

Pivotal.

Introduction to Pivotal Cloud Foundry



COMPETING ON

Product

Business Model

Customer Experience

New Age of Digital Transformation



Pivotal

A photograph of two men in an office environment. One man, on the left, is smiling and wearing a light blue button-down shirt. The other man, on the right, has white hair and is wearing a dark sweater over a collared shirt, looking down at a laptop screen.

“From 2 months for provisioning servers to
**delivering products in less
than 5 weeks”**

Humana®

Pivotal

“Moving from 100 day [cycles] to **minutes**”

“We get to drive business as a
Technology Company
(not an old insurance company driven by actuaries)”



Allstate[®]



New age of Digital Transformation

Enterprises operating at startup speeds



Bloomberg

comcast

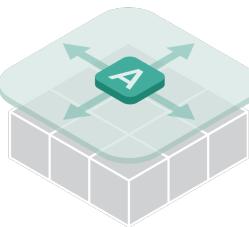


Mercedes-Benz

GARMIN™

verizon

Changing Model for Application Delivery

Architecture	Development	Abstraction Layer	Deployment	“Day 2” Ops
Monolithic App	Linear / Sequential	App Server on Machine	Sparingly at designated times	Many tools, ad hoc automation
				
Microservices / Composite app	Short cycles, test driven, iterative	App on “disposable” infrastructure	Ready for prod at any time	Manage services, not servers



DEVELOPMENT

Multiple Languages



...

Microservices Support



Services Marketplace



OPERATIONS

App Deployment & Management



CI/CD Tools,
ID, Security

Availability



Health,
Metrics,
Patching

Visibility & Administration



Apps &
Platform
Dashboards

Operating System



Container Orchestration



Cloud API



Google

AWS

Azure

VMW

Openstack



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Developer Self Service Provisioning

Flexibility with control



```
>cf
```

Push App



http://



more...

Push your app and it just works...no “snowflakes”, no waiting.

Automate Deployments

Behind the scenes with

```
$ cf push
```



Upload

'cf push' uploads the application bits and metadata to the Cloud Controller

Stage

Behind the scenes the code goes through a set of staging scripts called **BuildPacks** which create a container blueprint called '**Droplet**'

Distribute

'**Diego**' which is an auction based workload scheduler spins up containers and with the '**Droplet**' image, and alerts the '**Cloud Controller**' that the app is ready to receive traffic

Route

Your app receives an entry in the routing tier which provides a dynamic loadbalancer

Deploying an Application

IaaS versus PCF

- Provision VM
- Install Application Runtime
- Deploy Application
- Configure Load Balancer
- Configure SSL Termination
- Configure Service Connectivity
- Configure Firewall



cf push

Pivotal CF™

Pivotal

Scaling an Application

IaaS versus PCF

Pivotal CF™

- ⌚ Provision New VM
- ⌚ Install Application Runtime
- ⌚ Deploy Application
- ⌚ Configure Load Balancer / Update Route
- ⌚ Configure Service Connectivity
- ⌚ Configure Firewall



