

Pivotal.

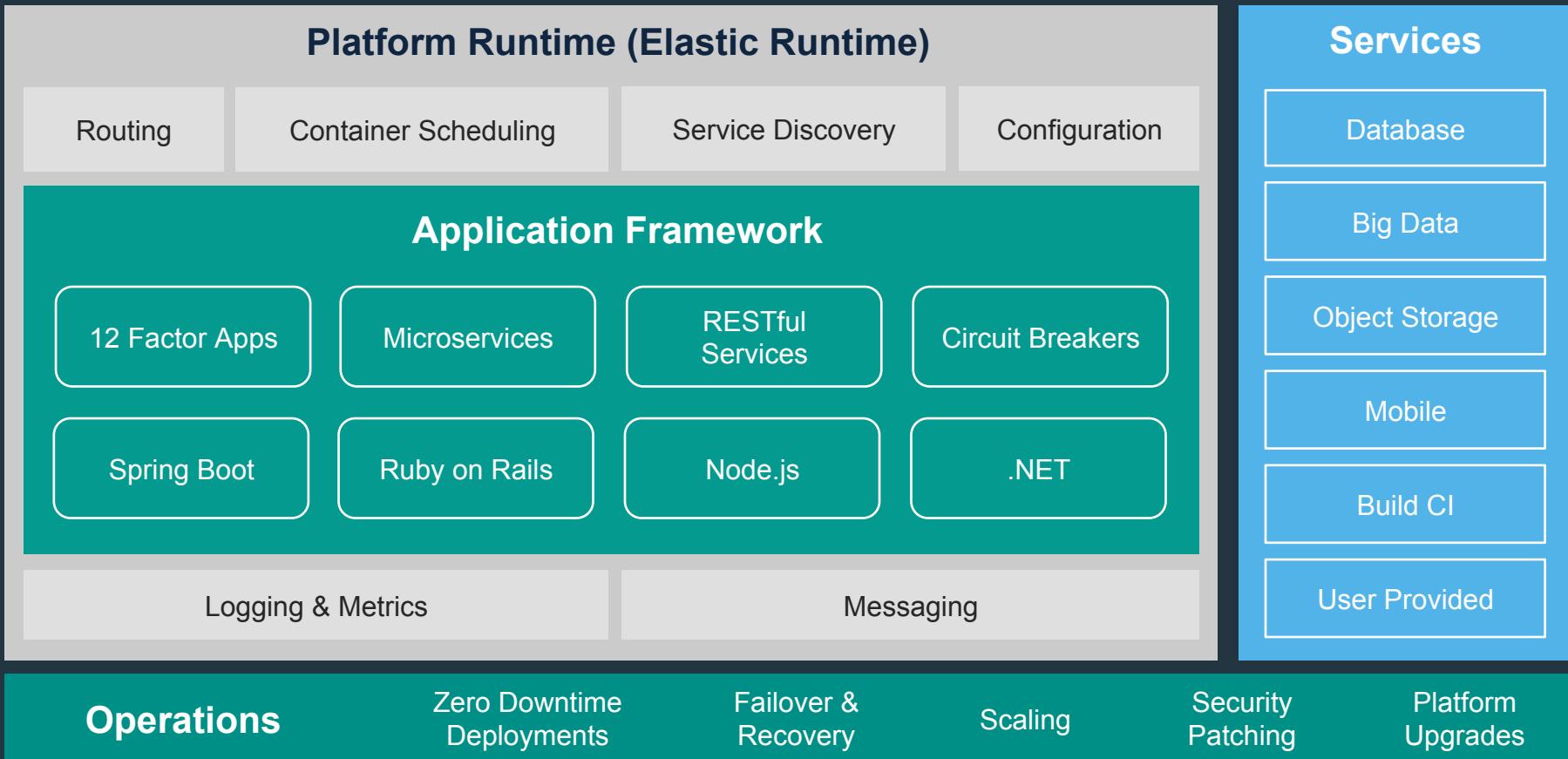
Pivotal Cloud Foundry Basics and Architecture



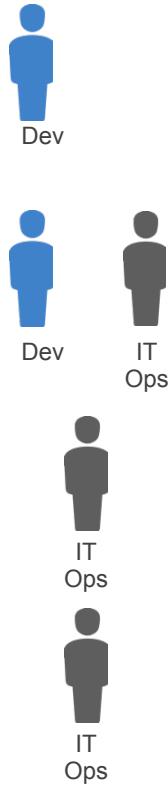
Agenda

- Pivotal Cloud Foundry
 - PCF Basics
 - PCF Architecture
- BOSH – Deploy Pivotal Cloud Foundry
 - BOSH Basics
 - BOSH Architecture

