Pivotal Cloud Foundry

The Cloud Native Platform

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VISION
Transform how the world builds software
Pivotal

What is Pivotal?

Ford Microsoft

EMC² + vmware + GE

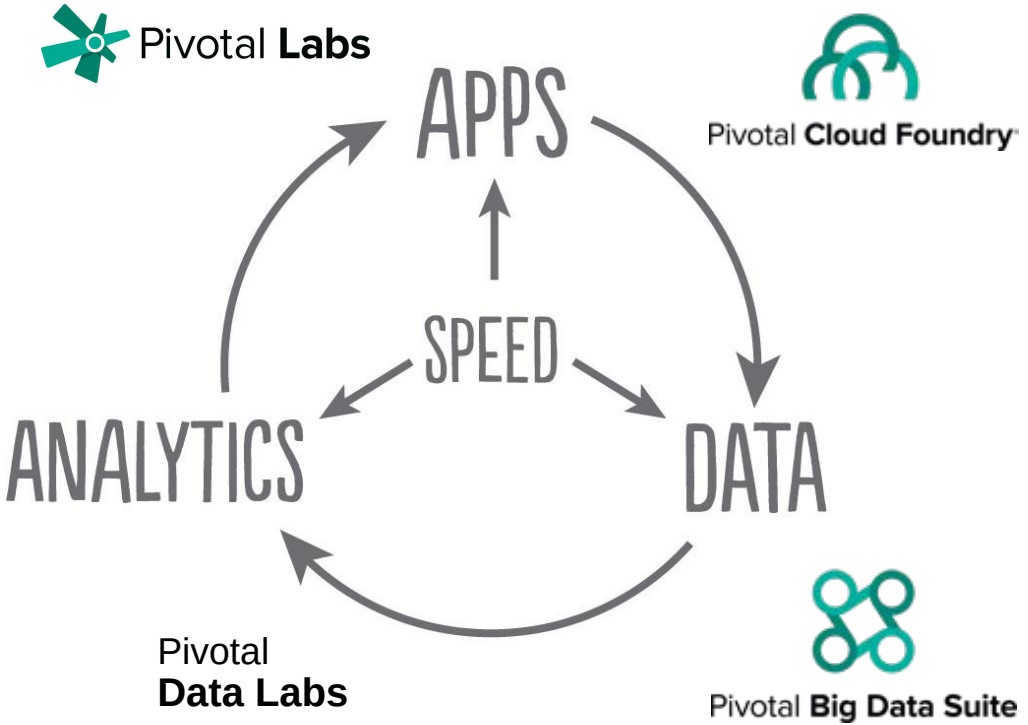
$105M investment for 10%

"SPIN OUT"
(on April 1, 2013)

…to focus on the intersection of big / fast data, cloud native software development and the enablement of continuous delivery

What Matters: Apps, Data and Analytics.

- *Apps power businesses, and those apps generate data*
- *Analytic insights from that data drive new app functionality, which in-turn drives new data*
- *The faster you can move around that cycle, the faster you learn, innovate & pull away from the competition*



Pivotal Cloud Foundry - widely adopted

For example...

The promise of Cloud Native

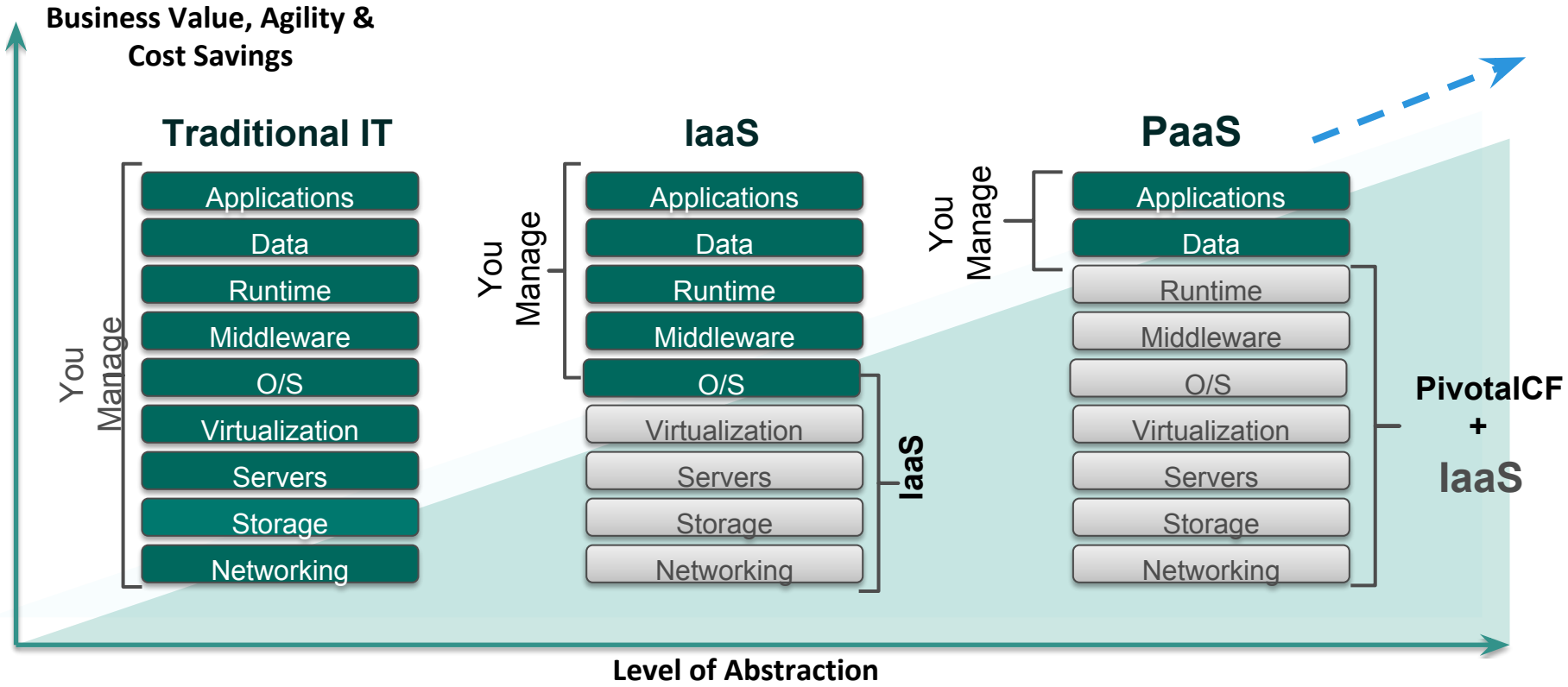
- Deploy new **features** daily to production
- Automate middleware
- Free/Cheap horizontal scaling
- Contract between App & Platform
- Always available

Defining Cloud-Native *(AKA: 'Agility, Agility, Agility')*

Cloud Native is not about **where** you run apps, but **how**

- **'Twelve-Factor' Architecture**
- **Microservices Designs**
- **"Antifragility"**
- **Containers**
- **The Application "Dial Tone"**
- **Cultural Shift from Silo IT to DevOps**

