

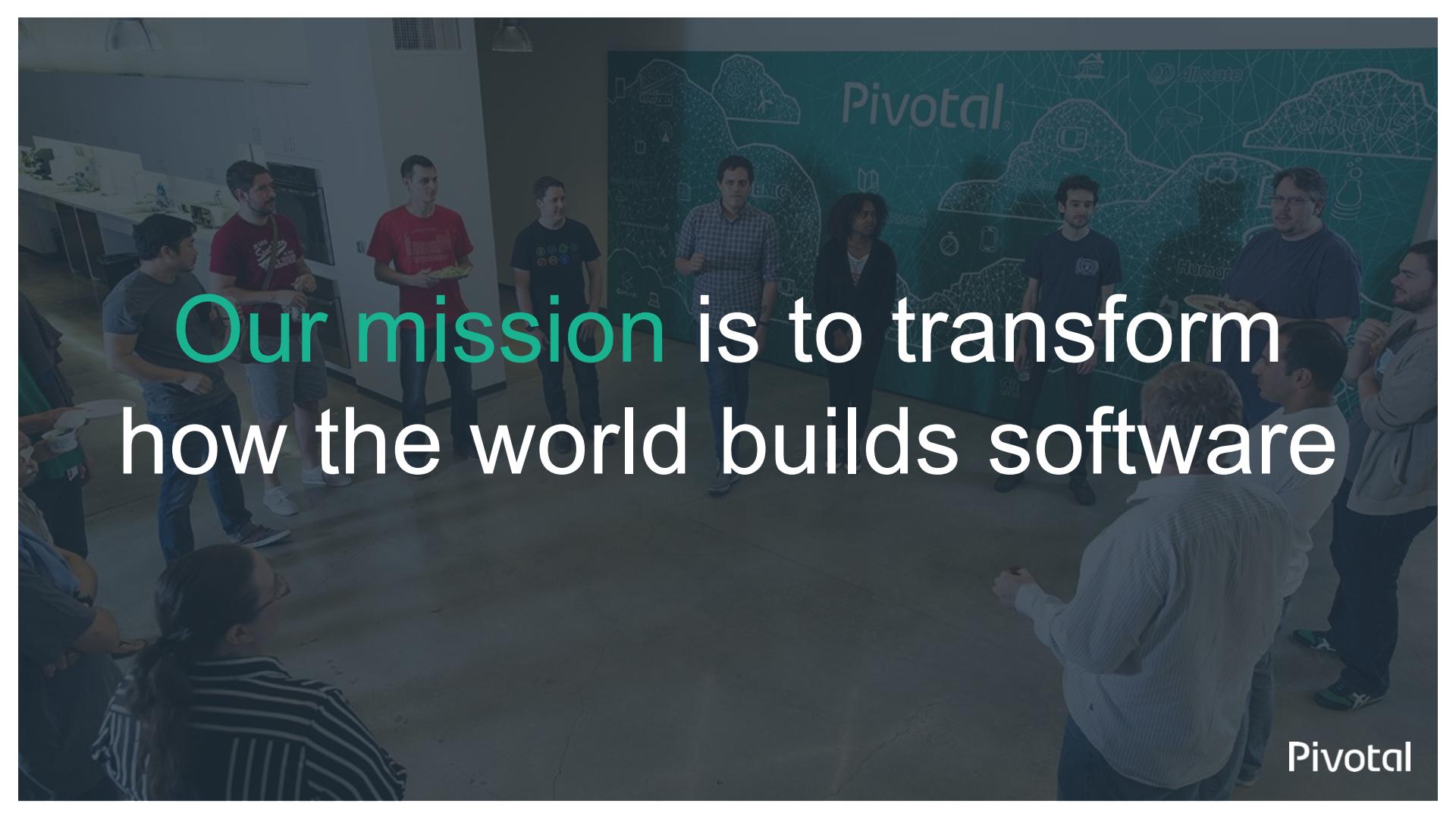
Pivotal

Cloud Native Workshop

The Cloud Native Platform

Pivotal Cloud Foundry

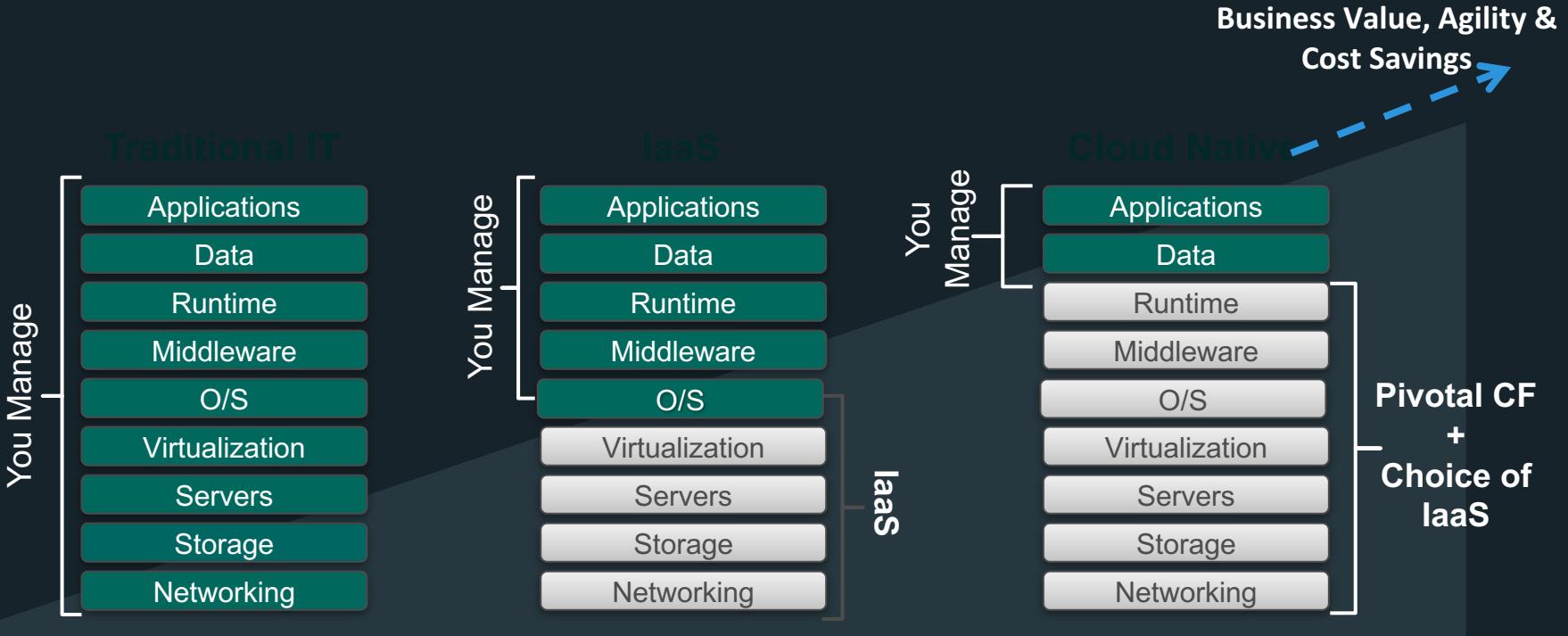
Pivotal



Our mission is to transform how the world builds software

Pivotal

Cloud Native Application Platforms



Modern Cloud-Native Platform

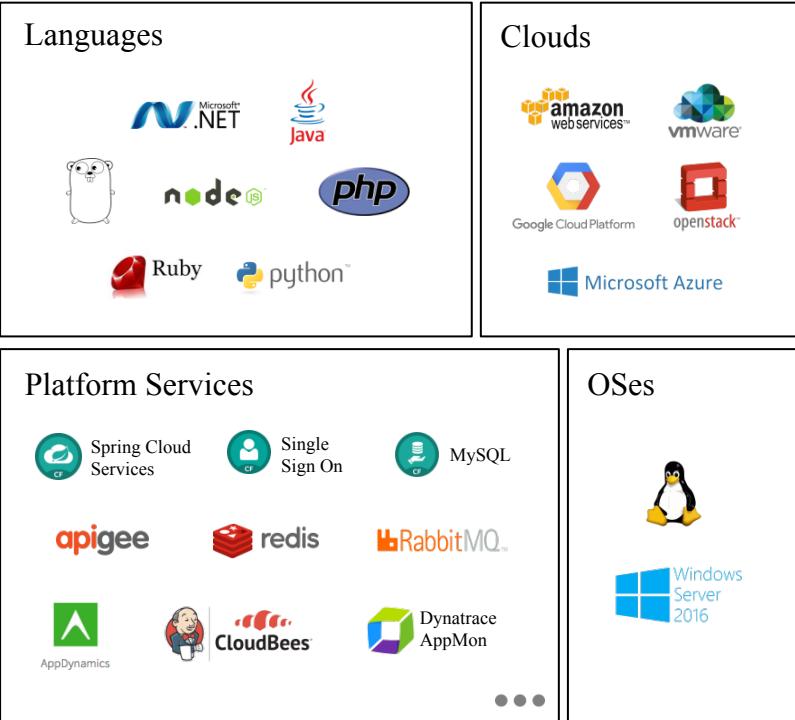
Building high-quality software at start-up speed requires modern software methodologies, cloud platform, and data tools



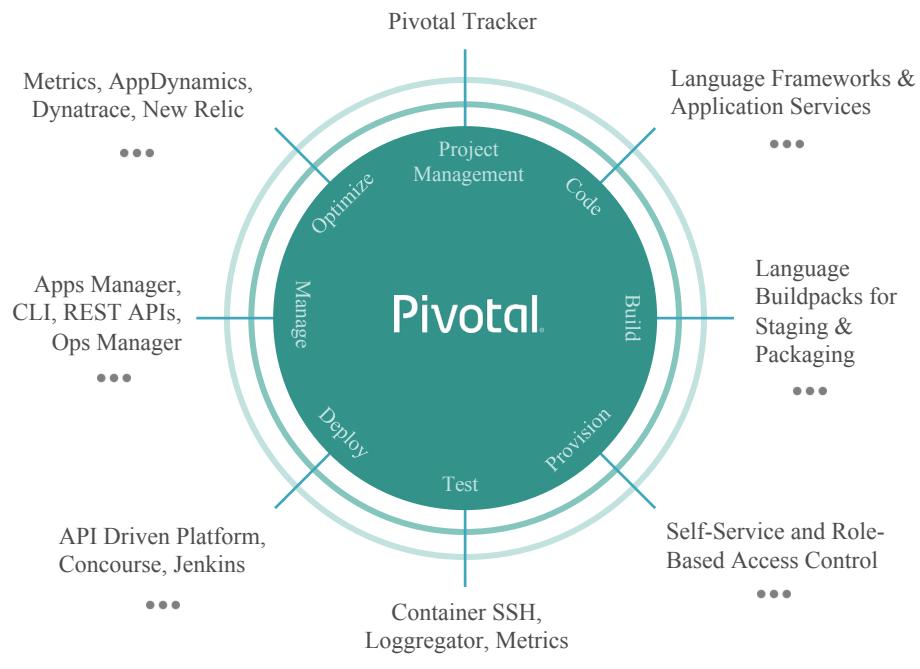
Pivotal

How Pivotal Can Help

Developer Choice



Developer Support



Applications/APIs/Microservices



Compiled, staged, containerized, deployed and managed by platform
Java | .NET | Ruby | Node.js | Python | PHP | Go



