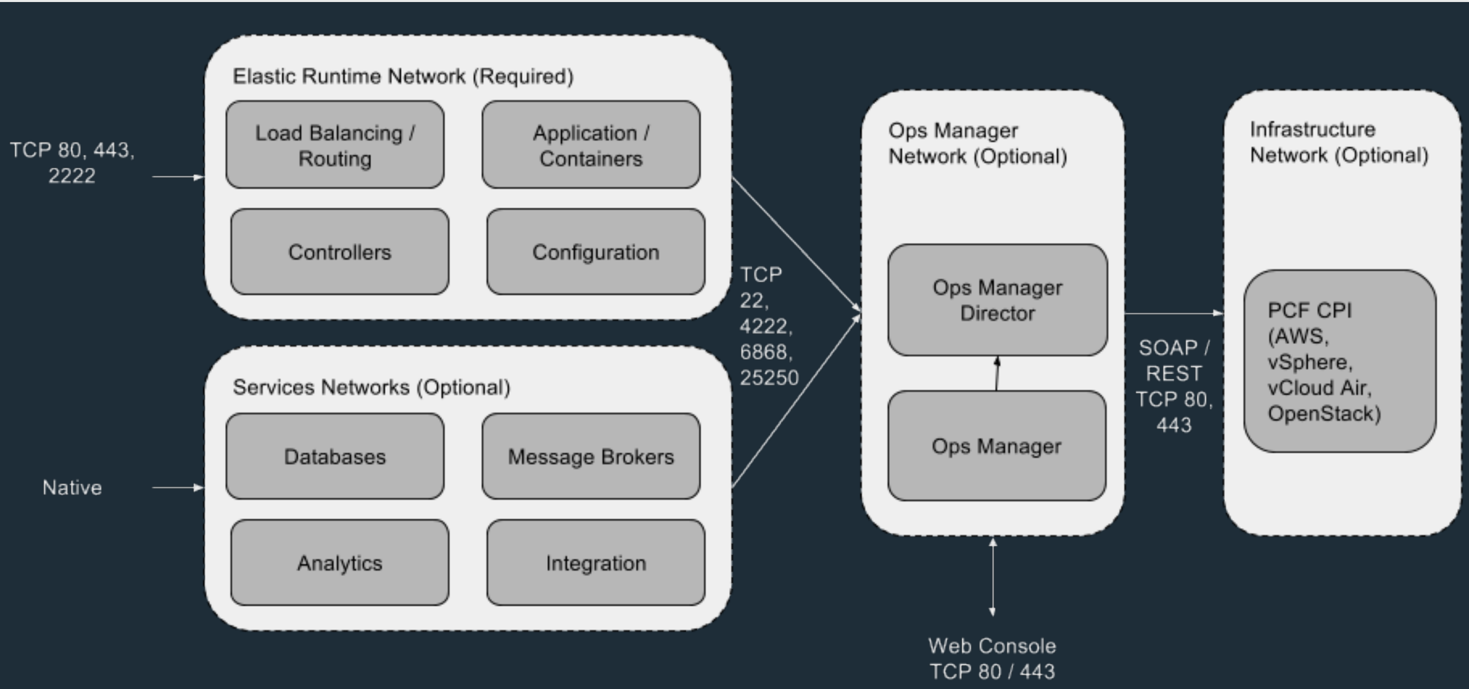
Agenda

- Prerequisites
- Installation & Configuration
- Ops Manager Introduction
- Backup and Recovery
- Patching & Upgrading
- Logging & Monitoring
- Basic Troubleshooting
- Network Topology
- Products & Services
- Blue / Green Deployments
- Application Scaling
- Platform Scaling

Installation Prerequisites

- Determine cloud provider
  - On-premise
    - vSphere, vCloud Director, or OpenStack
  - Off-premise
    - Amazon AWS, Managed OpenStack, or vCloud Air
- Determine Network Topology

Network Topology



Detailed topologies for AWS & vSphere can be found here: https://drive.google.com/open?id=0B4KCenwl13JOcUJjUXdsVzNxZlkF