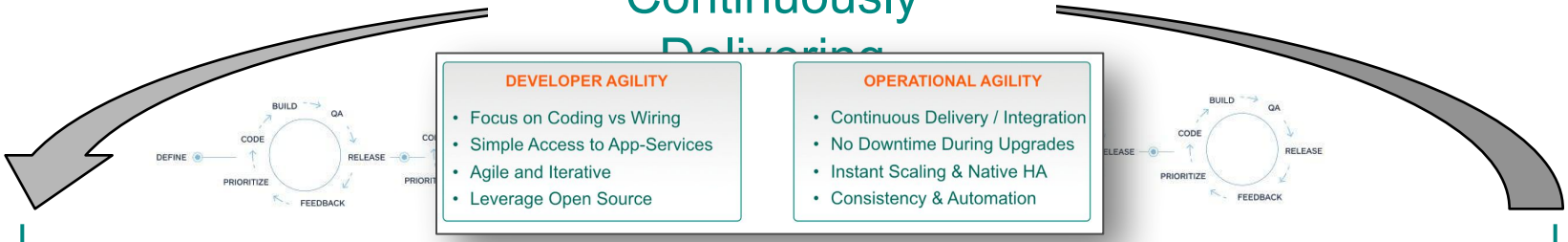
The Cloud Platform Evolution



Software Factory

Agile Development + An Open Platform

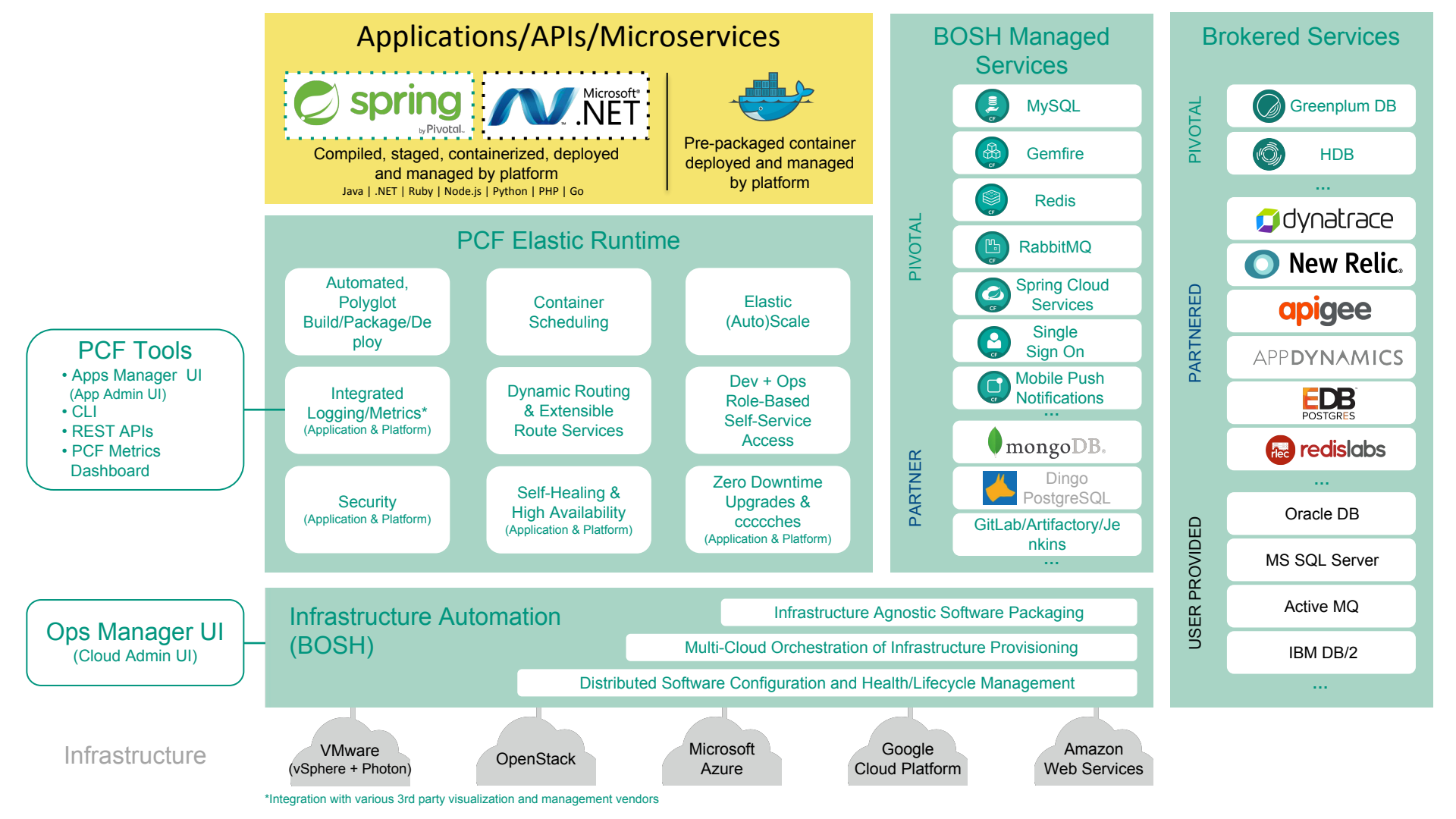
Continuously Delivering



Time to Value

Define → Design → Build → Deploy → Operate

CF Pivotal Cloud Foundry®



*Integration with various 3rd party visualization and management vendors

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Developer's Productivity

The developer dream haiku

Here is my source code,

Run it in the Cloud for me,

I do not care how

Deploying Apps Shouldn't Be Painful (.NET)

Traditional

Provision a VM, IP, DNS
Install IIS
Install .NET FWK

Deploy Application

Configure Load Balancer

Configure SSL Termination

Configure Firewall

Configure Monitoring

Configure Logging

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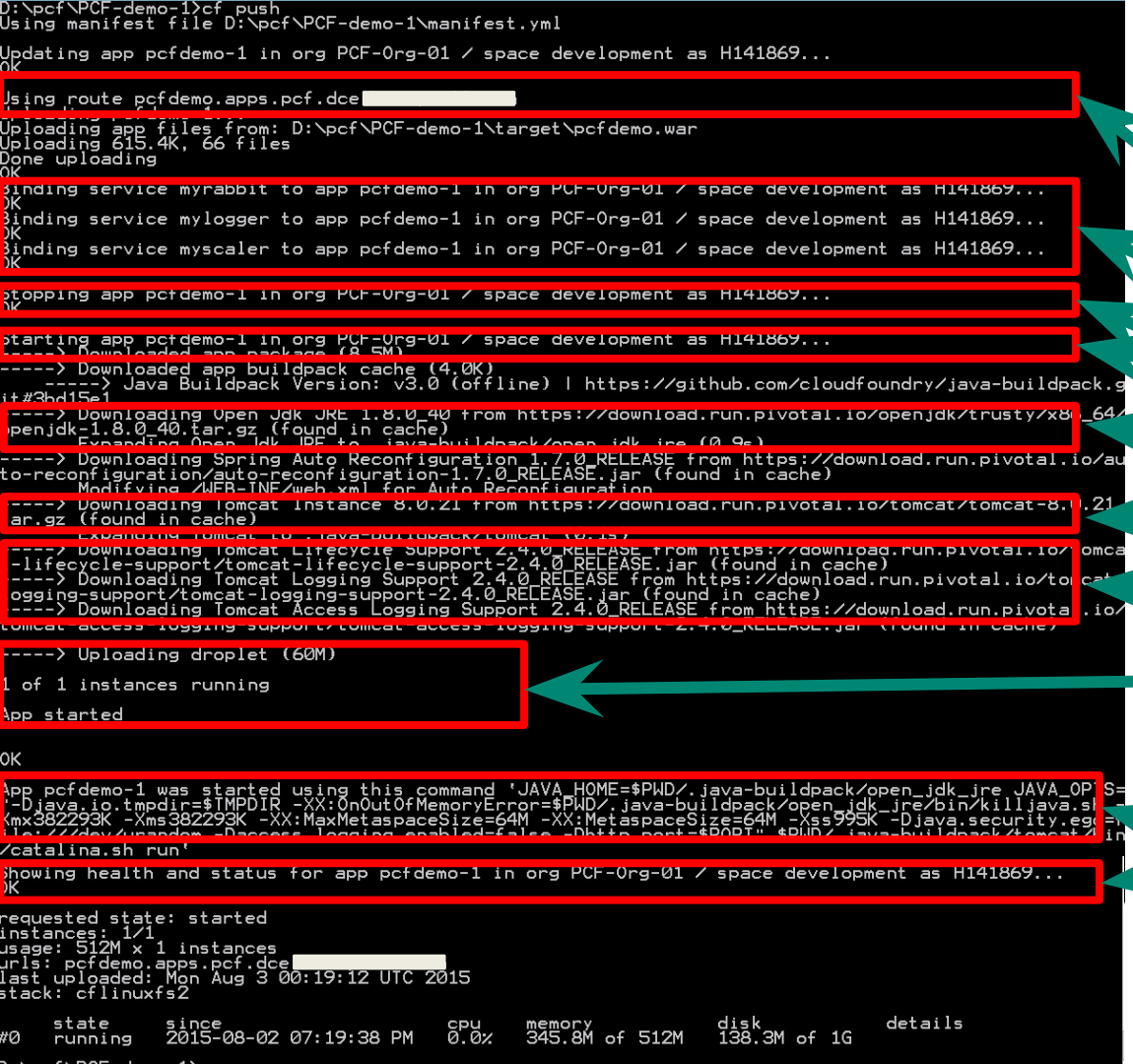
```
cf push
```

Enabling DevOps



Firewall & Routes

Service Bindings

App Lifecycle

Runtime Installation & Config

Middleware Installation & Config

Application Installation & Config

App Lifecycle

Logging, Health, Telemetry

Pivotal Cloud Foundry

Anatomy of the Platform

Anatomy of a Cloud Native Platform

Culture

Dev

Dev

IT Ops

IT Ops

IT Ops

Cloud Native Framework

Application Framework

Contract: **12 Factor App**

Container Runtime

Contract: **BOSH Release**

Infrastructure Automation

Contract: **Cloud Provider Interface**

Infrastructure

Integrated Stack

Spring Boot

Spring Cloud

Spring Cloud Dataflow

.NET

Cloud Foundry

BOSH

Spring Boot

From 0 to app in < 5 min

Spring Boot:

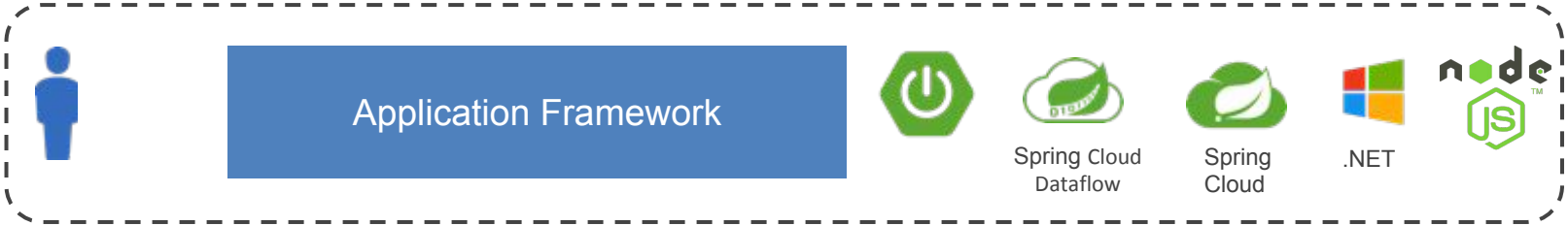
- Is designed to get you up and running as quickly as possible, with minimal upfront configuration of Spring.
- Takes an opinionated view of building production ready applications.
- Build microservices with REST, WebSocket, Messaging, Reactive, Data, Integration, and Batch capabilities via a simple and consistent development experience.

Spring Cloud Data Flow

Event-Driven Data Microservices

Spring Cloud Dataflow provides:

- Leverages Spring and Spring Boot
- Orchestrable Data Microservices
  - Create flexible, robust and elastic and scalable data processing pipelines on demand
  - Ingest, transform and load data into concurrent and analytical data stores.



Spring Cloud Services

Powered by Netflix OSS

Spring Cloud Services:

- Which is built on Spring Boot simplifies distributed, microservice-style architecture by implementing proven patterns to bring resilience, reliability, and coordination to your microservices.
- When used with PCF customers have a turnkey, secure solution for production operations of this coordination infrastructure—service registry, config server, and circuit breaker dashboard.
- Coming to .NET in 2016! (Project SteelToe)

Service Registry

A dynamic directory that enables client side load balancing and smart routing

Cloud Bus

Application bus to broadcast state changes, leadership election

Circuit Breaker

Microservice fault tolerance with a monitoring dashboard

OAuth2 Patterns

Support for single sign on, token relay and token exchange

Configuration Server

Dynamic, versioned propagation of configuration across lifecycle states without the need to restart your application

Lightweight API Gateway

Single entry point for API consumers (browsers, devices, other APIs)

Spring Cloud Services

Turnkey microservice operations and security on Pivotal Cloud Foundry

Spring Cloud Netflix for .NET: Project STEELTOE

http://steeltoe.io/

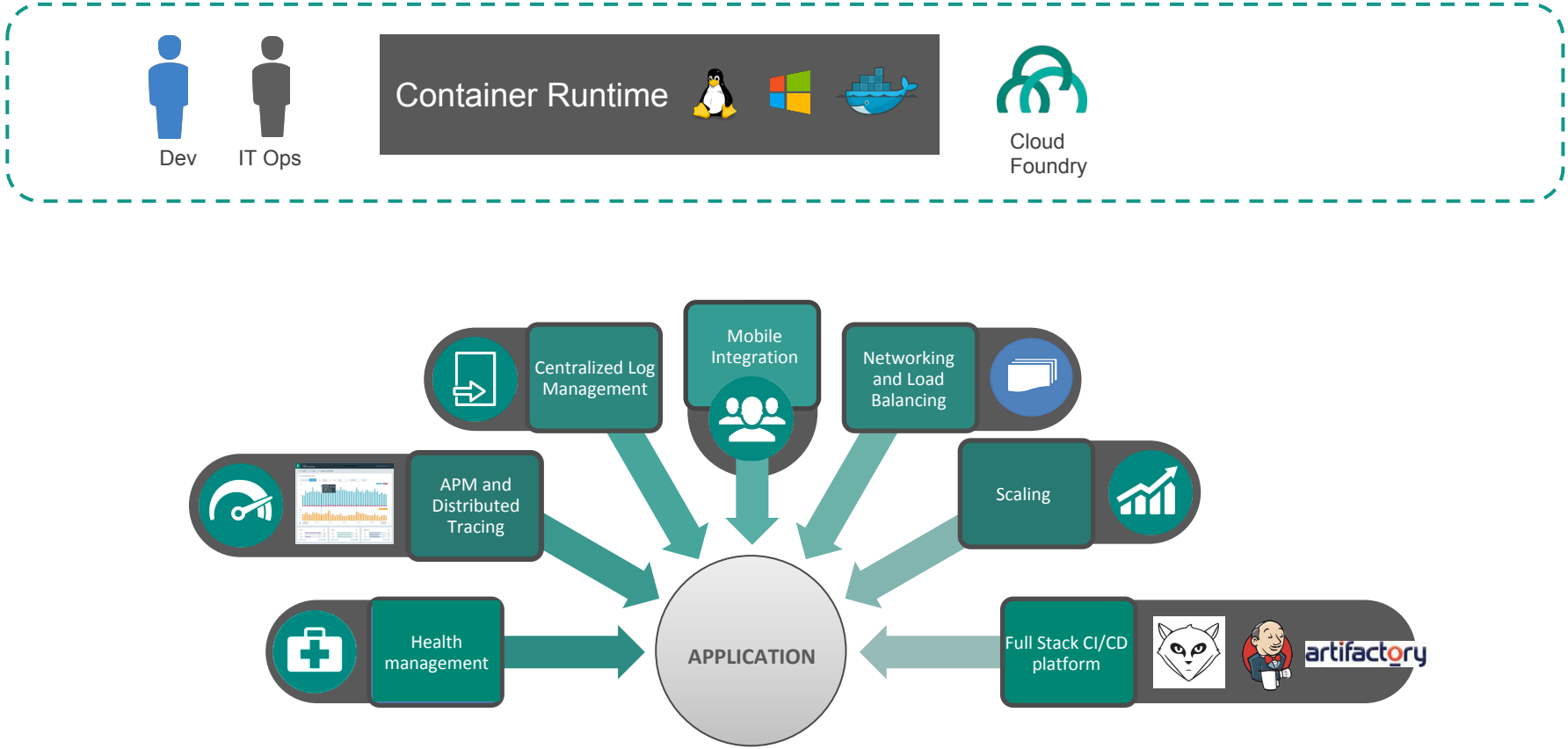
Enterprise-ready .NET toolkit for common microservices patterns

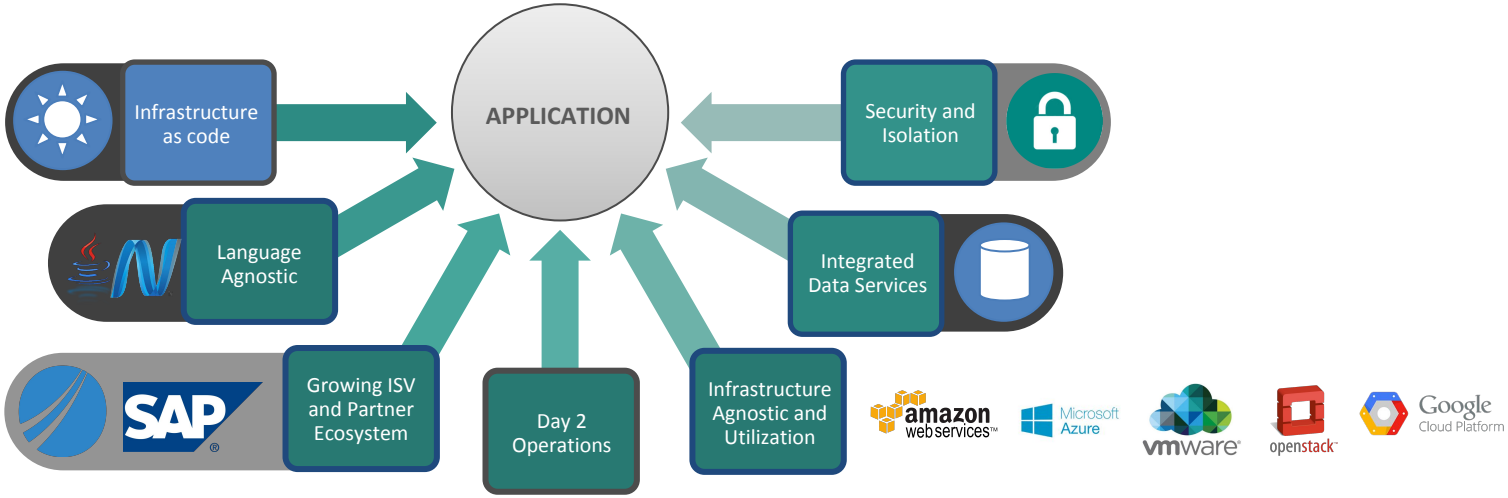
Breaking the Monolith

- Project Steeltoe contains best of breed components around configuration, service discovery, and soon, distributed tracing from NetflixOSS and Spring Cloud Services.
- These can be used to evolve an infrastructure from a monolithic application to a set of microservices.

