What is Cloud Foundry?

Overview

Introduction to Cloud Technologies

What is Cloud Foundry?

- **Introduction to Cloud**
- Cloud Foundry
- Key Concepts
- Pivotal CF

"The Cloud"

- Means many things to many people.
  - Distributed applications accessible over a network
    - Typically, but not necessarily, The Internet
  - An application and/or it's platform
  - Resources on demand
  - Inherently virtualized
  - Can run in-house (private cloud) as well
  - Hardware and/or software sold as a commodity

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Types of Cloud Computing: IaaS

- Infrastructure as a Service
  - Replacement for physical hardware
  - Provides virtual hardware, OS, Network
  - Amazon Web Services (AWS), RackSpace, Microsoft Azure, VMware vCloud Air

Types of Cloud Computing: PaaS

- Platform as a Service
    - More than a raw machine with OS
    - Provides ready-made platform for running apps
    - CloudFoundry, Heroku, Google App Engine, Amazon Elastic Beanstalk

Types of Cloud Computing: SaaS

- Software as a Service
  - Complete software application
  - SalesForce.com, Google Apps, hundreds of examples

PaaS: Pizza as a Service!

| You Manage |
| Provided |

Traditional data-center (on-prem)	Infrastructure as a Service (IaaS)	Platform as a Service (PaaS)	Software as a Service (SaaS)
Dining Table	Dining Table	Dining Table	Dining Table
Soda	Soda	Soda	Soda
Electric/Gas	Electric/Gas	Electric/Gas	Electric/Gas
Oven	Oven	Oven	Oven
Fire	Fire	Fire	Fire
Pizza Dough	Pizza Dough	Pizza Dough	Pizza Dough
Tomato Sauce	Tomato Sauce	Tomato Sauce	Tomato Sauce
Toppings	Toppings	Toppings	Toppings
Cheese	Cheese	Cheese	Cheese
Make at Home	**Frozen Pizza**	**Home Delivery**	**Eat Out**

Albert Barron: http://www.linkedin.com/today/post/article/20140730172610-9679881-pizza-as-a-service

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PaaS: Platform as a Service

Legend:
- You Manage
- Provided

Agility And Cost Savings (vertical axis, upward arrow)

Cloud Enablement (horizontal axis, rightward arrow)

Traditional IT
Layer
Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Network

IaaS
Layer
Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Network

PaaS
Layer
Applications
Data
Runtime
Middleware
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Network

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What is Cloud Foundry?

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Cloud Foundry – The *Open* PaaS
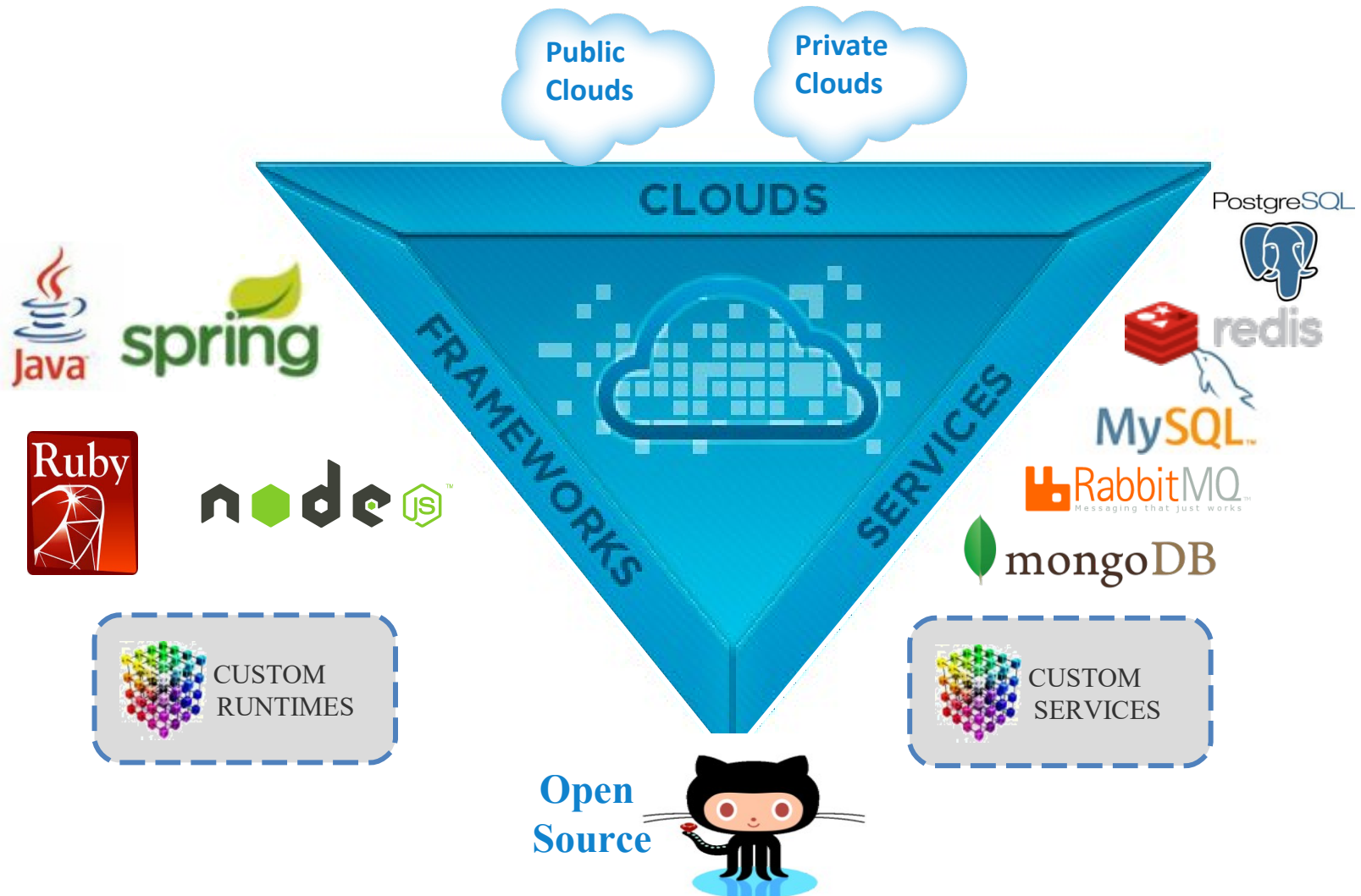
Why Cloud Foundry?

