

A background image showing a business meeting. In the foreground, a person's hand is writing on a document. In the background, another person is holding a pen over a document. The documents contain charts and graphs.

Pivotal Cloud Foundry

Objectives of PCF

- Purpose:
 - To learn pivotal cloud foundry and deploy some application into PCF with some services.
- Product:
 - Infrastructure as a Service(IaaS)
 - Platform as a Service (PaaS)
 - Software as a Service (SaaS)
- Process:

Table of Contents

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 - Cloud Foundry Concepts
 - Using Command Line, Web plug-in, Eclipse plug-in
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- Pivotal Cloud Foundry Basic
 - Using Services
 - Using BuildPacks
 - Managing Applications in Cloud Foundry
 - Cloud Foundry Architecture and Concepts

Introduction to Cloud Technologies

What is Cloud Foundry?

“The Cloud”

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

Types of cloud computing

- IaaS → Infrastructure as a Service
- PaaS → Platform as a Service
- SaaS → Software as a Service

Infrastructure as a Service (IaaS)

- Replacement for physical hardware
- Provides virtual hardware
- Amazon Web Services (AWS) , RackSpace, Microsoft Azure, VMware vCloud Air



Platform as a Service (Paas)

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



Software as a Service (SaaS)

- Complete Software Application
- SalesForce.com, Google Apps, hundreds of examples.



PaaS : Pizza as a Service !

You Manage

Provided

Traditional data-center (on-prem)

Dining Table

Soda

Electric/Gas

Oven

Fire

Pizza Dough

Tomato Sauce

Toppings

Cheese

Make at Home

Infrastructure as a Service (IaaS)

Dining Table

Soda

Electric/Gas

Oven

Fire

Pizza Dough

Tomato Sauce

Toppings

Cheese

Frozen Pizza

Platform as a Service (PaaS)

Dining Table

Soda

Electric/Gas

Oven

Fire

Pizza Dough

Tomato Sauce

Toppings

Cheese

Home Delivery

Software as a Service (SaaS)