Installation Requirements

General Requirements

Cloud Provider	***Requirements***
vSphere	***vSphere Requirements***
vCloud Air	***vCloud Air Requirements***
OpenStack	***OpenStack Requirements***
AWS	***AWS Requirements***

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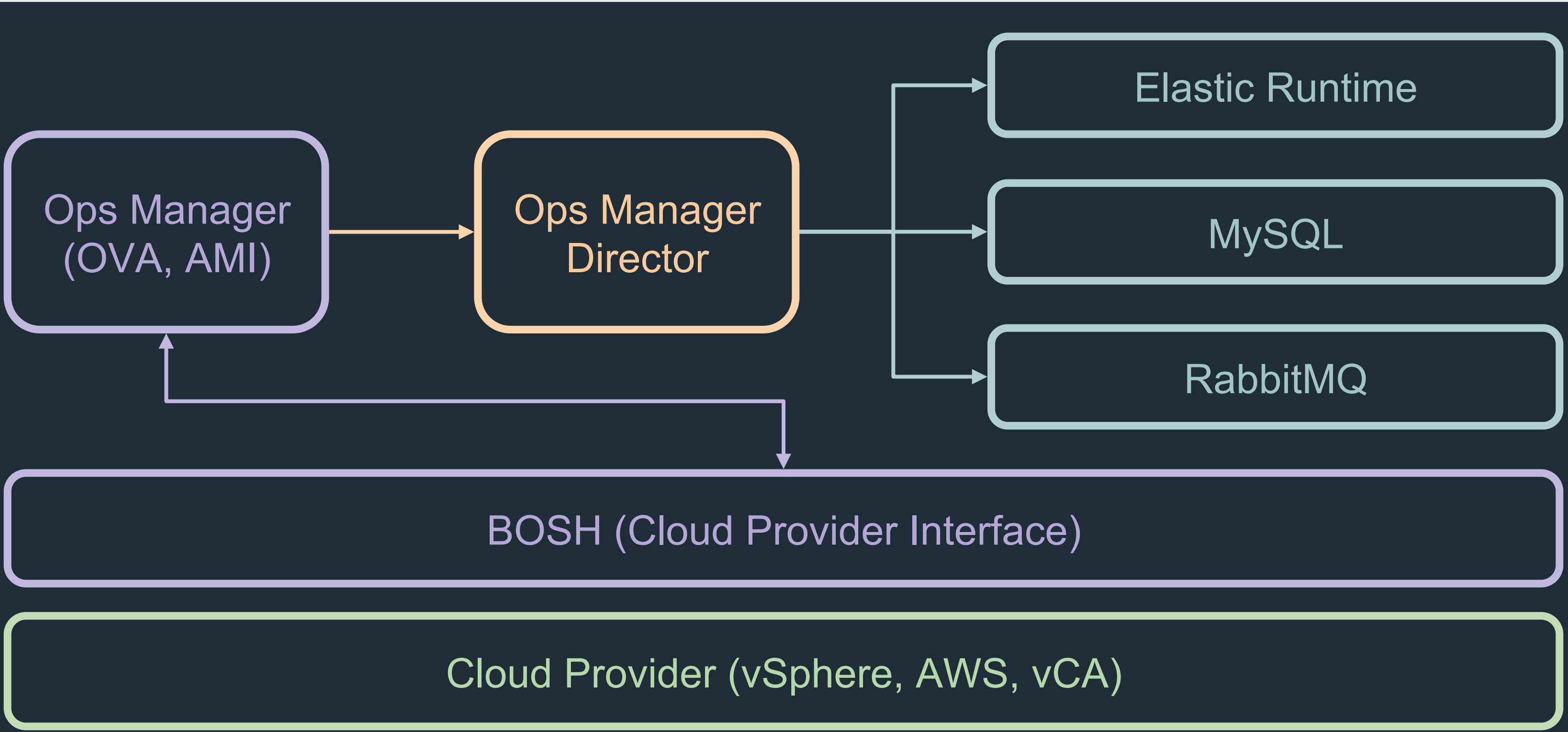
Installation & Configuration

