

Pivotal.

Pivotal Cloud Foundry Basics and Architecture 301

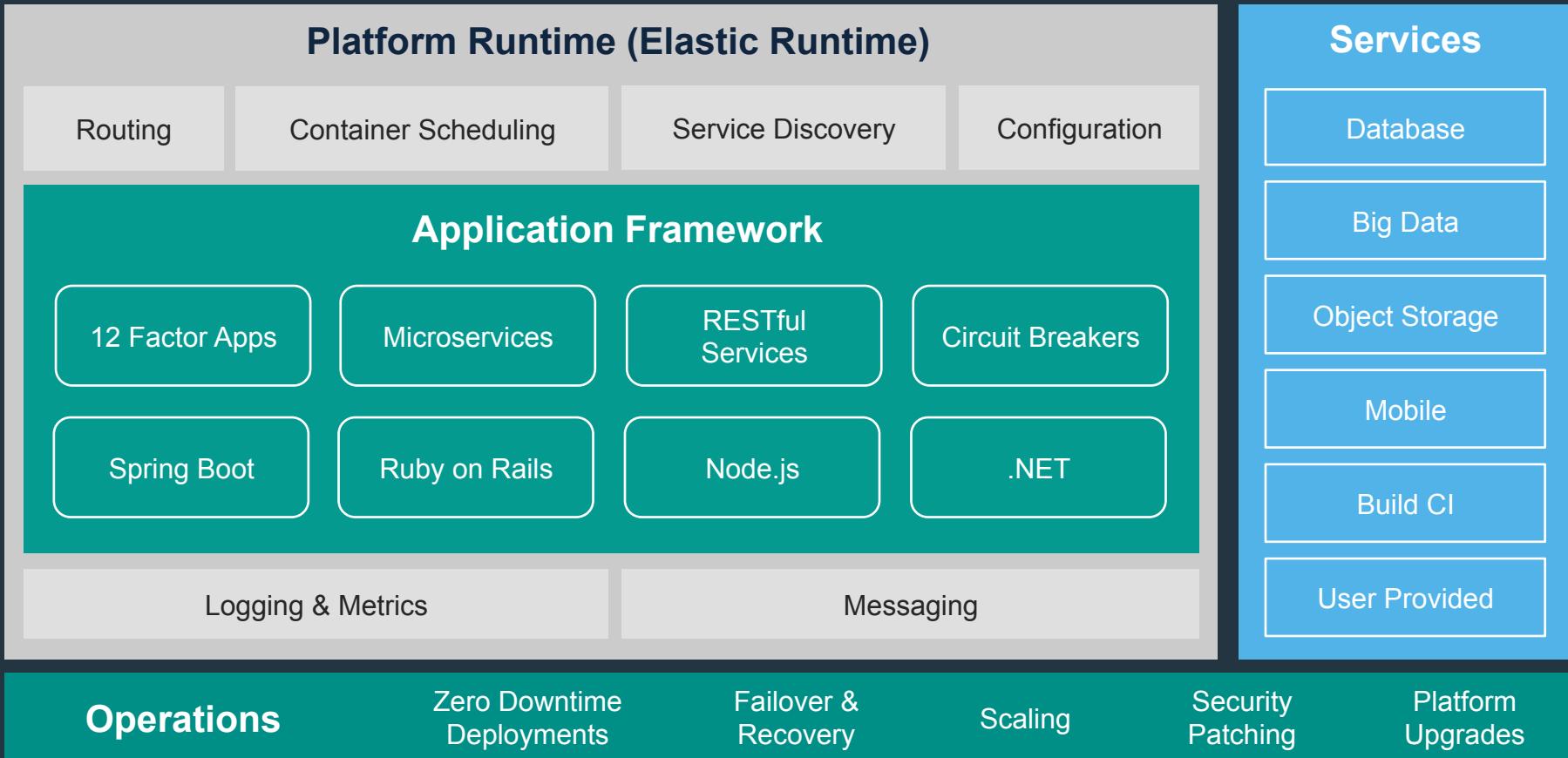
Draft 1

- Still awaiting feedback from complete SME team

Agenda

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

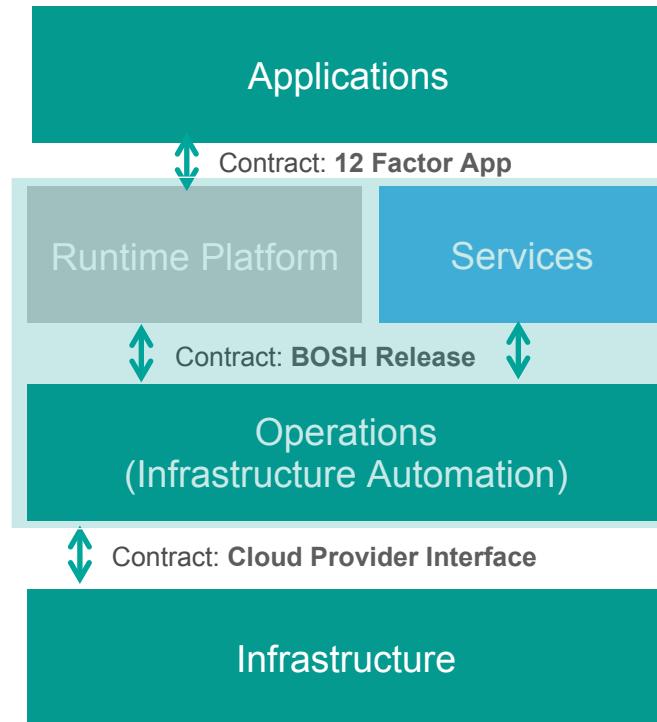
Pivotal Cloud Foundry Architecture



Roles



Pivotal Cloud Foundry