Dining Table

Soda

Electric/Gas

Oven

Fire

Pizza Dough

Tomato Sauce

Toppings

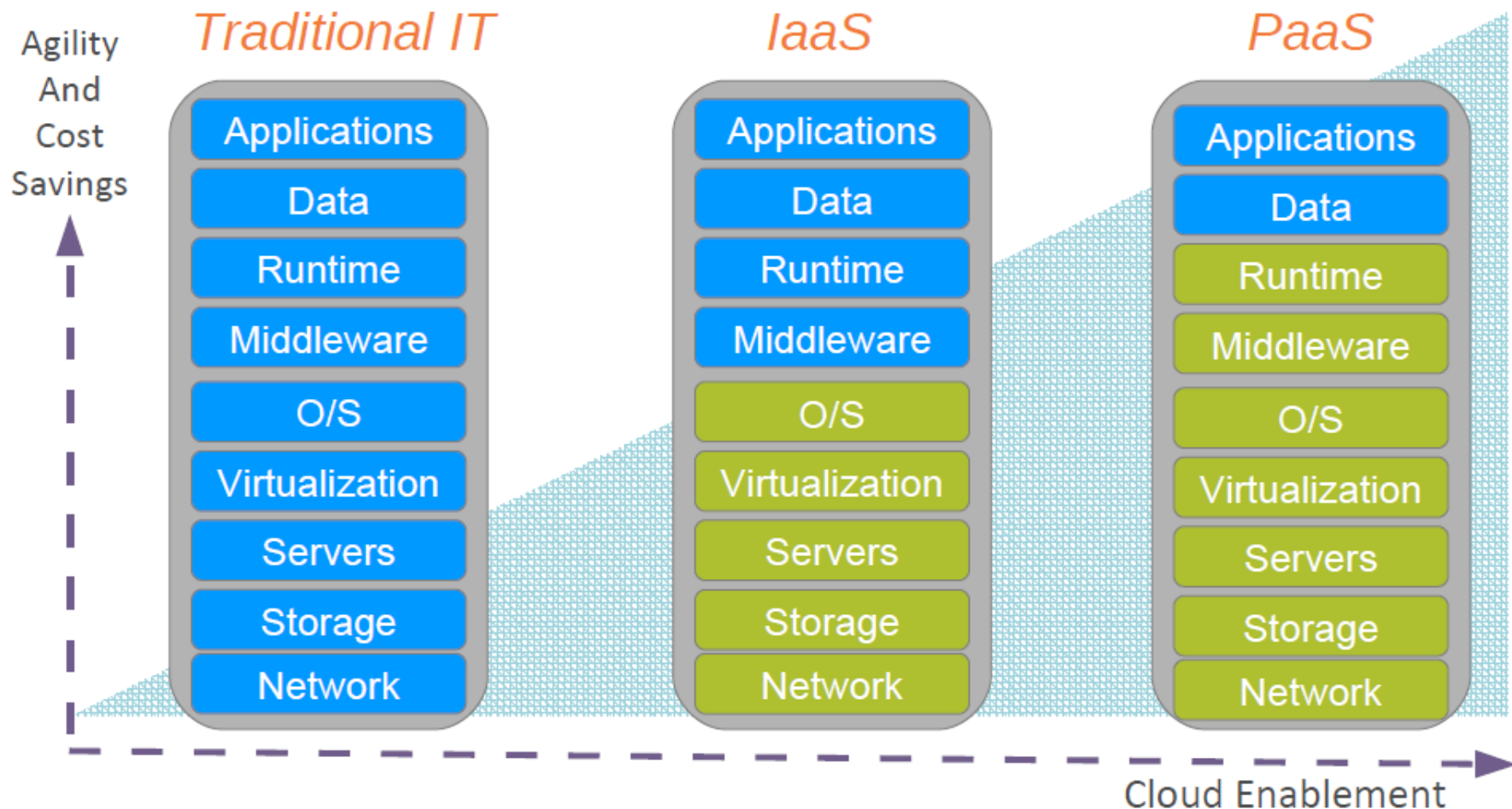
Cheese

Eat Out

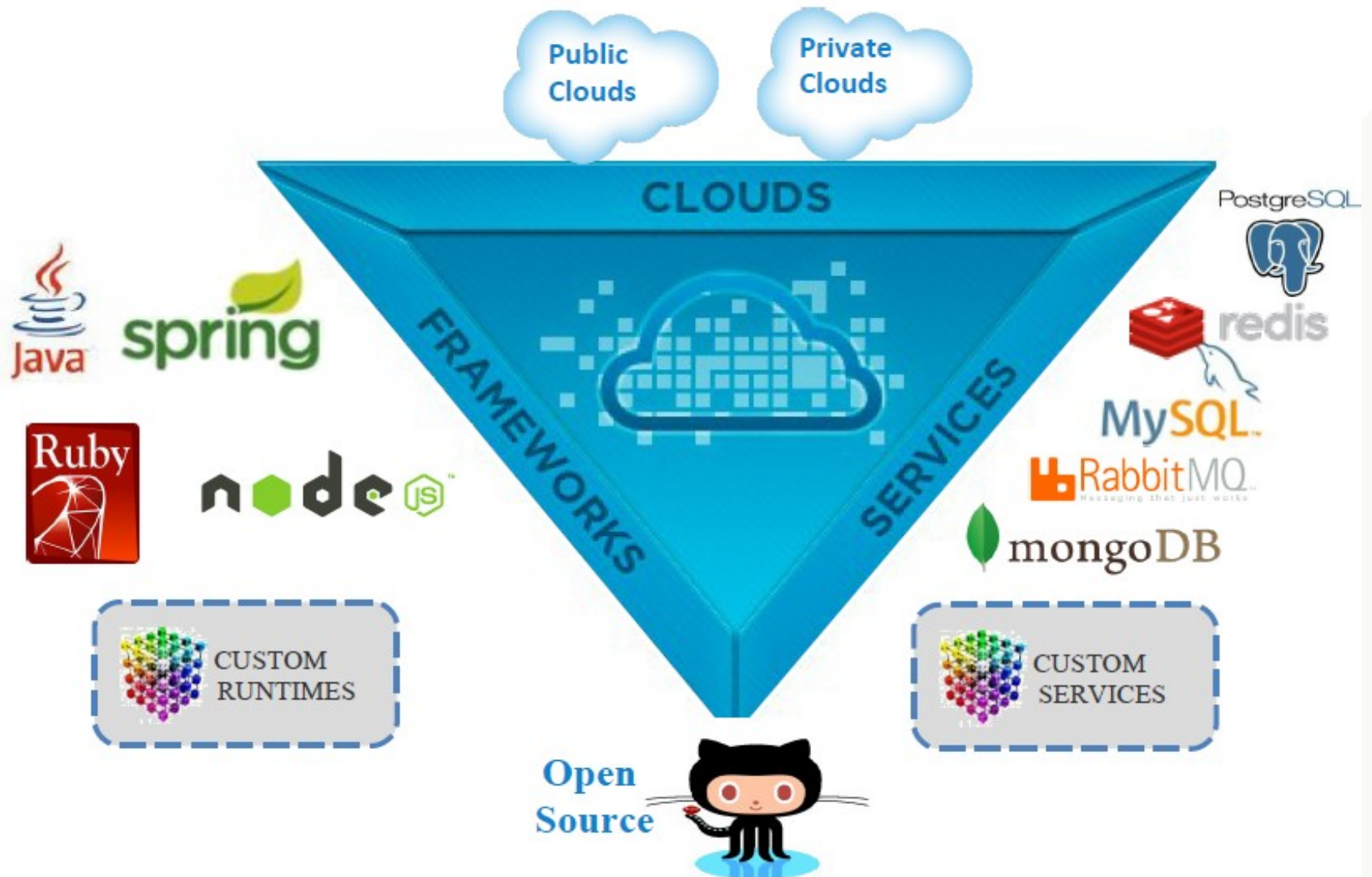
Platform as a Service (Paas)

You Manage

Provided



CloudFoundry – The Open PaaS



Why Cloud Foundry

- Open Source
 - Reduce vendor – lock
- Public or private
- Language Independence
 - Via Buildpacks
- Wide growing range of service



Cloud Foundry : Foundation

Open Governance

Platinum

Pivotal™

EMC²

IBM

hp

rackspace
HOSTING

vmware

SAP

Gold

accenture
High performance. Delivered.

intel



BNY MELLON

Capgemini
CONSULTING. TECHNOLOGY. OUTSOURCING

CenturyLink™

sas



ERICSSON

ActiveState

NTT

verizon

swisscom

Hortonworks

Silver

TELUS

CANONICAL

mongoDB

bluebox

Piston
Piston | Cloud | Computing

FUJITSU

JFrog



redislabs

APPDYNAMICS

anyinnes

AZUL
SYSTEMS

Stark & Wayne.

ANCHORA
MoPaaS

CloudCredo

An Explanation of the Various Web Sites

- A web-search for “Cloud Foundry” can be confusing!

URL	Details
cloudfoundry.org	<ul style="list-style-type: none">• The open source project’s home page• No hosting of any kind here.• Documentation.
github.com/couldfoundry	<ul style="list-style-type: none">• The location of the source.• Download, build and run it you like!
cloudfoundry.com	<ul style="list-style-type: none">• Old commercial web-site.• superseded by <i>run.pivotal.io</i>
blog.cloudfoundry.org	<ul style="list-style-type: none">• Technical blog
run.pivotal.io	<ul style="list-style-type: none">• Pivotal Web Services (PWS)• Pivotal’s hosted environment, runs Pivotal CF

A Major Cloud Foundry Site

- Largest Chinese Internet Search Site
 - One billion page views per day
 - Ad-words facility powered by Cloud Foundry