1. Create Ops Manager Instance (AMI, OVA)
2. Configure Ops Manager Director
3. Install Ops Manager Director
4. Upload Elastic Runtime Product
5. Configure Elastic Runtime
6. Install Elastic Runtime
7. Upload, Configure, & Install Other Products

PCF Installation



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Ops Manager Installation

Cloud Provider	*Installation Instructions*
vSphere & vCloud Air	*vSphere & vCloud Air Installation*
OpenStack	*OpenStack Installation*
AWS	*AWS Installation*

Ops Manager Configuration

Cloud Provider	*Ops Manager Configuration*
vSphere	*vSphere Configuration*
vCloud Air	*vCloud Air Configuration*
OpenStack	*OpenStack Configuration*
AWS	*AWS Configuration*

Backup & Recovery

A comprehensive backup and recovery strategy will go a long way in the event of a catastrophic system failure. Having automated backup and recovery plans will greatly contribute to the stability of the Pivotal Cloud Foundry.

There are four major steps that need to be completed to ensure a sufficiently backed up installation.

1. Record DB Encryption Credentials
2. Export Installation Settings
3. Download BOSH Manifest
4. Backup Critical Datastores

Backup & Recovery

The encryption credentials that control access to the Cloud Controller database should be recorded, this will provide an entry point for Pivotal Support, should you need to contact them.

Exporting the installation settings will greatly speed up the recovery process and insure an exact replica of the PCF you backed up from. NOTE: This will not back up your VM's or external systems.

Backup & Recovery

The BOSH deployment manifest needs to be downloaded and stored. Make sure you download the manifest for each BOSH deployment. These contain information about your BOSH databases, which will allow us to back up the critical datastores in the next step

Up to now, the backup steps have focused on the configuration aspect of the installation, it is equally important to backup the installation critical datastores. Various components of Pivotal Cloud Foundry rely on these datastores: Cloud Controller, UAA, and the Apps Manager to name a few. Use the manifest to access these datastores.

Full instructions for Backup can be found here: http://docs.pivotal.io/pivotalcf/customizing/backup-restore/backup-pcf.html

Backup & Recovery

Recovery

The recovery process is even more simple than the backup. You only need to do two things:

1. Import those settings from the second step in the backup process
2. Restore the critical data stores, using the BOSH deployment manifest, that were saved in the fourth step.

An optional third step would be to download new copies of the BOSH deployment manifest after you have completed step one here. These can be used to validate the import.

Full instructions for Recovery can be found here:
http://docs.pivotal.io/pivotalcf/customizing/backup-restore/restore-pcf.html

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Patching & Upgrading Ops Manager

1. Verify Upgrade Path
2. Export Installation Settings
3. Shut Down Existing Ops Manager VM
4. Deploy Patched / Upgraded Ops Manager VM
5. Import Installation Settings

Full instructions can be found here: http://docs.pivotal.io/pivotalcf/customizing/upgrading-pcf.html

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Patching & Upgrading PCF Products

1. Verify Upgrade Path
2. Import Patched / Upgraded Product
3. Click “Upgrade”
4. Enable disabled errands if necessary
5. Click “Apply Changes”

Full instructions can be found here: http://docs.pivotal.io/pivotalcf/customizing/upgrading-products.html

F

Logging & Monitoring

Monitoring VMs

- Ops Manager UI (Product -> Status)
- BOSH CLI (‘bosh vms’)
- vCenter Client (vSphere)
- vCenter Operations Manager (vCloud Air)
- vCenter Hyperic (vCloud Air)

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Logging & Monitoring

Viewing Platform Logs

- Ops Manager UI (Product -> Status -> Logs and then Product -> Logs)
- CloudFoundry CLI (‘cf logs <APPNAME> --recent’)
- BOSH CLI (‘bosh logs’)