Pre-packaged container deployed and managed by platform

PCF Tools

- Apps Manager UI (App Admin UI)
- CLI
- REST APIs
- PCF Metrics Dashboard

PCF Elastic Runtime

Automated, Polyglot Build/Package/Deploy

Container Scheduling

Elastic (Auto)Scale

Integrated Logging/Metrics* (Application & Platform)

Dynamic Routing & Extensible Route Services

Dev + Ops Role-Based Self-Service Access

Security (Application & Platform)

Self-Healing & High Availability (Application & Platform)

Zero Downtime Upgrades & Patches (Application & Platform)

Ops Manager UI (Cloud Admin UI)

Infrastructure Automation (BOSH)



Distributed Software Configuration and Health/Lifecycle Management

Infrastructure Agnostic Software Packaging

Multi-Cloud Orchestration of Infrastructure Provisioning

Infrastructure

VMware (vSphere + Photon)

OpenStack

Microsoft Azure

Google Cloud Platform

Amazon Web Services

BOSH Managed Services



MySQL



Cloud Cache



Redis



RabbitMQ



Spring Cloud Services



Single Sign On



Mobile Push Notifications



mongoDB



GitLab



Dingo PostgreSQL

Brokered Services

PIVOTAL



Greenplum DB



HDB



dynatrace



New Relic



apigee



EDB POSTGRES



redislabs

...

PARTNERED



Oracle DB



MS SQL Server



Active MQ

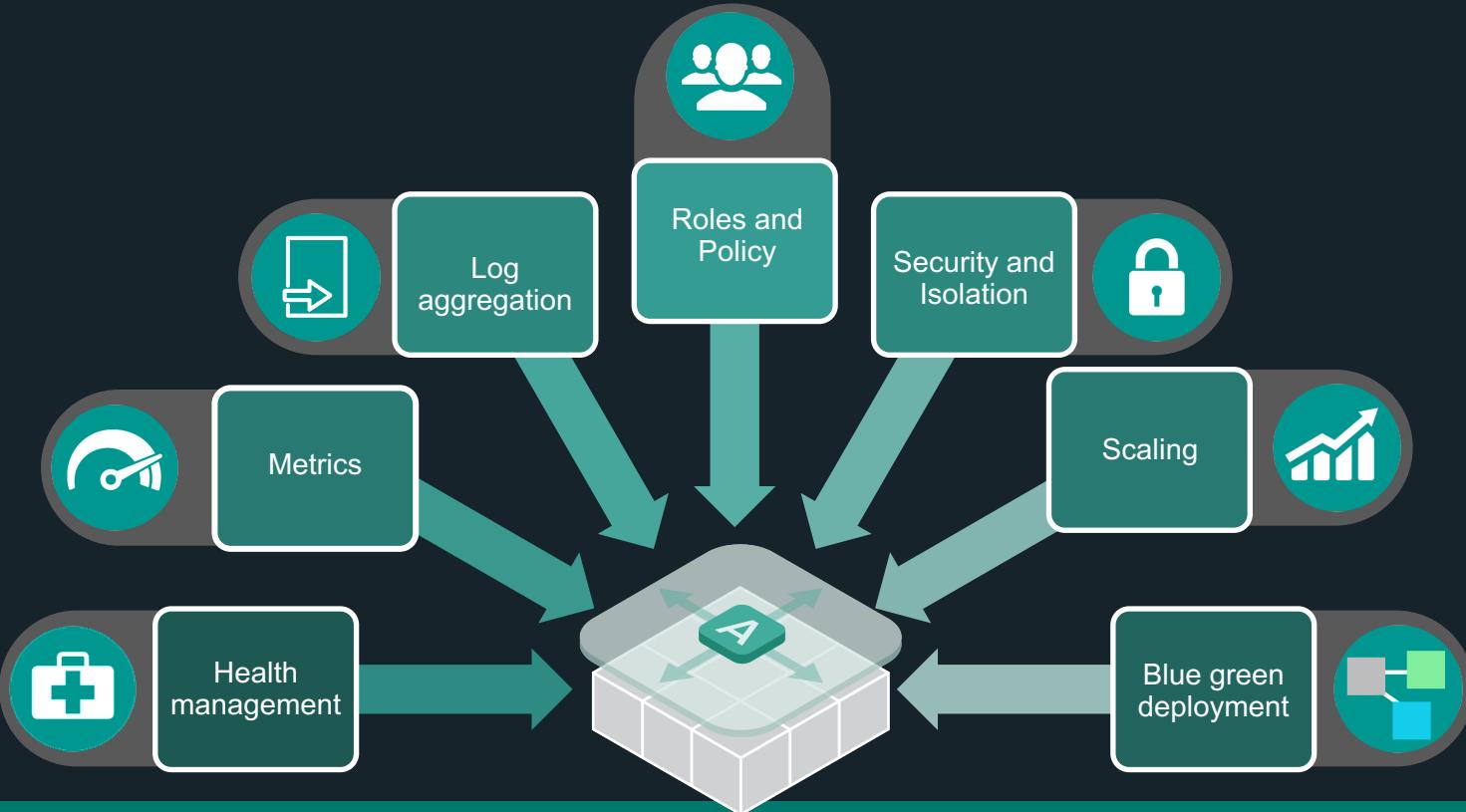


IBM DB/2

USER PROVIDED

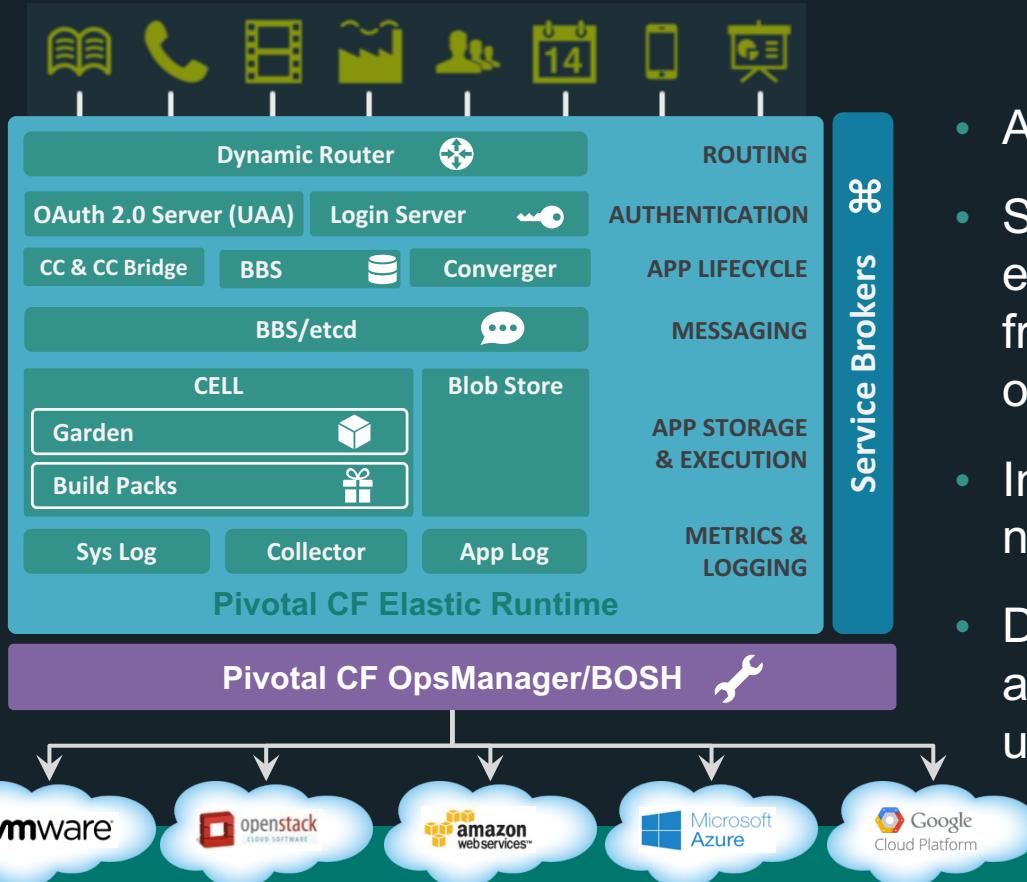
Pivotal™

A platform for keeping promises



PCF Architecture

Elastic Runtime Architecture



- Automated Platform-as-a-Service
- Scalable runtime environment, extensible to most modern frameworks and languages running on Linux
- Instant expansion or upgrade with no downtime
- Deploy, scale and manage applications with bindable services using simplified semantics and APIs