Tools





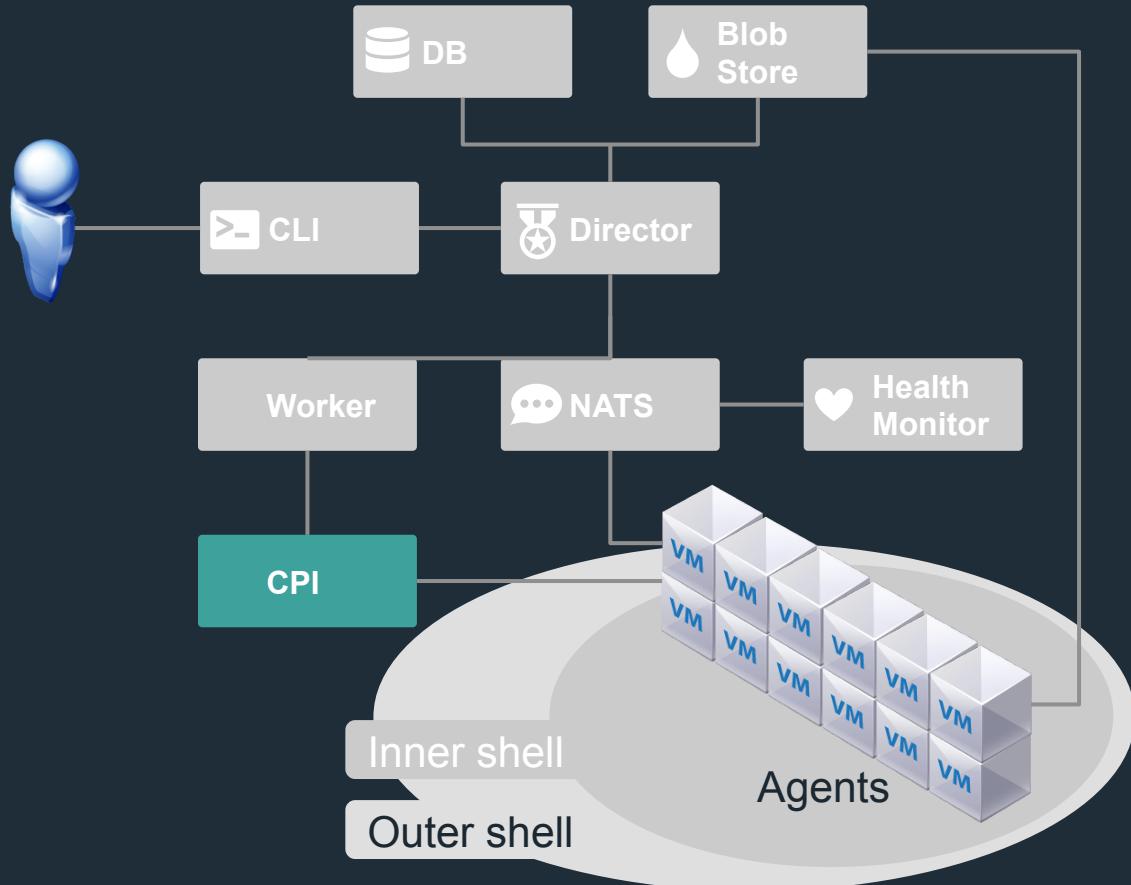
BOSH BASICS AND ARCHITECTURE

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.

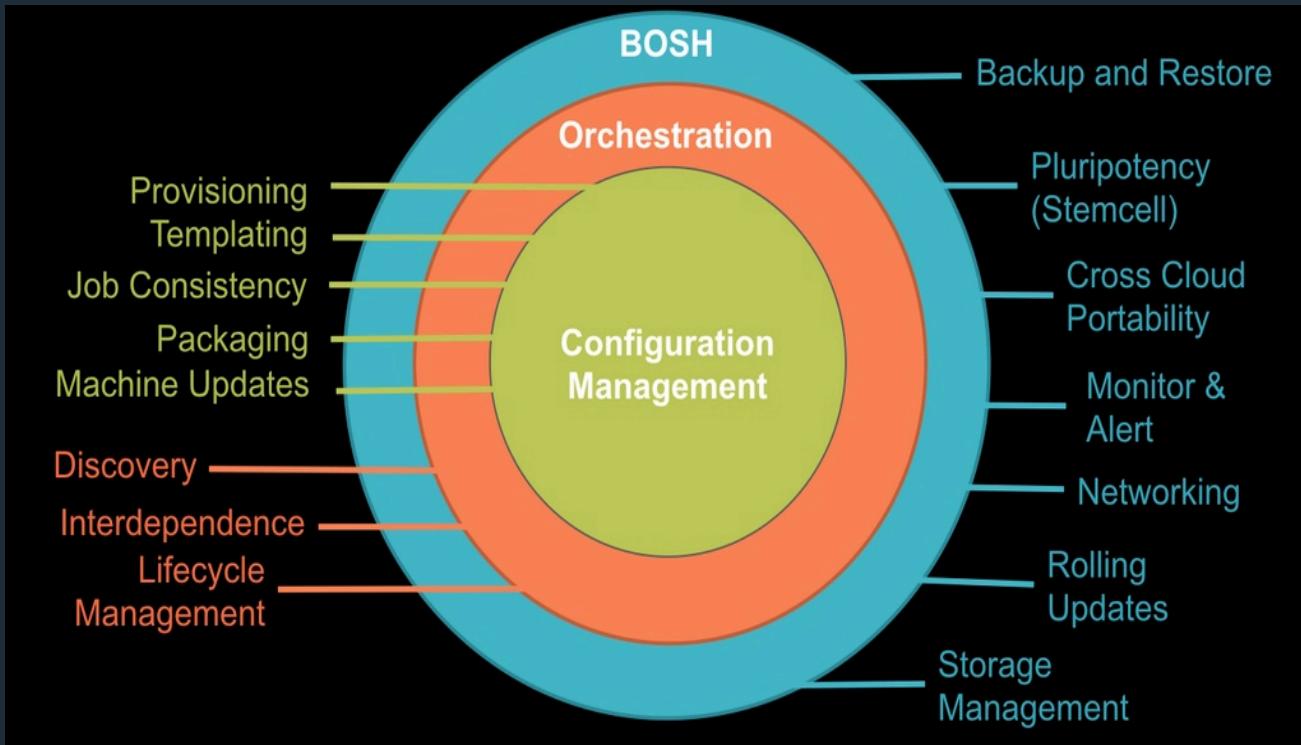


What problem is BOSH trying to Solve? 4 Principles of Modern Release Engineering

- **“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?