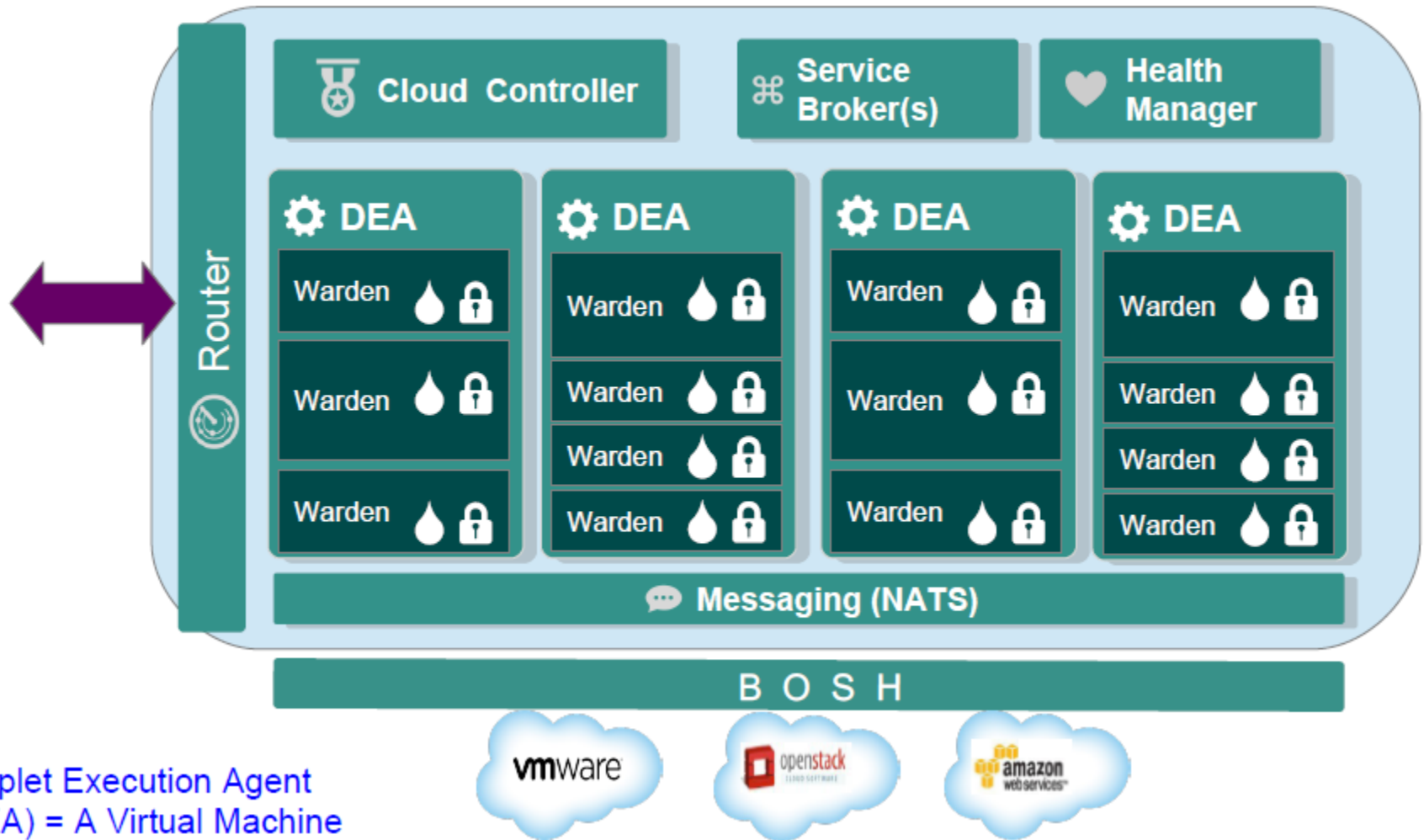


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Cloud Foundry Architecture

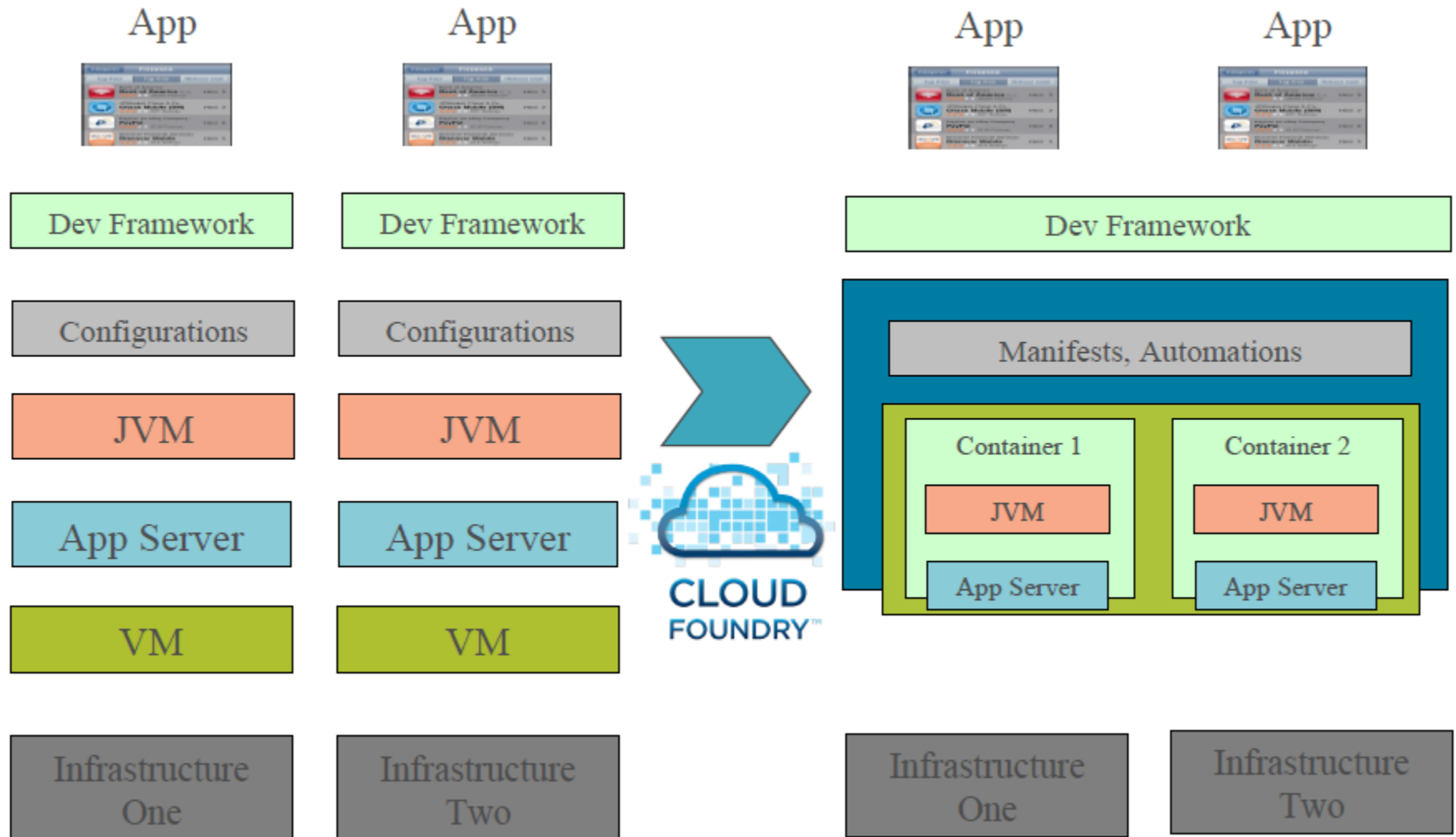


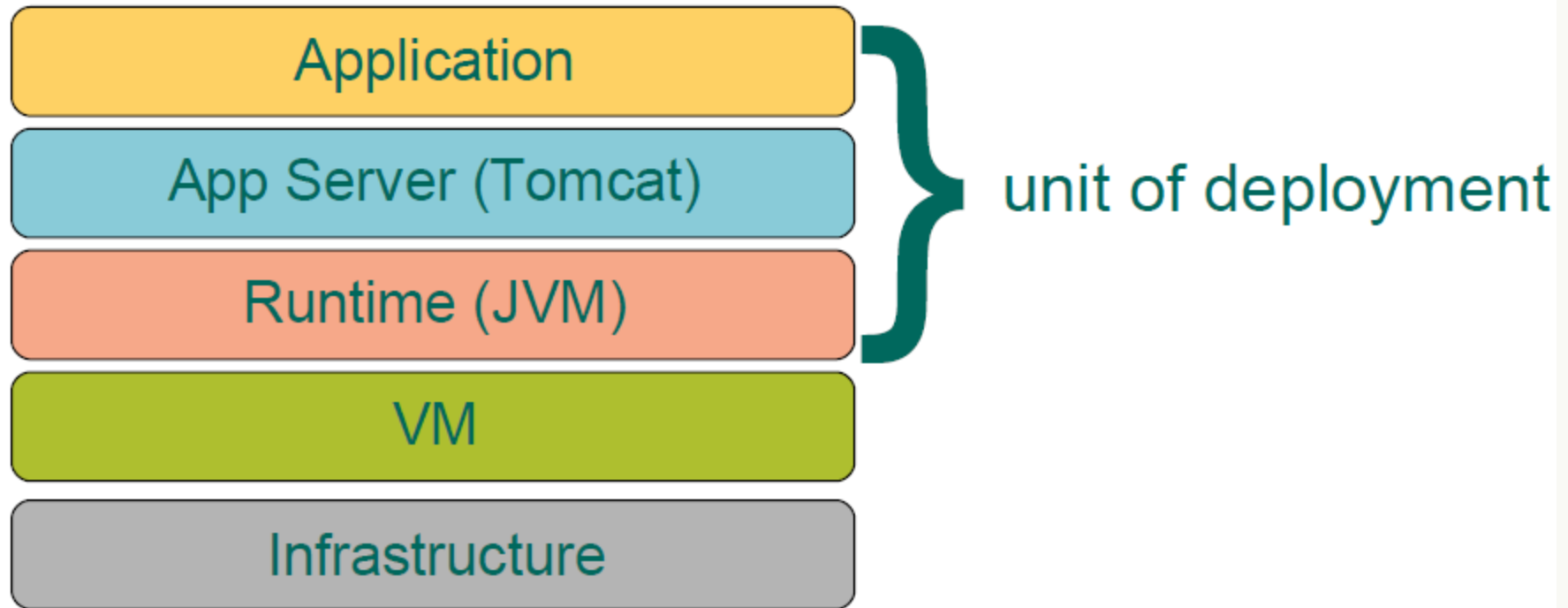
Cloud Foundry Platform as a Service

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



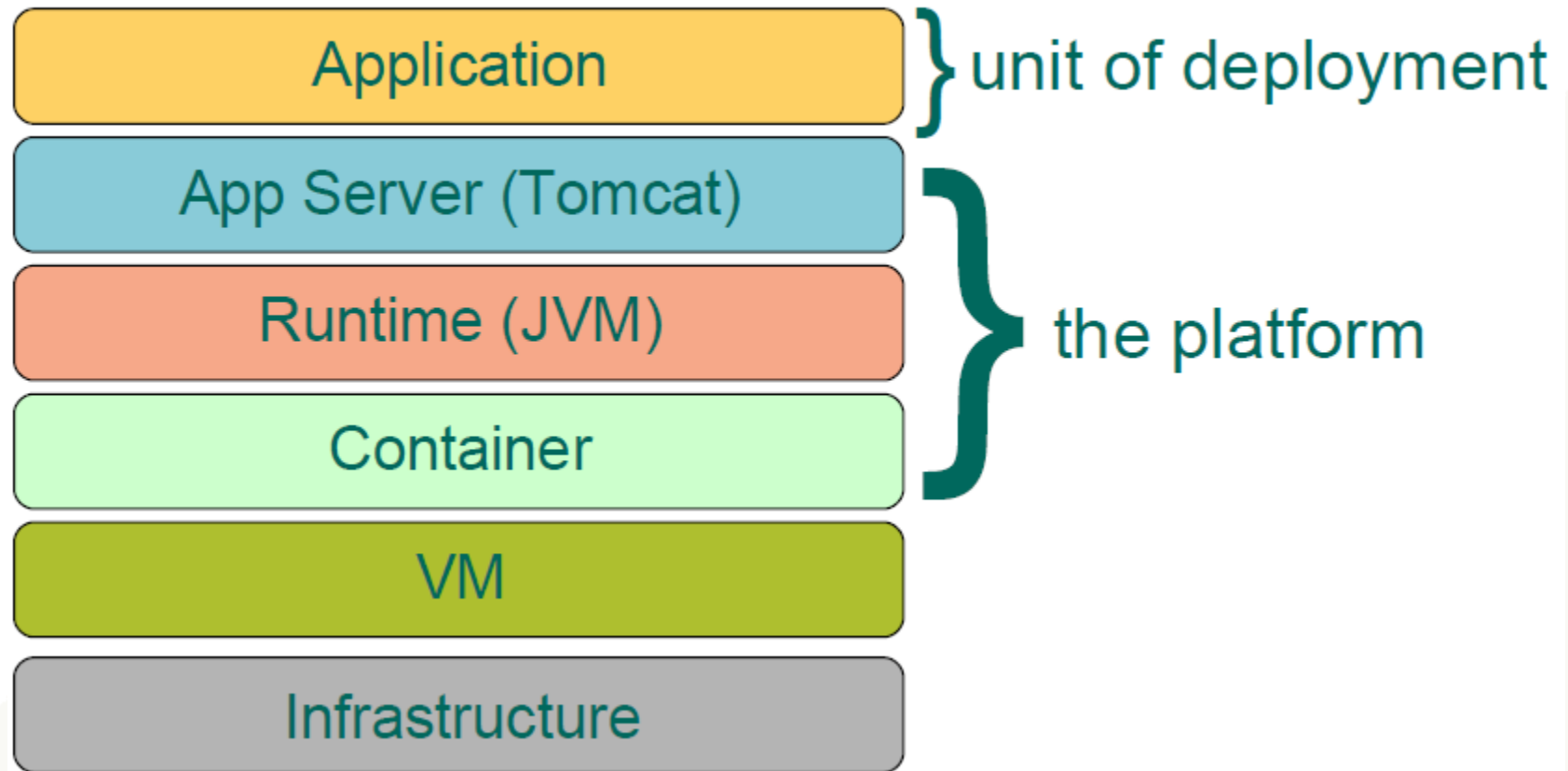
From VM Centric to Application Centric





Scaling = creating VM from blueprints/templates

PaaS – App centric Deployment



Scaling = creating container in a VM pool

Core Tenets of Pivotal CF

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

Which Cloud Foundry Product



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



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
- Same as PWS with guaranteed SLAs.



- 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

Getting started with Pivotal CF

What is Pivotal Cloud Foundry?