CLI – Command Line Interface

- Command line utility providing easy access to the Pivotal CF commands.
- Scriptable
- Fully documented (`cf --help`)

```
[...-> cf
NAME:
  cf - A command line tool to interact with Cloud Foundry

USAGE:
  [environment variables] cf [global options] command [arguments...] [command options]

VERSION:
  6.13.0-e68ce0f-2015-10-15T22:53:29+00:00

BUILD TIME:
  2016-01-05 12:14:41.736991803 -0600 CST

GETTING STARTED:
  help                               Show help
  login                             Log user in
  logout                            Log user out
  passwd                            Change user password
  target                            Set or view the targeted org or space

  api                                Set or view target api url
  auth                              Authenticate user non-interactively

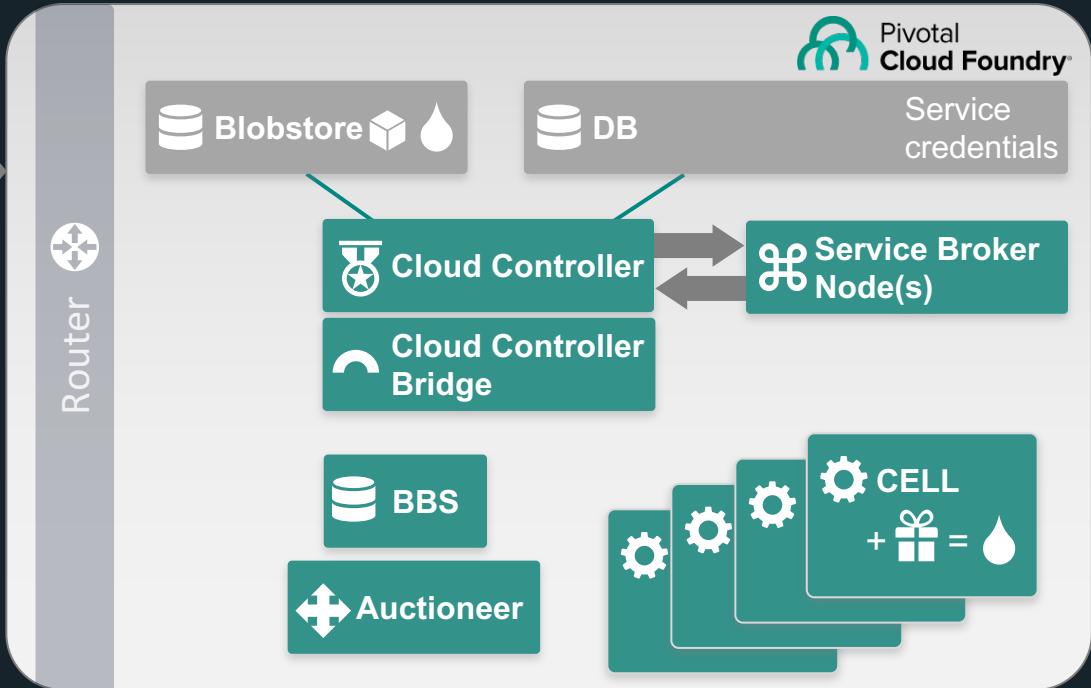
APPS:
  apps                             List all apps in the target space
  app                               Display health and status for app

  push                             Push a new app or sync changes to an existing app
  scale                            Change or view the instance count, disk space limit, and memory limit for an app
  delete                           Delete an app
  rename                           Rename an app

  start                            Start an app
  stop                             Stop an app
  restart                          Restart an app
  restage                          Restage an app
```

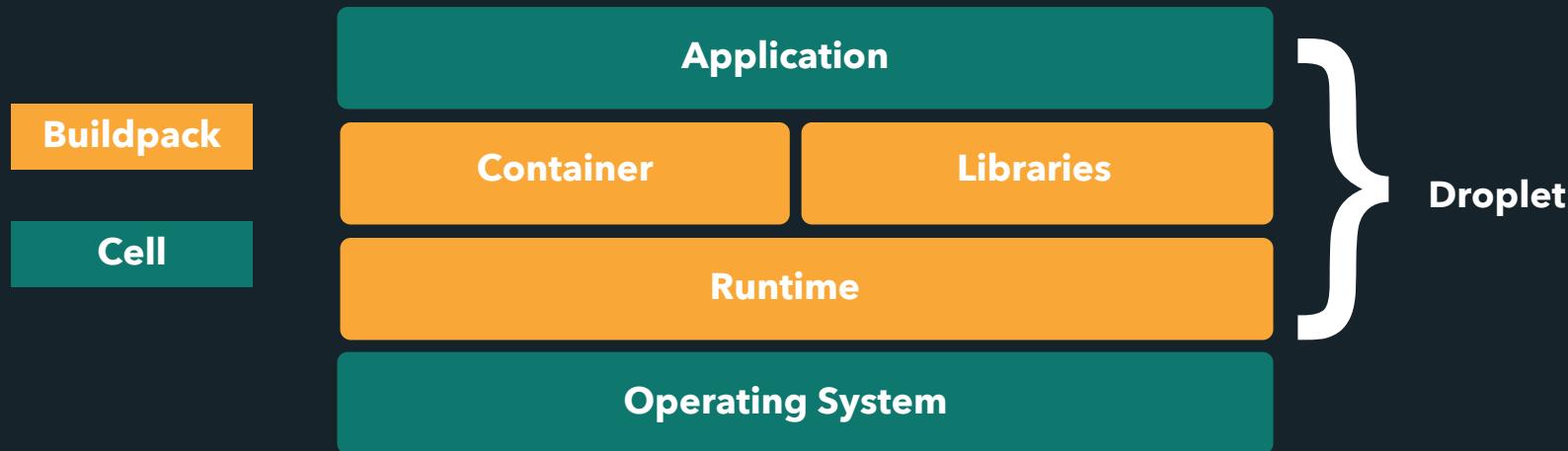
Pushing an Application

- ① Upload app bits and metadata  push app  + app metadata
- ② Create and bind services
- ③ Stage application
- ④ Deploy application
- ⑤ Manage application health



Staging and Buildpacks

Buildpacks are responsible for preparing the machine image for an application.



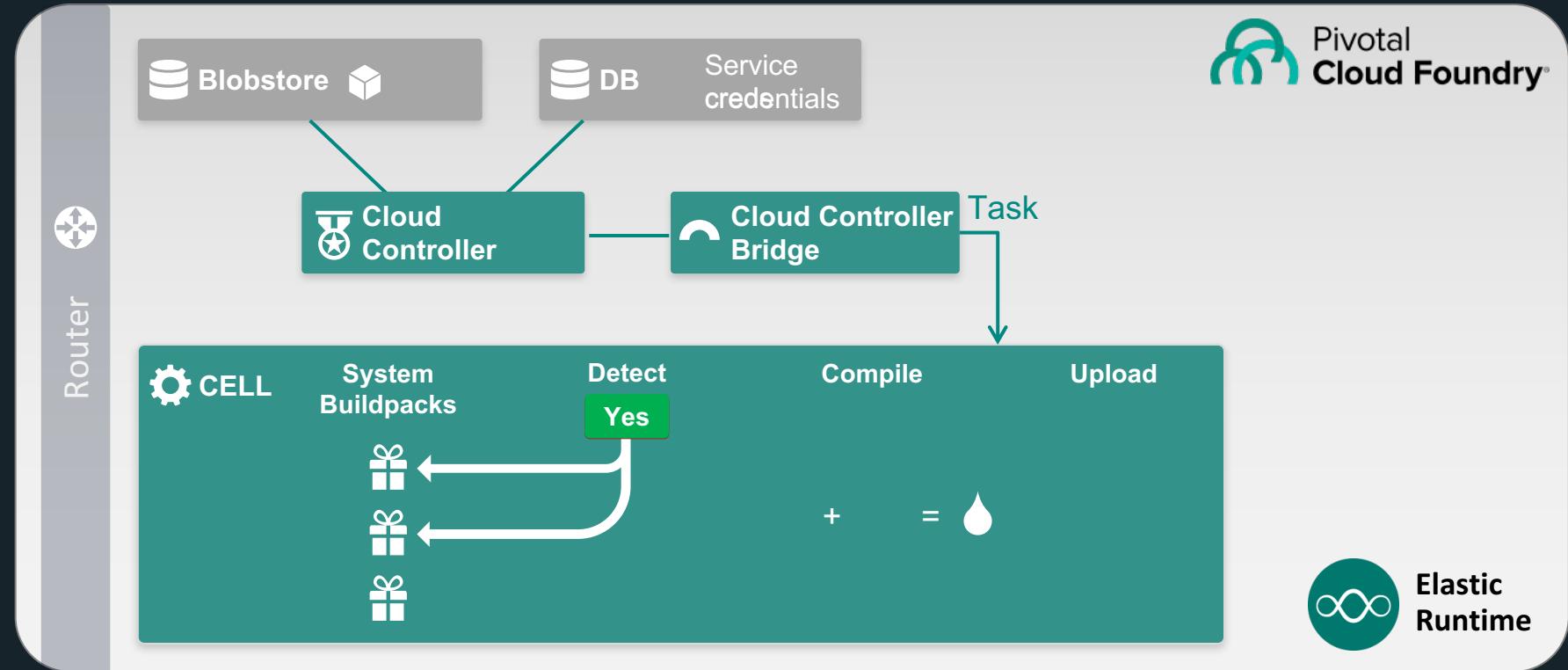
Buildpacks

- Buildpacks installed into a Cloud Foundry instance or loaded from an external location at app deployment time
- Buildpacks provided by public Cloud Foundry
 - Java
 - Ruby
 - Node.js
 - Go
 - Python
 - PHP
 - Dotnet core
 - Binary
 - Staticfile
 - ...

[Cloud Foundry Community Buildpack](#)