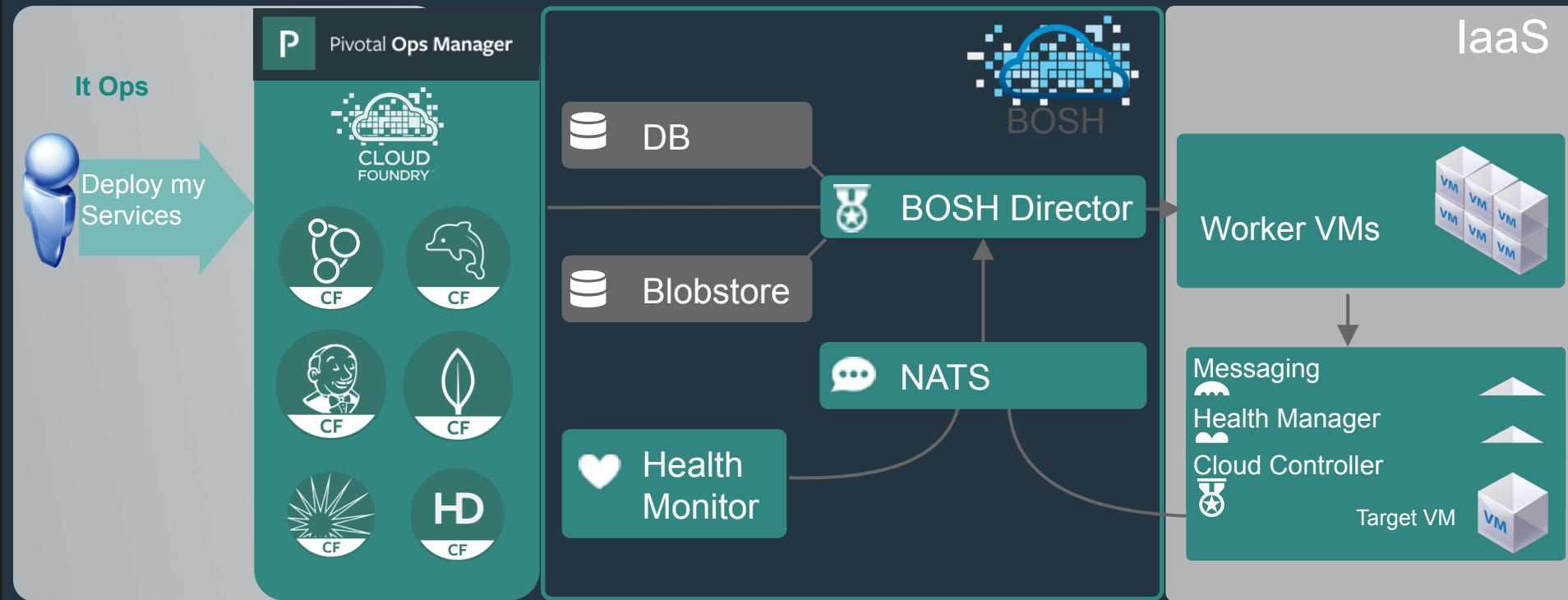
- Provision services, not machines
- Enables Continuous Delivery
- Cloud-agnostic view of Ops Platform
- Holistic Toolchain for “rule them all”
- Eliminate bespoke automation on top of config management



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.