- 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

- **Enable 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**

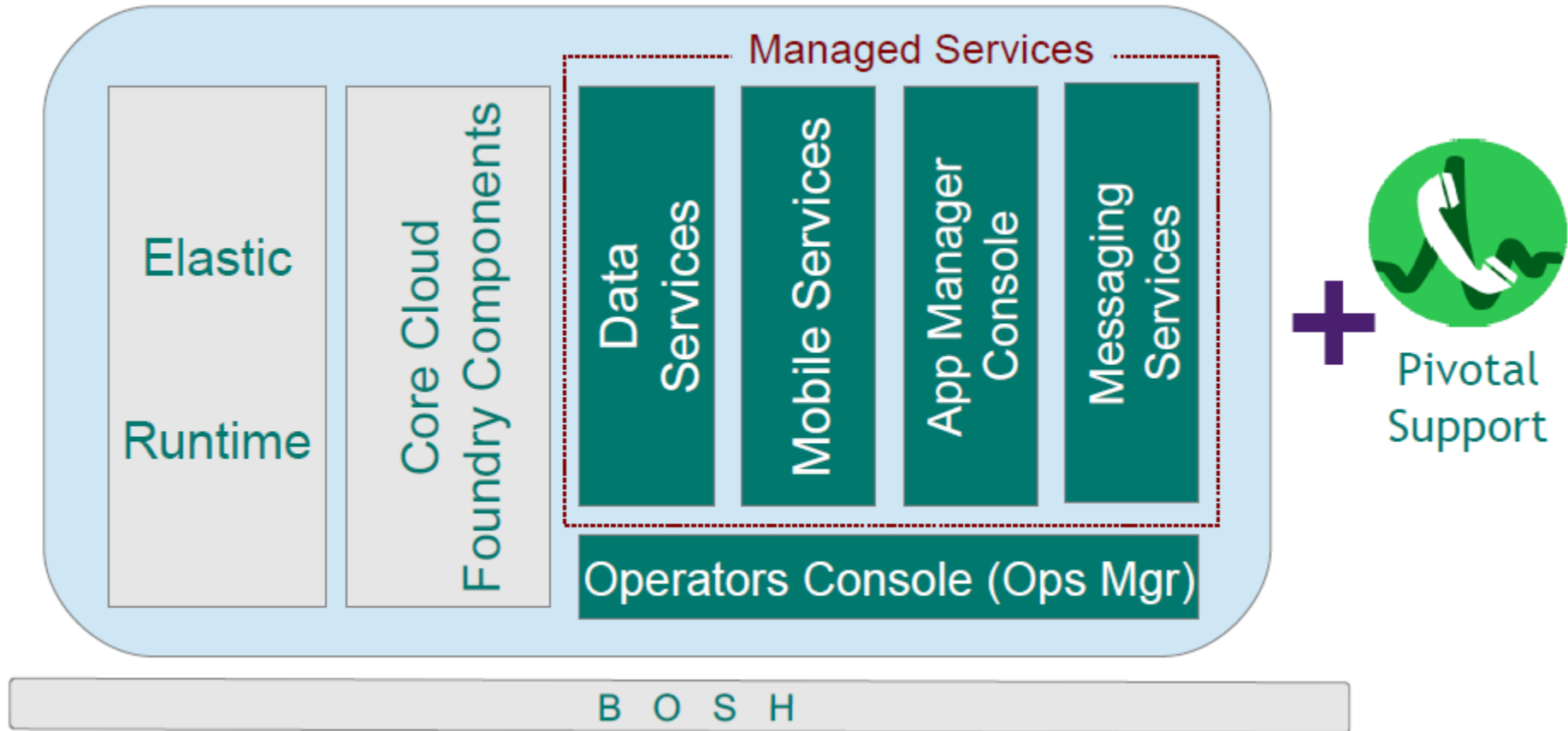
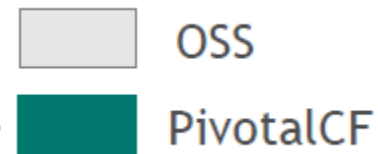
Pivotal CF : Enterprise PaaS Commercially supported

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*

OSS vs Pivotal Cloud Foundry



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

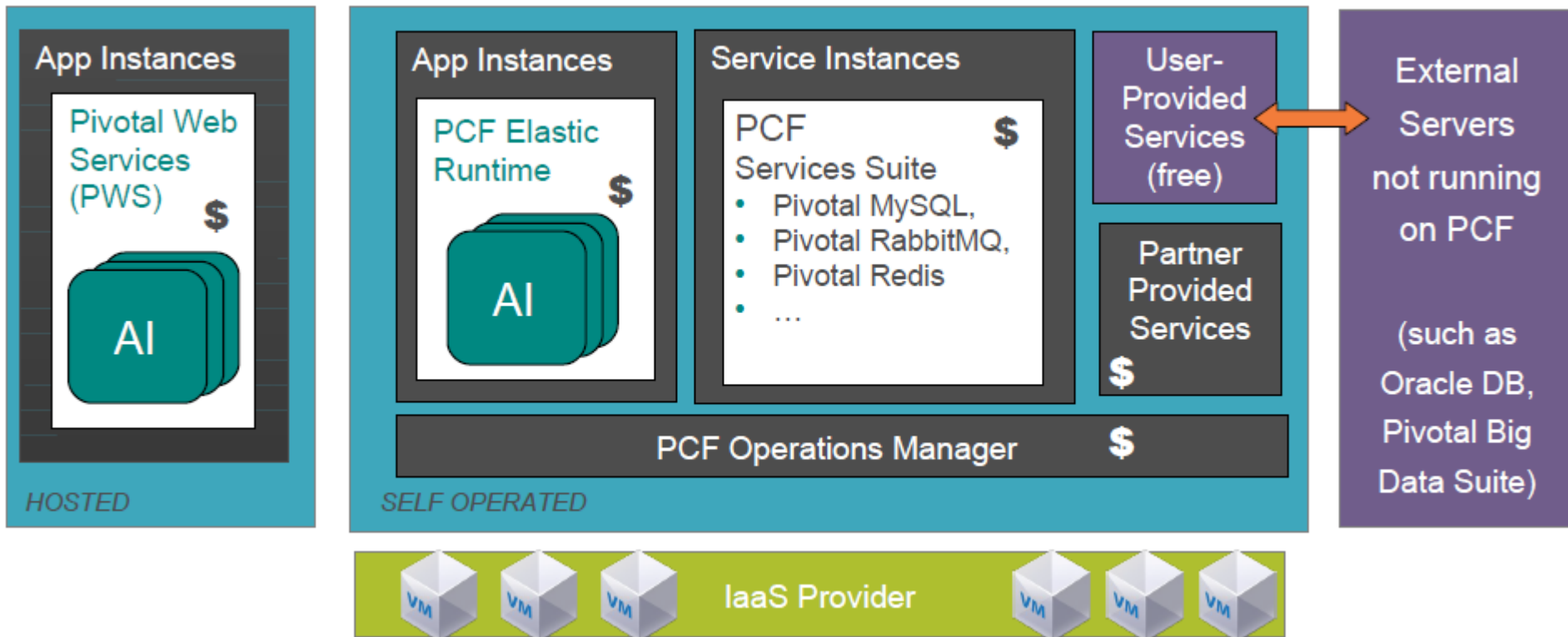
Mobile Services: Push Notifications, API Gateway , Data Sync,

Pivotal CF – Commercial Components

PCF Ops Manager	<ul style="list-style-type: none">• 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 x2 for HA)
PCF Elastic Runtime Application Instances (AI)	<ul style="list-style-type: none">• Individual instance 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)	<ul style="list-style-type: none">• 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, messaging, development and/or data storage) within the same (or another) licensed Foundation.

What Pivotal Charge For

- Each App Instance, each Op manager, each managed Service



Pivotal CF : Developer Benefits

■ Application Manager

- Start / Stop
- Scale
- Services
- Logs
- ect.

The screenshot shows the Pivotal CF Application Manager interface for the 'spring-music-sct' application. The interface is divided into several sections:

- Header:** Pivotal CF logo, breadcrumb navigation (sct-org > development > spring-music-sct), and user profile (struth@gopivotal.com).
- Left Sidebar:** Navigation menu with sections for ORG (sct-org), SPACES (development, production, staging, testing), Marketplace, Docs, Support, and Tools.
- Main Content Area:**
 - APP:** A large circular graphic with the app name 'spring-music-sct' and two icons (a blue square and a blue circle).
 - ABOUT:** Metadata including BUILDPACK (liberty_buildpack), STACK (Ubuntu 10.04), and ROUTE (spring-music-sct.example.com).
 - INSTANCES:** A control panel showing 2 instances, a memory limit of 256 MB, and a disk limit of 1 GB. A 'SCALE APP' button is present.
 - USAGE:** A table showing the usage of two instances.
 - Activity:** Tabs for Service Instances, Resources, and a Delete app button.
 - EVENTS:** A list of events, including 'scaled instances (1 to 2)' and 'started app'.
 - RECENT LOGS:** A list of recent log entries with timestamps and log messages.