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Basic Troubleshooting

- Ops Manager Debug Endpoint - http://<ops-manager>/debug
  - Files
  - Components
  - Rails Log
- BOSH CLI

PCF Troubleshooting Guide: https://docs.pivotal.io/pivotalcf/customizing/troubleshooting.html
BOSH CLI Troubleshooting Guide: https://docs.pivotal.io/pivotalcf/customizing/trouble-advanced.html

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Products & Services

Products

- PCF products add capabilities to the platform
- PCF products are provided as .pivotal files
  - Download products from Pivotal Network
  - Import into Ops Manager
  - Configure product
  - Install product
- Customers can create their own products

Products & Services

Services

- Services are systems external to applications that applications can use
- Services may be managed by the platform or they may be external services
- Applications use services through a Service Broker API

Products & Services

3 Types of PCF Services:

1. **User-provided** - Existing service, and applications just need connection information
2. **Service broker** - Existing service, but applications need full lifecycle experience (catalog, create, bind, etc.)
3. **PCF product** - Service runtime is managed by PCF. Typically installs a service broker too

Products & Services

	Late binding	*User self-service*	*Platform managed*
User-provided	✔		
Service broker	✔	✔	
PCF product	✔	✔	✔

Blue / Green Deployments

- Blue / green deployments are a way of deploying new app versions with no downtime.
- Multiple versions are deployed, but the "live" route only points to a single version
- PCF enables blue / green deployments by allowing multiple routes to be mapped to an application
- Gorouter will enable more complex traffic shaping in future releases

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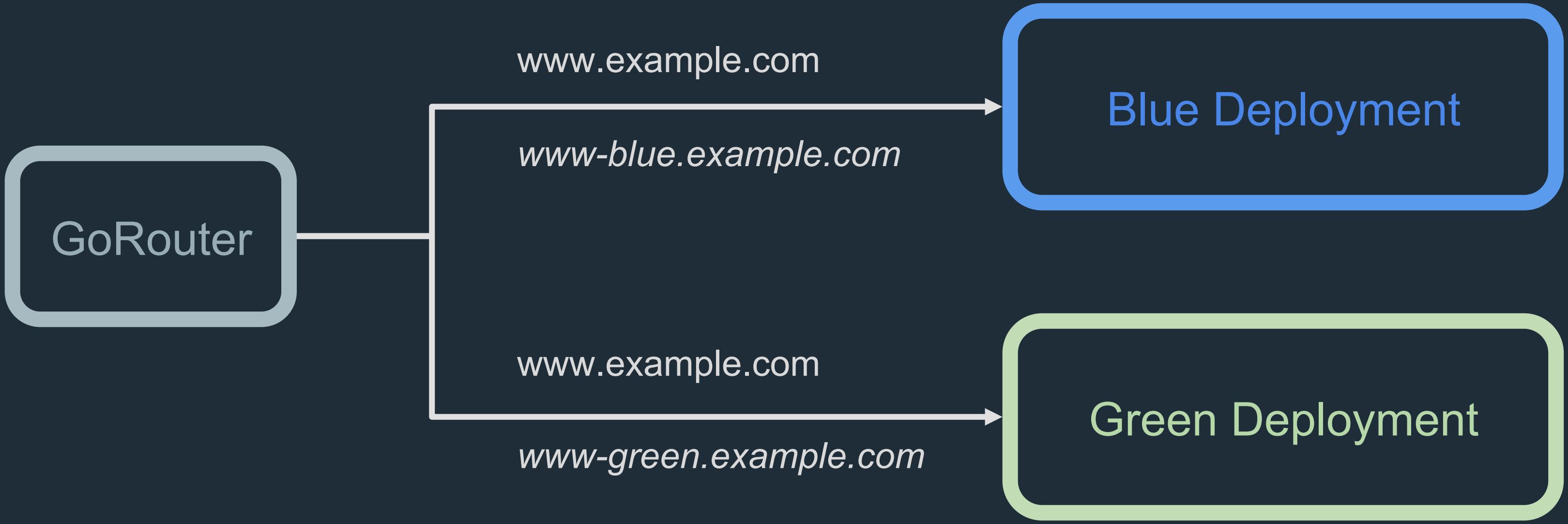
Blue / Green Deployments