- Open Source
  - Reduce vendor-lock

- Public OR Private

- Language Independence
  - Via Buildpacks

- Wide, growing range of services

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Cloud Foundry: Foundation
Open Governance

An Explanation of the Various Web Sites

- A web-search for "Cloud Foundry" can be confusing!

URL	Details
cloudfoundry.org	• The open source project's home page • No hosting of any kind here. • Documentation
github.com/cloudfoundry	• The location of the source • Download, build, and run if you like!
cloudfoundry.com	• Old commercial web-site • Superseded by *run.pivotal.io* • Redirects to *pivotal.io* product page
blog.cloudfoundry.org	• Technical blog
run.pivotal.io	• Pivotal Web Services (PWS) • Pivotal's hosted environment, runs PivotalCF

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A Major Cloud Foundry Site

- Largest Chinese Internet search site
  - *One billion* page views per day
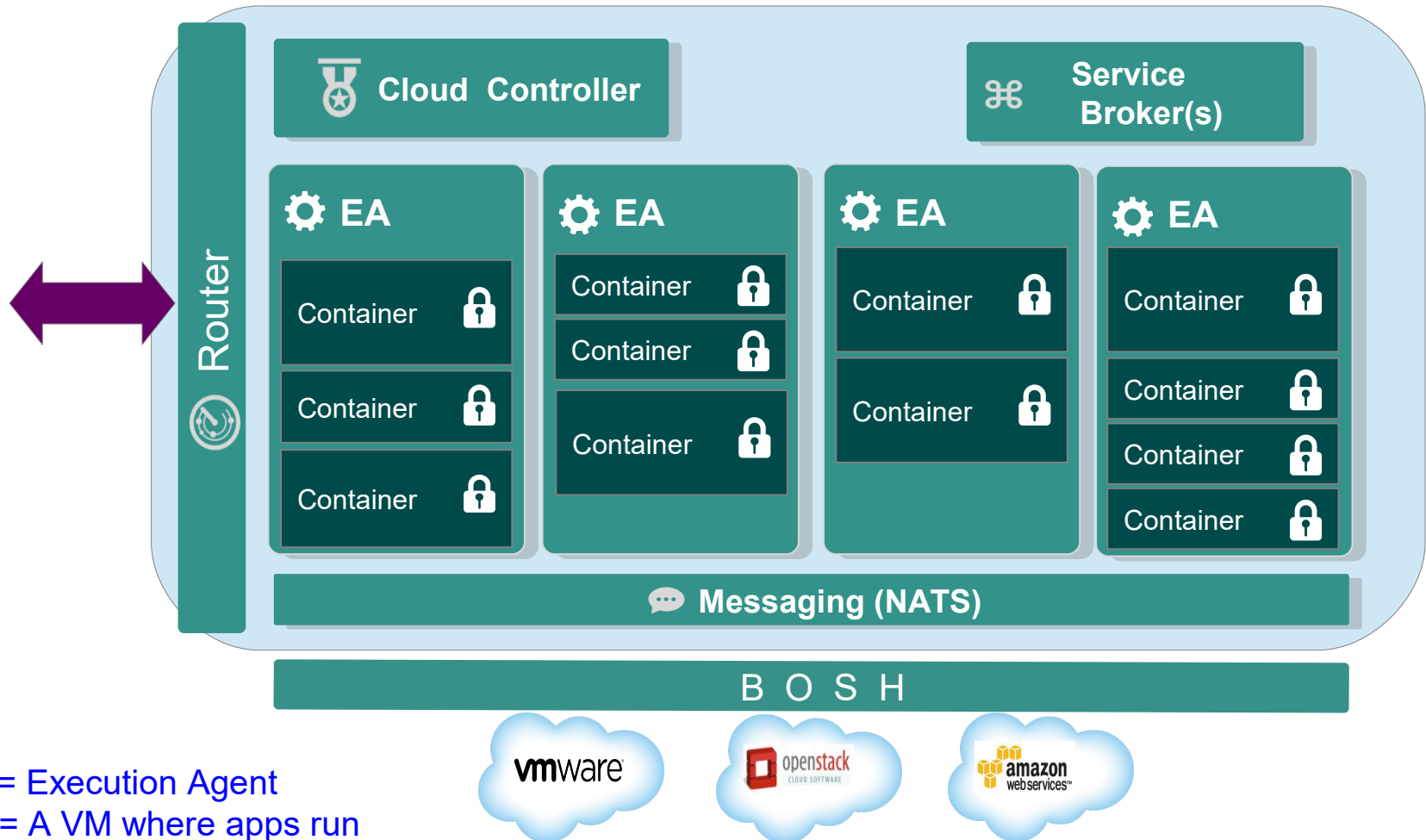 - Ad-Words facility powered by Cloud Foundry