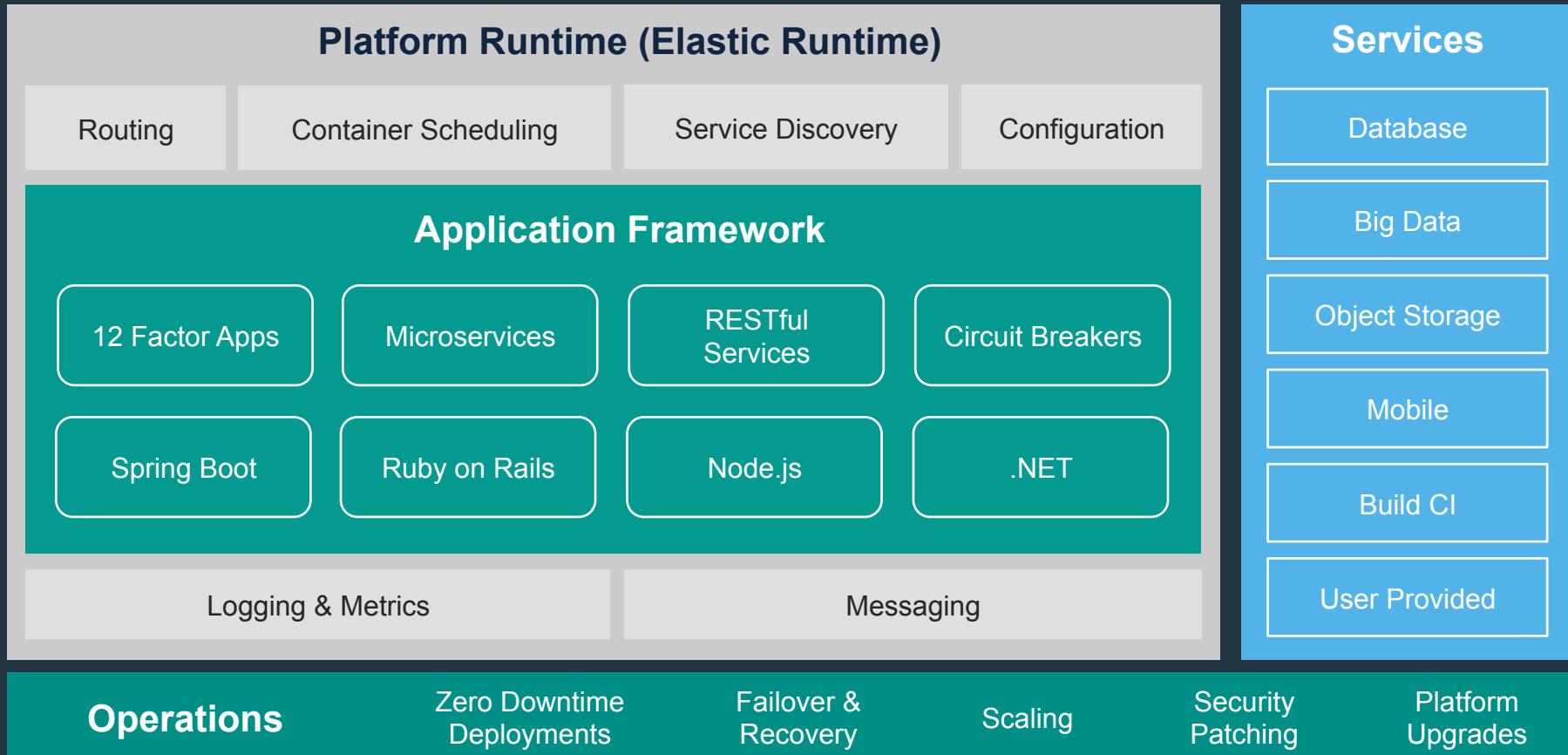
BOSH + Pivotal Ops Manager



A dark, atmospheric photograph of an airport terminal. In the foreground, several silhouetted figures of people are walking across a polished floor. Behind them is a massive, curved glass wall that looks out onto a bright sky and some buildings. The overall mood is mysterious and modern.

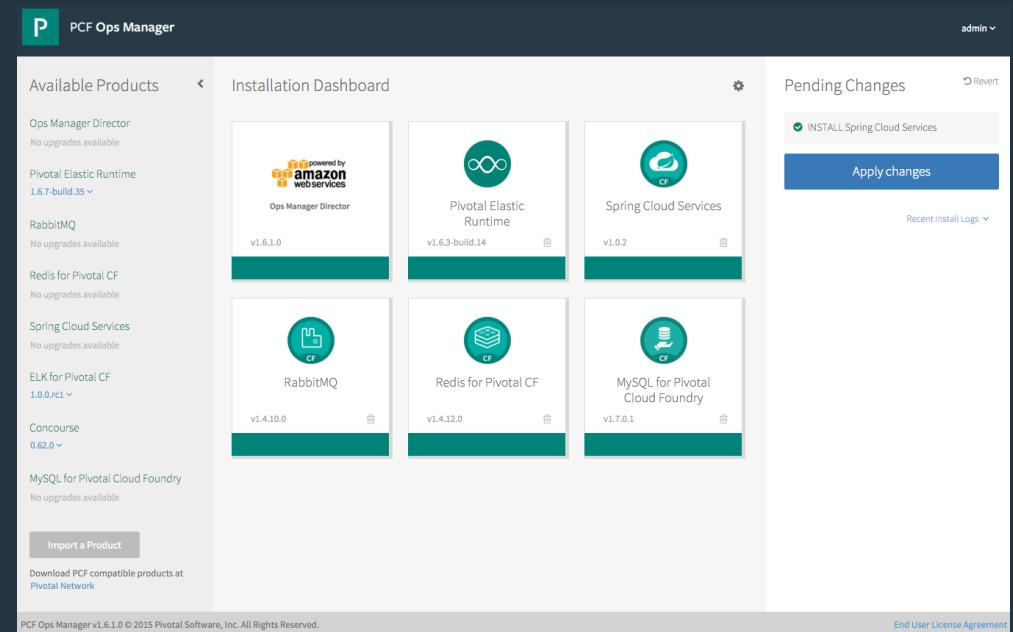
PCF BASICS

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 two views of the PCF Ops Manager interface.

Top View: The "Resource Config" section under "Pivotal Elastic Runtime". It displays a table of component configurations:

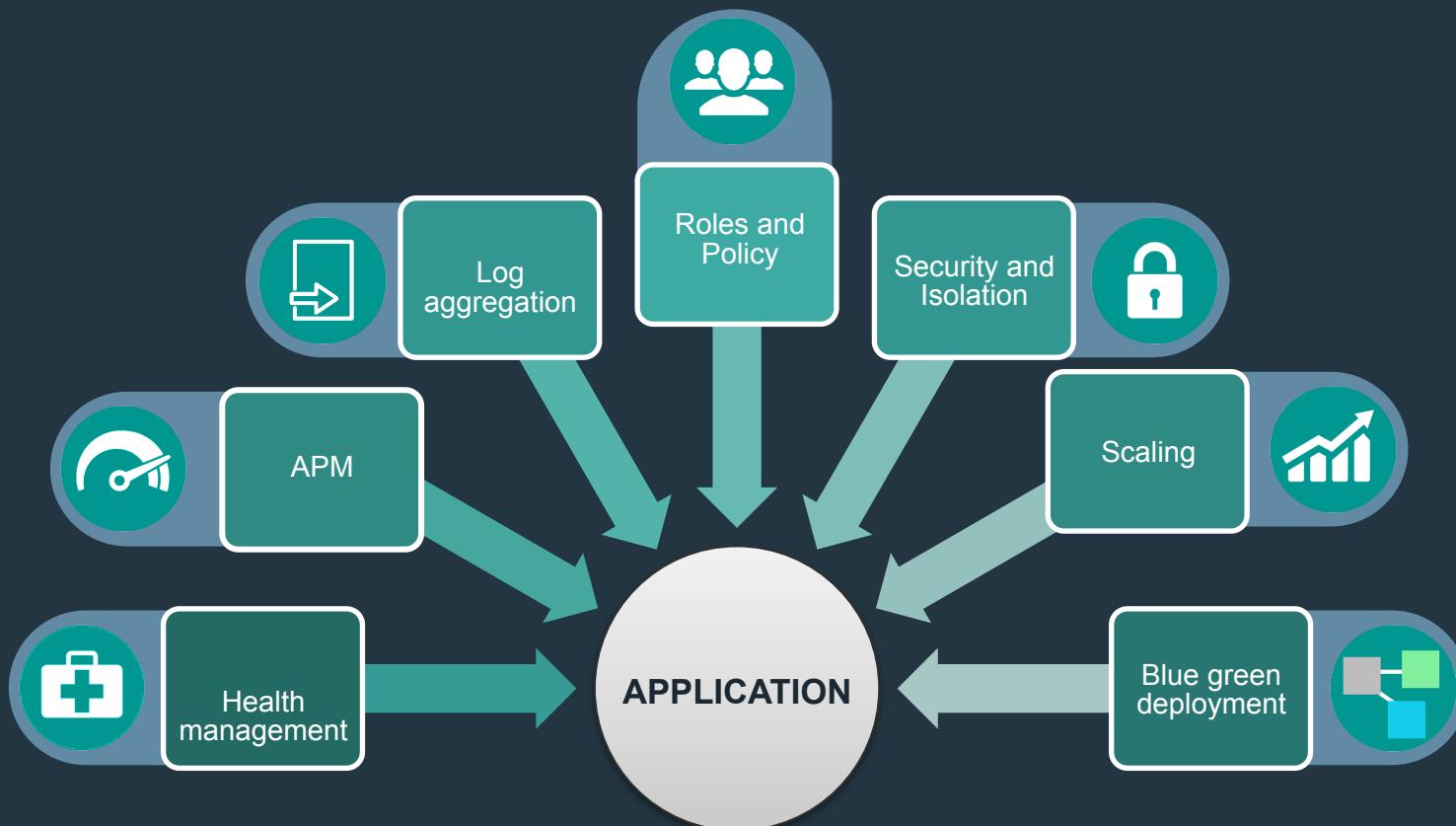
| INSTANCE | CPU | RAM (MB) | EPHEMERAL DISK (MB) | PERSISTENT DISK (MB) |
|----------|-----|----------|---------------------|----------------------|
| 1 | 1 | 1024 | 2048 | 0 |
| 1 | 1 | 1024 | 2048 | 1024 |
| 1 | 1 | 1024 | 2048 | 30960 |
| 1 | 1 | 1024 | 2048 | 2048 |
| 1 | 1 | 1024 | 2048 | 8192 |
| 1 | 1 | 1024 | 2048 | 1024 |

Bottom View: The "Available Products" dashboard. It lists various Pivotal services with their current versions:

- Pivotal Elastic Runtime v1.6.1-build.36
- RabbitMQ v1.4.1.8
- Redis for Pivotal CF v1.0.4-rc1
- Spring Cloud Services v1.0.2
- ELK for Pivotal CF v1.0.4-rc1
- Concourse v6.0.0-v
- MySQL for Pivotal Cloud Foundry v1.4.10.0
- RabbitMQ v1.4.10.0
- Redis for Pivotal CF v1.4.12.0
- MySQL for Pivotal Cloud Foundry v1.7.0.1

This results in updating the deployment manifest followed by a “bosch deploy.”

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 for 'admin'. The main dashboard displays the following information:

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

The left sidebar lists the organization's spaces: 1 - Development, 2 - Testing, 3 - Staging, 4 - Production, and Marketplace. Navigation links at the bottom include Docs, Support, and Tools.

Pivotal Apps Mgr. - App View

The image shows two screenshots of the Pivotal Apps Manager web interface. On the left, the 'development' space overview is displayed, showing one running application ('pcf-scale-prod') and two service instances ('auto-scaler' and 'ge-db'). On the right, the detailed view for the 'pcf-scale-prod' application is shown, including configuration (instances, memory limit, disk limit), status (1 instance running, 128 MB memory, 1 GB disk), 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 area is titled "Services Marketplace" and says "Get started with our free marketplace services. Upgrade to gain access to premium service plans." It lists several services 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.), CloudAMQP (Managed HA RabbitMQ servers in the cloud), ElephantSQL (PostgreSQL as a Service), SendGrid (Email Delivery. Simplified.), Mongo (Fully managed MongoDB), Load Impact (Automated and on-demand performance testing), Memcached (Memcached), CloudForge (Development Tools In The Cloud), Instacart Scaleable (Spark DB, free), Boost DB (\$10.00/MONTH), Amp DB (\$50.00/MONTH), Shock DB (\$100.00/MONTH). To the right, there's a "ABOUT THIS SERVICE" section for ClearDB MySQL Database, which is described as a reliable, fault tolerant, geo-distributed database-as-a-service for MySQL powered applications. It includes a "Documentation | Support" link. Below that is a "COMPANY" section for SuccessBricks, Inc. DBA ClearDB. At the bottom right is a "PLAN FEATURES" list with checkboxes for 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. A "Select this plan" button is at the bottom.

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

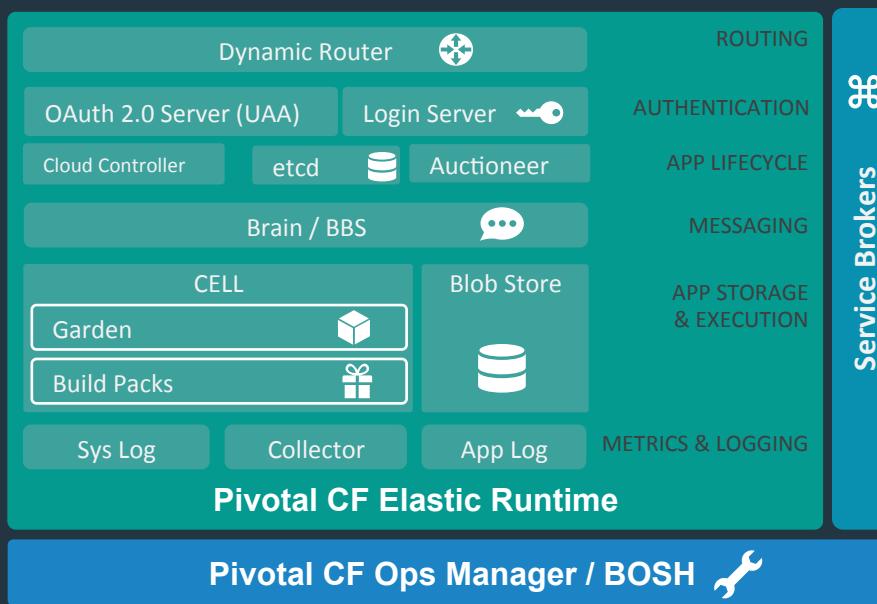
  push                                        Push a new app or sync changes to an existing app
  scale                                       Change or view the instance count, disk space limit, and memory limit for an app
  delete                                      Delete an app
  rename           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