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Application Scaling

- Applications can be scaled 2 ways
  - Vertically - add more memory / disk per instance
  - Horizontally - add more instances
- Horizontally scaling can be manual or automatic
  - Autoscaling is bound as a service to an application
  - Autoscaling only supports CPU thresholds or scheduling

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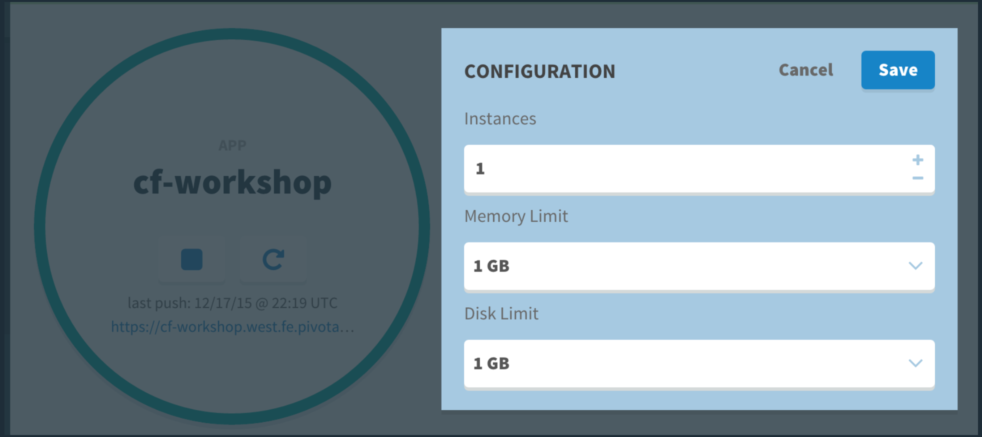
Application Scaling



last push: 12/17/15 @ 22:19 UTC

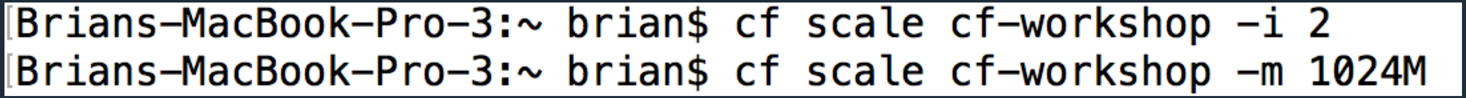
https://cf-workshop.west.fe.pivota…

CONFIGURATION

Instances: 1

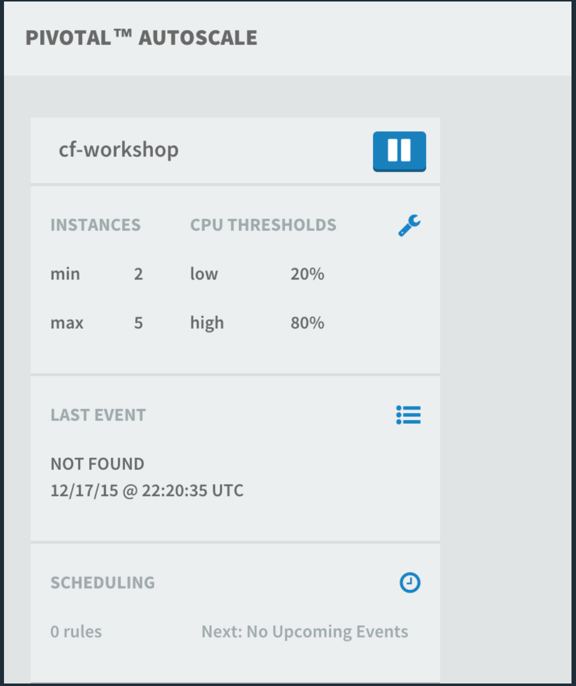
Memory Limit: 1 GB

Disk Limit: 1 GB



```
[Brians-MacBook-Pro-3:~ brian$ cf scale cf-workshop -i 2
[Brians-MacBook-Pro-3:~ brian$ cf scale cf-workshop -m 1024M
```