Cloud Foundry Architecture
High-Level View – more details later

EA = Execution Agent
    = A VM where apps run

DEA vs DIEGO

- Execution Agents
  - This course generically refers to Execution Agents
    - Virtual Machines (VMs) where applications run
    - Could be a DEA or a *Diego* Cell
  - Almost all course content applies to *either* implementation

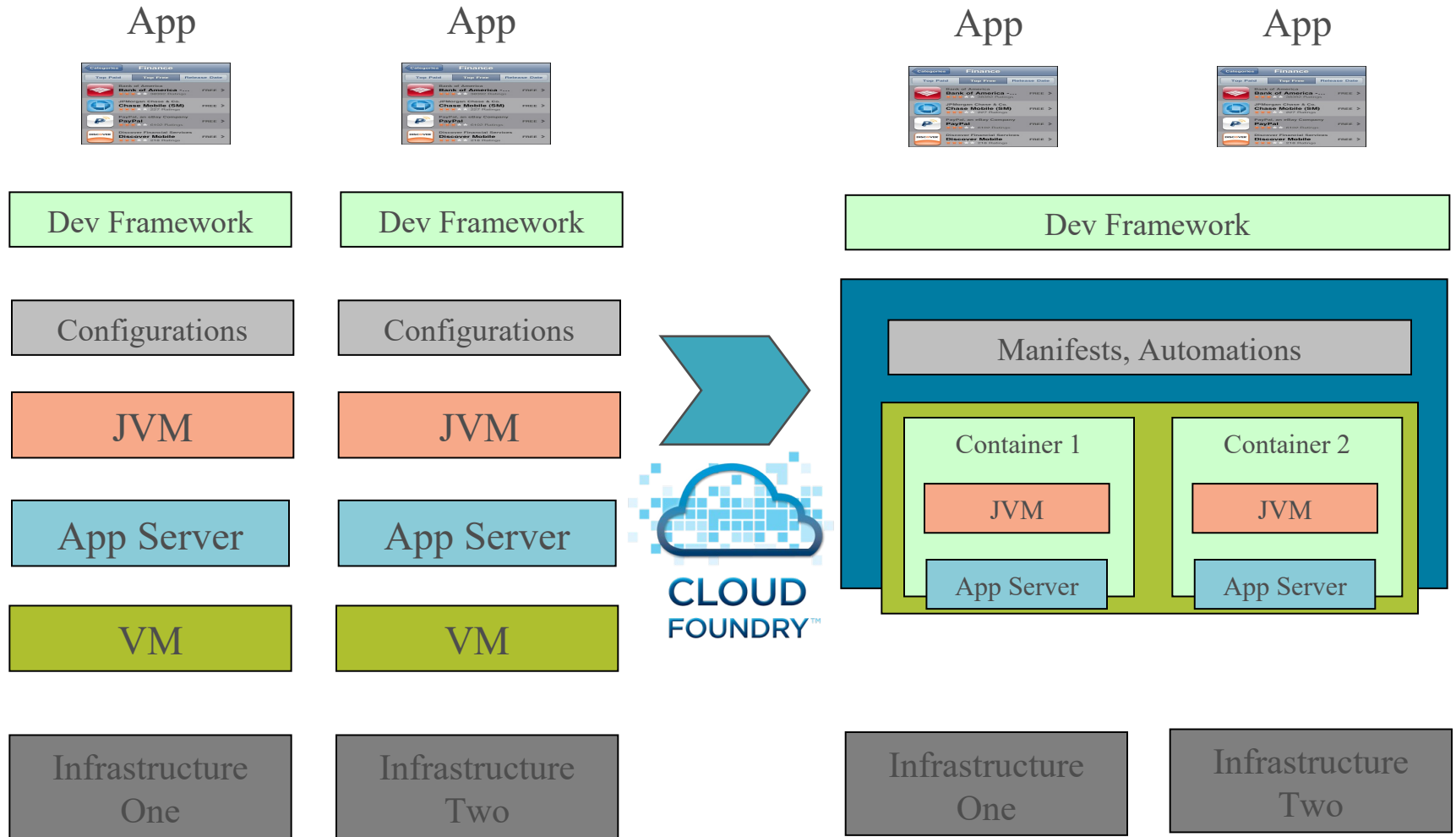| Cloud Foundry Version	Execution Agent Type	Description
Since 1.0	Droplet Execution Agent (DEA)	A VM running one or more "Droplets" - each Droplet is an application instance
Since 1.5 (Diego)	*Cell*	A VM running one or more Droplets, Docker images, ...