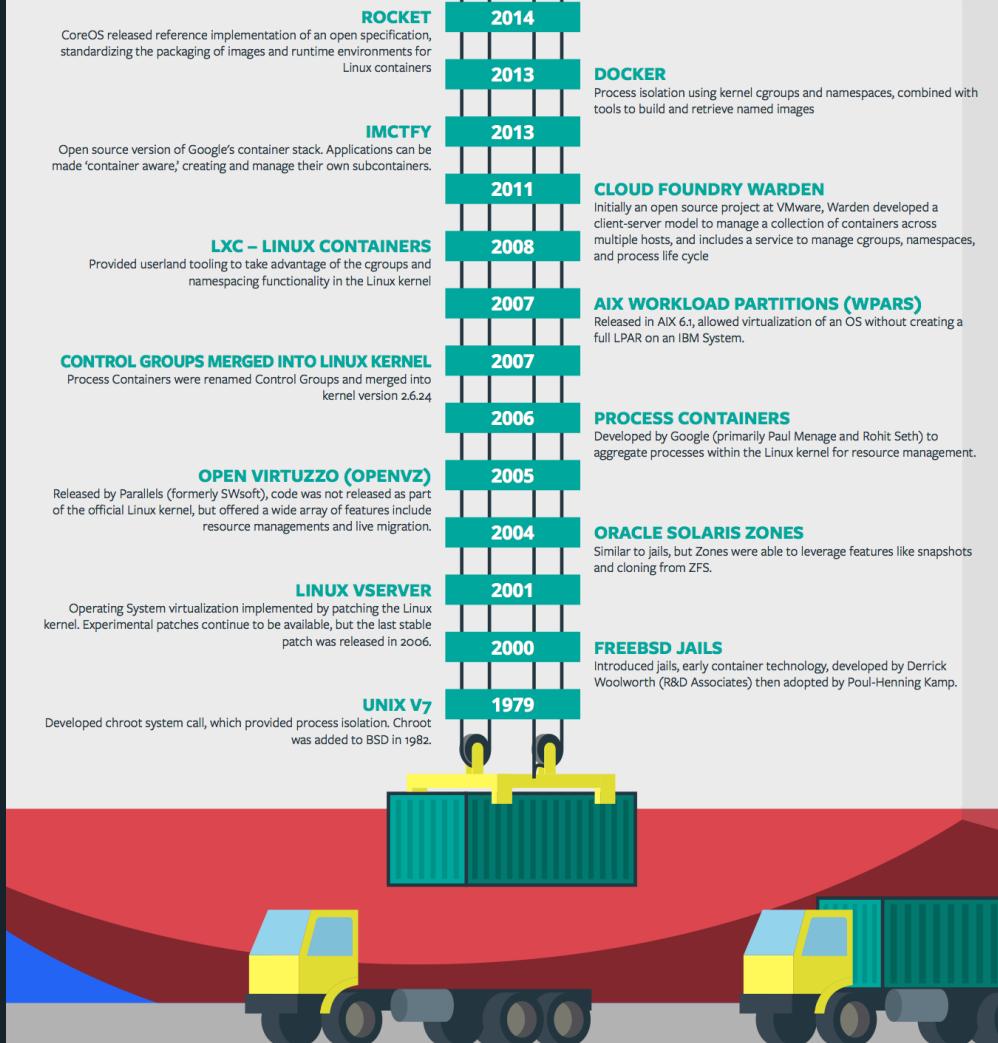
Write your own

Application Staging

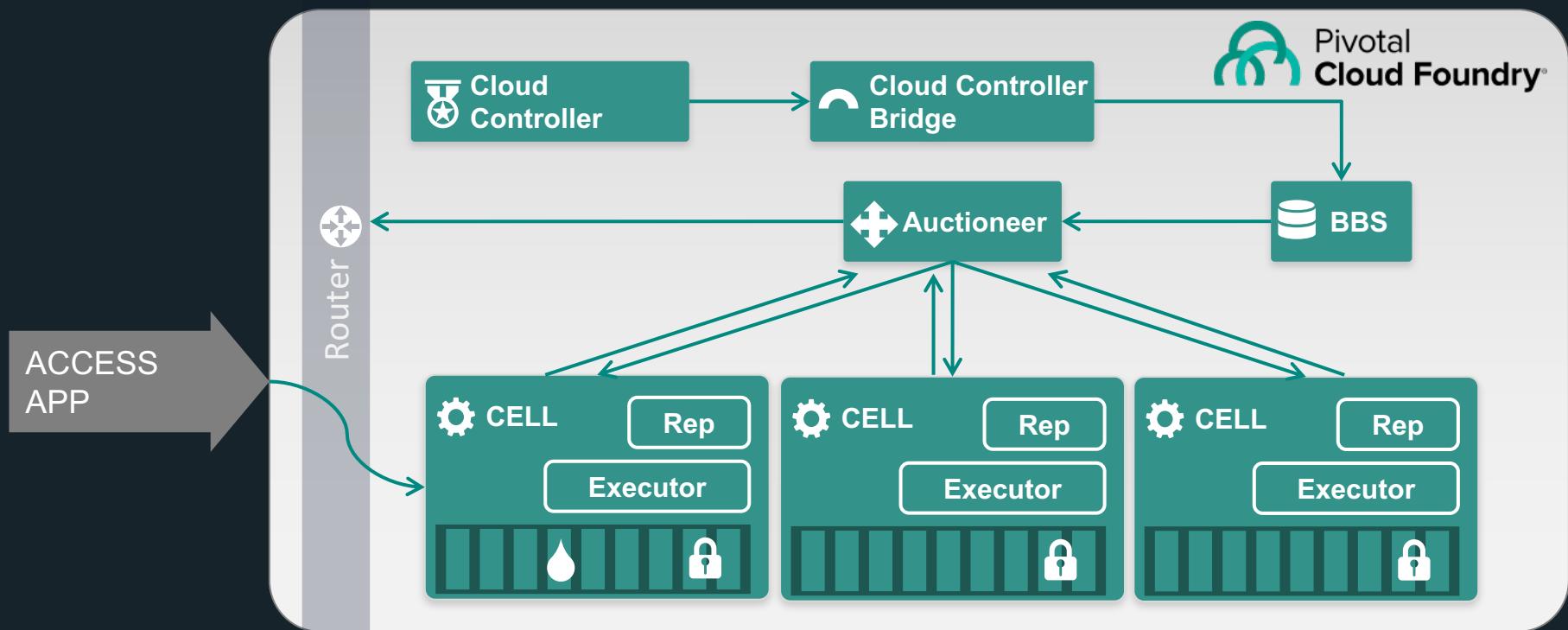


Containers - History

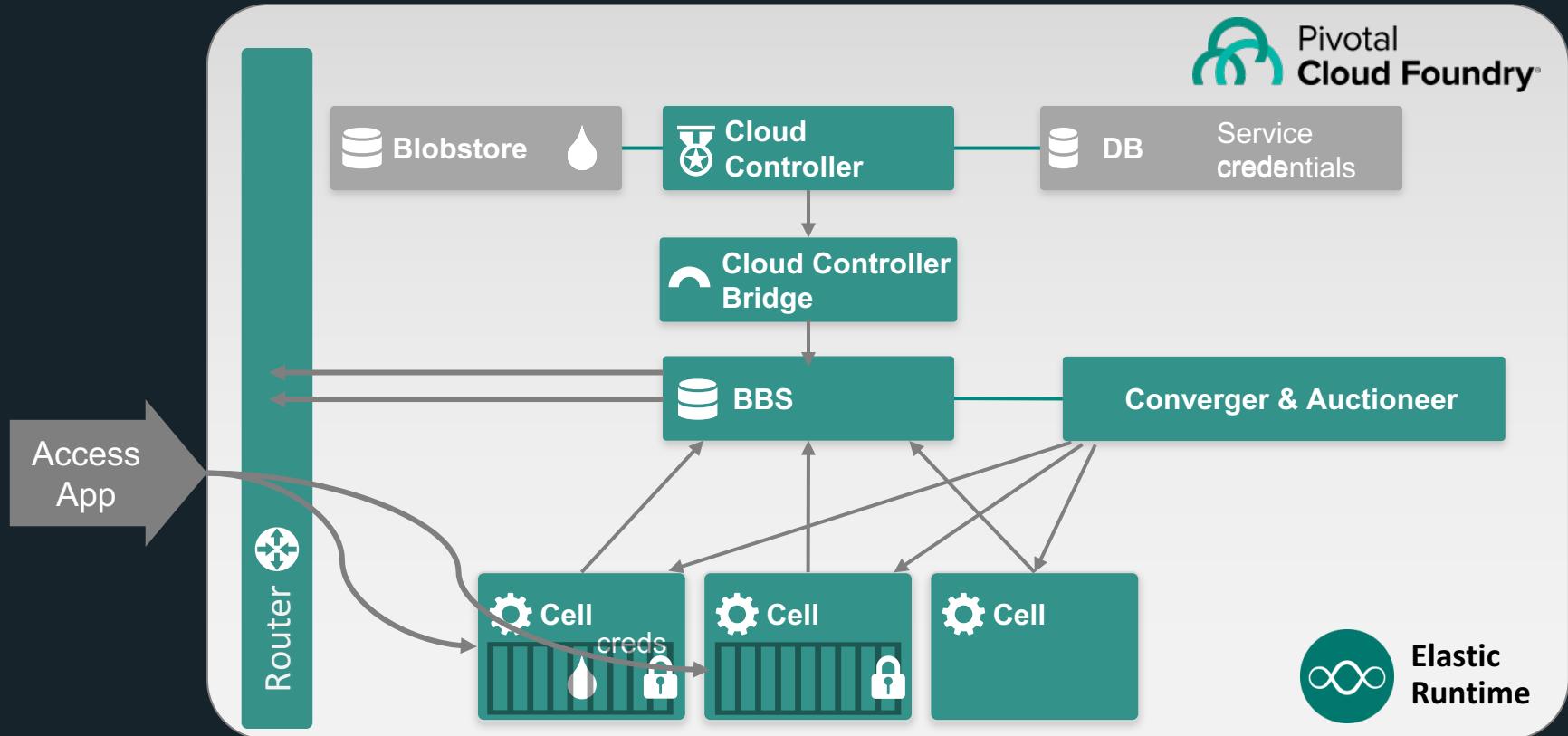
- Containers are not new
- Cloud Foundry has used containers since it's inception
- Cloud Foundry supports multiple container technologies as first class citizens including Docker, Warden, Garden and runC



Deploying an Application and containers



Application scaling



D E M O

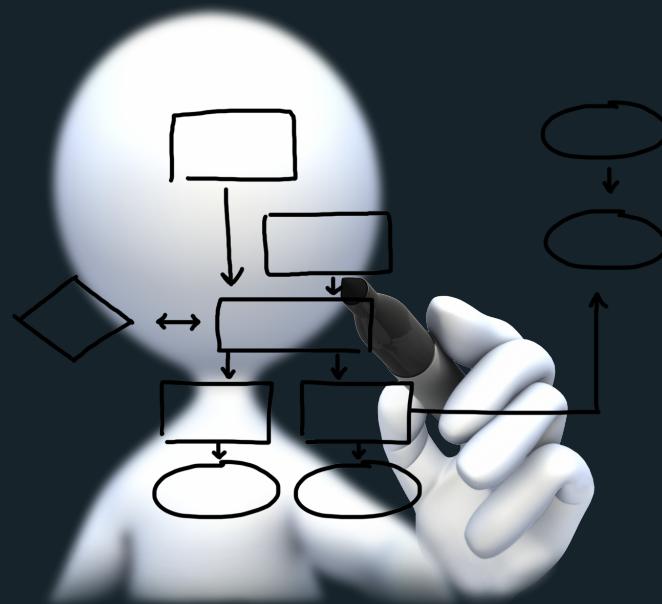
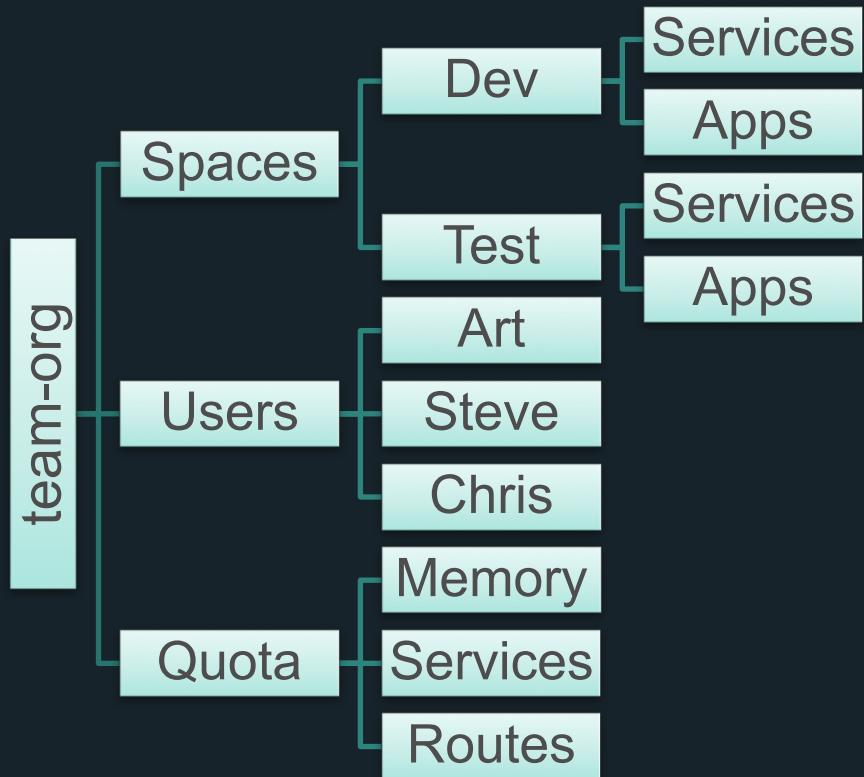