#	STATUS	CPU	MEMORY	DISK	UPTIME
1	Running	80%	96.0	.39	5d 23hr 39min
2	Running	85%	94.4	.39	5d 23hr 59min

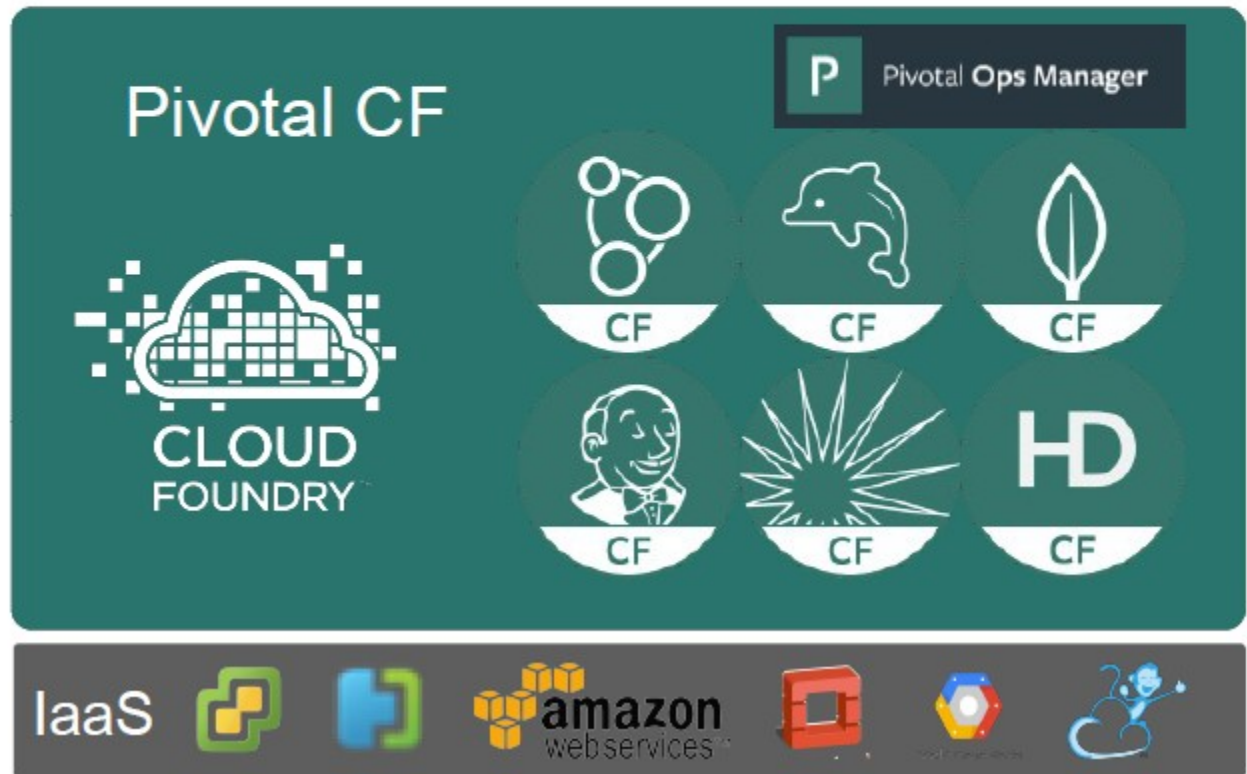
Timestamp	Log Message
2014-02-21T14:29:21.55-0800 [App/0]	OUT at org.apache.catalina.loader.WebappClassLoader.findClassInternal (WebappClassLoader.java:2932)
2014-02-21T14:29:22.31-0800 [App/0]	OUT 22:29:21,304 INFO ContextLoader:272 - RootWebApplicationContext: initialization started

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

Pivotal CF : Operators View



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 in third-party cloud provider
 - Open Stack, AWS , ...

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.

■ Support is available for Pivotal Cloud Foundry

- Options : <http://pivotal.io/support/offertings>
- 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/>

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 Cloud Foundry Distribution
 - Supported easier to install /manage
- Various documentation resources available

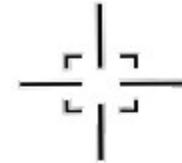


Cloud Foundry Concepts

Overview

■ After completing this lesson, we should understand:

- Applications
- Buildpacks
- Manifests
- Organizations
- Spaces
- Users and Roles
- Quotas
- Domains
- Routes
- Services



Applications



- PaaS exits to deploy applications
 - In Cloud Foundry, the application is the unit of deployment
 - Developers focus on apps, not runtimes or services

- Cloud Foundry is development agnostic
 - Not limited to specific language
 - Doesn't mandate the runtime environment you get
 - Some are “out-of-the-box”
 - you can add more

Buildpacks and Manifests



■ Buildpacks

- Allow CF to support multiple languages and deployment environments
 - Buildpacks for Java, Ruby, JavaScript, ...
 - Buildpacks for Tomcat, Rails, Node.JS