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What is Cloud Foundry?

- Introduction to Cloud
- Cloud Foundry
- **Key Concepts**
- Pivotal CF

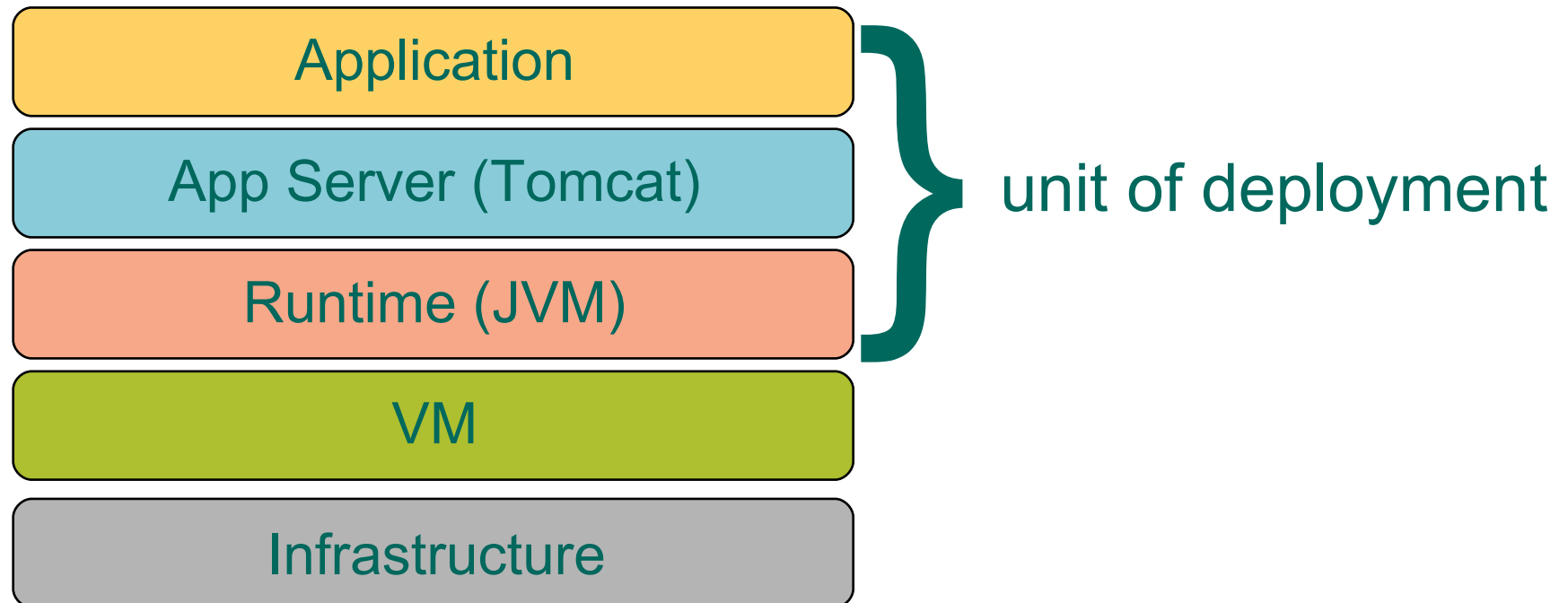# Cloud Foundry Platform as a Service

- **Application** is the new unit of deployment and control
  - Abstracting VMs and Middleware
  - Abstracting containers and processes
  - Data as a service
  - Eliminate bottleneck of provisioning & deployment

From VM Centric to Application Centric

App   App   App   App

Dev Framework	Dev Framework

Configurations	Configurations

JVM	JVM

App Server	App Server

VM	VM

Infrastructure One	Infrastructure Two

CLOUD FOUNDRY™

Dev Framework

Manifests, Automations

Container 1	Container 2
JVM	JVM
App Server	App Server

Infrastructure One	Infrastructure Two

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IaaS: VM-centric Deployment

Application
App Server (Tomcat)
Runtime (JVM)