Write Once, Scale Anywhere

- Project Steeltoe is built to work especially well with platforms like Pivotal Cloud Foundry. It also integrates seamlessly with Java microservices written with Spring Cloud, allowing for true polygot architecture.


Dev
IT Ops
Container Runtime
Cloud Foundry
Centralized Log Management
Mobile Integration
Networking and Load Balancing
APM and Distributed Tracing
Scaling
Health management
APPLICATION
Full Stack CI/CD platform
artifactory



IT Ops

Infrastructure Automation

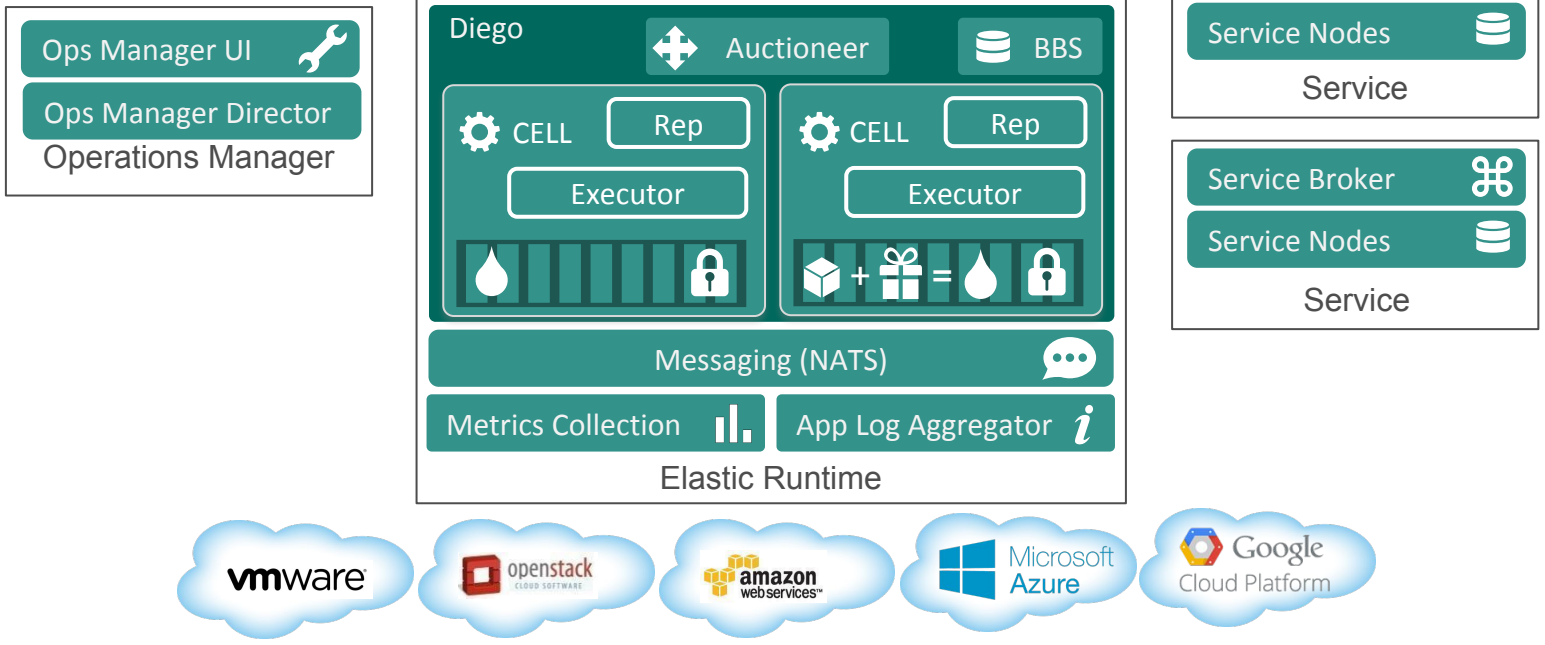
BOSH

IT Ops

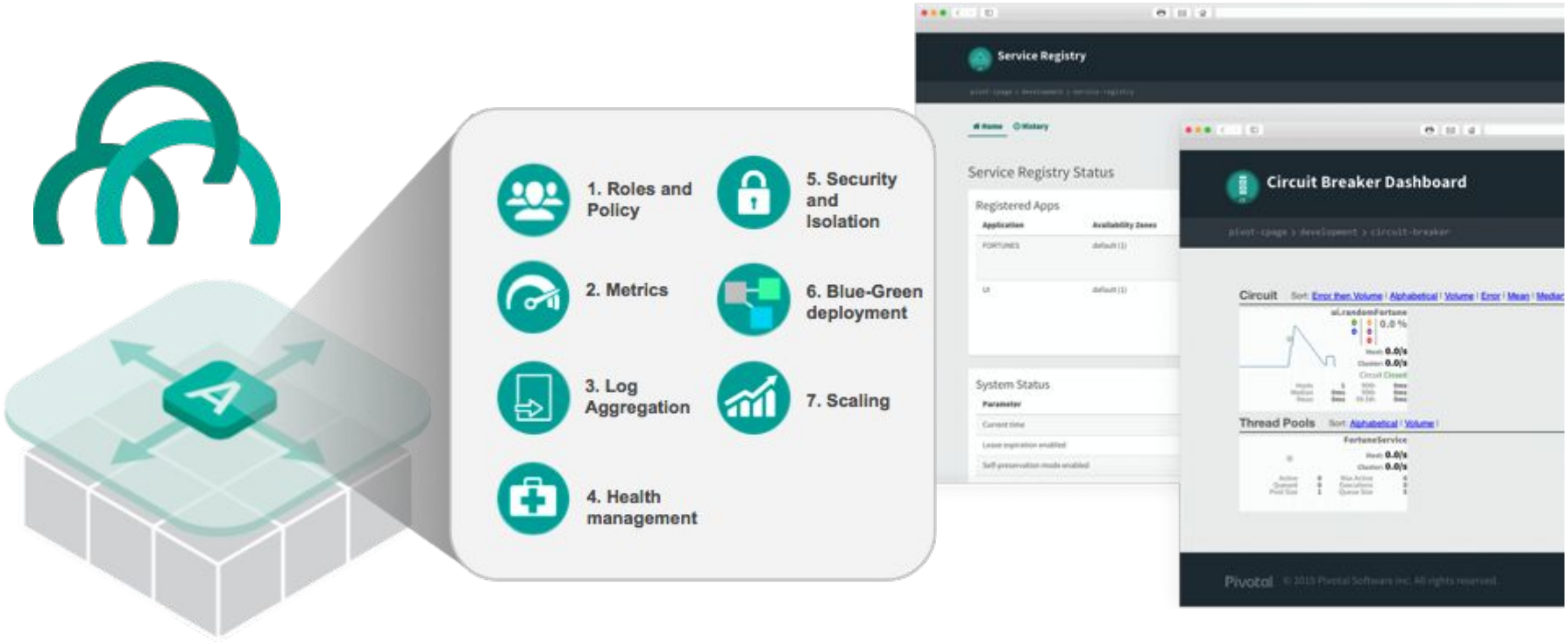
Infrastructure

amazon web services · Microsoft Azure · vmware · openstack · Google Cloud Platform