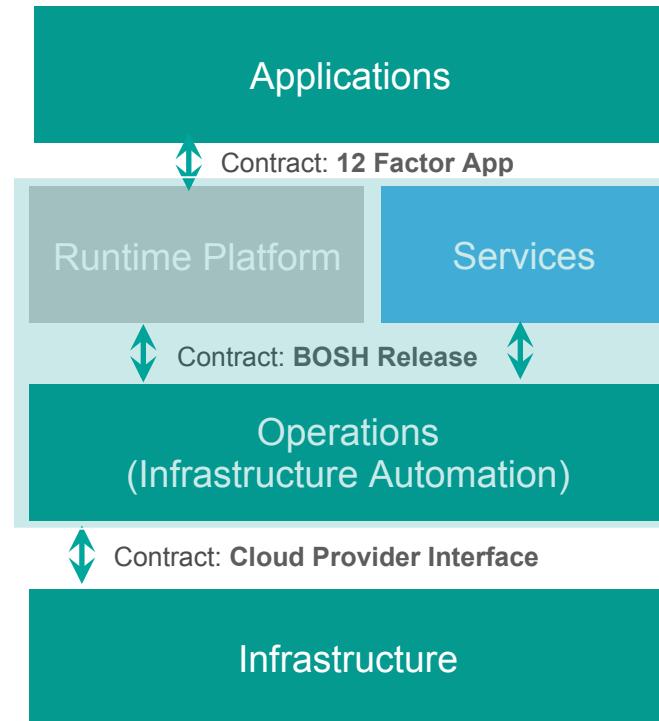
Pivotal Cloud Foundry Architecture



Roles

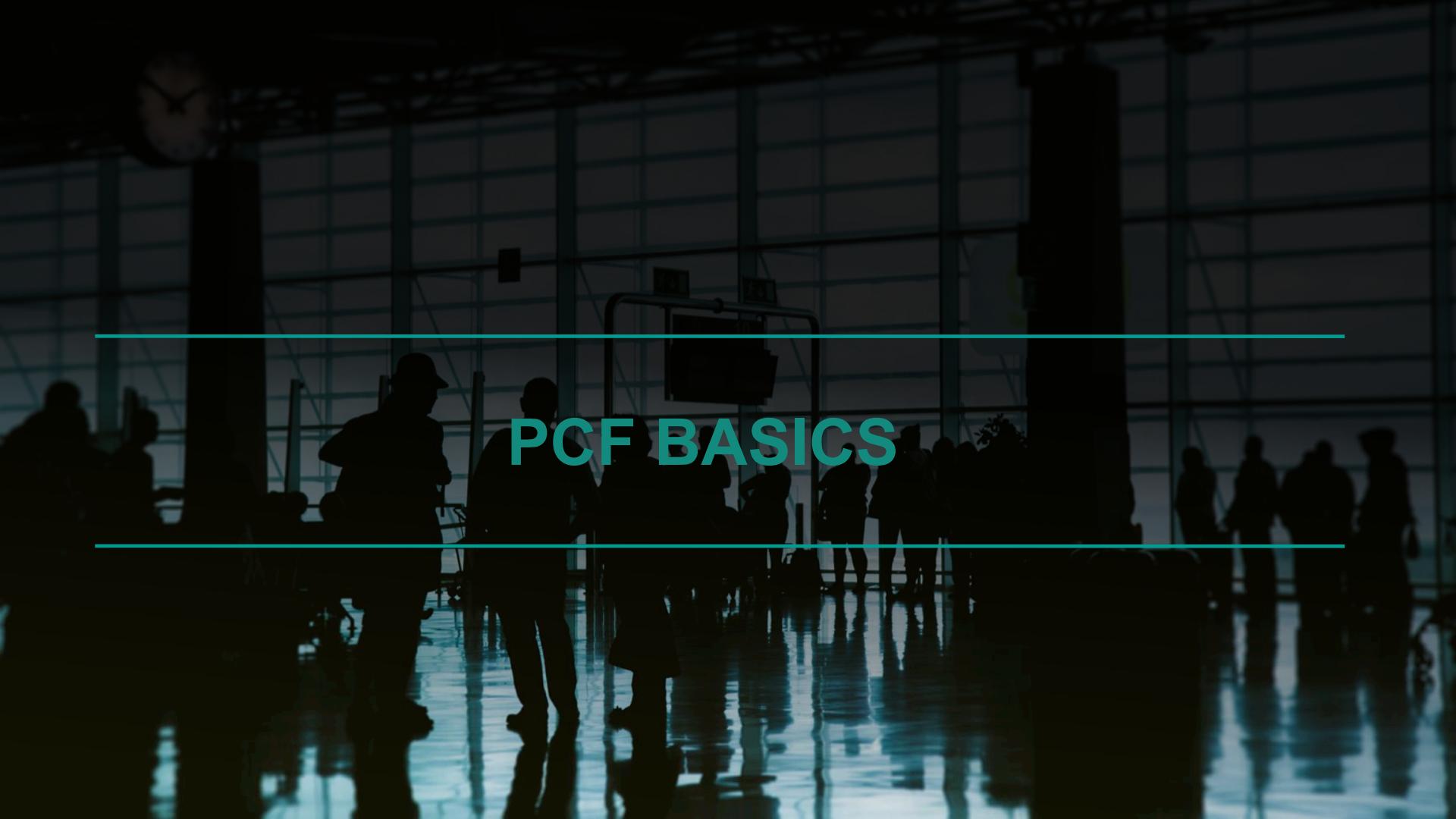


Pivotal Cloud Foundry



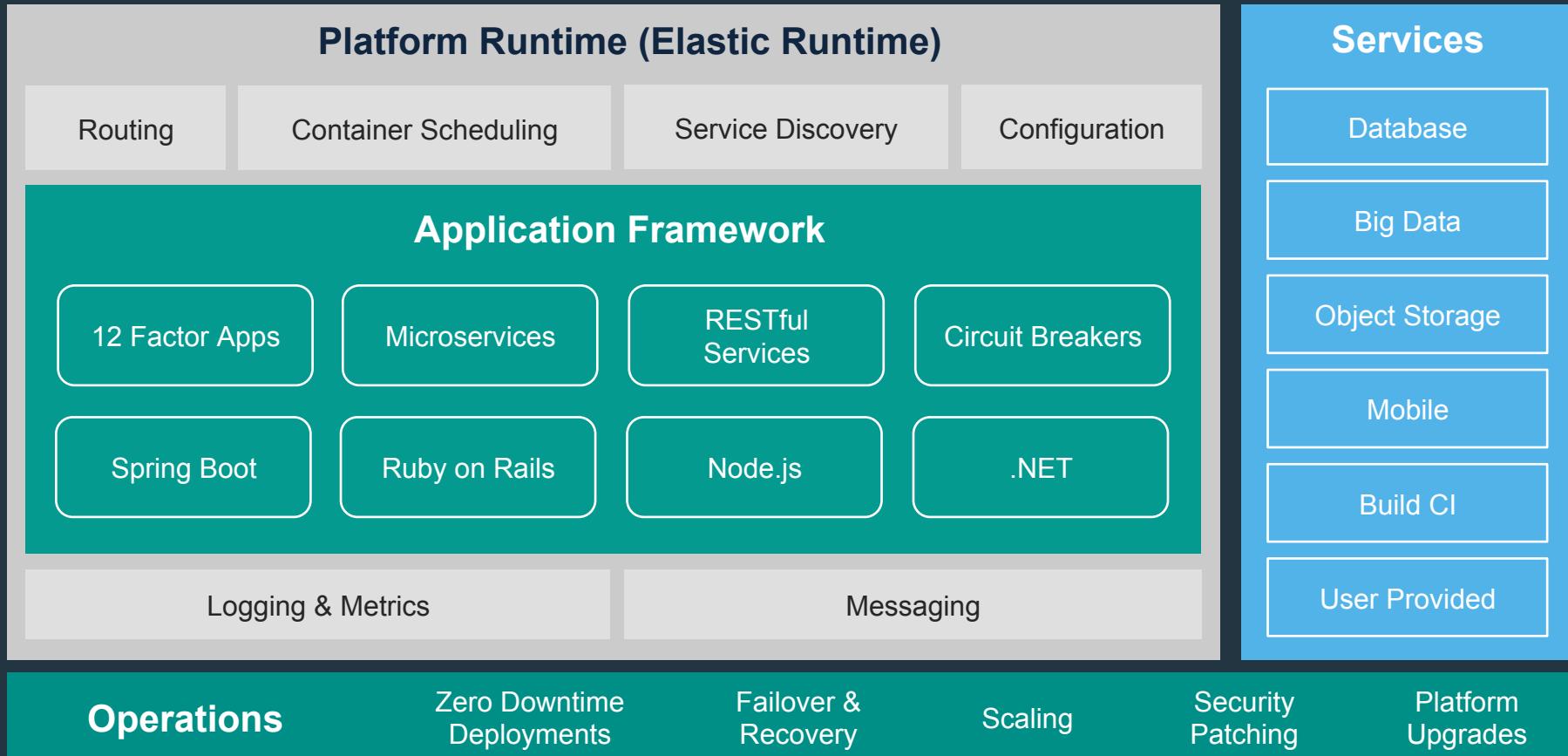
Tools



A dark, atmospheric photograph of an airport terminal. Silhouettes of numerous people are visible against a bright, overexposed background where large windows and structural beams are visible. A thin horizontal teal line runs across the middle of the frame, containing the title text.

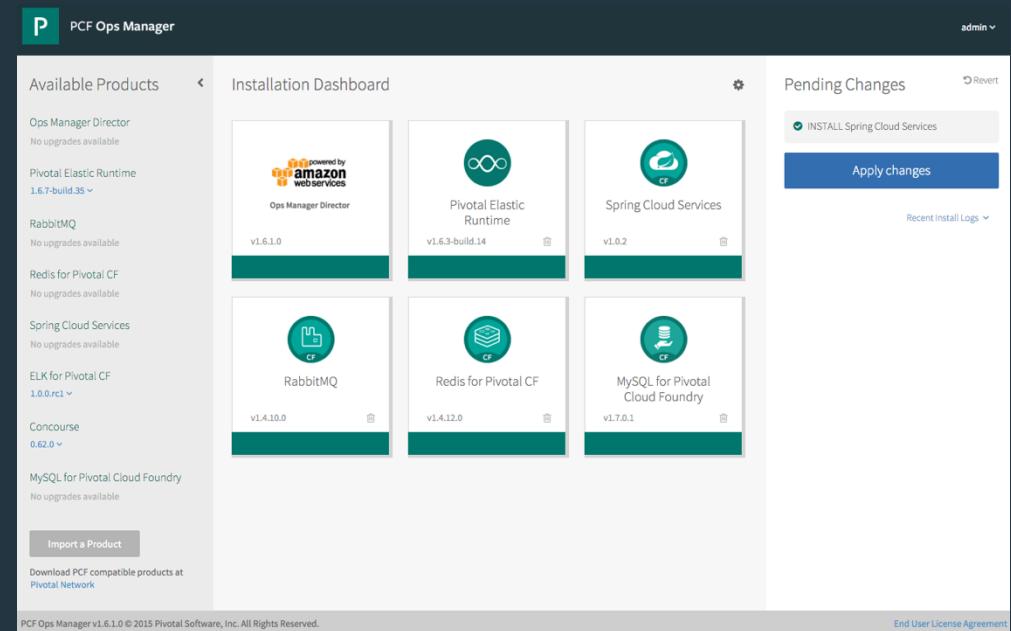
PCF BASICS

Pivotal Cloud Foundry Architecture



Operations - Pivotal Ops Manager

- Click to Install the Platform
- Built-in High Availability
- Install and Manage Services
- Handle Live upgrades and updates
- Click to scale the platform
- Built-in Platform monitoring



Elastic Runtime Tile

- Web form allowing an operator to scale components both
 - vertically (CPU, RAM, Disk) and
 - horizontally (number of instances).