} unit of deployment

VM

Infrastructure

Scaling = creating VMs from blueprints/templates

PaaS: App-centric Deployment

Application	} unit of deployment
App Server (Tomcat)	
Runtime (JVM)	} the platform
Container	
VM	
Infrastructure	
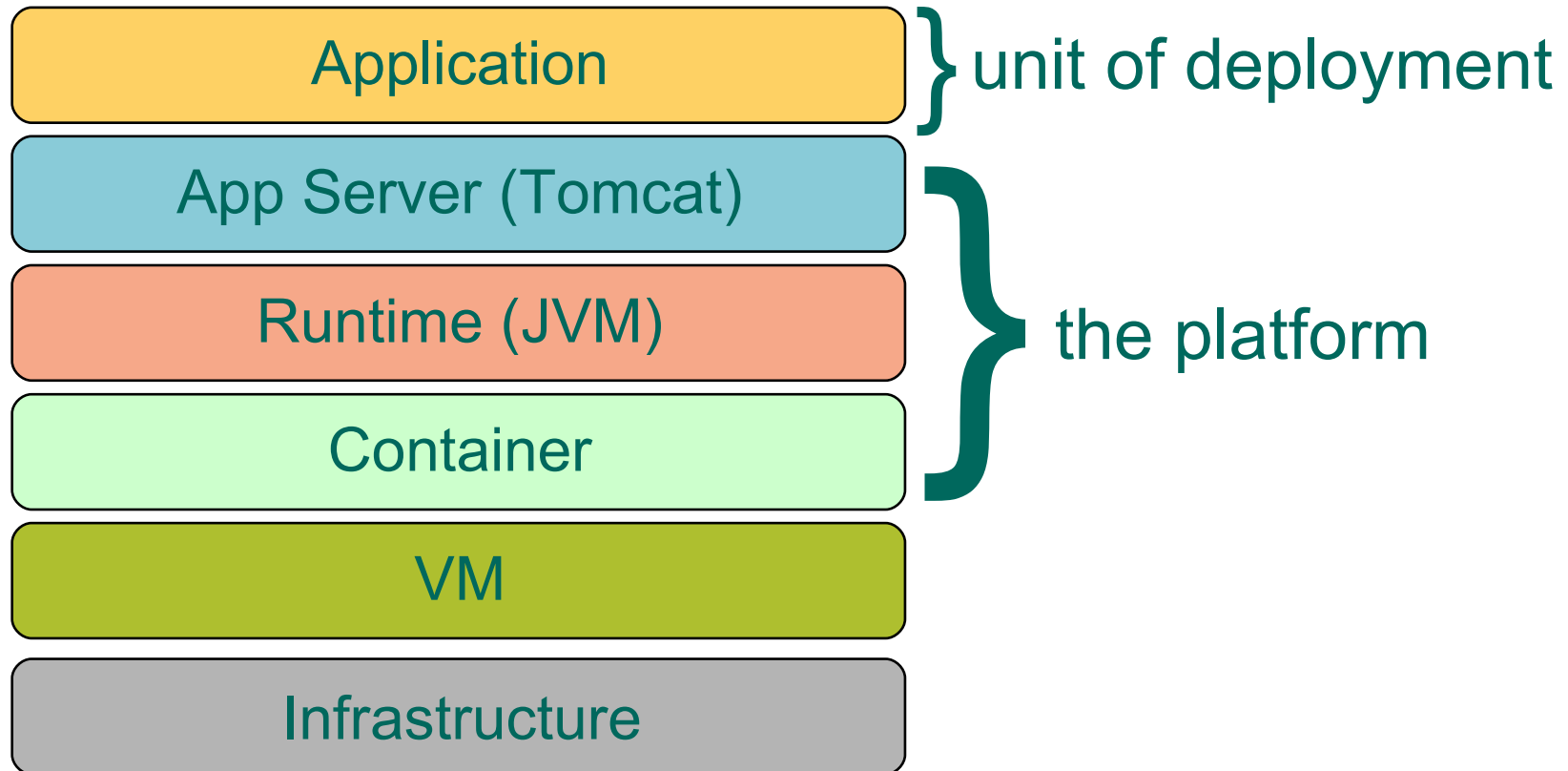
Scaling = creating containers in a VM pool

Core Tenets of Pivotal CF

Pivotal Cloud Foundry®

Radically Simple, Developer Friendly

- Push an app – "it just works"
- Supporting wide ranging use cases
- Support new application patterns – microservices
- Easy to add/customize

Broad Ecosystem of Services

- Data Services
- App Services
- Mobile Services

Operational Benefits for every Application

- Highly scalable
- Self healing
- Logging & audit trail
- Existing enterprise policies – user access & authorization
- Application monitoring
- Operational metrics
- App uptime SLAs

Deploy, Operate Update, Scale Platform on Any IaaS

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What is Cloud Foundry?

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- **Pivotal CF**

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Which Cloud Foundry Product?