Pivotal Cloud Foundry Architecture



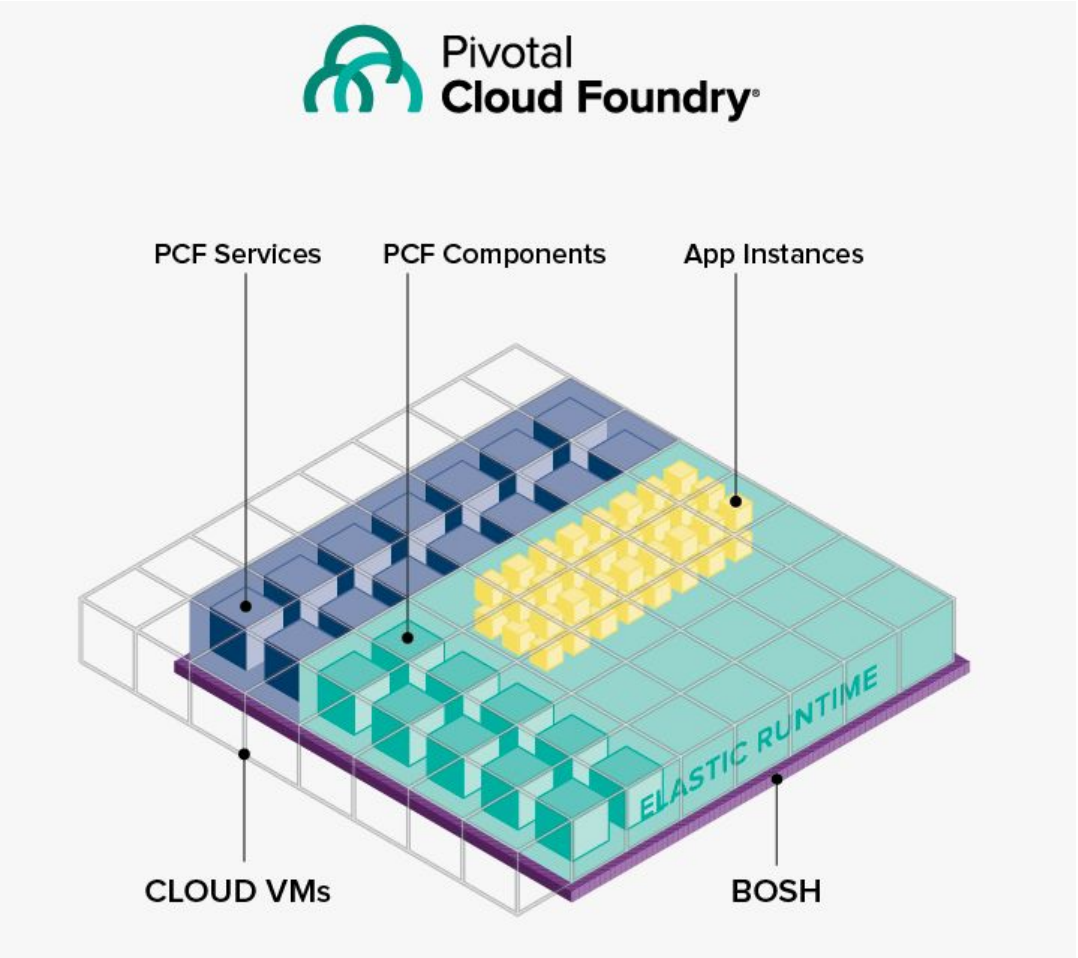
Everything Needed to Deploy and Operate an App