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

A dark, atmospheric photograph of a modern interior space, likely a lobby or public area. The ceiling is a prominent feature, consisting of a large grid of rectangular panels. Silhouettes of several people are visible against the light coming through the windows and the ceiling grid. The floor appears to be polished concrete.

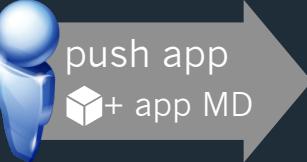
PCF ARCHITECTURE

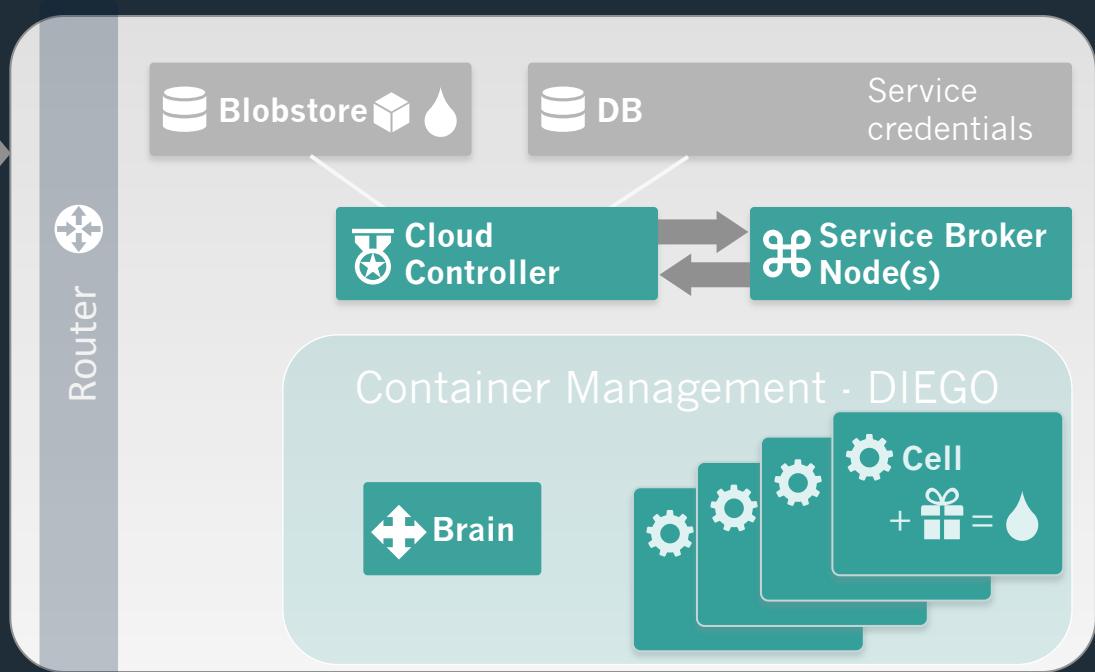
Elastic Runtime Architecture



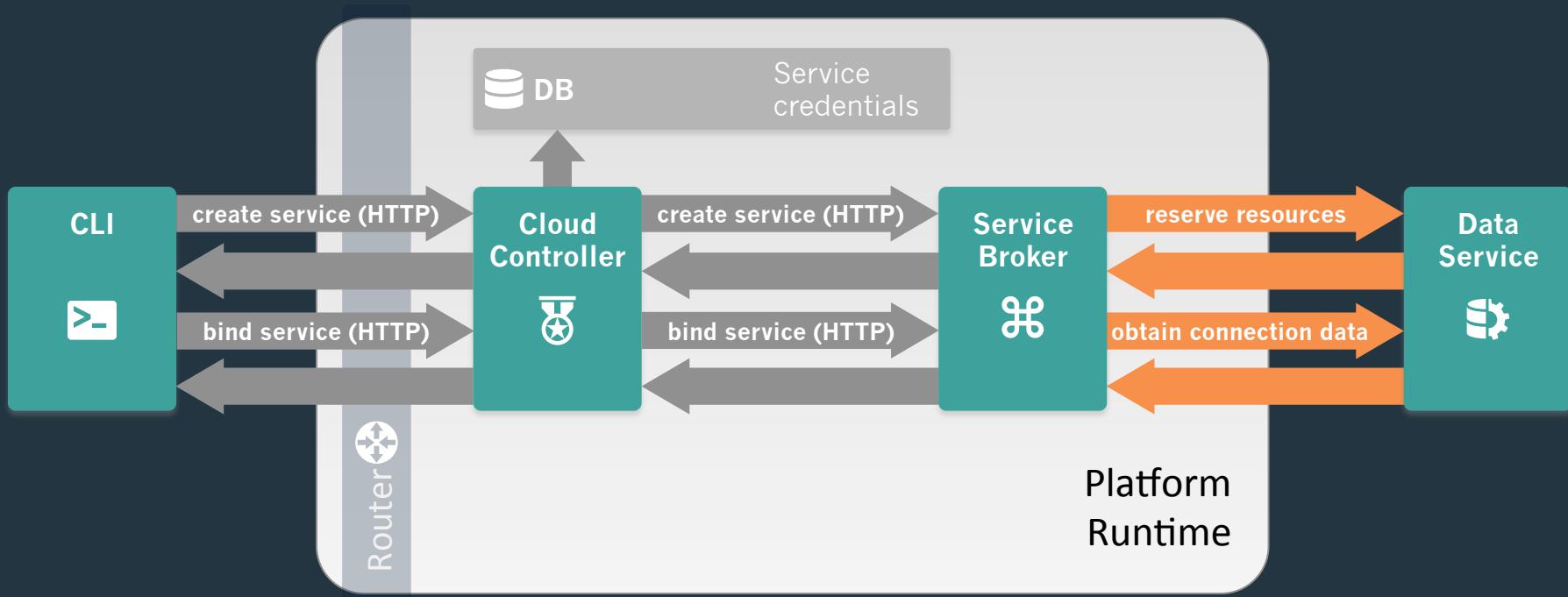
- Turnkey, Fully automated Cloud Native Platform
- Scalable runtime environment, extensible to modern framework and languages
- Instant scalable with updates and upgrades with no downtime
- Deploy, scale and manage applications with services