CLOUD FOUNDRY

- Open Source
- Setup and run a PaaS for yourself
- No paid support
- No tools

Pivotal Web Services

PWS
- Pivotal Web Services
- Public CF PaaS run/managed by Pivotal
- Hosted on AWS
- No guaranteed SLAs, not for production
- Support offered

PWS-E
- PWS Enterprise
- For existing Pivotal customers to use PWS

Pivotal Cloud Foundry®

- Commercial product
- Run private PaaS in-house, or
- Create public PaaS (ISP managed)
- Sophisticated Web Console (App Mgr)
- Additional Tools (Ops Mgr)
- Less hassle
- Support offered

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What is Pivotal CF?

- An Enterprise PaaS powered by Cloud Foundry

TURN KEY
- Delivers *a turnkey PaaS* experience on the **private** cloud, complete with application and data services.

GAME CHANGING
- Enables *enterprises* to speed up application and data services delivery from *months to days* and innovate with disruptive speed

MOMENTUM
- Entered GA in Nov 2013
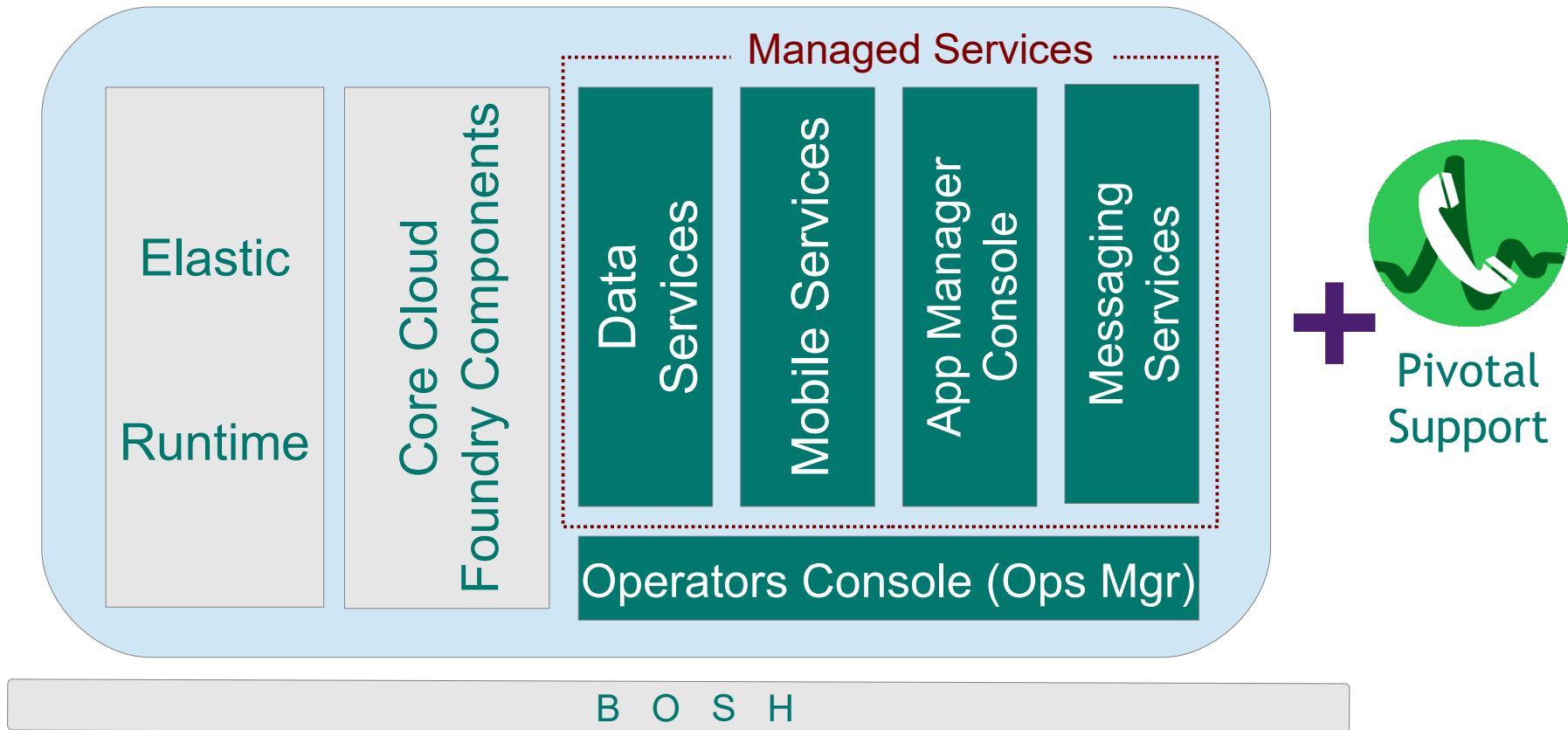- *www.pivotal.io/pivotal-products/pivotal-cf*

Pivotal CF: Enterprise PaaS
Commercially Supported

Pivotal **CF**

- **Certified** upgrades, **curated** & **tested** quarterly releases

- **Operations Manager** Cloud Administrative Console

- Elastic Runtime **Application Manager** *

- Built-in **Application Performance Monitoring** (APM)