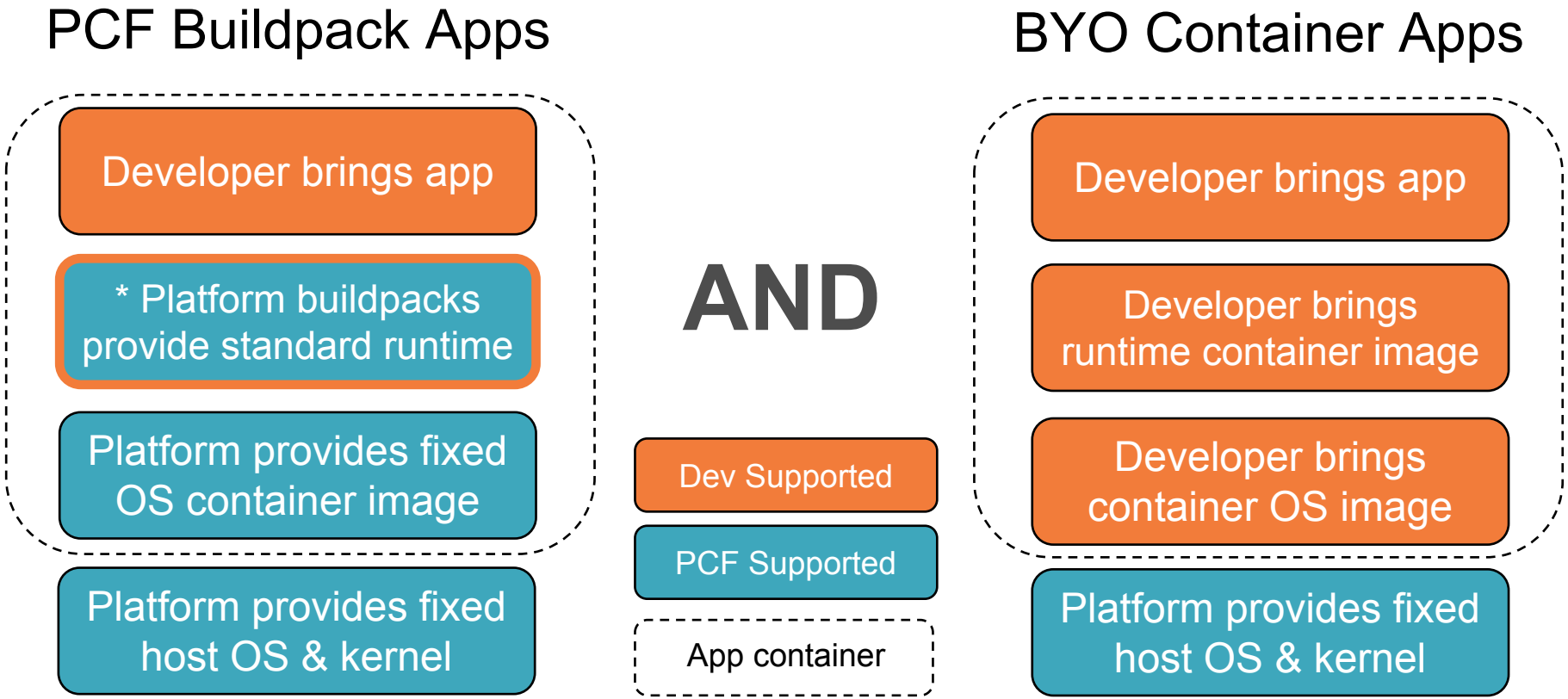
Pivotal Cloud Foundry

Containers and buildpacks

Pivotal Cloud Foundry - POWERED BY BOSH



Open Choice for Containers



* Devs may bring a custom buildpack

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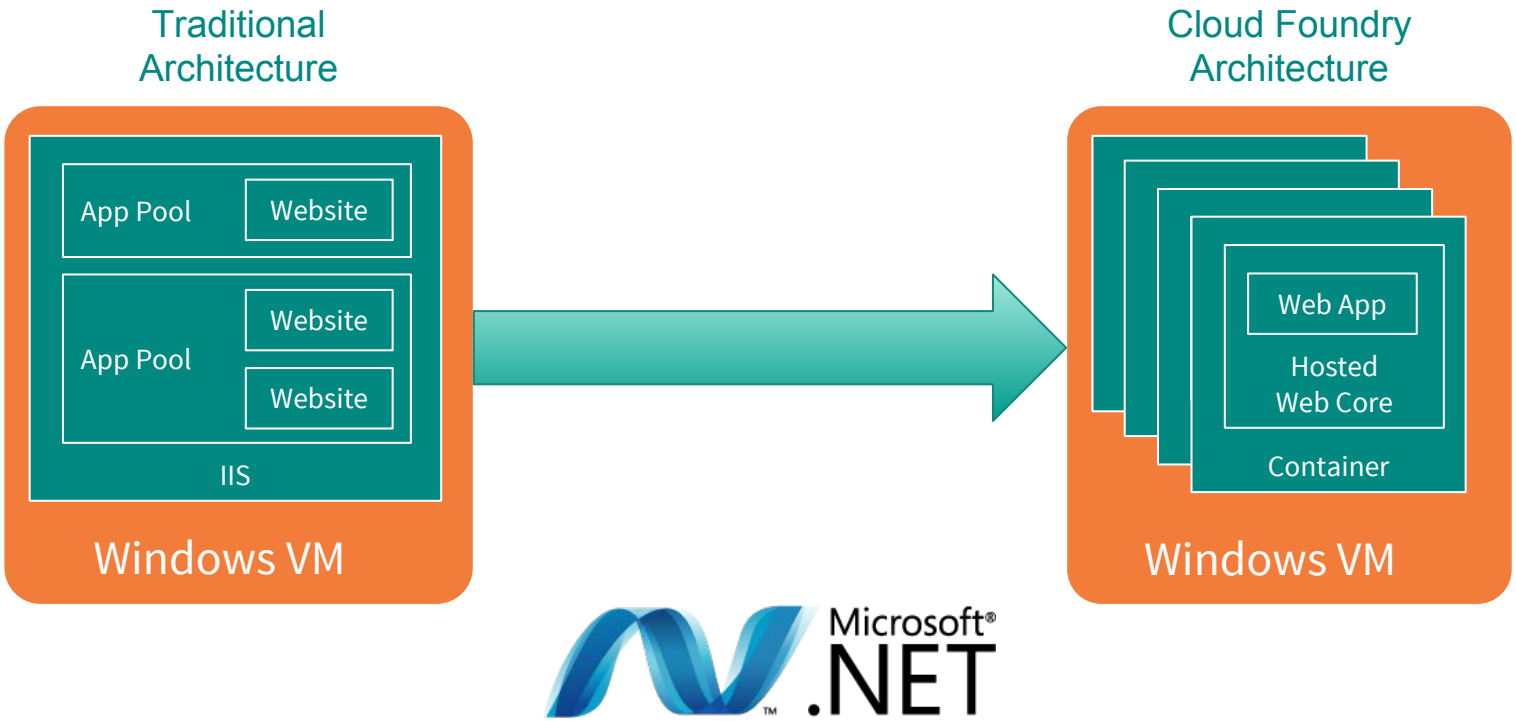
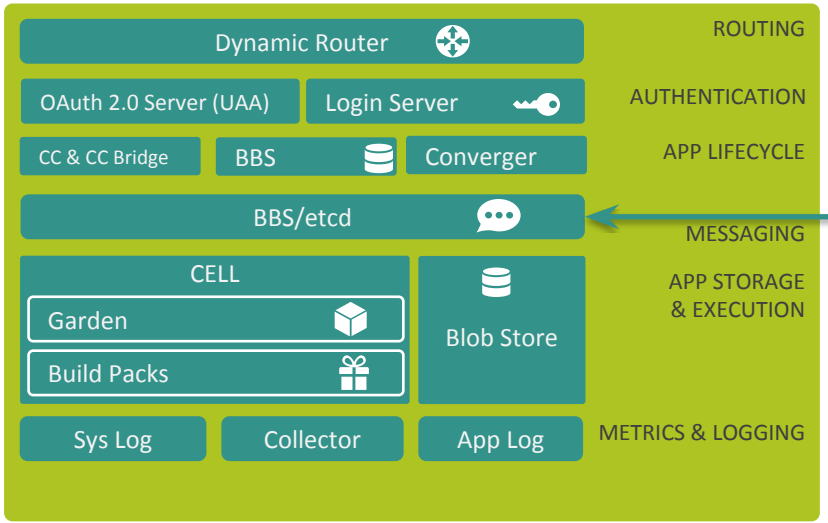
.NET App Evolution



Garden Windows

resource isolation
kernel job object
disk quotas

namespace isolation
user accounts
Host Web Core
(an isolated IIS instance)



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
  - Binary
  - Go
  - Python
  - PHP
  - Static file
  - .NET
  - Cloud Foundry Community Buildpack
  - Write your own

Why Buildpacks

- Control what frameworks/runtimes are used on the platform
- Provides consistent deployments across environments
  - Stops deployments from piling up at operation's doorstep
  - Enables a self-service platform
- Eases ongoing operations burdens:
  - Security vulnerability is identified
  - Subsequently fixed with a new buildpack release
  - Restage applications

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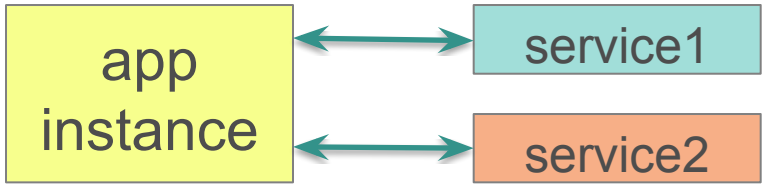
Services

Two Types of Services

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

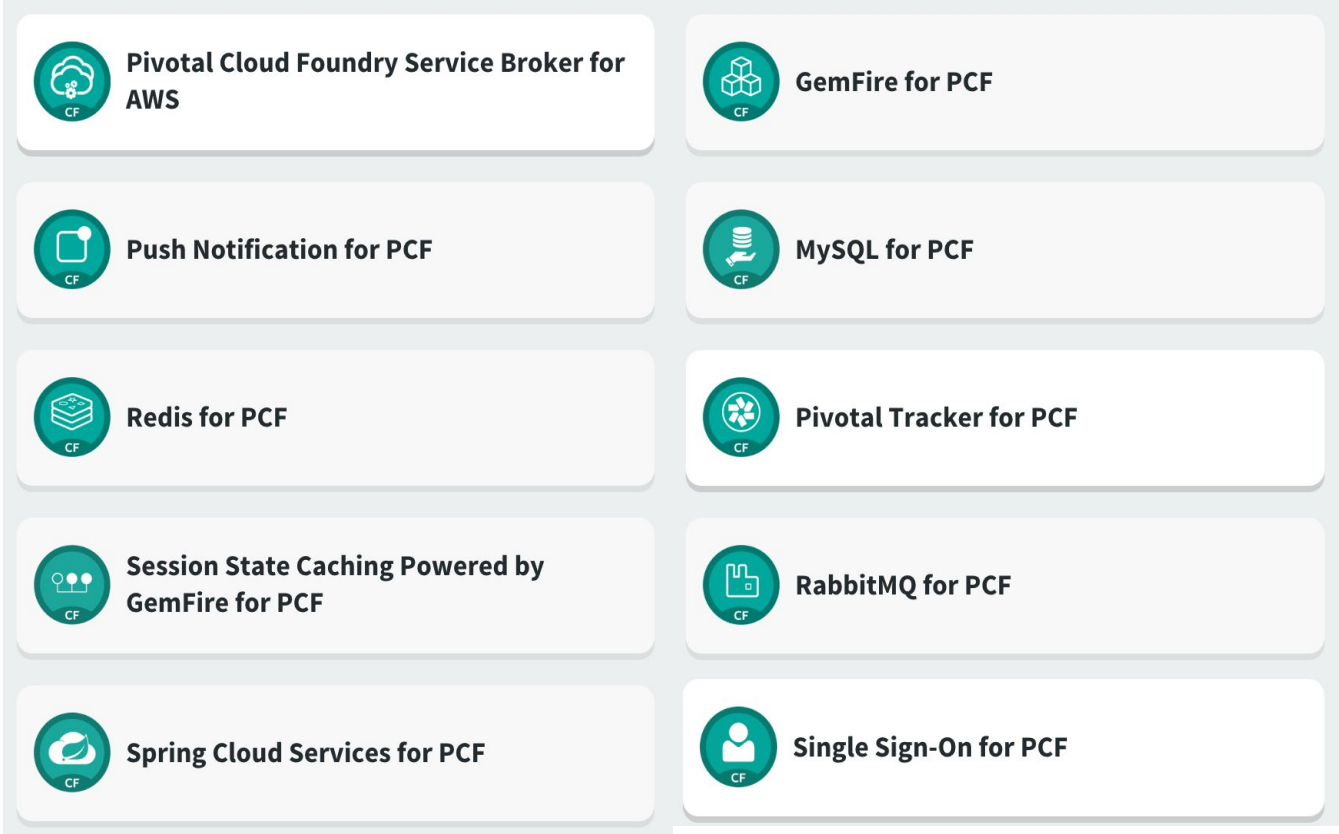
Cloud Foundry Services

- A service is an external application dependency or component such as:
  - External state
    - Database, cache, message queue
  - Tools
    - Monitoring app, external logging sink, etc
  - External applications
    - Microservice, web service, legacy application