Pivotal
Cloud Foundry®

Pivotal Cloud Foundry

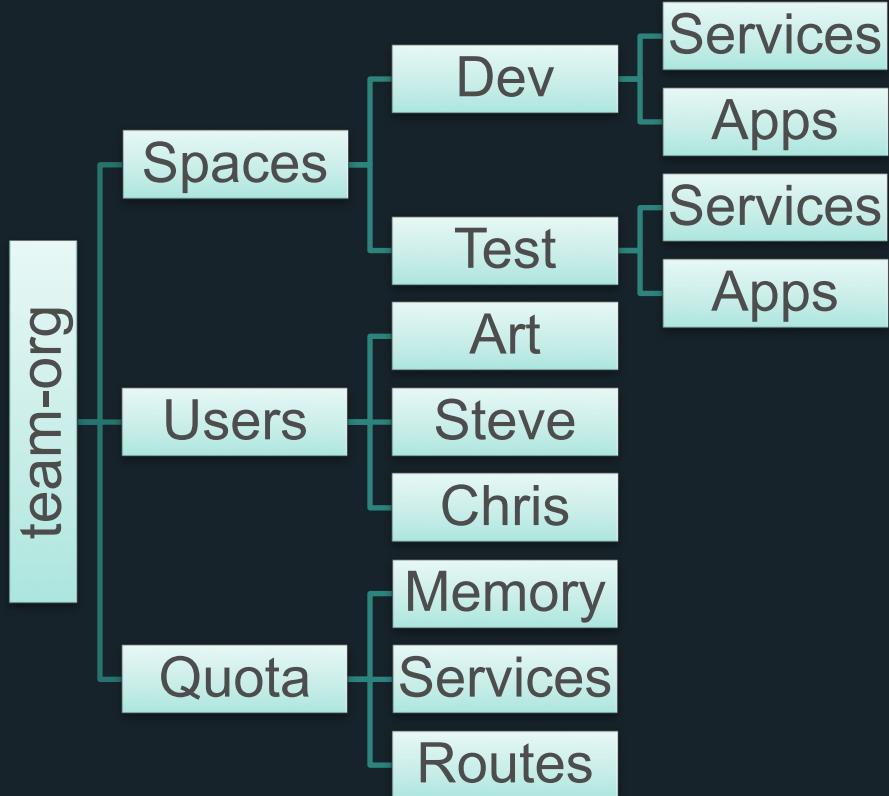
Multi-tenancy

Orgs, Spaces, Users and Quotas



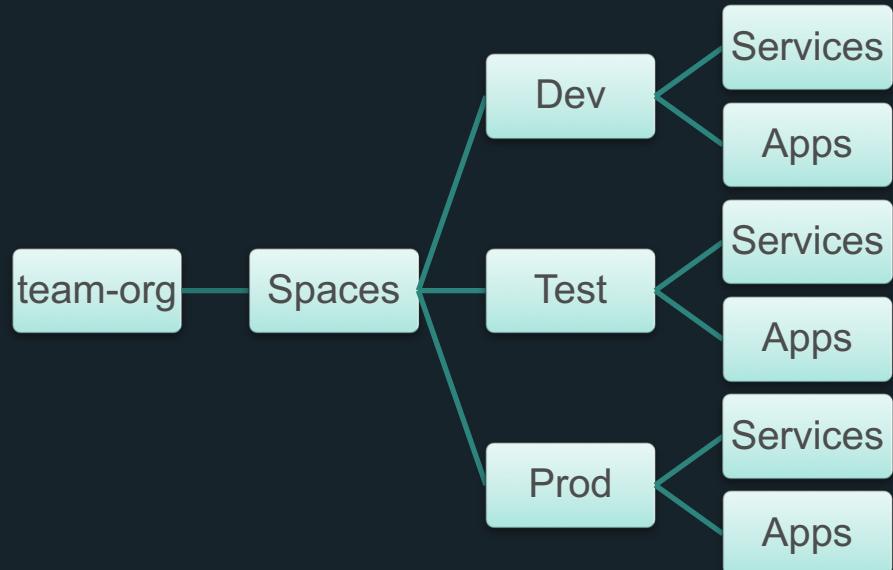
Organizations

- Logical division within a Pivotal CF install / Foundation.
- Each organization has its own users and assigned quota
- User permissions / roles are specified per space within an organization
- Sub-divided into Spaces



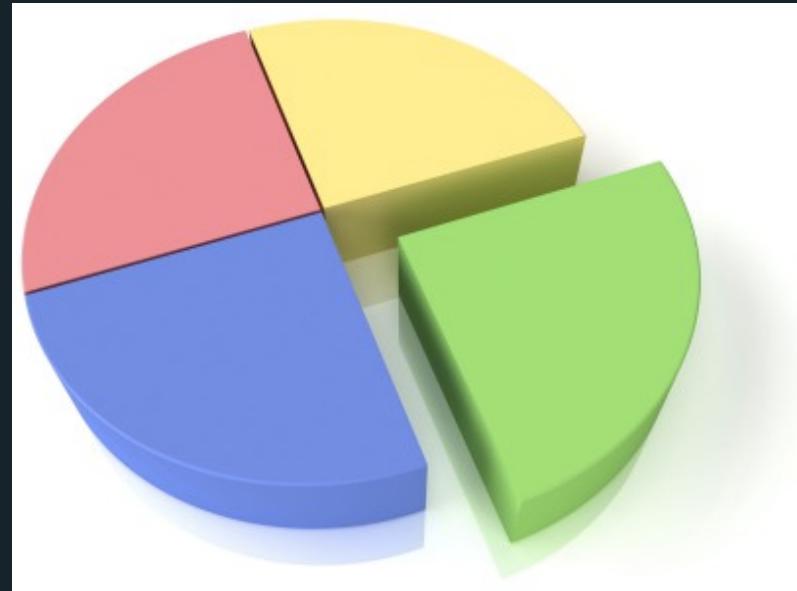
Spaces

- Logical sub-division within an organization
- Users authorized at an organization level can have different roles per space
- Services and Applications are created / specified per Space
- Same Service can have different meanings per space



Quotas and Plans

- Different quota limits (e.g. “small”, “enterprise”, “default”, “runaway”) can be assigned per Organization
- Quota defines
 - Total Memory
 - Total # of Services
 - Total # of Routes



D E M O



Pivotal
Cloud Foundry®

Pivotal Cloud Foundry

Services

Pivotal™

What is a Service

- Allows resources to be easily provisioned on-demand
- Typically middleware, frameworks, and other “components” necessary for applications
- Can be a persistent, stateful layer



Two Types of Services



- **Managed**
Fully integrated, with full lifecycle management
- **User-Provided**
Created and managed external to the platform

Rapid self-service provisioning

Push button deployed service instance

- Bind to apps through easy to use interface
- Easy accessibility through Marketplace
- Common access control and audit trails across the breadth of services