cf scale

Eliminating Service Tickets

```
D:\pcf\PCF-demo-1>cf push
Using manifest file D:\pcf\PCF-demo-1\manifest.yml
Updating app pcfdemo-1 in org PCF-Org-01 / space development as H141869...
OK

Using route pcfdemo.apps.pcf.dce
Uploading app files from: D:\pcf\PCF-demo-1\target\pcfdemo.war
Uploading 615.4K, 66 files
Done uploading
OK

Binding service myrabbit to app pcfdemo-1 in org PCF-Org-01 / space development as H141869...
OK
Binding service mylogger to app pcfdemo-1 in org PCF-Org-01 / space development as H141869...
OK
Binding service myscaler to app pcfdemo-1 in org PCF-Org-01 / space development as H141869...
OK

Stopping app pcfdemo-1 in org PCF-Org-01 / space development as H141869...
OK

Starting app pcfdemo-1 in org PCF-Org-01 / space development as H141869...
----> Downloaded app package (8.5M)
-----> Java Buildpack Version: v3.0 (offline) | https://github.com/cloudfoundry/java-buildpack.git#3bd15e1
-----> Downloading Open Jdk JRE 1.8.0_40 from https://download.run.pivotal.io/openjdk/trusty/x86_64/openjdk-1.8.0_40.tar.gz (found in cache)
-----> Expanding Open Jdk JRE to java-buildpack/open_jdk_jre (0.9s)
-----> Downloading Spring Auto Reconfiguration 1.7.0.RELEASE from https://download.run.pivotal.io/auto-reconfiguration/auto-reconfiguration-1.7.0.RELEASE.jar (found in cache)
-----> Modifying AUTO-INF/web.xml for Auto Reconfiguration
-----> Downloading Tomcat Instance 8.0.21 from https://download.run.pivotal.io/tomcat/tomcat-8.0.21.tar.gz (found in cache)
-----> Expanding Tomcat 8.0.21 to java-buildpack/tomcat-8.0.21/
-----> Downloading Tomcat Lifecycle Support 2.4.0.RELEASE from https://download.run.pivotal.io/tomcat-lifecycle-support/tomcat-lifecycle-support-2.4.0.RELEASE.jar (found in cache)
-----> Downloading Tomcat Logging Support 2.4.0.RELEASE from https://download.run.pivotal.io/tomcat-logging-support/tomcat-logging-support-2.4.0.RELEASE.jar (found in cache)
-----> Downloading Tomcat Access Logging Support 2.4.0.RELEASE from https://download.run.pivotal.io/tomcat-access-logging-support/tomcat-access-logging-support-2.4.0.RELEASE.jar (found in cache)

----> Uploading droplet (60M)
1 of 1 instances running
App started
OK

App pcfdemo-1 was started using this command 'JAVA_HOME=$PWD/.java-buildpack/open_jdk_jre JAVA_OPTS=-Djava.io.tmpdir=$TMPDIR -XX:OnOutOfMemoryError=$PWD/.java-buildpack/open_jdk_jre/bin/killjava.sh -Xmx382293K -Xms382293K -XX:MaxMetaspaceSize=64M -XX:MetaspaceSize=64M -Xss995K -Djava.security.egd=file:///dev/urandom -Daccess.logging.enabled=false -Dhttp.port=$PORT" <$PWD/.java-buildpack/tomcat-8.0.21/catalina.sh run'
Showing health and status for app pcfdemo-1 in org PCF-Org-01 / space development as H141869...
OK

requested state: started
instances: 1/1
usage: 512M x 1 instances
urls: pcfdemo.apps.pcf.dce.honeywell.com
last uploaded: Mon Aug 3 00:19:12 UTC 2015
stack: cflinuxfs2

#0  state      since          cpu%   memory     disk      details
#0  running    2015-08-02 07:19:38 PM  0.0%  345.8M of 512M  138.3M of 1G
```