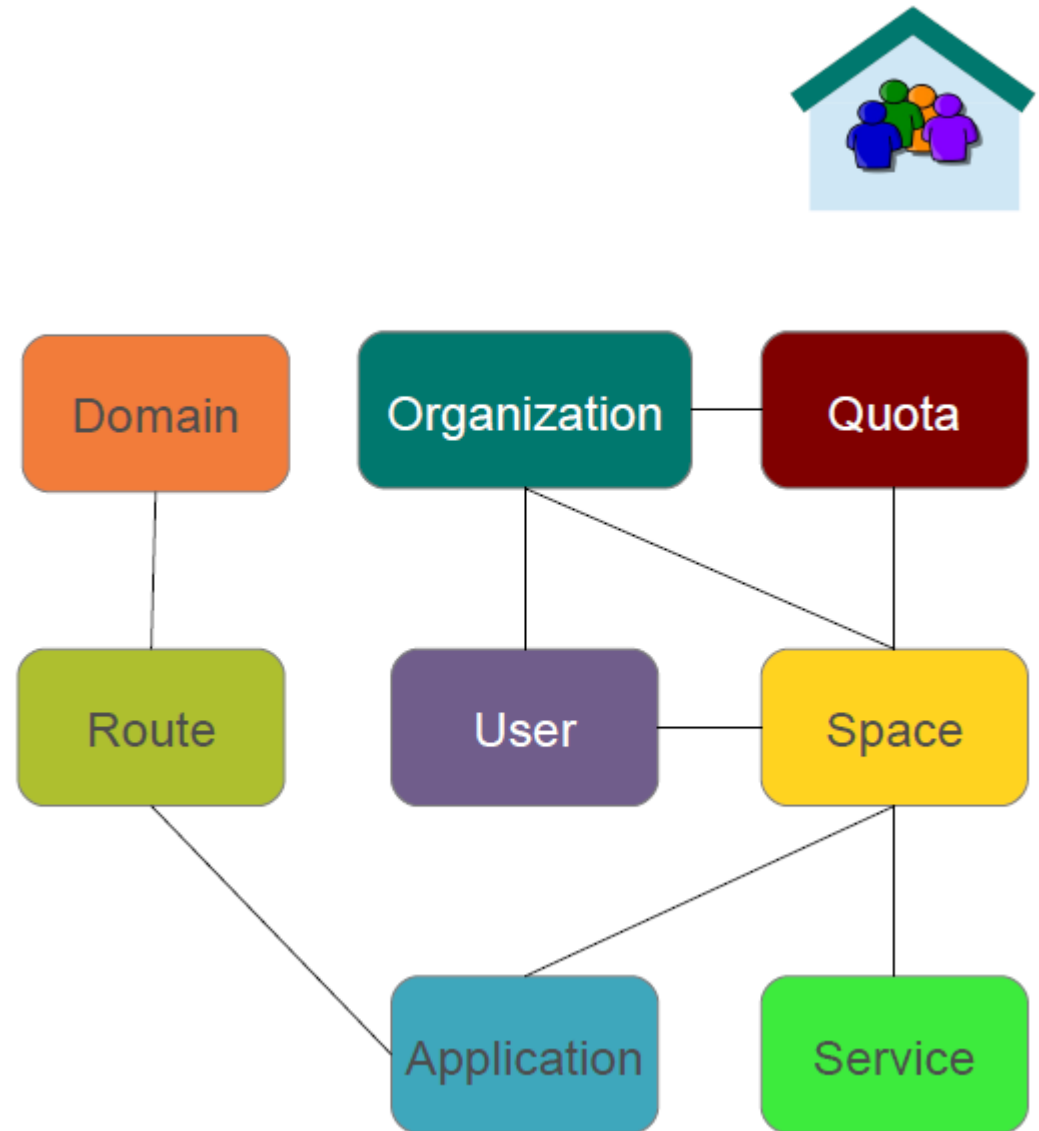
■ Manifests

- A deployment “blueprint” for an application
- Repeatable : redeploy using same manifest

```
---
applications:
- name: nodetestdh01
  memory: 64M
  instances: 2
  host: crn    # unique
  domain: cfapps.io
  path: .
```


Organizations

- Top-most administrative unit
- Contains Spaces and users
 - Which own routes, applications and services
- Quotas restrict resources
 - For orgs and spaces
- Domain(s)
 - Define routes to apps

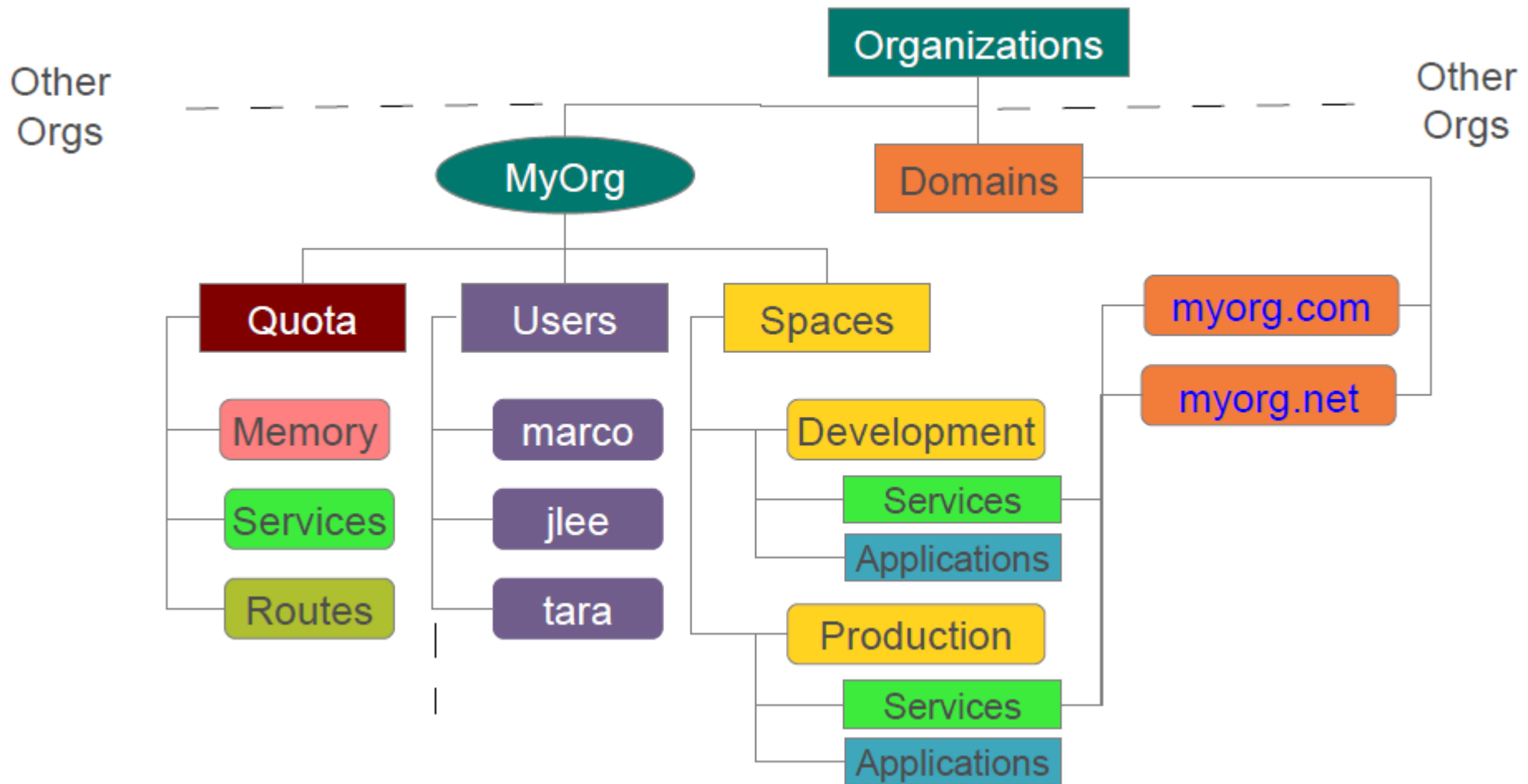


Organizations



- CF is designed for use by Organizations
 - Typically a company, department, application suite or large project
- Designed to support collaboration
 - Potentially many users
- Defines one or more domains
 - Cloud Foundry instance defines default domain for all organizations
 - For PWS: cfapps.io
 - You may add additional domains
- Defines Security, Quotas

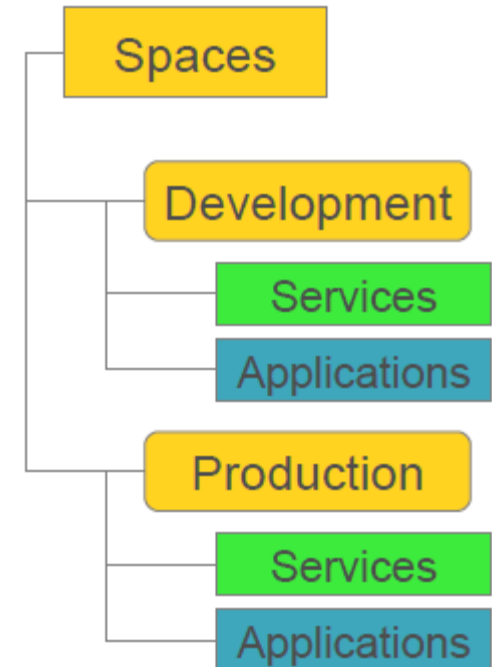
Example Organization



Spaces



- Organization contains multiple spaces
 - Default PWS space: development
 - Users can create additional spaces
- Application and services scoped to a space
 - Many applications can run/scale within space
- Provides set of users access to a shared location
 - Application development
 - Functionality and/or performance testing
 - Quality Assurance
 - Deployment to production
 - Maintenance