The screenshot shows the PCF Ops Manager interface for managing the Pivotal Elastic Runtime. The top navigation bar includes a logo, the title "PCF Ops Manager", and a user dropdown. The main content area has two tabs: "Resource Config" and "Available Products".

Resource Config: This section shows the configuration for the "Pivotal Elastic Runtime" component. It lists several services and their current resource settings:

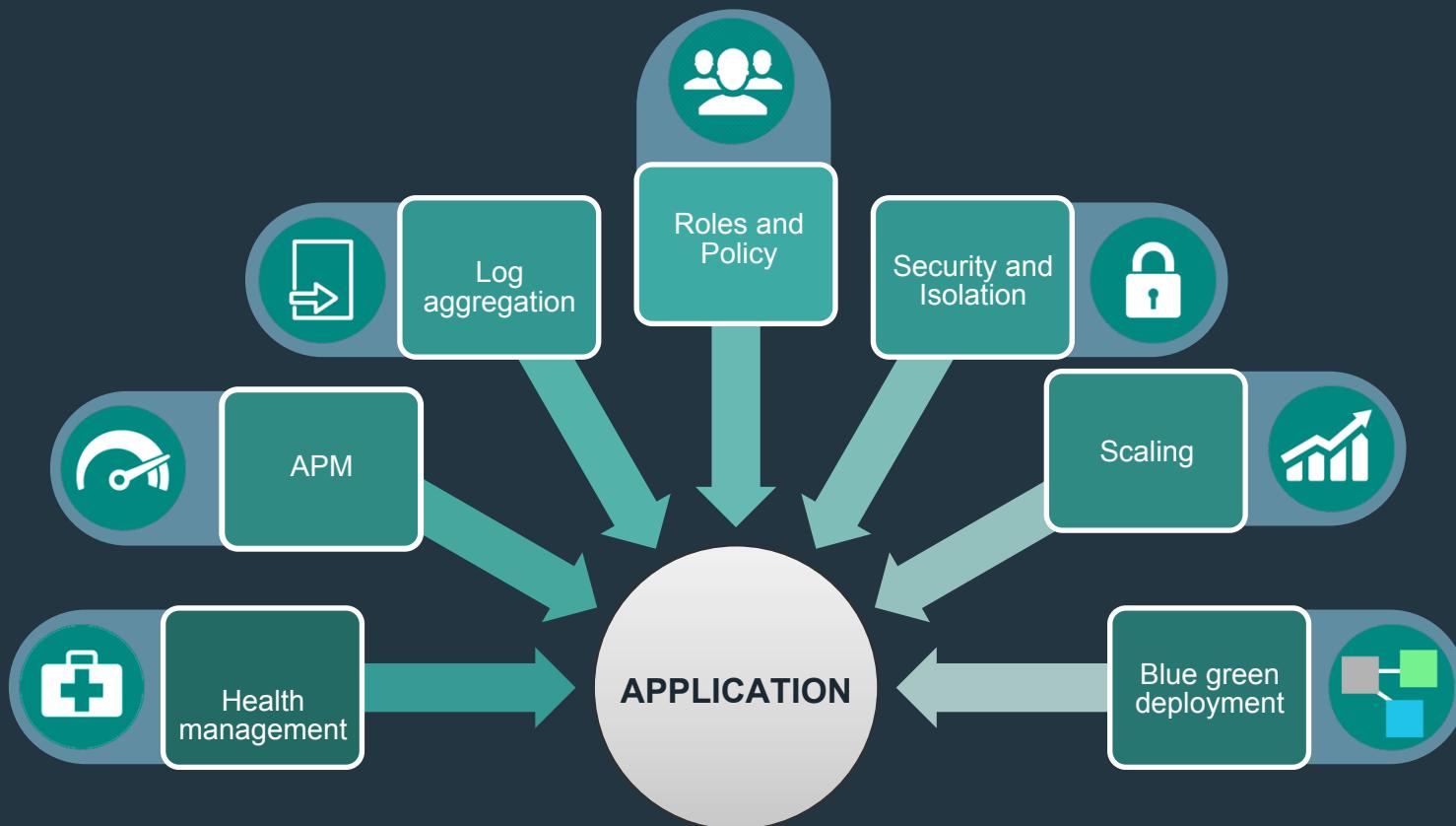
Service	Instances	CPU	RAM (MB)	Ephemeral Disk (MB)	Persistent Disk (MB)
NATS	1	1	1024	2048	0
consul	1	1	1024	2048	1024
etcd	1	1	1024	2048	1024
NFS Server	1	1	1024	2048	30960
Cloud Controller Database	1	1	1024	2048	2048
UAA Database	1	1	1024	2048	8192
Apps Manager Database	1	1	1024	2048	1024

Available Products: This section lists various Pivotal products with their current versions:

- Ops Manager Director: v1.6.1.0
- Pivotal Elastic Runtime: v1.6.1 build 36
- RabbitMQ: No upgrades available
- Redis for Pivotal CF: No upgrades available
- Spring Cloud Services: No upgrades available
- ELK for Pivotal CF: v1.0.0.12
- Concourse: v6.0.5
- MySQL for Pivotal Cloud Foundry: No upgrades available
- RabbitMQ: v1.4.10.0
- Redis for Pivotal CF: v1.4.12.0
- MySQL for Pivotal Cloud Foundry: v1.7.6.1

At the bottom, there are links for "Import a Product", "Download PCF compatible products at Pivotal Network", and "Recent Install Logs". The footer includes the copyright notice "PCF Ops Manager v1.5.2.0 © 2015 Pivotal Software, Inc. All Rights Reserved." and a link to the "End User License Agreement".

Platform Runtime – Application Centric



Platform Runtime - Apps Manager

- Manage Organizations, users, applications and Spaces
- Monitor applications logs, services and routes
- Access Service Marketplace, create services and bind to applications

The screenshot shows the Pivotal CF Apps Manager interface for the organization 'pivotalcf-demo'. The top navigation bar includes the Pivotal CF logo, the organization name 'pivotalcf-demo', and a user dropdown labeled 'admin'. The main dashboard displays the following information:

- QUOTA:** 2% (2.63 GB of 100 GB Limit)
- Org Members:** 14 Members
- Spaces:** 4 Spaces (1 - Development, 2 - Testing, 3 - Staging, 4 - Production)
- Domains:** 1 Domain
- Resources:** 14 Members, 4 Spaces, 1 Domain, 14 Members
- Space Details:**
 - 1 - Development:** APPS 1, SERVICES 0, 0% of Org Quota
 - 2 - Testing:** APPS 1, SERVICES 0, 0% of Org Quota
 - 3 - Staging:** APPS 1, SERVICES 0, 0% of Org Quota
 - 4 - Production:** APPS 2, SERVICES 0, 1% of Org Quota
- Add A Space:** A button to add a new space.

Pivotal Apps Mgr. – App View

The image shows two screenshots of the Pivotal Apps Manager interface. On the left, the 'development' space overview is displayed, showing one running application ('pcf-scale-prod') and its associated services ('auto-scaler' and 'ge-db'). On the right, the detailed view for the 'pcf-scale-prod' application is shown, including configuration (instances: 1, memory: 128MB), status (running, 0% CPU), and recent events (started app). A large green arrow points from the left screenshot to the right one.

- Drill into a space to see all application and services instances
- Then drill into an application to see configuration, status, event, logging, routes, environment variables and service instances bound to the application

Services Marketplace

- Service is an external application dependency or components such as:
 - Database or Message Queue
- Quickly access platform services via marketplace
- Create services instances based on service plans
- Bind Services to Applications

The screenshot shows the Pivotal Web Services Services Marketplace. On the left, there's a sidebar with navigation links: OSG, EastPractice, SPACES (development, jaxenter, jcr, production, staging, Marketplace), Docs, Support, Tools, Blog, Status. The main content area has a header "Services Marketplace" with a sub-header "Get started with our free marketplace services. Upgrade to gain access to premium service plans." Below this, there are several service cards arranged in a grid:

- Searchify: Custom search you control.
- BlazeMeter: The JMeter Load Testing Cloud.
- Redis Cloud: Enterprise-Class Redis for Developers.
- ClearDB MySQL Database: Highly available MySQL for your Apps. (This card is highlighted with a green border and has a large green checkmark icon.)
- CloogdAMQP: Managed HA RabbitMQ servers in the cloud.
- ElephantSQL: PostgreSQL as a Service.
- SendGrid: Email Delivery. Simplified.
- Mongo: Fully managed MongoDB.
- Load Impact: Automation and on-demand performance testing.
- Memcached: Memcached.
- CloudForge: Development Tools In The Cloud.
- Innodb: Scalable MySQL.