Marketplace



MySQL



Pivotal Cloud Cache



RabbitMQ



Concourse



Redis



Dynatrace Service Broker

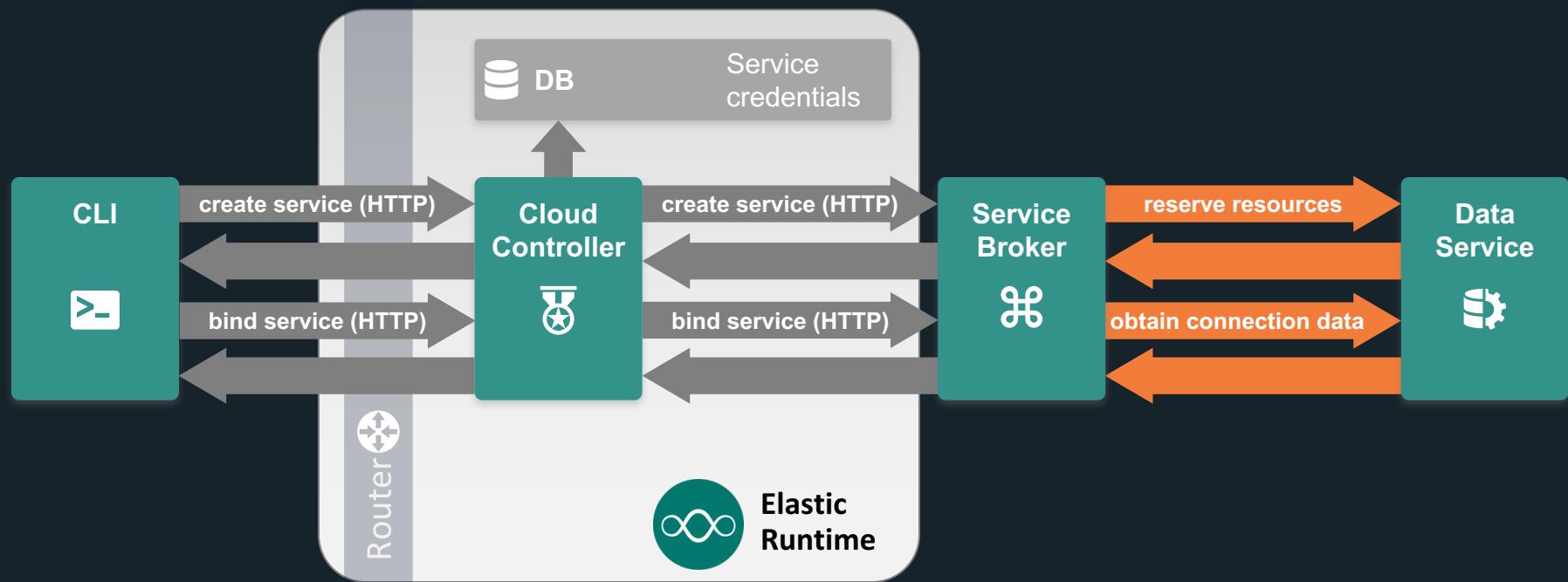


Spring Cloud Services



Google Service Broker

Creating and Binding a Service



D E M O

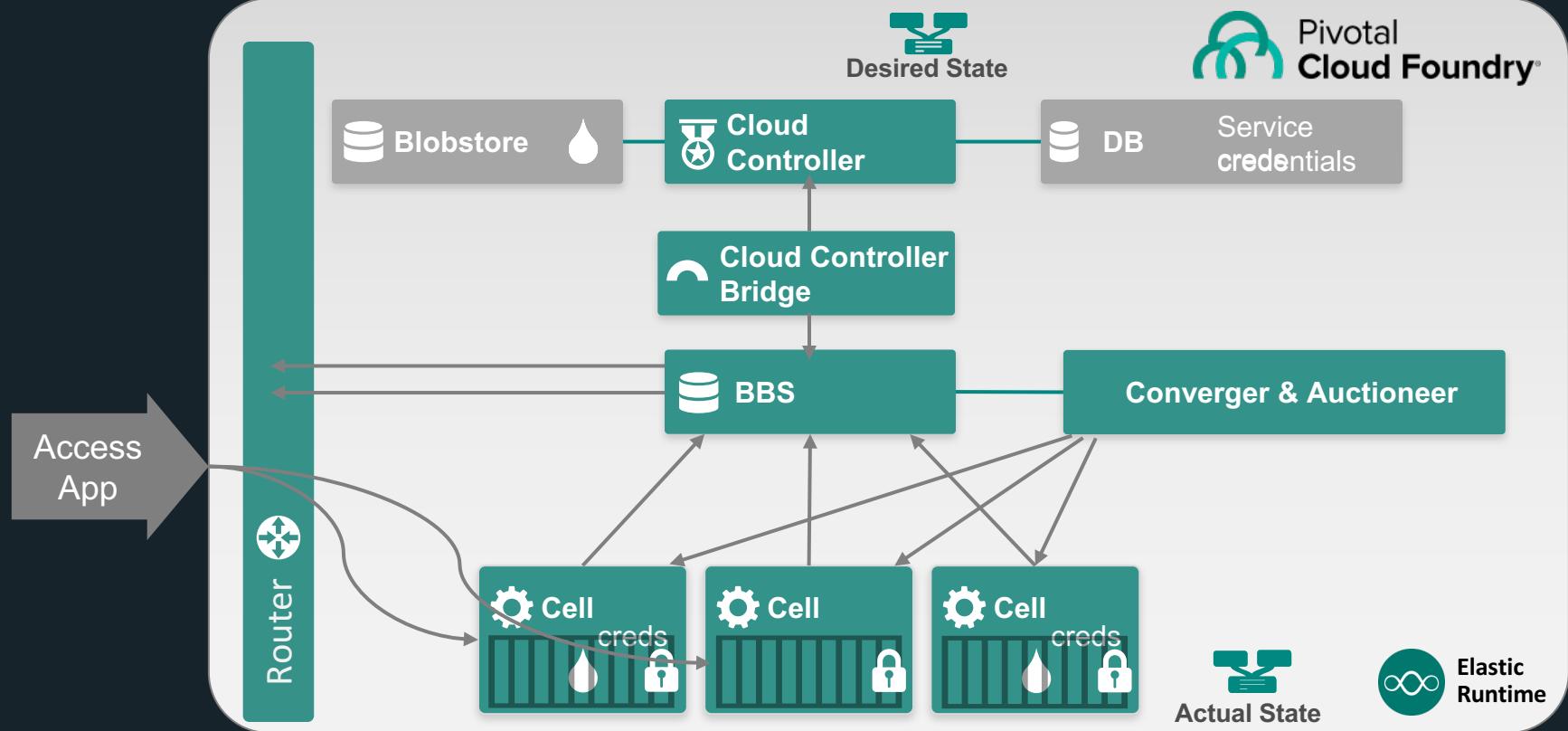


Pivotal
Cloud Foundry®

Pivotal Cloud Foundry

Architecture &
4 Layers of High Availability

HA 1 - Failed Application Instances Replaced



HA 2 - Elastic Runtime Processes are Monitored

Health Monitor

Responses:

pager

email

monitoring

...

Message Bus

Pivotal CF Operations Manager

AGENT

BBS



AGENT

CELL



AGENT

Cloud Controller



IaaS

Pivotal™

HA 2 - Elastic Runtime Processes are Monitored

Health Monitor

Responses:

pager

email

monitoring

...