Deploying an Application

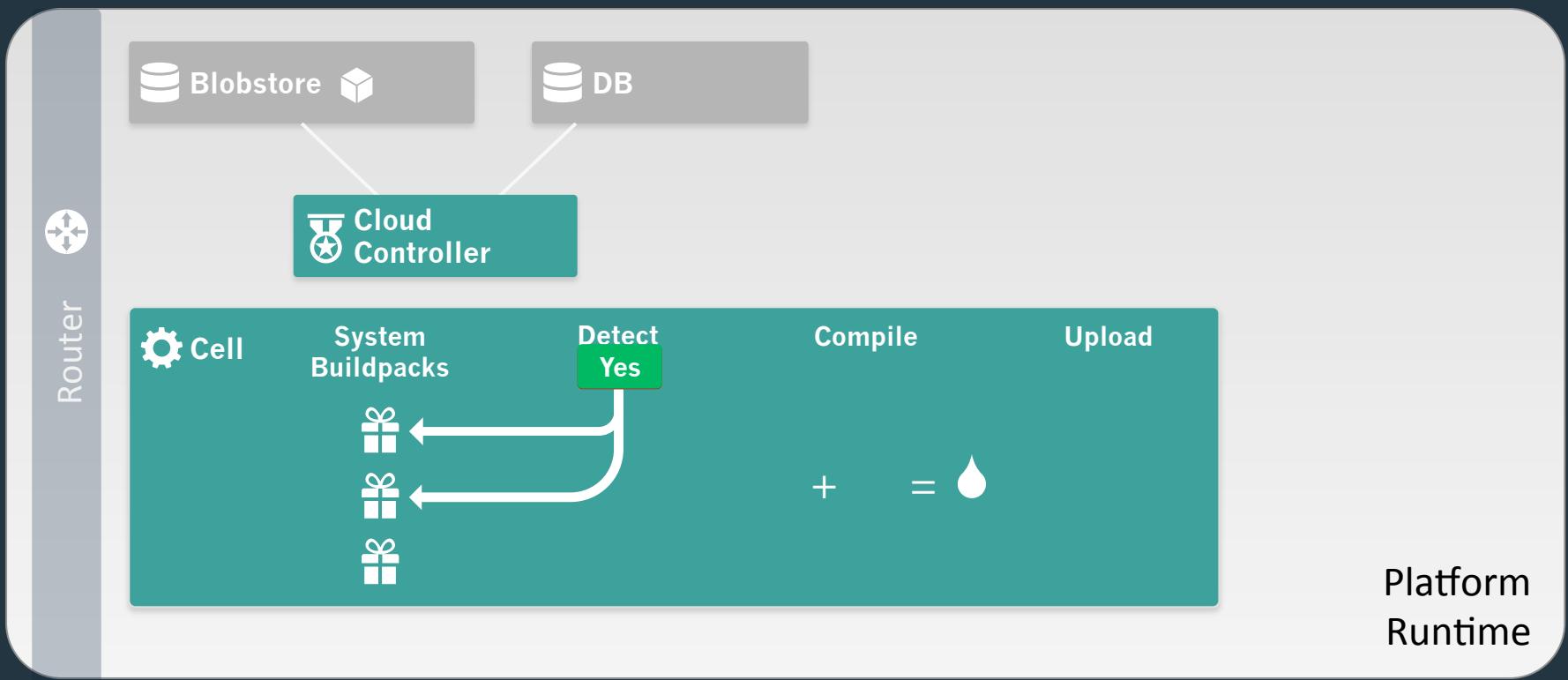
- ① Upload app bits and metadata 
- ② Create and bind services
- ③ Stage application
- ④ Deploy application
- ⑤ Manage application health