services are external to the app instance

Marketplace Pivotal Services



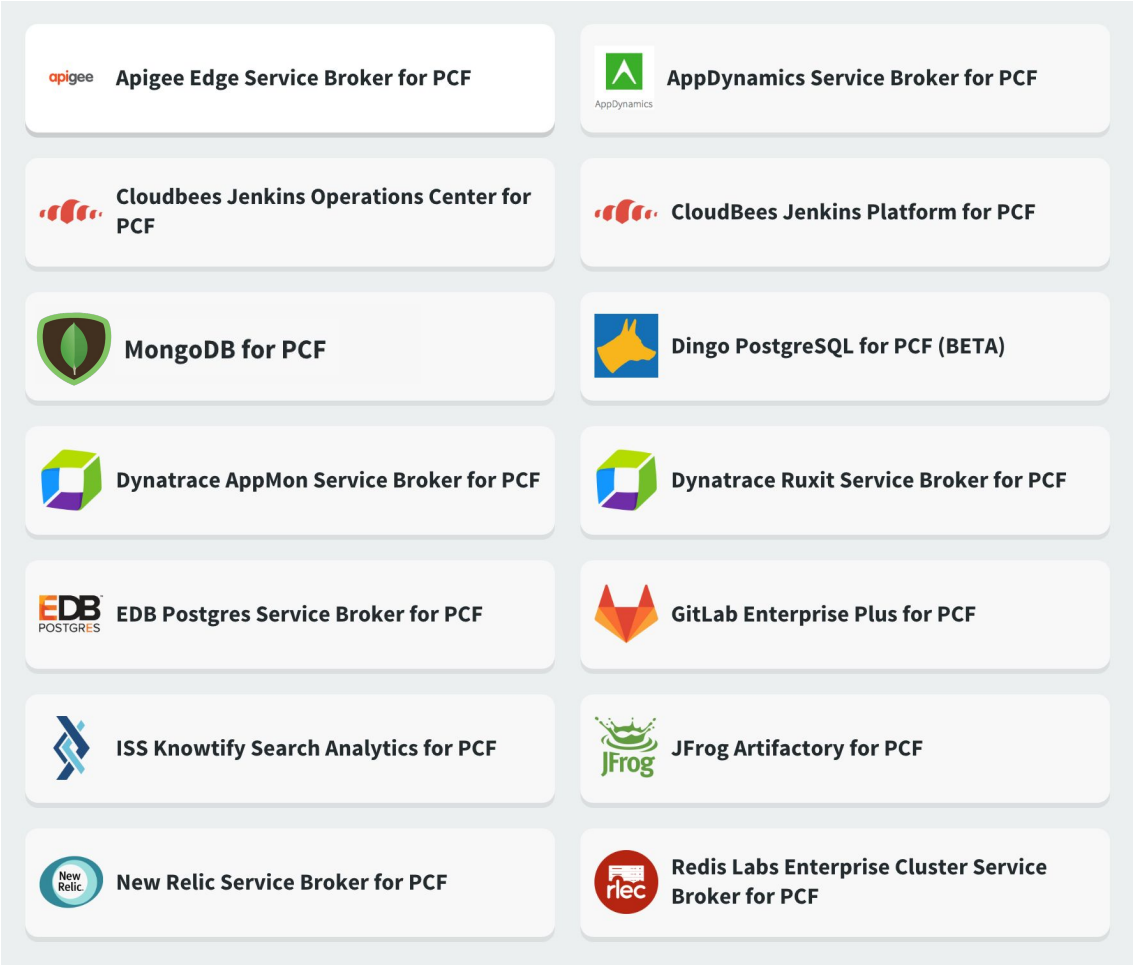
Pivotal Network

https://network.pivotal.io/

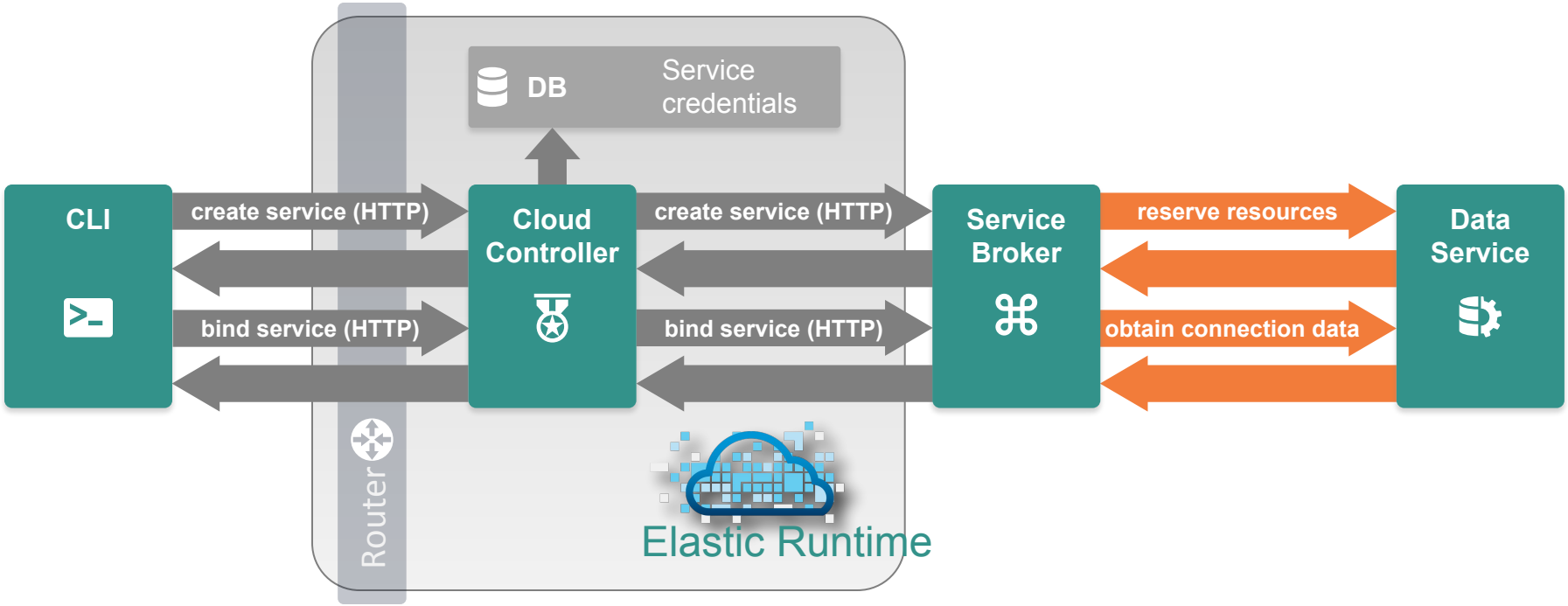
Marketplace - Partner Services

Pivotal Network

https://network.pivotal.io/



Creating and Binding a *Service*



User Provided Services

- User-provided - A user-provided service is simply **a list of connection parameters** that are stored in the platform and provided to an application when it binds to the service.
- User-provided services are useful for **quickly getting parameters to an application**, without having to create a service broker and registering with it the platform. They are also helpful for services that will probably only be used once or twice.
- Applications connect to the same instance.
- User-provided services are created using the CF CLI's create-user-provided-service command, which takes an arbitrary set of key/value pairs as an argument.
- Same portability for apps as with Service Brokers thanks to the Name Based Service Binding

```
> cf create-user-provided-service my-old-db -p '{"user":"admin","password":"pwd"}'
```

Full instructions can be found here https://docs.pivotal.io/pivotalcf/devguide/services/user-provided.html

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VCAP_SERVICES


```
"VCAP_SERVICES": {
  "p-identity": [
    {
      "credentials": {
        "client_id": "e3ca311d-999b-4e4f-b056-b50138cfff9f",
        "client_secret": "a995365e-d7b7-4727-95b8-463df2842f64",
        "auth_domain": "https://sso1.login.run.haas-76.pez.pivotal.io"
      },
      "syslog_drain_url": null,
      "label": "p-identity",
      "provider": null,
      "plan": "sso1",
      "name": "sso",
      "tags": []
    }
  ]
}
```


VCAP: short for VMware's Cloud Application Platform, in reference to the origins of the Cloud Foundry Platform.