Firewall & Routes

Service Bindings

App Lifecycle

Runtime Installation & Config

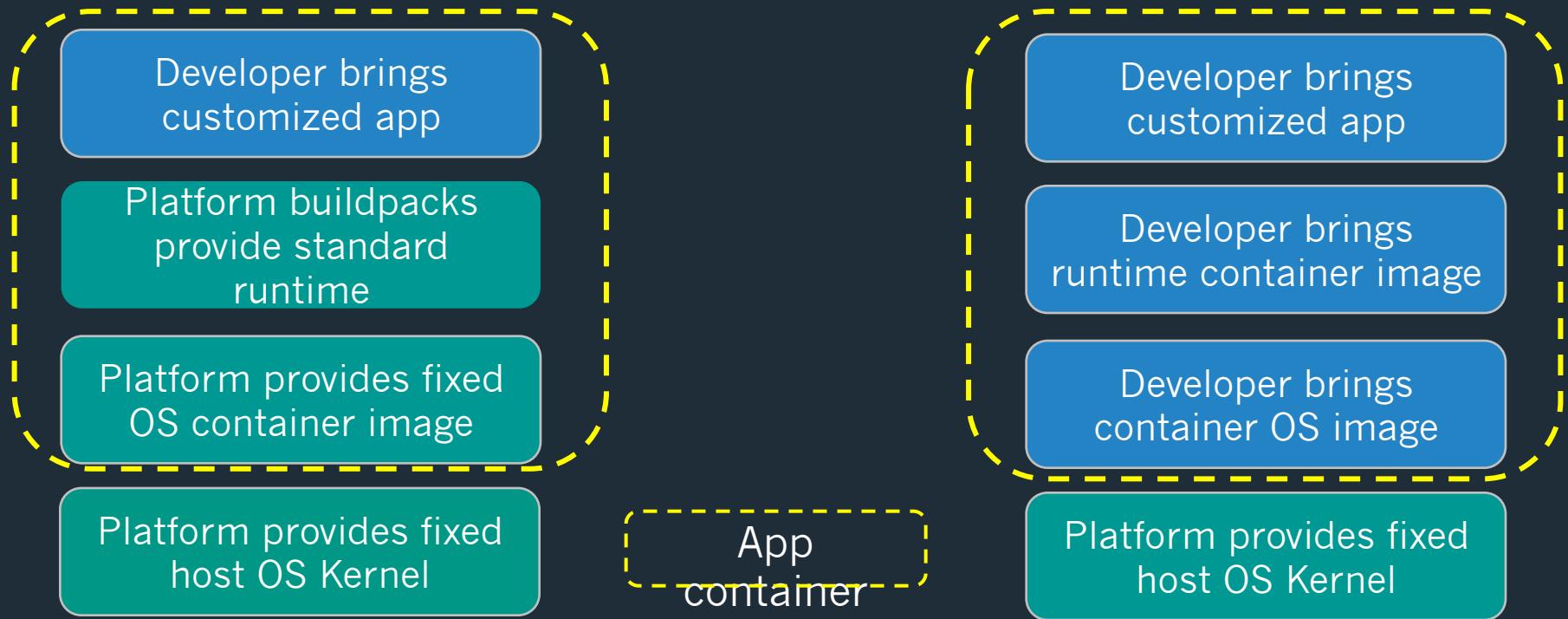
Middleware Installation & Config

Application Installation & Config

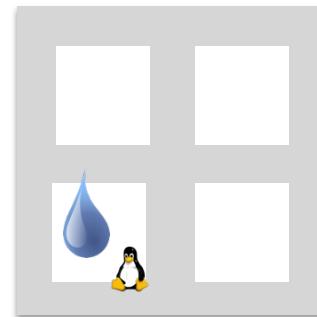
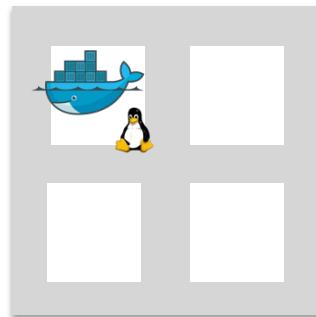
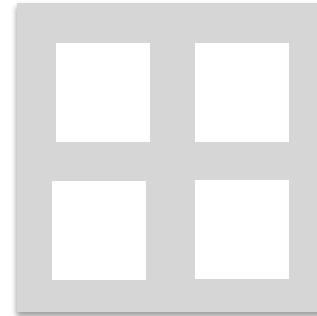
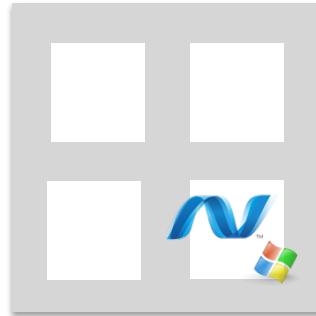
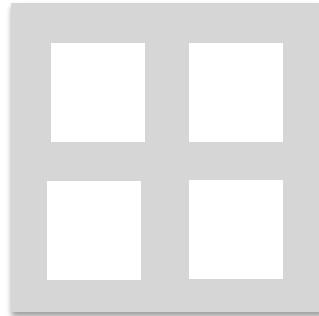
App Lifecycle