On the right side, there's a section titled "ABOUT THIS SERVICE" which says "ClearDB is a reliable, fault tolerant, geo-distributed database-as-a-service for your MySQL powered applications." It includes a "Documentation | Support" link. Below this, there's a "COMPANY" section for SuccessBricks, Inc. DBA ClearDB. A "SERVICE PLANS" table lists four plans:

Service Plan	Cost
Spark DB	free
Boost DB	\$10.00/MONTH
Amp DB	\$50.00/MONTH
Shock DB	\$100.00/MONTH

Under "PLAN FEATURES", there are several checked items: Price: FREE!, DB size up to 5 MB, Connections: 4, I/O Performance: Low, Daily Backups, and Perfect for proof-of-concept and initial development. At the bottom right is a "Select this plan" button.

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 EST

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

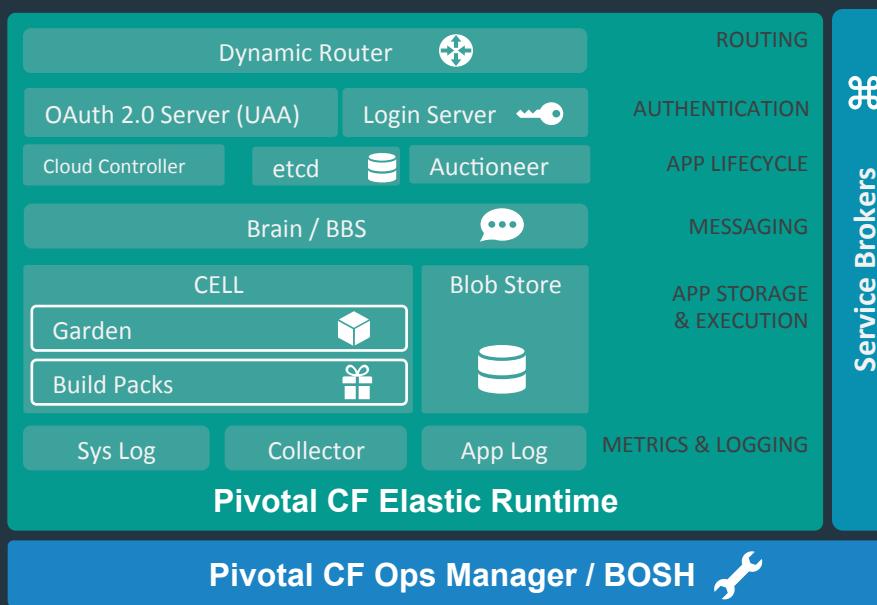
  push                                        Push a new app or sync changes to an existing app
  scale                                       Change or view the instance count, disk space limit, and memory limit for an app
  delete                                      Delete an app
  rename           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

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

A dark, atmospheric photograph showing the silhouettes of many people walking through a modern building with large glass windows. The floor reflects the light from the windows, creating a bright path of reflections. The overall mood is mysterious and architectural.

PCF ARCHITECTURE

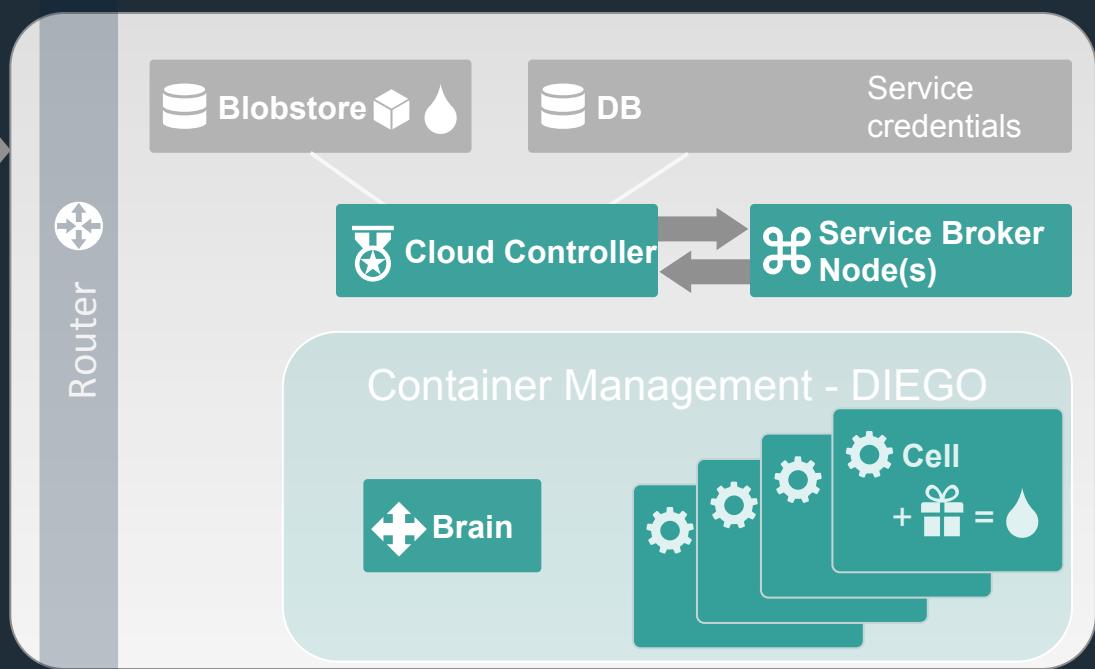
Elastic Runtime Architecture



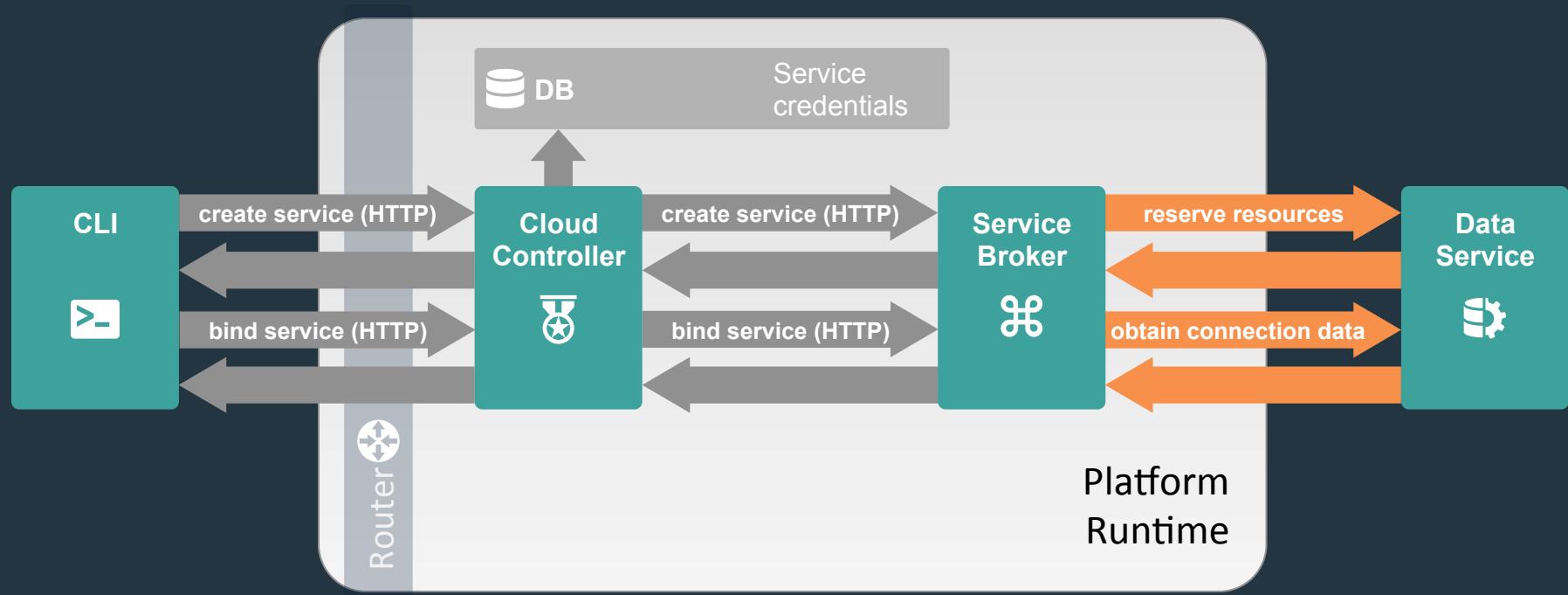
- Turnkey, Fully automated Cloud Native Platform
- Scalable runtime environment, extensible to modern framework and languages
- Instant scalable with updates and upgrades with no downtime
- Deploy, scale and manage applications with services