Application Auto-Scaling



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cf-workshop

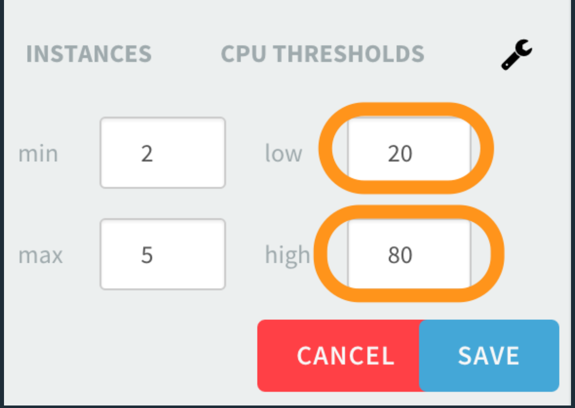
INSTANCES		CPU THRESHOLDS	
min	2	low	20%
max	5	high	80%

LAST EVENT

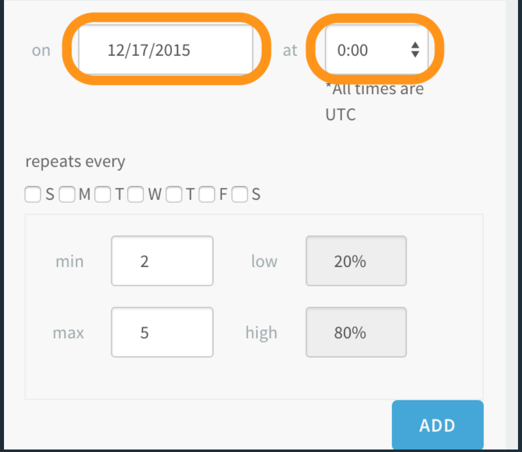
NOT FOUND
12/17/15 @ 22:20:35 UTC

SCHEDULING

0 rules Next: No Upcoming Events



INSTANCES		CPU THRESHOLDS	
min	2	low	20
max	5	high	80



on 12/17/2015 at 0:00

*All times are UTC

repeats every

□ S □ M □ T □ W □ T □ F □ S

min	2	low	20%
max	5	high	80%

Platform Scaling

- Platform scaling is performed by the cloud operator
- Scaling is done in the resource config tab in Ops Manager
- For elastic runtime, only a few components typically need to be scaled for capacity
  - GoRouter
  - DEA / Cell
  - Loggregator / Doppler

More information on platform scaling can be found here: https://docs.pivotal.io/pivotalcf/concepts/high-availability.html#capacity