Logging, Health, Telemetry

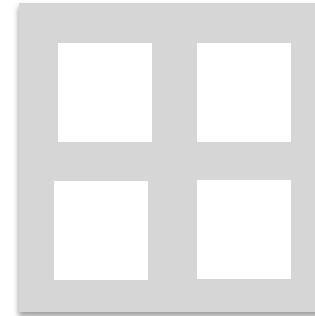
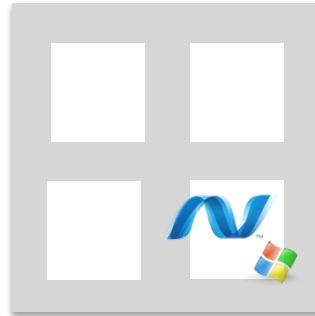
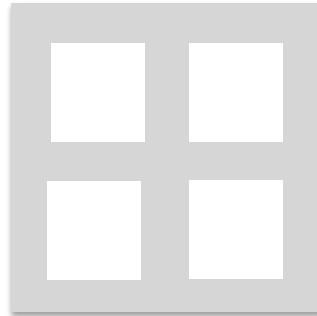
Serverless: Runtime vs No-Runtime



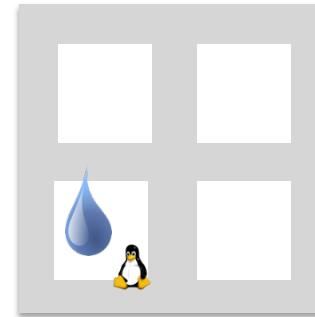
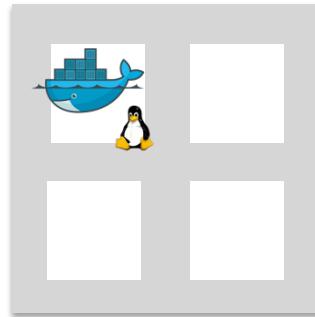
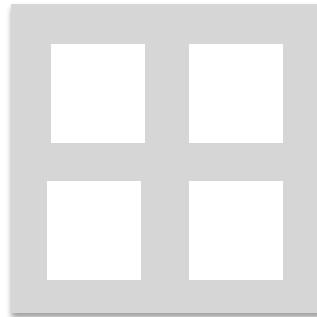
Container Scheduler Handles Workloads



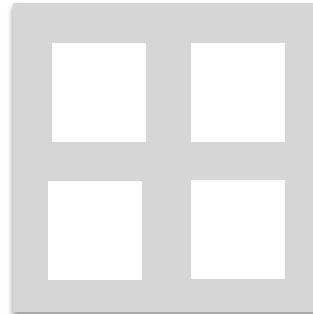
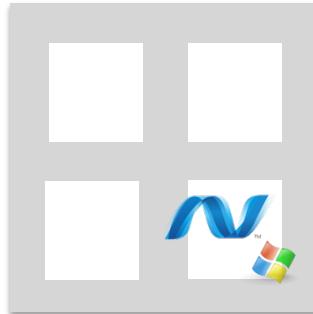
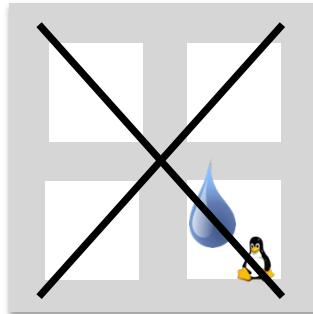
Container Scheduler Handles Workloads



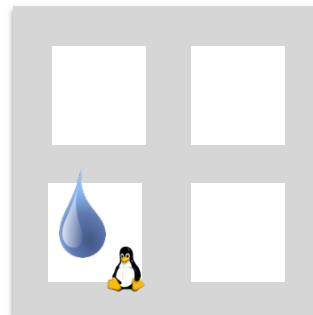
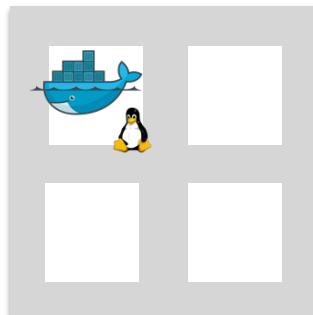
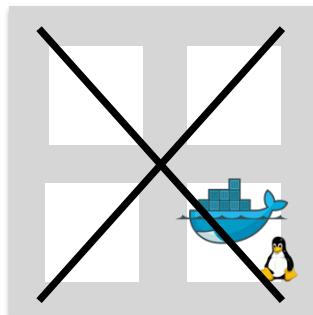
**Dynamic load
balancing**