Message Bus

Pivotal CF Operations Manager

AGENT



AGENT



CELL



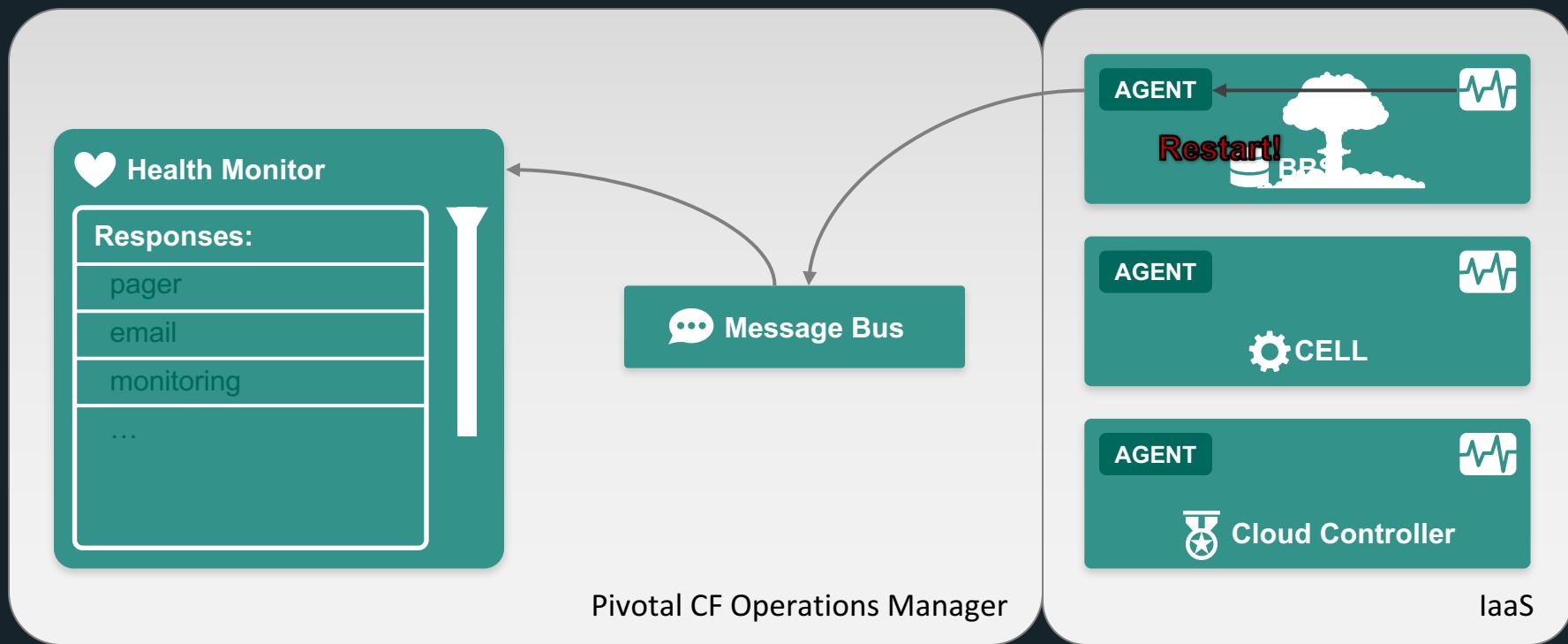
AGENT



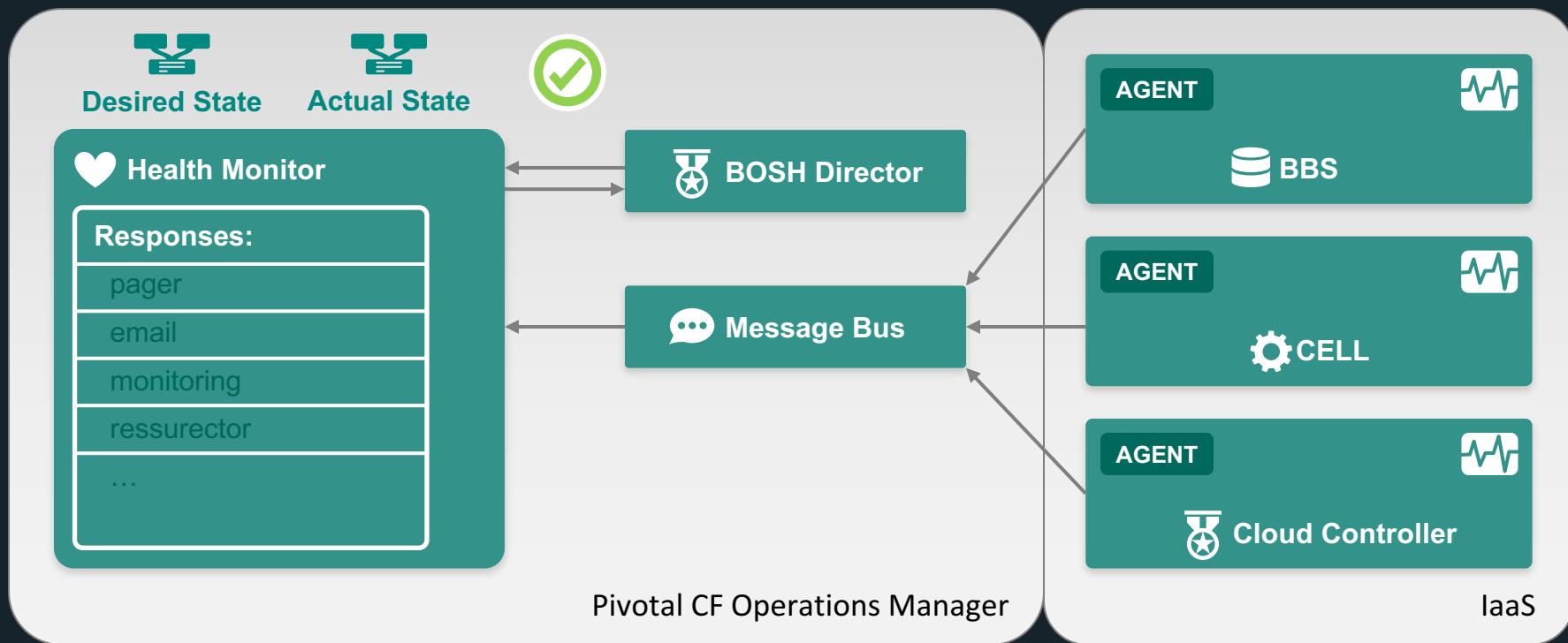
Cloud Controller

IaaS

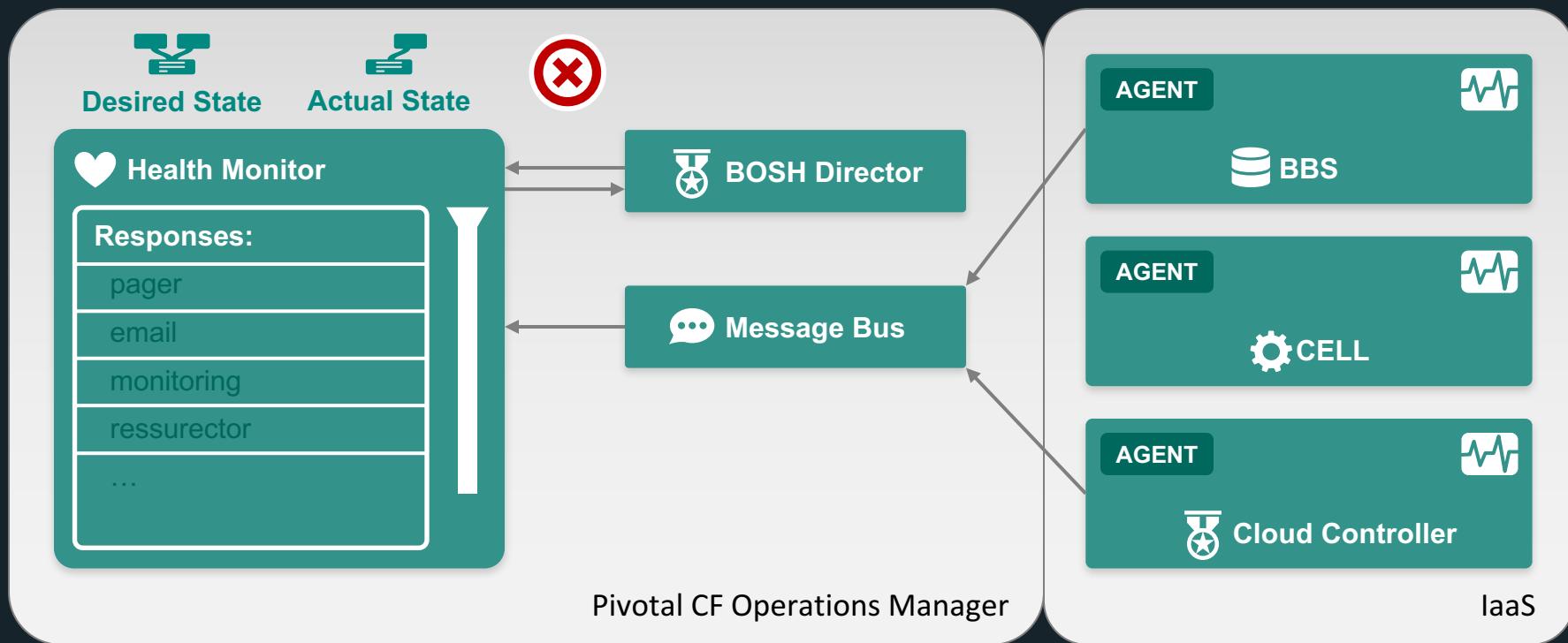
HA 2 - Elastic Runtime Processes are Monitored



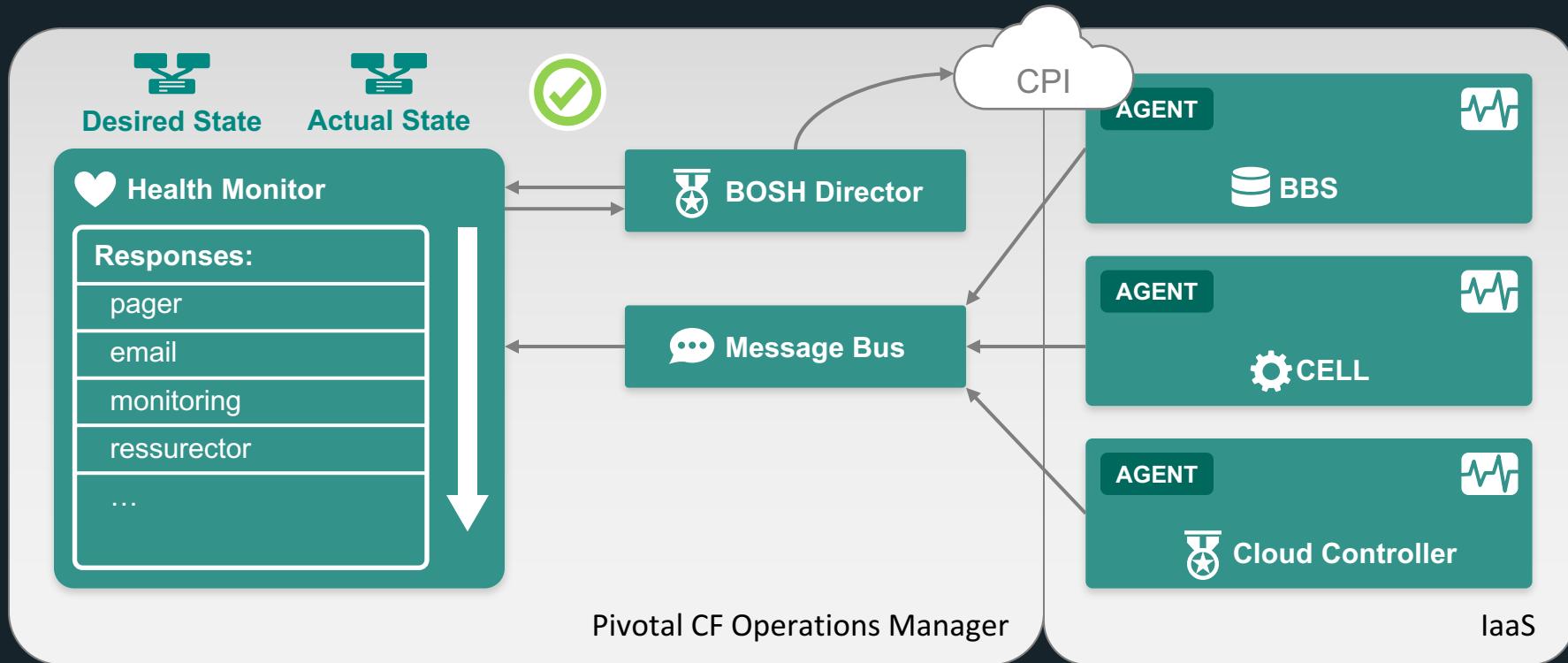
HA 3 - VMs are Monitored



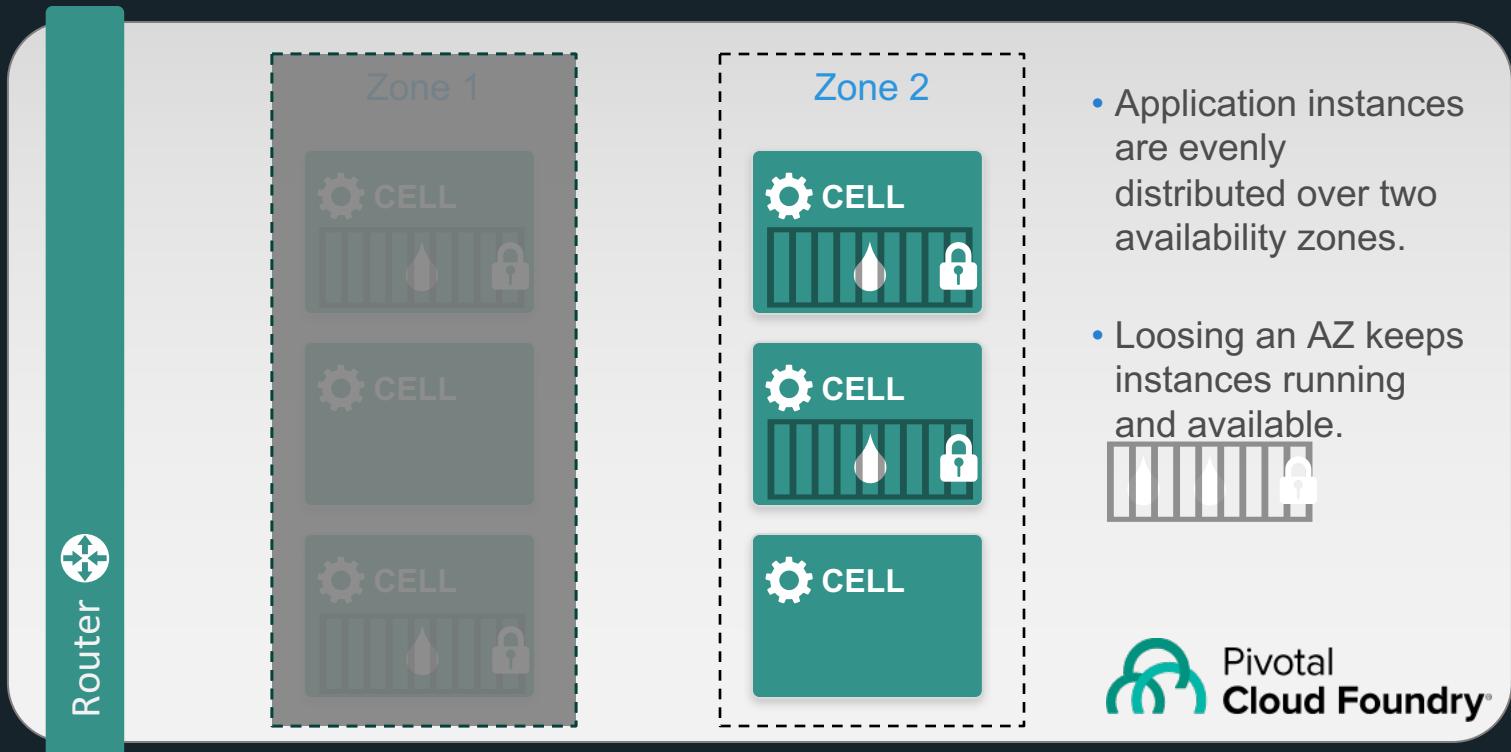
HA 3 - VMs are Monitored



HA 3 - VMs are Monitored



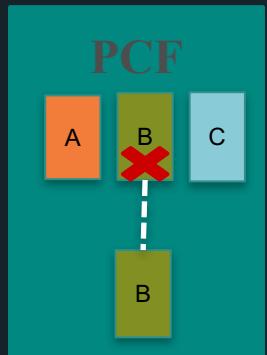
HA 4 - Application Instances and Availability Zones