Deploying an Application

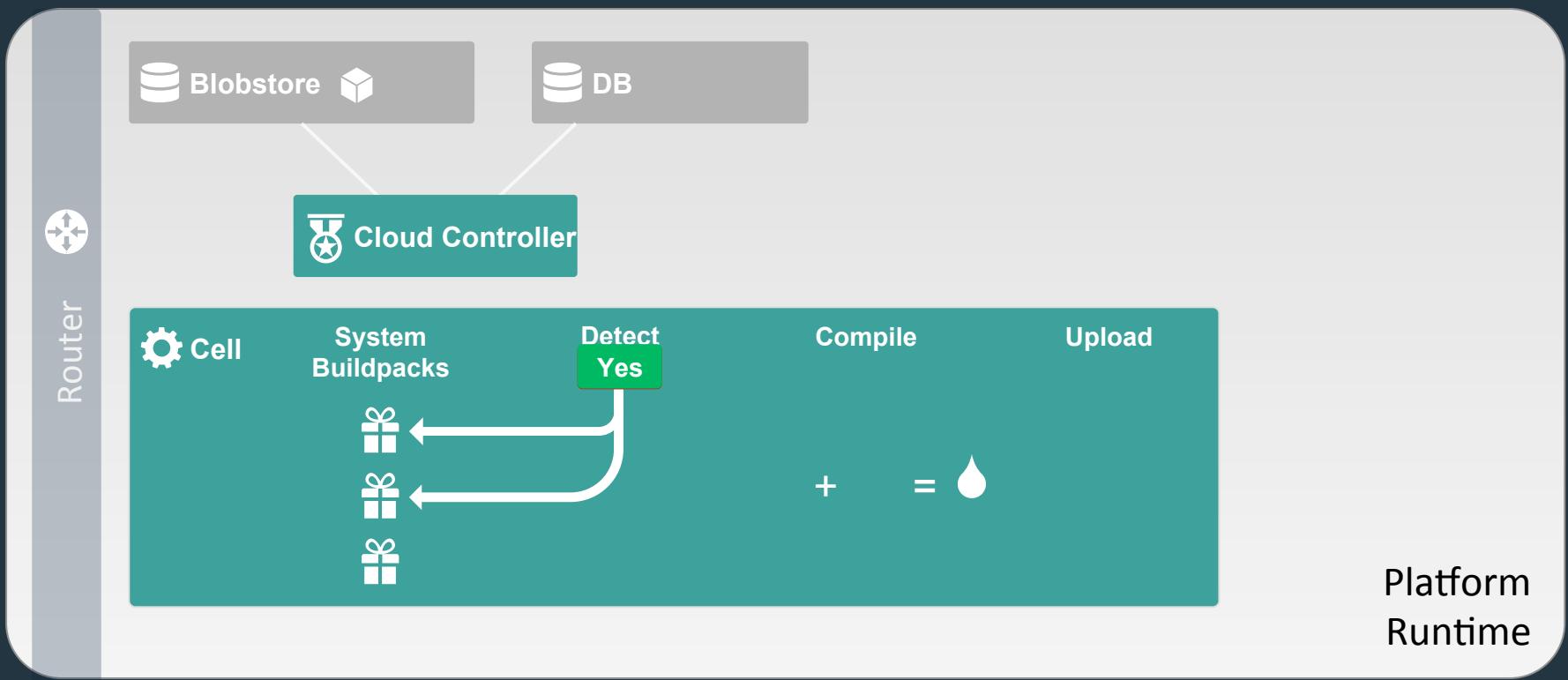
1. Upload app bits and metadata
2. Create and bind services
3. Stage application
4. Deploy application
5. Manage application health