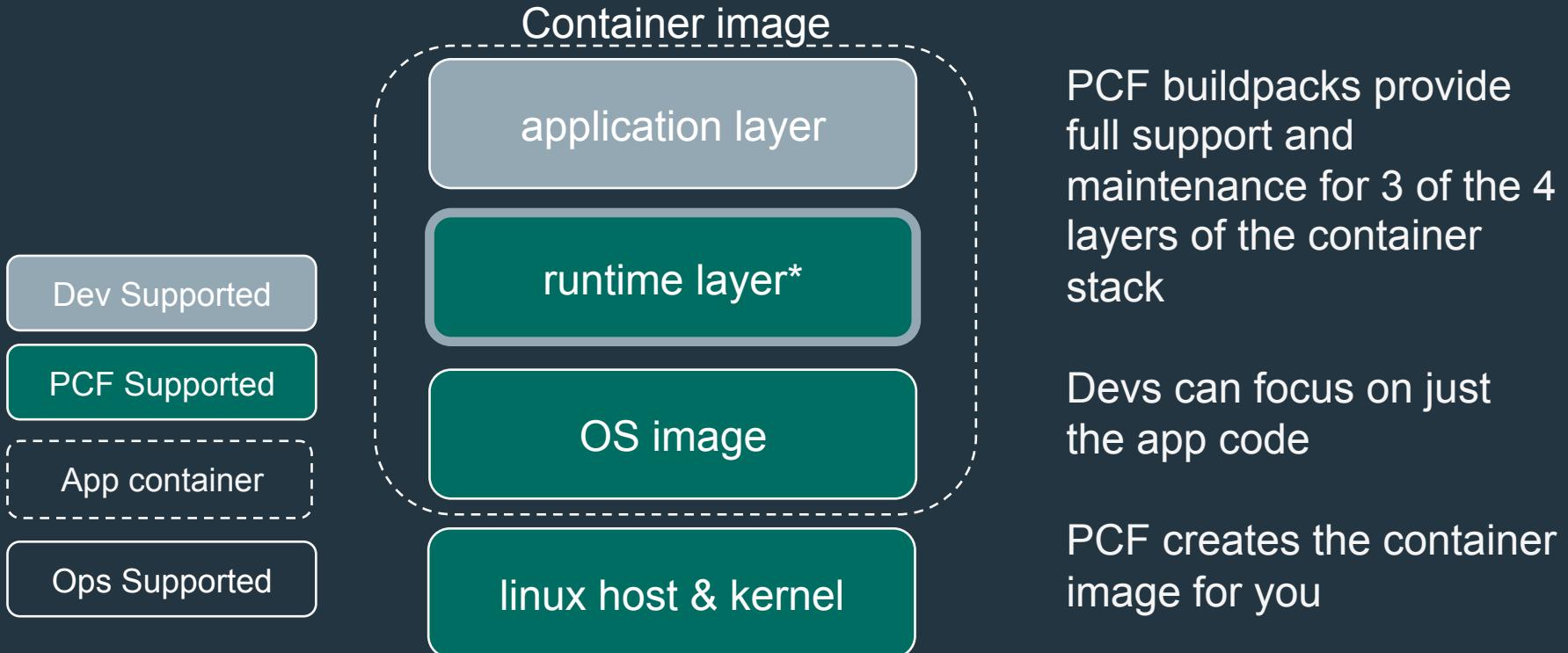
Creating and binding services



Staging an Application

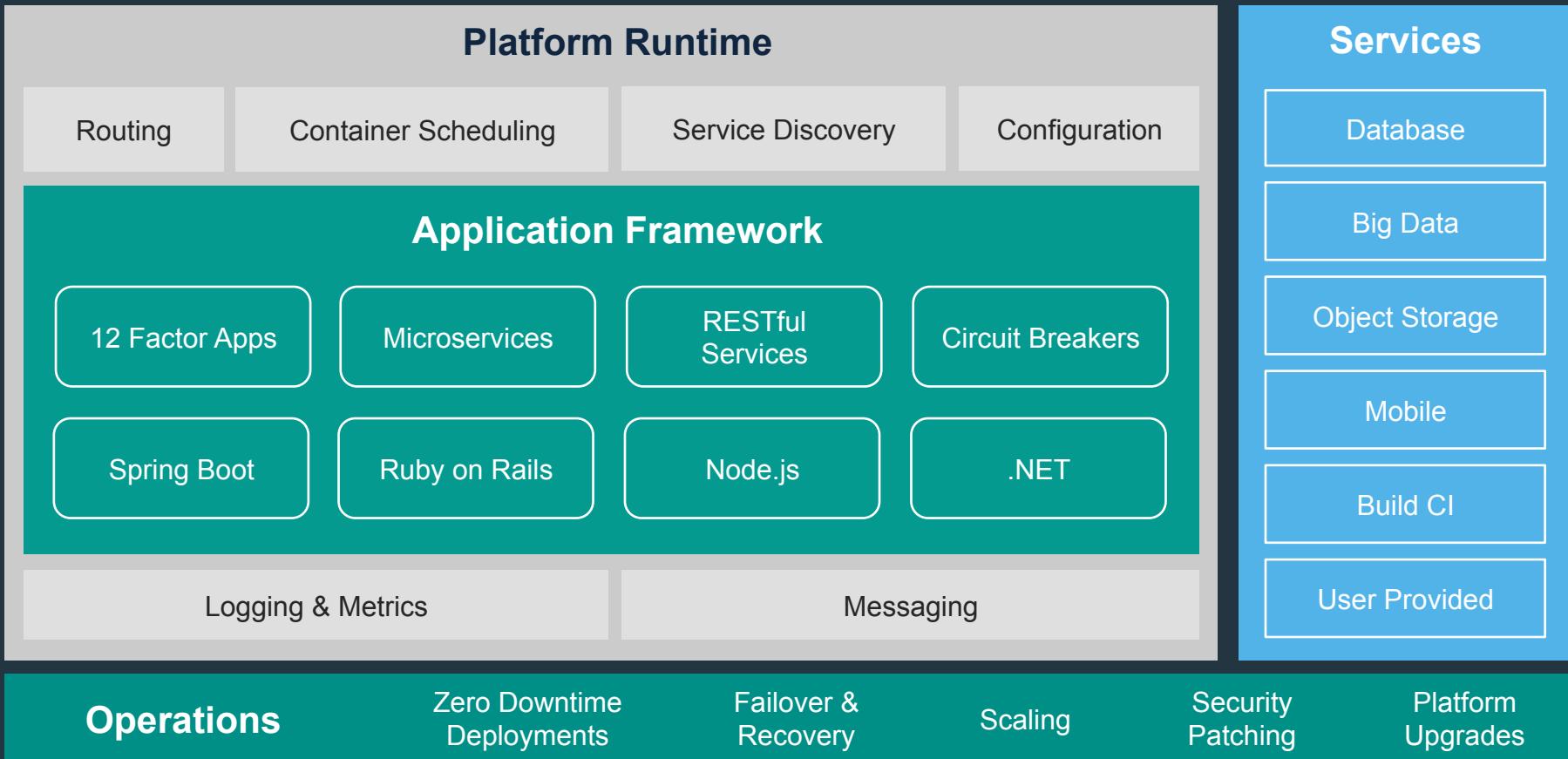


Platform Runtime – Application Frameworks



* Devs may bring a custom buildpack

Pivotal Cloud Foundry Architecture



Open. Agile. Cloud-Ready.

Pivotal.