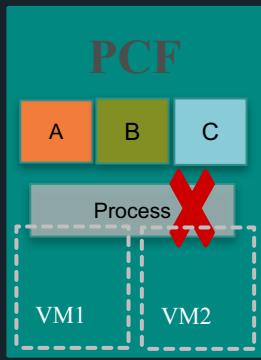
Pivotal
Cloud Foundry®

How Pivotal CF enables four layers of HA

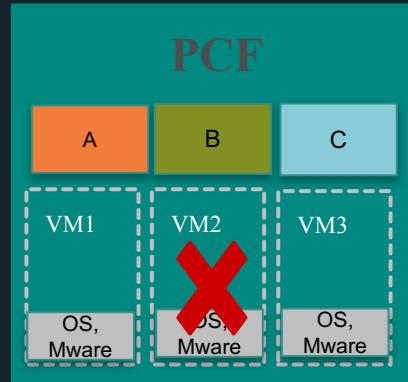
1.



2.



3.



4.



If an **app** fails, PCF reboots app in a new container.

App Fail

If a **process** fails, PCF restarts the process

Process Fail

If an **OS or network failure** occurs PCF kills the VM and reboots the host in a new Virtual machine.

VM Fail

If a **datacenter rack fails**, PCF ensures applications stay running in multiple availability zones

Rack Fail

Pivotal Cloud Foundry = Enterprise-grade Platform

- Cloud-scale, distributed, self-healing, eventually consistent architecture
 - Similar patterns in Elastic Runtime (for your apps) and BOSH (for your services)
- Declarative – you declare your desired state and Pivotal Cloud Foundry keeps the system consistent with that desired state (4 levels of HA!!)
- Zero-downtime, rolling upgrades
- Pivotal Cloud Foundry manages containers (ERS) and VMs (BOSH)

Pivotal Cloud Foundry

Auditing and Logging

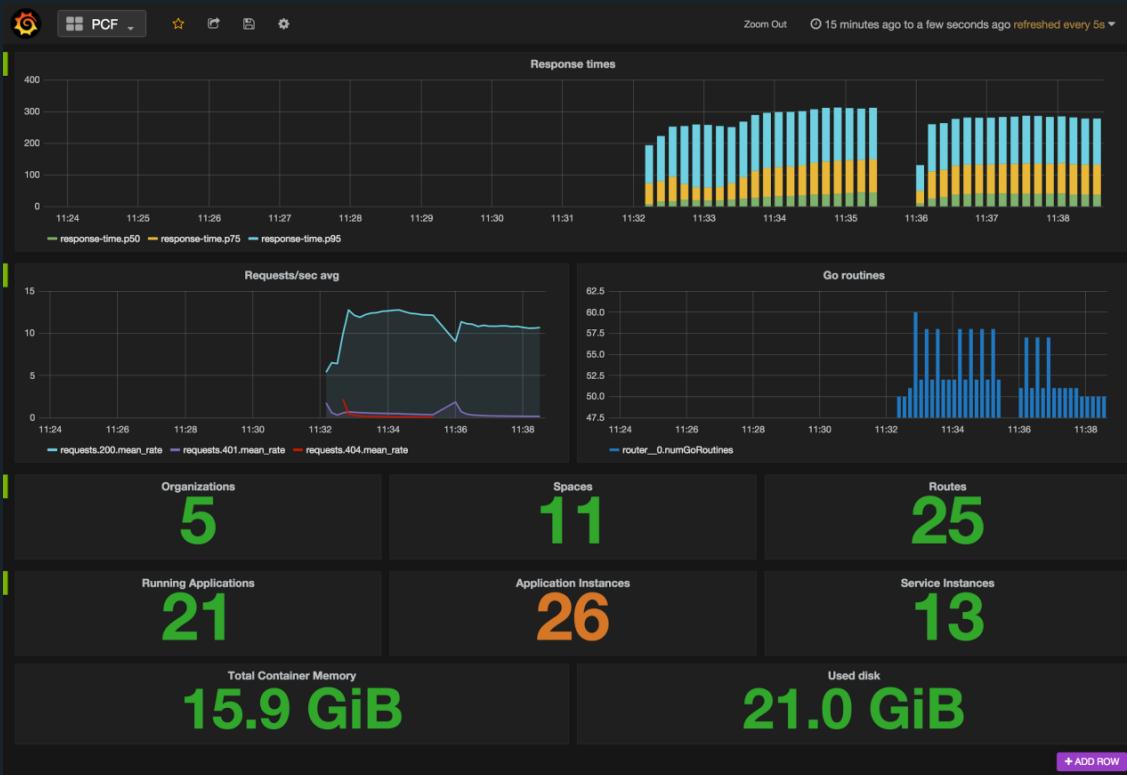
Visibility Through Logs and Metrics

Single source for all platform logs and metrics. Single view console that makes system and application monitoring visible and actionable

- First packet logging
 - Enables tool for external audit controls
- Aggregated Logging
 - HTTP Events, Counters, Gauges, Errors
 - Every stdout and stderr from all apps and platform components
 - Health gauges
- Snap-in best of breed application monitors
 - AppDynamics, New Relic, Splunk, etc.



Platform Operations Logging

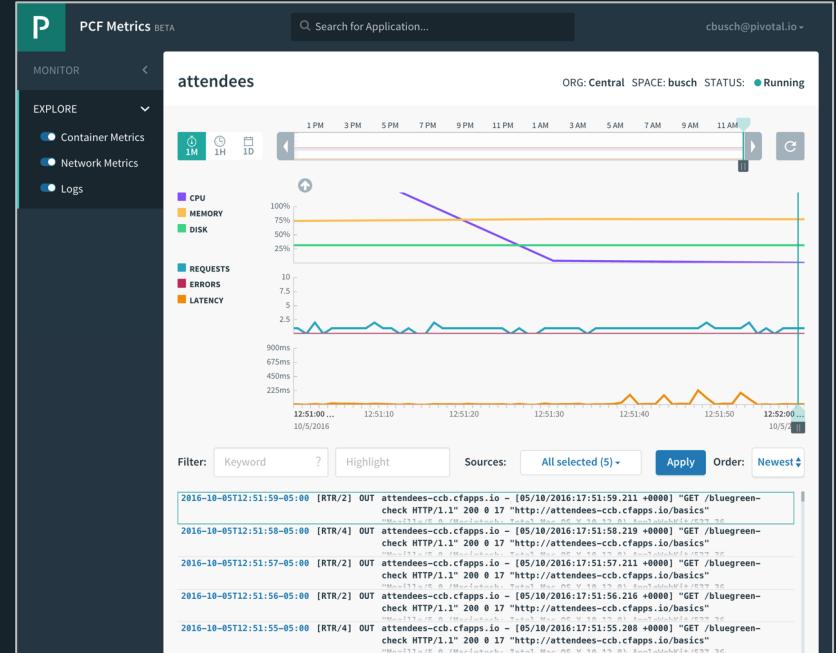
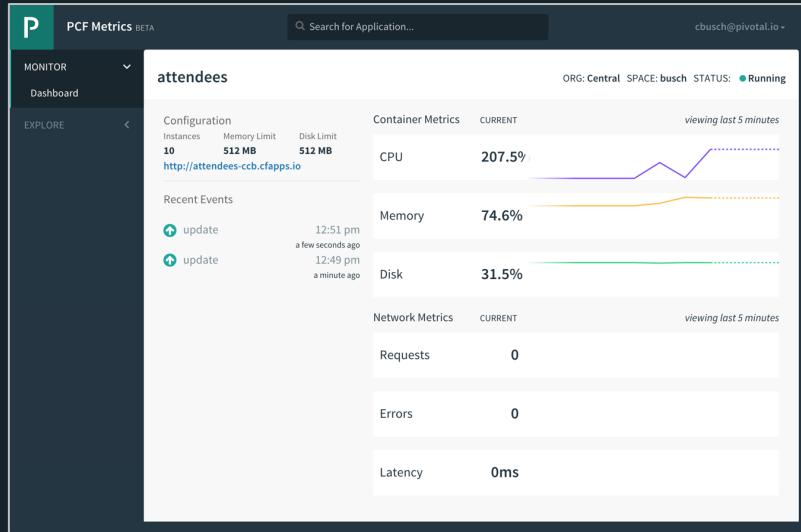


Platform Operations Logging Firehose

Overall Platform Health

- Resource Utilization
- Request Volumes / Latency

Application Operations Logging & Metrics



- Self-service Application Performance dashboards to monitor applications
- Per-application container and network metrics with associated log-streams with relevant router activity

D E M O



Pivotal
Cloud Foundry®

HANDS-ON LABS



Pivotal
Cloud Foundry®

Hands-on Lab Instructions

- Prerequisites
 - CF CLI installed
 - Git installed
 - git clone <https://github.com/cbusch-pivotal/pcf-intro.git>
 - Download zip and unzip
 - <https://github.com/cbusch-pivotal/pcf-intro/archive/master.zip>
- Lab instructions
 - <https://github.com/cbusch-pivotal/pcf-intro>

Pivotal

A NEW PLATFORM FOR A NEW ERA