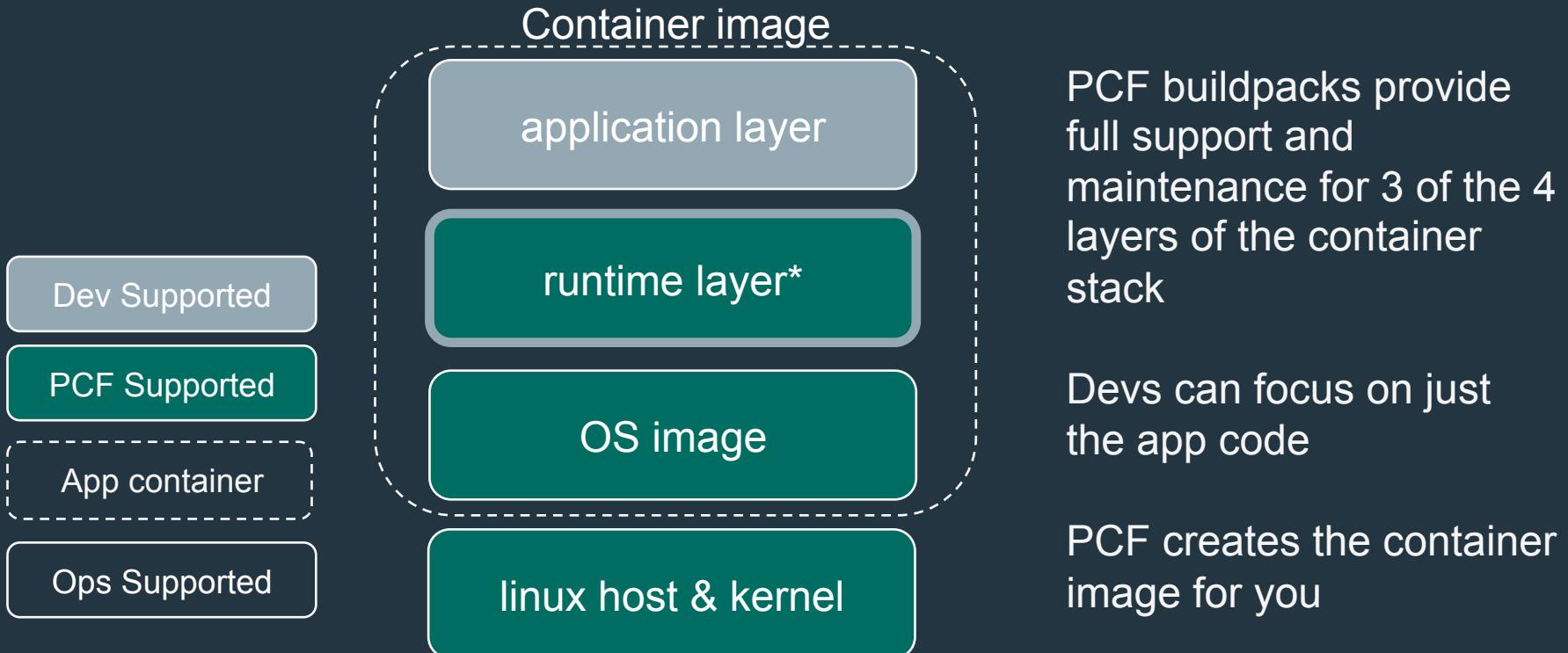
Creating and binding services



Staging an Application

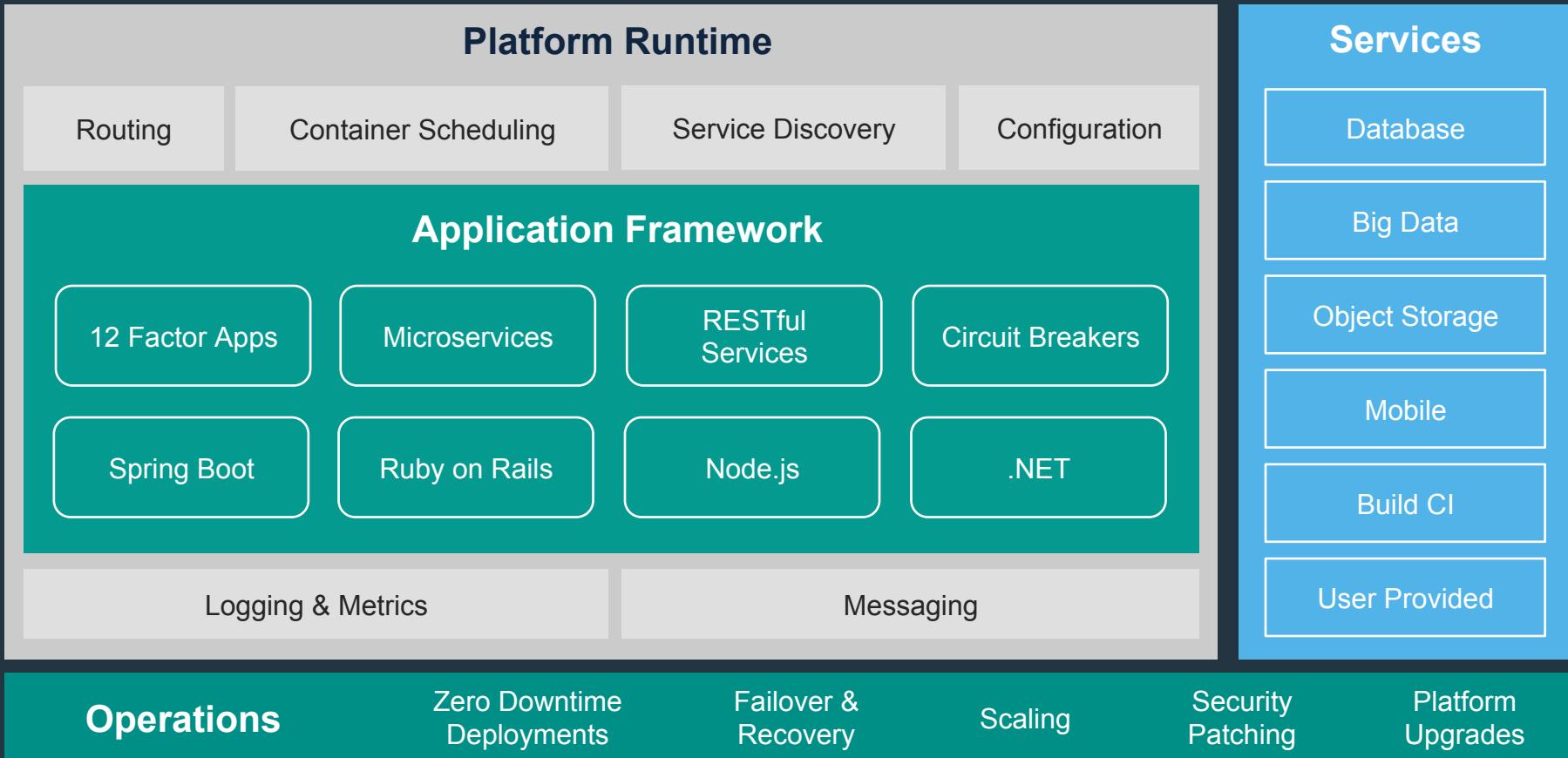


Platform Runtime – Application Frameworks



* Devs may bring a custom buildpack

Pivotal Cloud Foundry Architecture





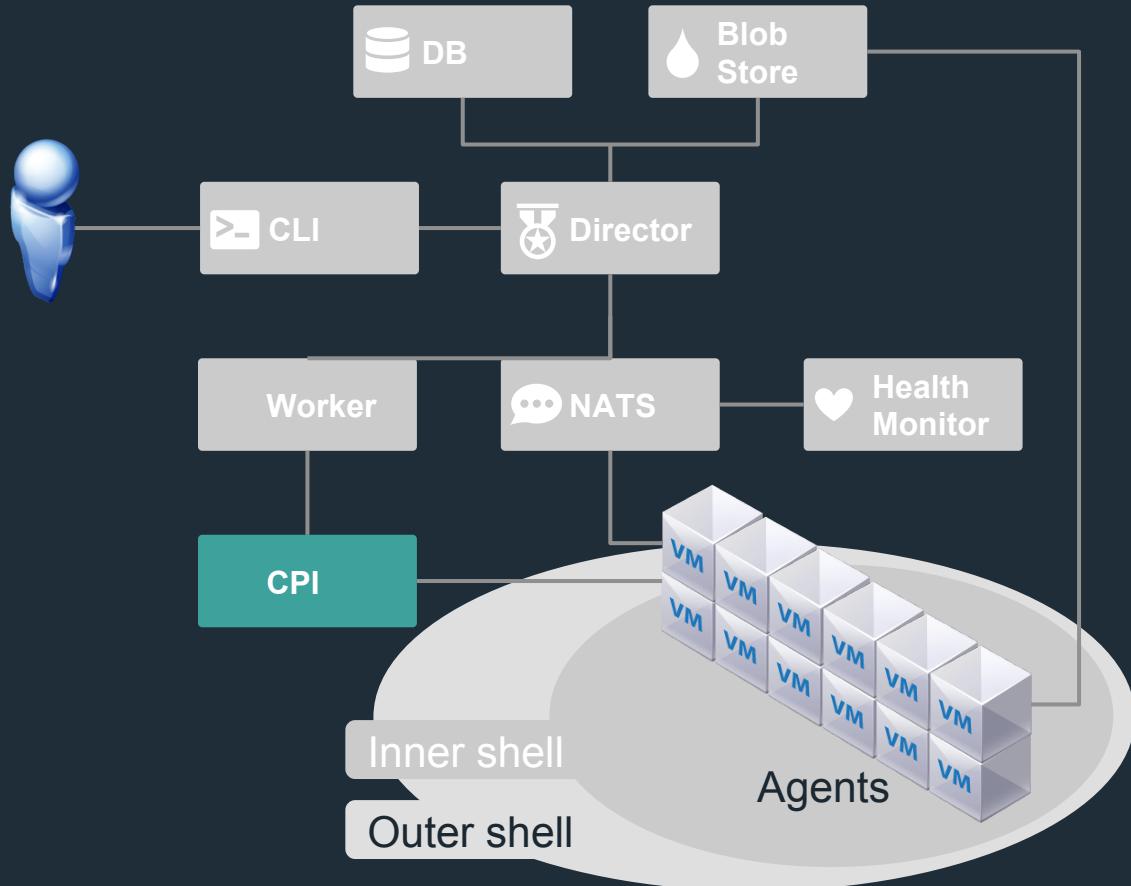
BOSH BASICS AND ARCHITECTURE

BOSH

“BOSH is an open-source tool chain for release engineering, deployment and lifecycle management of large-scale distributed services”

What is Bosh?

- Unifies release engineering, deployment, and lifecycle management large-scale cloud software.
- BOSH can provision and deploy software over hundreds of VMs.
- BOSH supports multiple Infrastructure as a Service (IaaS) providers like VMware vSphere, vCloud Director, Amazon Web Services EC2, and OpenStack
- It performs monitoring, failure recovery, and software updates with zero-to-minimal downtime.