Container Scheduler Handles Workloads

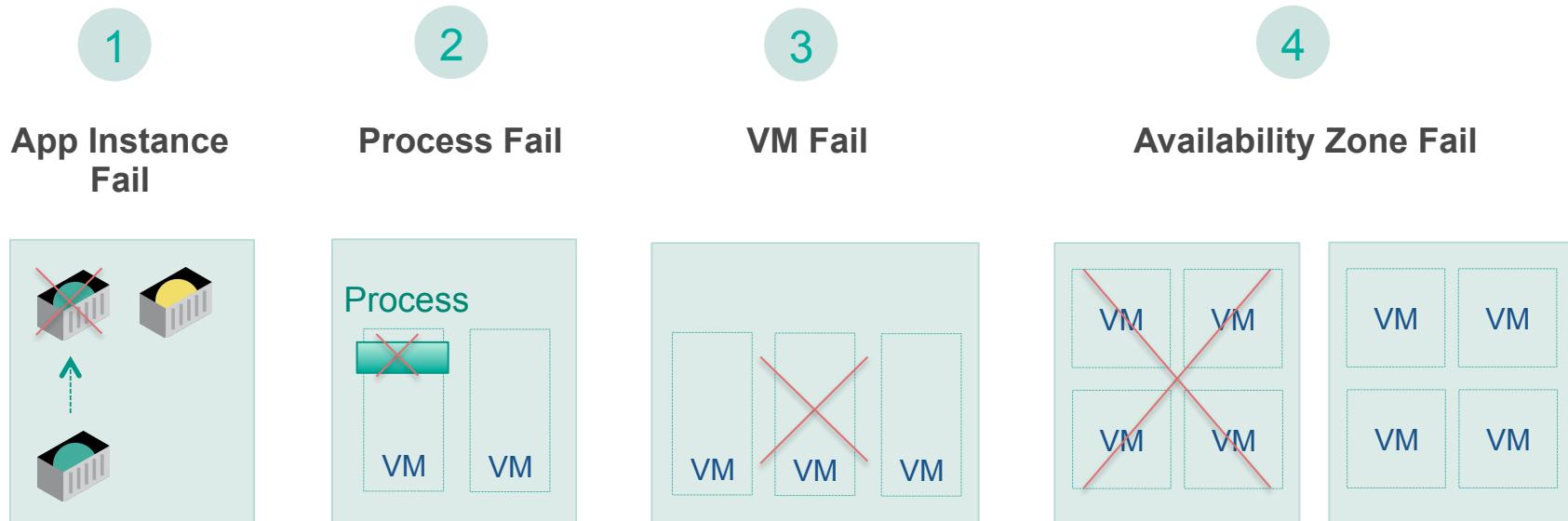


Dynamic load balancing



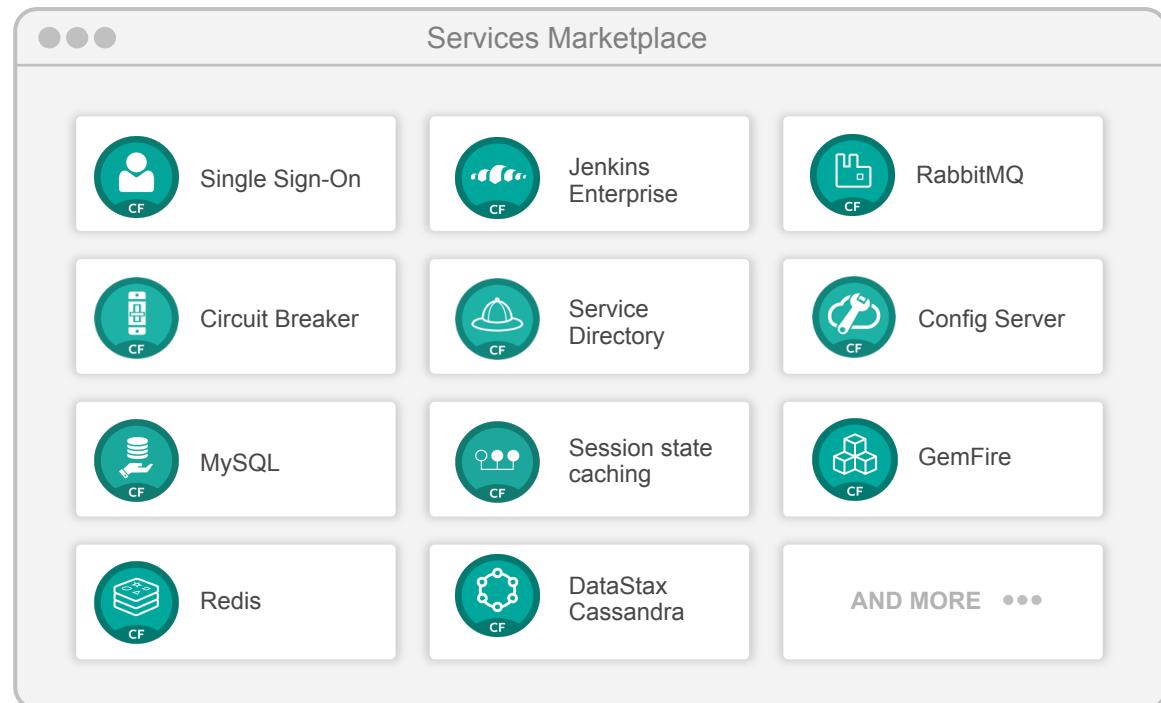
Remediation and rebalance of workloads

4 Levels of High Availability



Services prepackaged for simple consumption

- Easy accessibility through Marketplace
- Instant Provisioning and full lifecycle managed
- Bind to apps through easy to use interface
- Common access control and audit trails across services





DEVELOPMENT

Multiple Languages



...