Appendix

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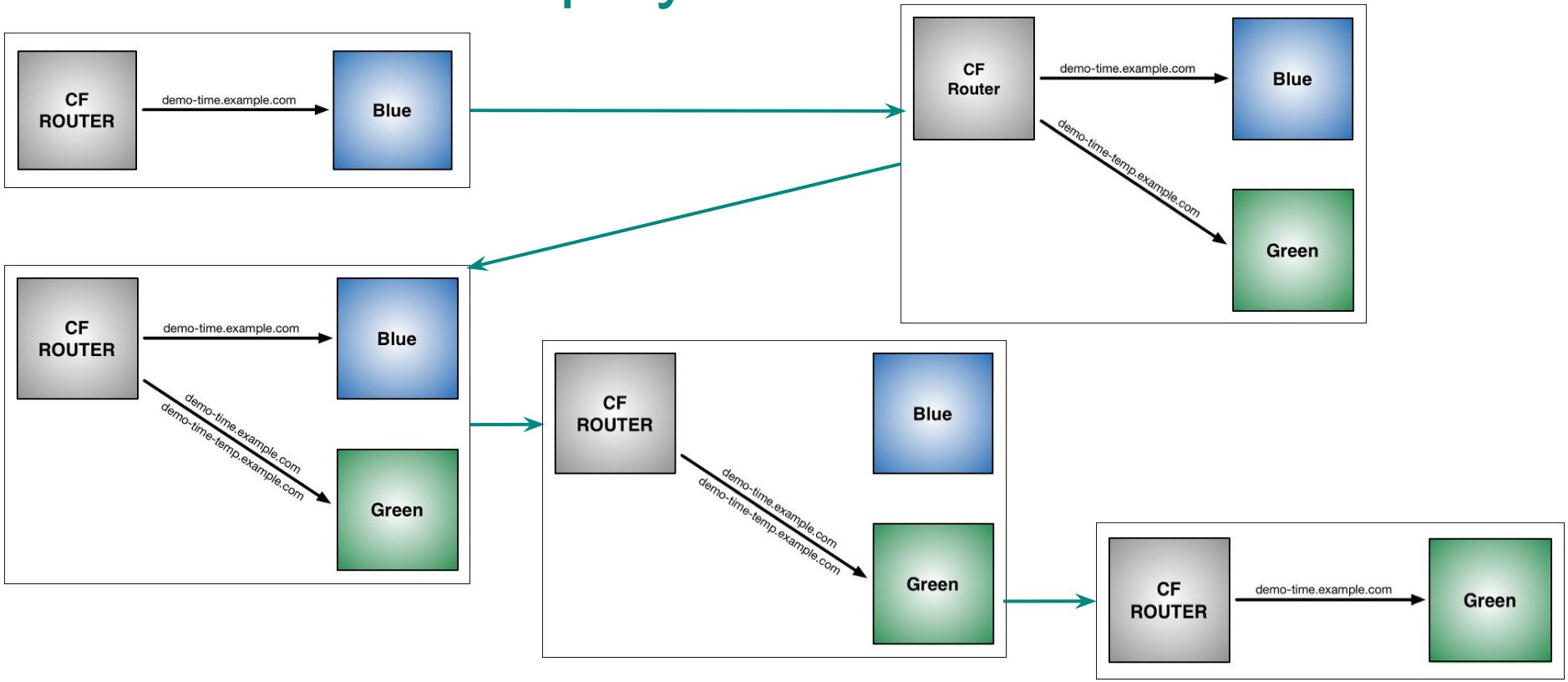
Zero-Downtime deployment

Blue-Green Deployment



https://docs.pivotal.io/pivotalcf/1-8/devguide/deploy-apps/blue-green.html

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Cloud
Foundry

CI/CD

Application Lifecycle Management: CI/CD

Delivery High Quality Software, Faster and Continuously From Idea to Production

AUTOMATION.
Integrate tools and automate processes from testing to builds and deployment

SPEED.
Release more frequently with smaller bits will reduce complexity and improve time-to-market

QUALITY.
Reduce feedback loop using test-driven development to surface problems sooner and be responsive

AGILITY.
Push updates on regular basis with no downtime to improve customer experience and time to market

Build Pipeline Operations

Commit Code Change	Automate Build & Test (Unit Test, Static Code Analysis)	Store Binaries & Build Artifacts	Automated Integration Testing	Acceptance, Performance & Load	Zero Downtime Upgrade to Production
Tool Chain					
					
Gitlab	**Jenkins**		**Development**	**Test + UAT + Staging**	**Production**
Distributed revision control and source code management. Collaborative software development	Build and test software projects continuously and incrementally. Hundreds of compatible plugins	Share binaries and manage distributions. Manage artifact lifecycle. Avoid license violations	Develop, test, QA and production on the same platform. Simple, developer friendly commands and APIs. Operational benefits for every app. Built-in ecosystem services. Deploy, operate and scale on any IAAS		

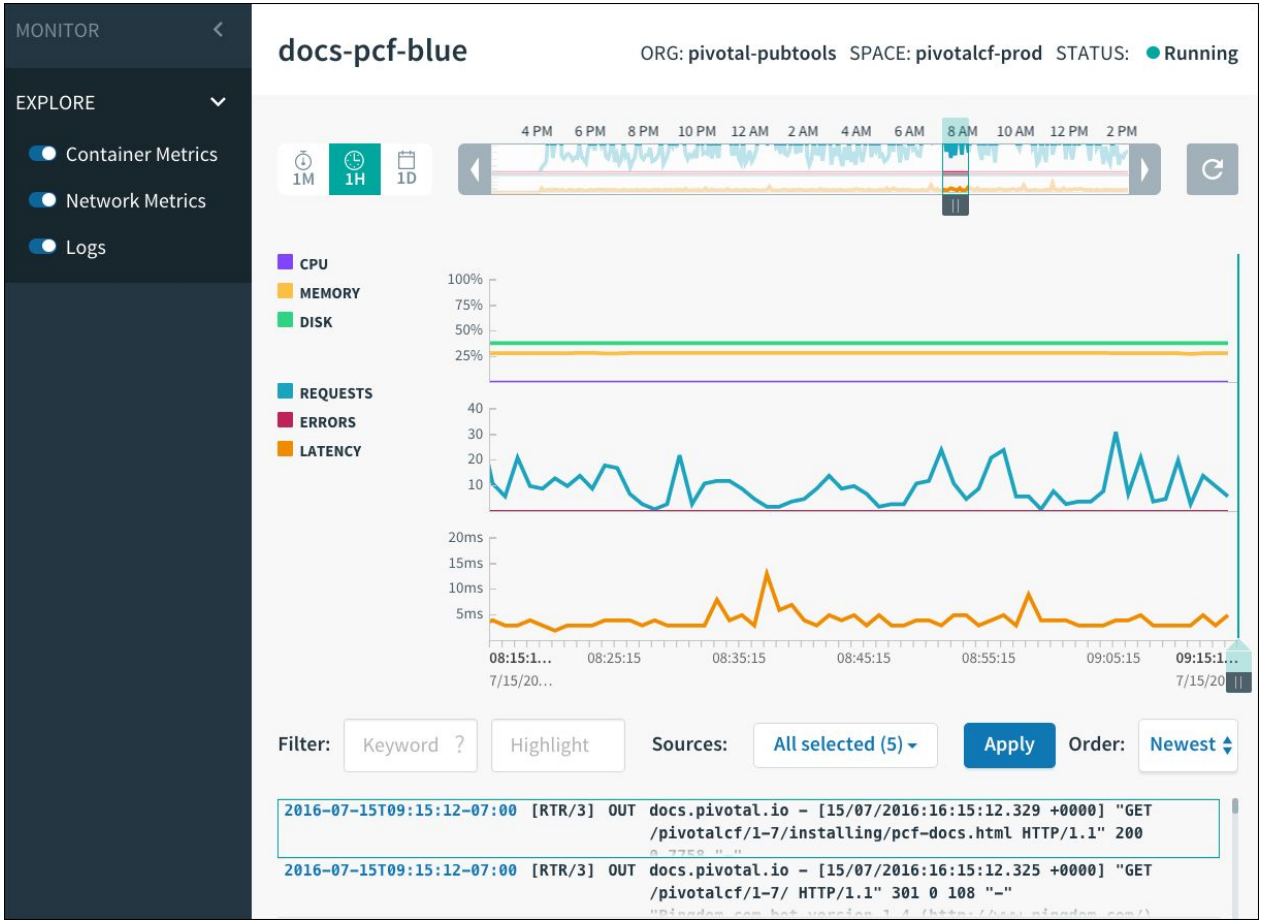
Pivotal Cloud Foundry

Metrics

Application Performance Monitoring

- PCF Metrics provides a real-time application monitoring dashboard
- 3rd Party Tiles provide in-depth monitoring of applications running on PCF via an embedded agent bundled with applications that are deployed using Buildpacks
    - Dynatrace
    - New Relic
    - AppDynamics

PCF Metrics


MONITOR
EXPLORE
Container Metrics
Network Metrics
Logs
docs-pcf-blue
ORG: pivotal-pubtools SPACE: pivotalcf-prod STATUS: Running
4 PM 6 PM 8 PM 10 PM 12 AM 2 AM 4 AM 6 AM 8 AM 10 AM 12 PM 2 PM
1M 1H 1D
CPU
MEMORY
DISK
REQUESTS
ERRORS
LATENCY
100% 75% 50% 25%
40 30 20 10
20ms 15ms 10ms 5ms
08:15:1... 08:25:15 08:35:15 08:45:15 08:55:15 09:05:15 09:15:1...
7/15/20... 7/15/20
Filter: Keyword Highlight Sources: All selected (5) Apply Order: Newest
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2016-07-15T09:15:12-07:00 [RTR/3] OUT docs.pivotal.io - [15/07/2016:16:15:12.325 +0000] "GET /pivotalcf/1-7/ HTTP/1.1" 301 0 108 "-"


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Thank You!
Pivotal