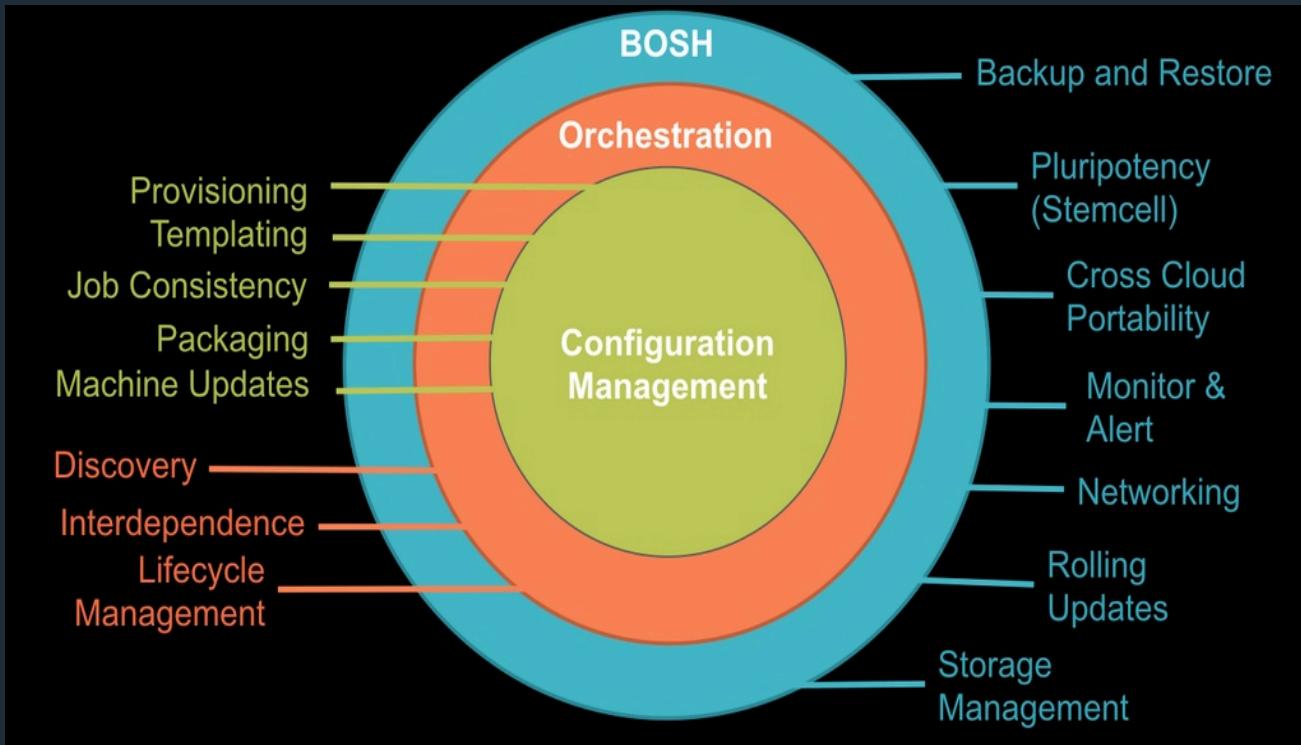


What problem is BOSH trying to Solve? 4 Principles of Modern Release Engineering

- **“Identifiability”** – Being able to identify all of the source, tools, environment, and other components that make up a particular release
- **Reproducibility** – The ability to integrate source, third party components, data and deployment externals of a software system in order to guarantee operational stability.
- **Consistency** – The mission to provide a stable framework for development, deployment, audit, and accountability for software components.
- **Agility** – The ongoing research into what are the repercussions of modern software engineering practices on the productivity in the software cycle. i.e Continuous Integration

Why BOSH?

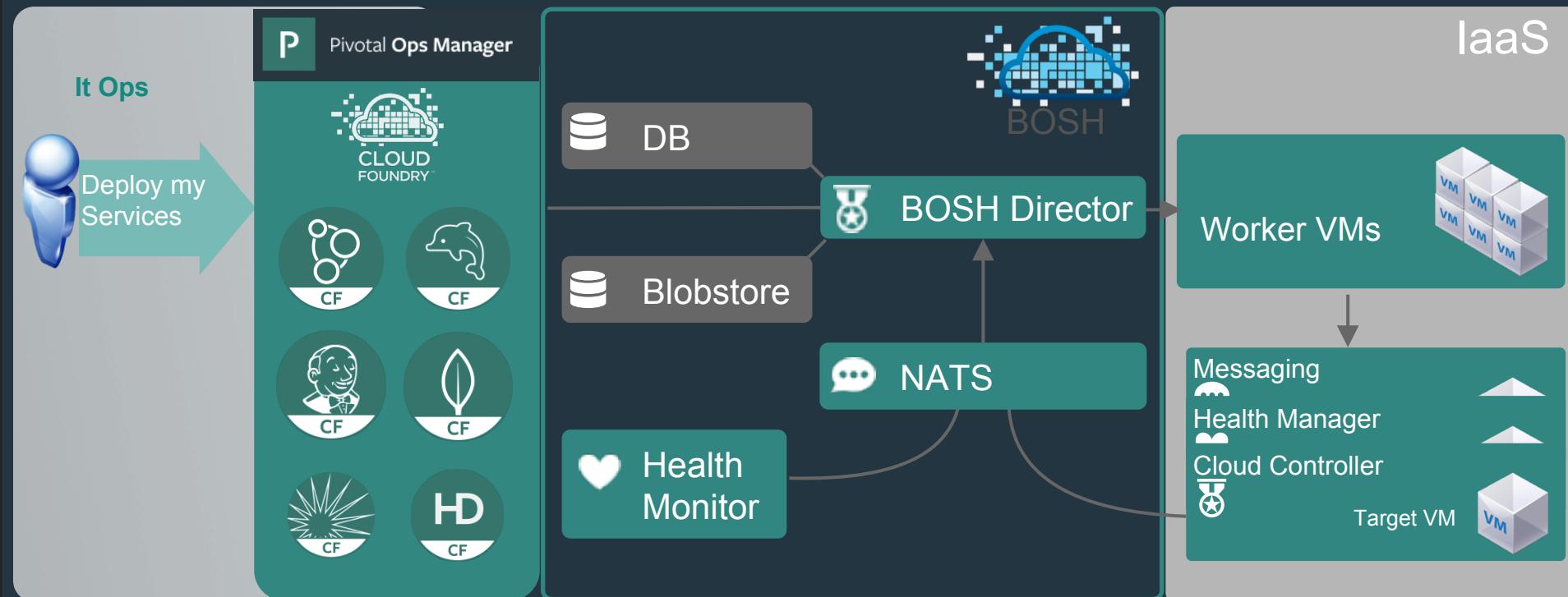
- Provision services, not machines
- Enables Continuous Delivery
- Cloud-agnostic view of Ops Platform
- Holistic Toolchain for “rule them all”
- Eliminate bespoke automation on top of config management



BOSH key terms

- **Stemcell** – is a versioned Operating System image wrapped with IaaS specific packaging. Contains the bare minimum OS skeleton with BOSH agent and few configuration files to securely configure the OS by default.
- **Release** – is a versioned collection of configuration properties, configuration templates, start up scripts, source code, binary artifacts, and anything else required to build and deploy software in a reproducible way.
- **Deployment** – is a collection of VMs, built from a stemcell, that has been populated with specific releases and disks that keep persistent data. These resources are created based on a manifest file in the IaaS and managed by BOSH Director, a centralized management server.