- **Operational Metrics** service

- **Auto-Scaling** service

- Easy **LDAP/Active Directory** Integration

- **Historical Usage** Data per Application Instance

- Declarative **Availability Zones**

- **Behind the firewall** download packages (do not require internet access)

- **Enterprise documentation** (PDF format)

Formerly Developer Console

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OSS vs Pivotal CF

Legend:
- OSS
- PivotalCF

Managed Services

| Elastic Runtime | Core Cloud Foundry Components | Data Services | Mobile Services | App Manager Console | Messaging Services |

Operators Console (Ops Mgr)

+ Pivotal Support

B O S H

Data Services: RDB and NOSQL   **Messaging Services:** Rabbit/MQ

Mobile Services: Push Notifications, API Gateway, Data Sync, ...

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Pivotal CF – Commercial Components

PCF Ops Manager	• One Pivotal CF Operation Manager instance hosted across a cluster of VMs. • Typical enterprise deployment contains 2-3 Pivotal CF Ops Manager instances (dev/test + production *x*2 for HA)
PCF Elastic Runtime Application Instances (AI)	• Individual instances of deployed applications on PCF Elastic Runtime *or* on Pivotal Web Services (PWS) • An application may scale up to multiple instances • For a Java app: each AI is a Java Virtual Machine (JVM)
Service Instances (SI)	• A single, unique configuration of a service (such as a database or other software or middleware) within a PCF Foundation (installation) • Utilizes resources (such as CPU, cores, virtual machines, memory, messaging, development and/or data storage) within the same (or another) licensed Foundation

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What We Charge For

- Each App Instance, each Op Manager, each managed service

App Instances	App Instances	Service Instances	User-Provided Services (free)	External Servers not running on PCF

App Instances

Pivotal Web Services (PWS) **$**

AI

HOSTED

App Instances

PCF Elastic Runtime **$**

AI

Service Instances

PCF **$**
Services Suite
- Pivotal MySQL,
- Pivotal RabbitMQ,
- Pivotal Redis
- …

User-Provided Services (free)

Partner Provided Services $

PCF Operations Manager **$**

SELF OPERATED

External Servers not running on PCF

(such as Oracle DB, Pivotal Big Data Suite)

VM **VM** **VM** IaaS Provider **VM** **VM** **VM**

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Pivotal CF: Developer Benefits

- Application Manager
    - Start/stop
    - Scale
    - Services
    - Logs
    - etc.

Pivotal CF: Operator Benefits
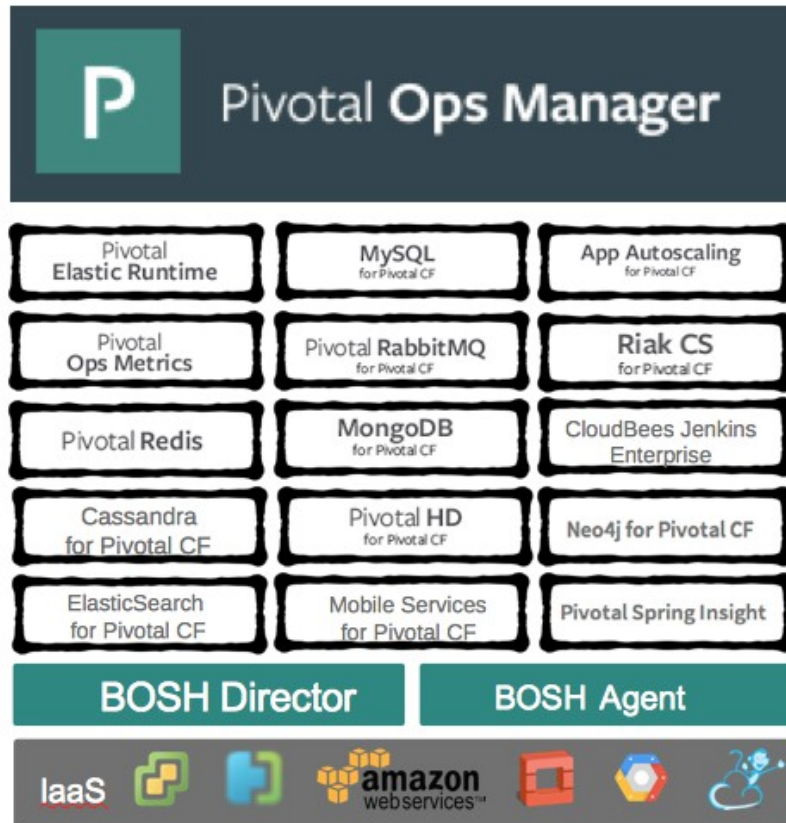
- Click to Install
- No downtime updates
- Explore install logs
- Click to scale platform
- Built-in high availability
- Built-in platform monitoring
- Integrated services