Users and Roles



- Members of the organization
 - You can invite users to share your cloud
- Have specific roles
 - Roles control access to domains and spaces
 - Roles therefore control who has permission
 - To manage routes (see later slides)
 - To deploy applications
 - To add/bind/remove services
- Don't need to be CF User to access deployed apps
 - Each application does its own user-management



- Organization manager
 - Can invite/manage users, select/change the plan, establish spending limits
- Organization Auditor
 - View only access to all org and space info, settings, reports



- Space Manager
 - Can invite/manage users, enable features for a given space
- Space Developer
 - Can create, delete, manage applications and services, full access to all usage reports and logs
- Space Auditor
 - View only access to all space information, settings, reports, logs

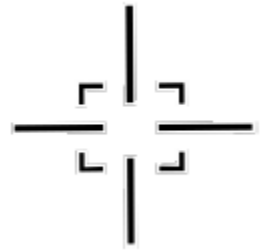


- Special Administrator user / role defined
 - Defined for the Cloud Foundry installation
 - Separate from users defined at Organization / Space
- Several CF commands restricted to Administrator only
 - Setting organization and space quotas
 - Defining security groups
 - Administering services
 - Adding, modifying and removing user accounts
- Use without right role, CLI return:

```
Server error, status code: 403, error code: 10003, message: You are not  
authorized to perform the requested action
```




- Restrictions on available resources
 - Total memory available to all applications
 - Total number of routes
 - Max application instance size
 - Total number of services
- Can view
 - Using the CLI
 - Using App Manager (on org homepage)



- Deployed applications are associated with a URL
 - All requests to that URL redirect to the application
- Each Cloud Foundry instance has a default app domain
 - PWS has cfapps.io
- Custom Domains
 - Register your own domain
 - Give it to Cloud Foundry to use and manage
- Subdomains
 - Each application has a unique sub-domain
 - Its' URL is therefore sub-domain.domain
 - Example: deploy an app to <http://myapp.cfapps.io>

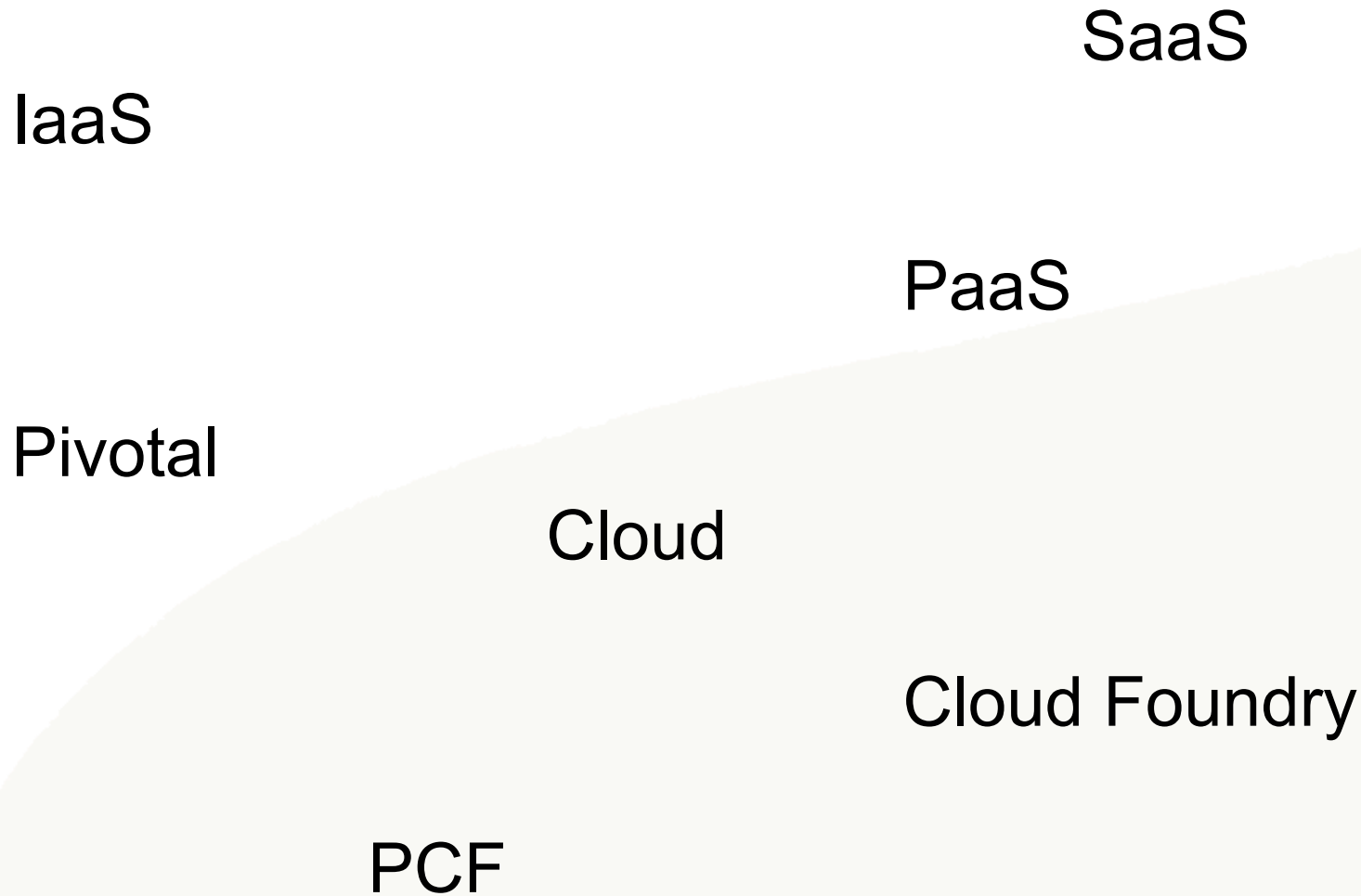


- Define how to get to an application
 - A unique route exists to each application in every space
 - Behind the scenes CF uses a router
 - Maps incoming request to the right application
- Domain can be mapped to multiple spaces
 - Route can only be mapped to one spaces
 - Same application can be deployed in multiple spaces
 - Each must have a different, unique URL
 - Development space route: <http://myapp-test.cfapps.io>
 - Production space route : <http://myapp.cfapps.io>



- Any type of add-on that can be provisioned along side your apps
 - Database, messaging, mail, third-party SaaS provider
- Services are usually “bound” to 1 or more applications
 - Connection info and credentials are put in an environment variable: **VCAP_SERVICES**
 - Note:
 - All configuration data to CF applications should be passed via environment variables
 - Can't use configuration files: *no file system*

Recap



People matter, results count.



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