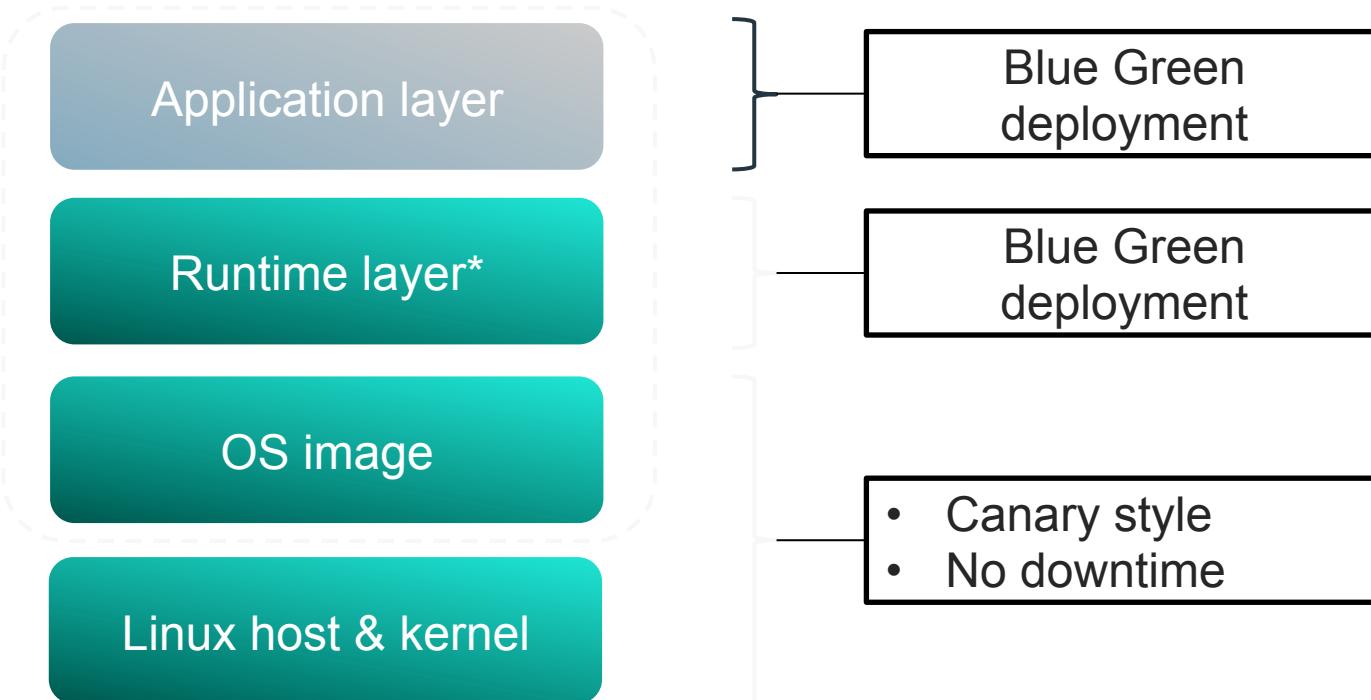
BOSH + Pivotal Ops Manager



Open. Agile. Cloud-Ready.

Pivotal.

Each Layer Upgradable with Zero Downtime

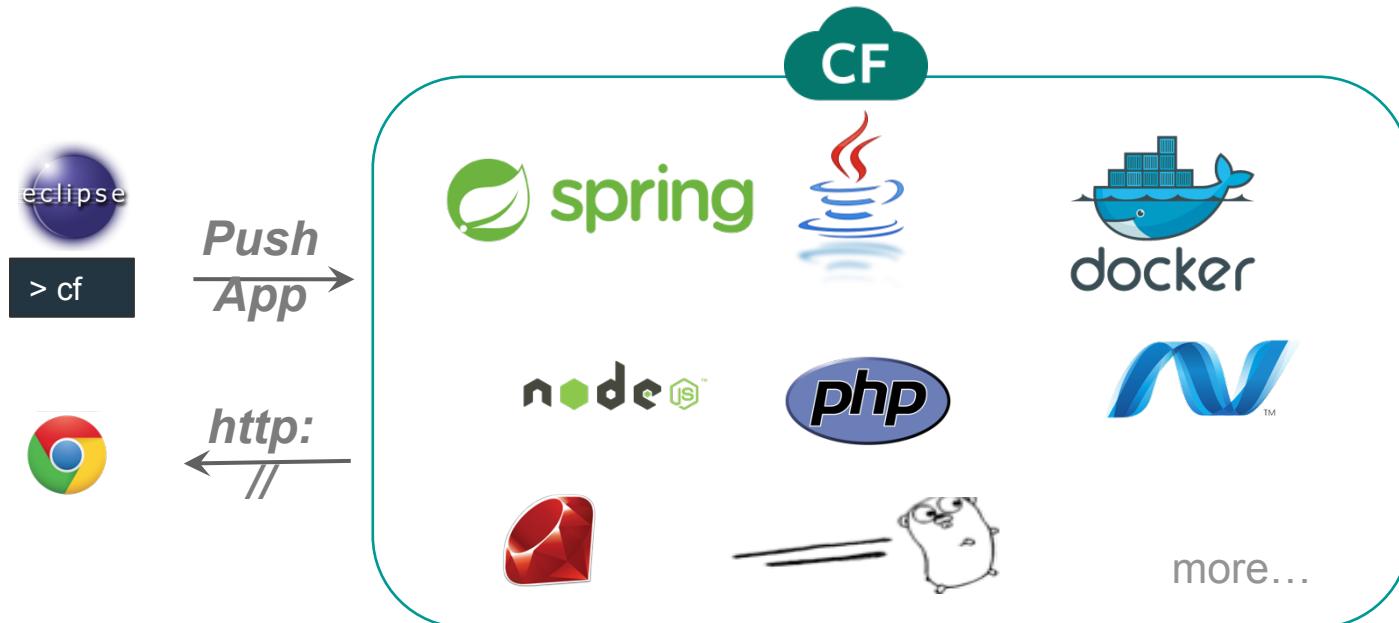


Fuel cloud native transformation

Business differentiating functionality deployed daily, hourly, continuously...

Provision Runtime Resources	Seconds
Container Orchestration	Built-in
Vertical and horizontal scaling	Seconds
Capacity management	Seconds
Design for failure, Self healing	Automatic
Patching and Upgrades	In-flight
Metering	Dynamic

Rapid self service provisioning



Push app and it just works

BOSH: Cloud Provider Interface

Stemcell

```
create_stemcell(image, cloud_properties)  
delete_stemcell(stemcell_id)
```

VM

```
create_vm(agent_id, stemcell_id, resource_pool,  
          networks, disk_locality, env)  
delete_vm(vm_id)  
reboot_vm(vm_id)  
configure_networks(vm_id, networks)
```

Disk

```
create_disk(size, vm_locality)  
delete_disk(disk_id)  
attach_disk(vm_id, disk_id)  
detach_disk(vm_id, disk_id)
```

IaaS Neutral



BOSH: Cloud Provider Interface

Stemcell

```
create_stemcell(image, cloud_properties)  
delete_stemcell(stemcell_id)
```

VM

```
create_vm(agent_id, stemcell_id, resource_pool,  
          networks, disk_locality, env)  
delete_vm(vm_id)  
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```

Disk

```
create_disk(size, vm_locality)  
delete_disk(disk_id)  
attach_disk(vm_id, disk_id)  
detach_disk(vm_id, disk_id)
```

IaaS Neutral



Managed Services

Managed Services are integrated with Cloud Foundry by implementing a documented API for which the cloud controller is the client

Service Broker is a component which implements the required API.

- Service brokers advertise a catalog of service offerings and service plans to Cloud Foundry, and receive calls from the Cloud Controller for five functions: fetch catalog, create, bind, unbind, and delete.

User Provided Service Instances

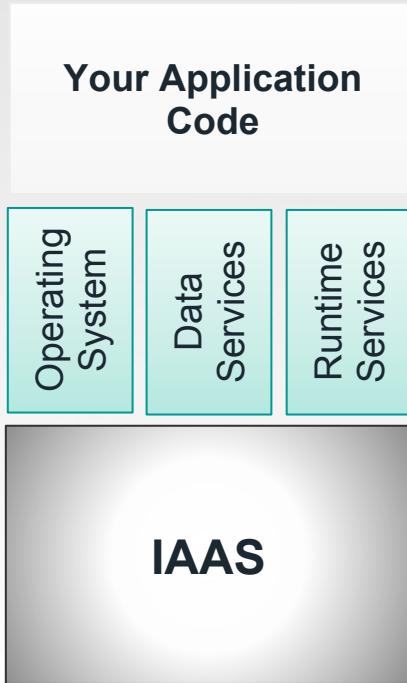
User-provided service instances are service instances which have been provisioned outside of Cloud Foundry

- Behave like other service instances once created
- Familiar commands ('create-service') provide service instance configuration (including credentials) to applications, eliminating the need to hard code service instance endpoints

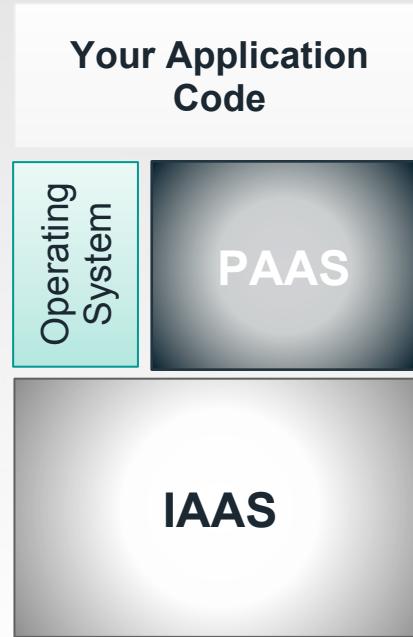
EXAMPLE: AN ORACLE DATABASE MANAGED OUTSIDE OF, AND UNKNOWN TO CLOUD FOUNDRY

The Evolution of Cloud Technologies

TRADITIONAL



IAAS



CLOUD-NATIVE