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Pivotal CF: Operators View

Install platform

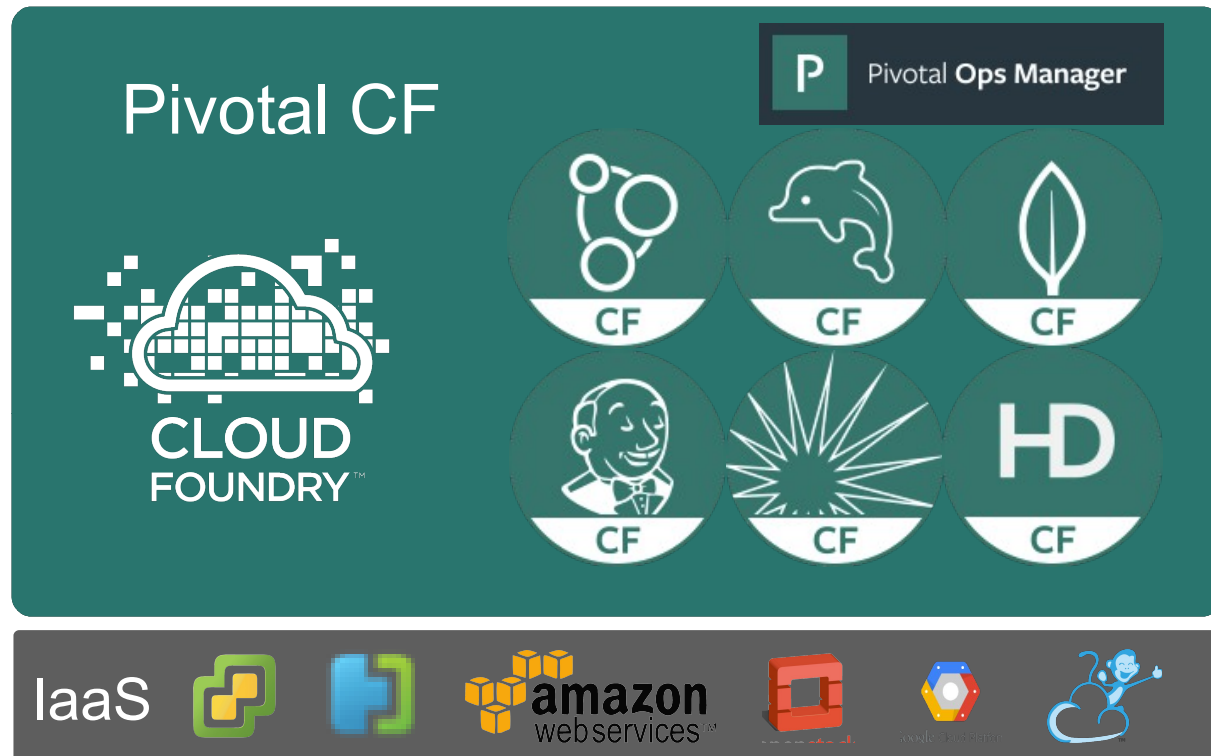Setup High Availability

Scale and plan capacity

Install and manage services

Target multiple clouds

Handle live upgrades/updates

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Pivotal **Ops Manager**

CLOUD FOUNDRY™

CF CF CF

CF CF HD CF
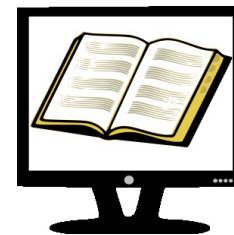
IaaS

amazon webservices™

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How can I use Pivotal CF?

- Pivotal CF is the commercial PaaS based on CF
- Many options:
    - Public – Pivotal Web Services: run.pivotal.io
    - Basis of other public PaaS offerings
    - Run it in-house as the basis of your private cloud
    - Run it yourself on third-party cloud provider
        - Open Stack, AWS …

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Cloud Foundry®

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Documentation

- CF docs can be found on three different sites, depending on the context:
  - http://docs.cloudfoundry.org
    - Open-source CF project docs
  - http://docs.pivotal.io/pivotalcf
    - Setting up and running Pivotal CF
  - http://docs.run.pivotal.io
    - Information about running on Pivotal Web Services
- Generic information about Cloud Foundry can be found on all three sites
  - In general pick one and stay with it

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Pivotal Support

- Support is available for Pivotal Cloud Foundry
  - Options: http://pivotal.io/support/offerings
  - Register: http://tinyurl.com/piv-support
  - Support Portal: https://support.pivotal.io
    - Community forums, Knowledge Base, Product documents
  - PWS Support:
    - https://support.run.pivotal.io or support@run.pivotal.io

- Community forums
  - https://groups.google.com/a/cloudfoundry.org/forum/#!forumsearch/

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Summary

- Cloud Foundry is "the Open PaaS"

- Key concepts: Organizations, Spaces, Services

  – The Application is the unit of deployment.

  – Simpler for Developers

- Pivotal CF is Pivotal's Cloud Foundry distribution

  – Supported, easier to install / manage

- Various documentation resources available

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Lab

Explore Cloud Foundry
& Pivotal CF documentation