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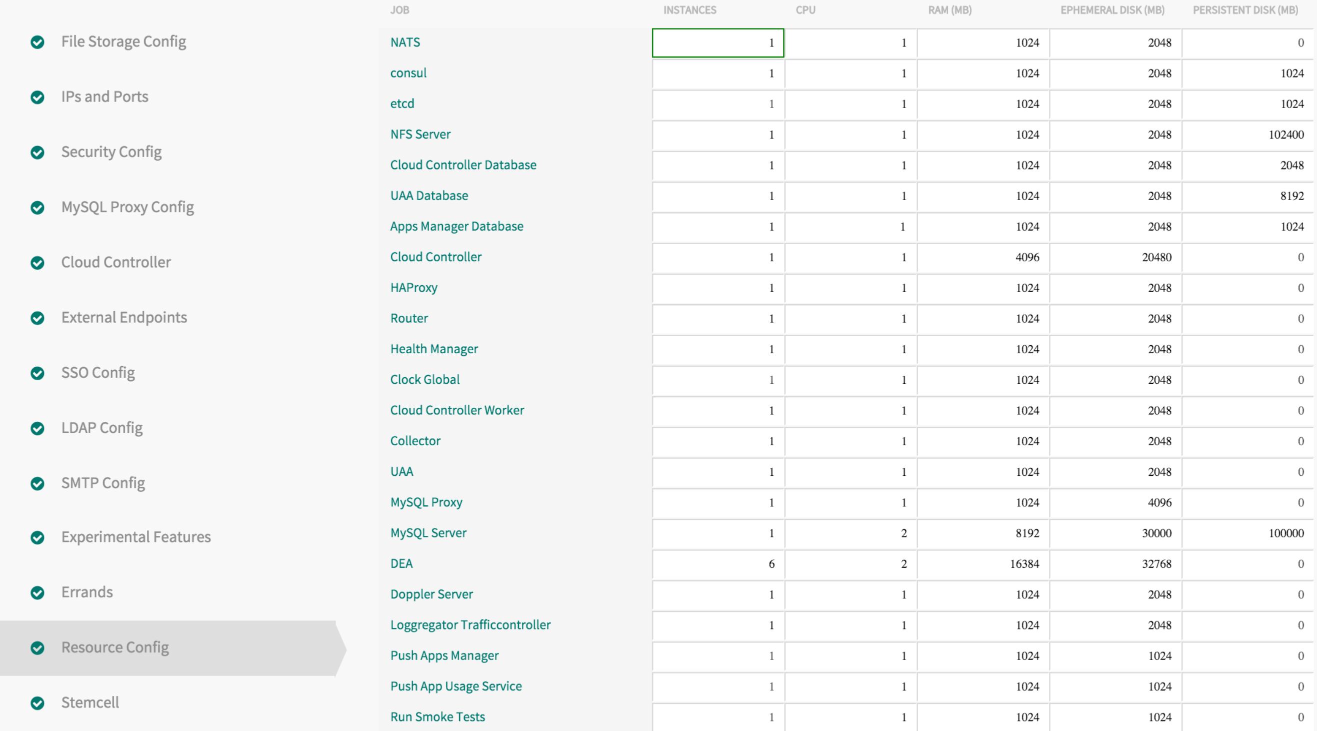
Platform Scaling



- ✓ File Storage Config
- ✓ IPs and Ports
- ✓ Security Config
- ✓ MySQL Proxy Config
- ✓ Cloud Controller
- ✓ External Endpoints
- ✓ SSO Config
- ✓ LDAP Config
- ✓ SMTP Config
- ✓ Experimental Features
- ✓ Errands
- ✓ Resource Config
- ✓ Stemcell

JOB	INSTANCES	CPU	RAM (MB)	EPHEMERAL DISK (MB)	PERSISTENT DISK (MB)
NATS	1	1	1024	2048	0
consul	1	1	1024	2048	1024
etcd	1	1	1024	2048	1024
NFS Server	1	1	1024	2048	102400
Cloud Controller Database	1	1	1024	2048	2048
UAA Database	1	1	1024	2048	8192
Apps Manager Database	1	1	1024	2048	1024
Cloud Controller	1	1	4096	20480	0
HAProxy	1	1	1024	2048	0
Router	1	1	1024	2048	0
Health Manager	1	1	1024	2048	0
Clock Global	1	1	1024	2048	0
Cloud Controller Worker	1	1	1024	2048	0
Collector	1	1	1024	2048	0
UAA	1	1	1024	2048	0
MySQL Proxy	1	1	1024	4096	0
MySQL Server	1	2	8192	30000	100000
DEA	6	2	16384	32768	0
Doppler Server	1	1	1024	2048	0
Loggregator Trafficcontroller	1	1	1024	2048	0
Push Apps Manager	1	1	1024	1024	0
Push App Usage Service	1	1	1024	1024	0
Run Smoke Tests	1	1	1024	1024	0

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Sizing & Capacity Planning

Shekel Tool for Sizing Environments: https://pcfsizer.cfapps.pez.pivotal.io

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