Microservices Support



Services Marketplace



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Container Orchestration



Cloud API



Google

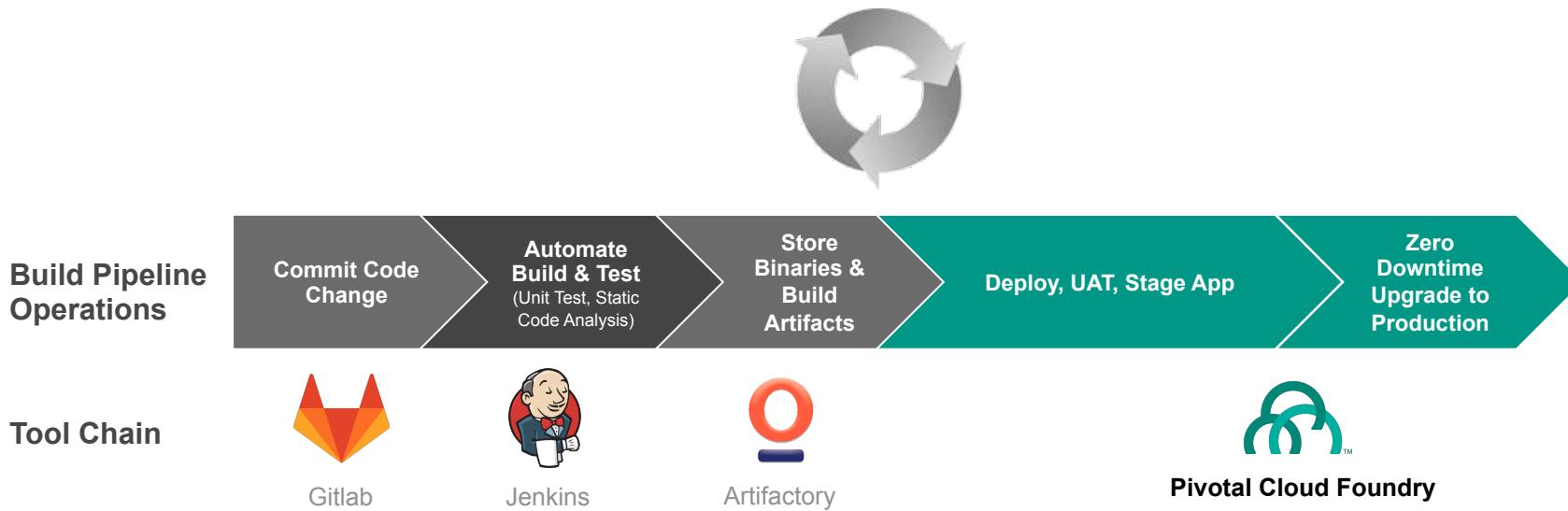
AWS

Azure

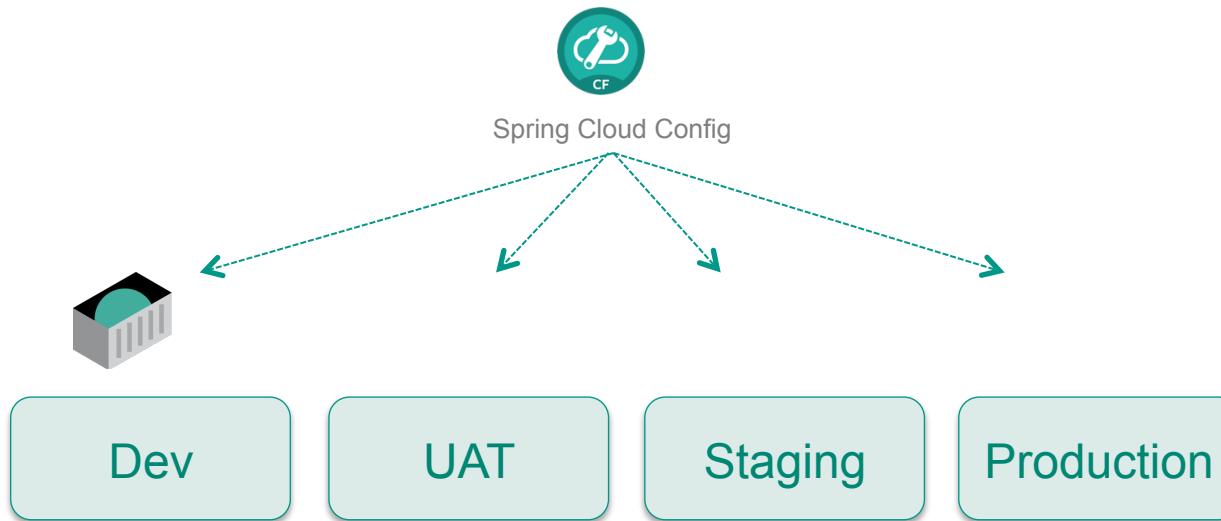
VMW

Openstack

Comprehensive application lifecycle management

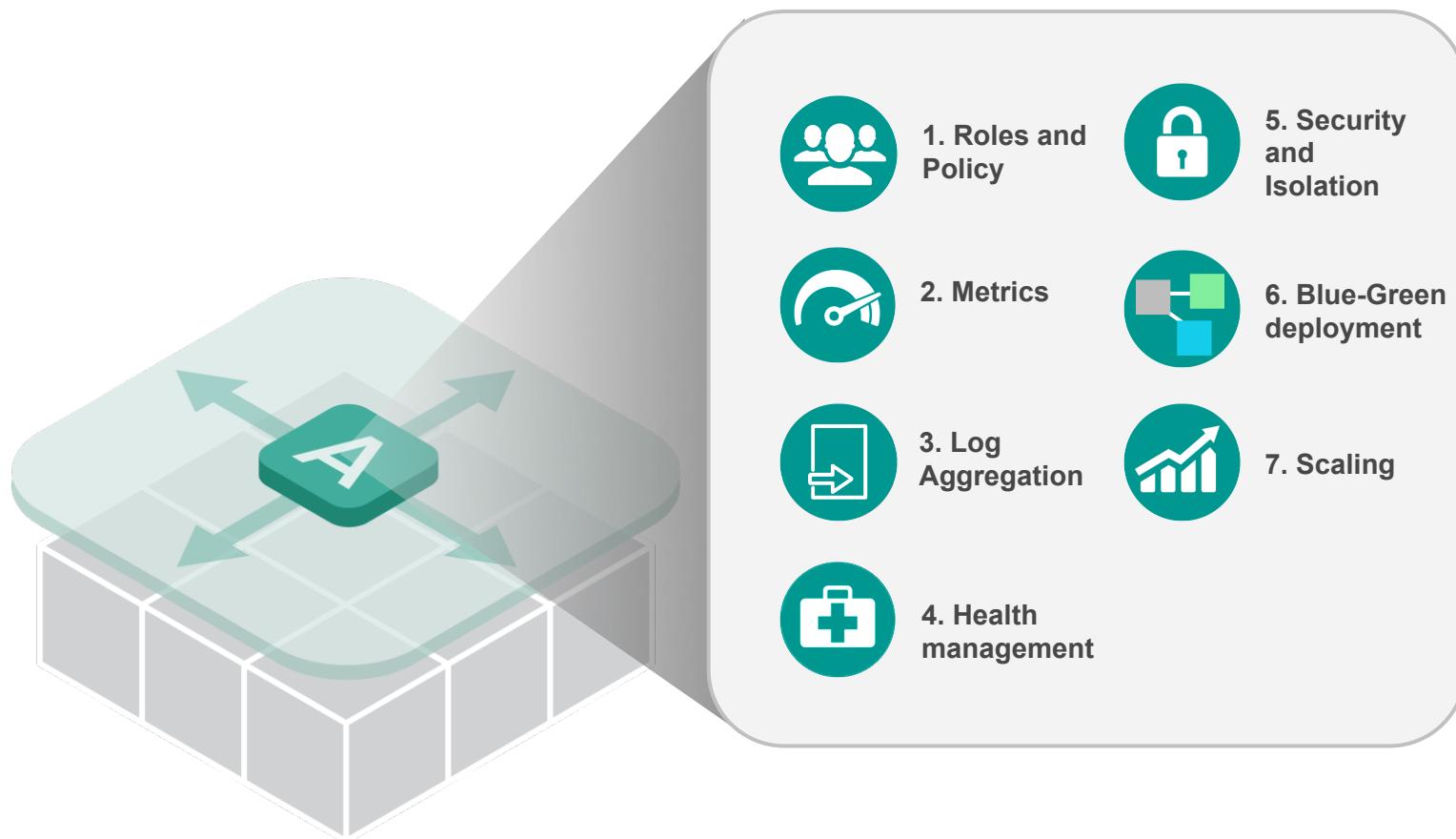


Accelerating the velocity of each iteration



- Dev, Test, Staging and Production on the same platform
- Bit for bit consistent environments
- Logical groupings of user access controls

Everything to Deploy and Manage the App



Comprehensive Visibility & Administration

PCF Ops Manager

The dashboard displays five product cards:

- Ops Manager Director**: VMware vSphere, v1.6.8.0
- Pivotal Elastic Runtime**: v1.6.13-build.1
- Spring Cloud Services**: v1.0.4
- RabbitMQ**: v1.5.4
- MySQL for Pivotal Cloud Foundry**: v1.7.2

Available Products sidebar:

- Ops Manager Director (No upgrades available)
- Pivotal Elastic Runtime (No upgrades available)
- RabbitMQ (No upgrades available)
- Spring Cloud Services (No upgrades available)
- MySQL for Pivotal Cloud Foundry (No upgrades available)

Import a Product button.

Operations Manager

Pivotal Apps Manager

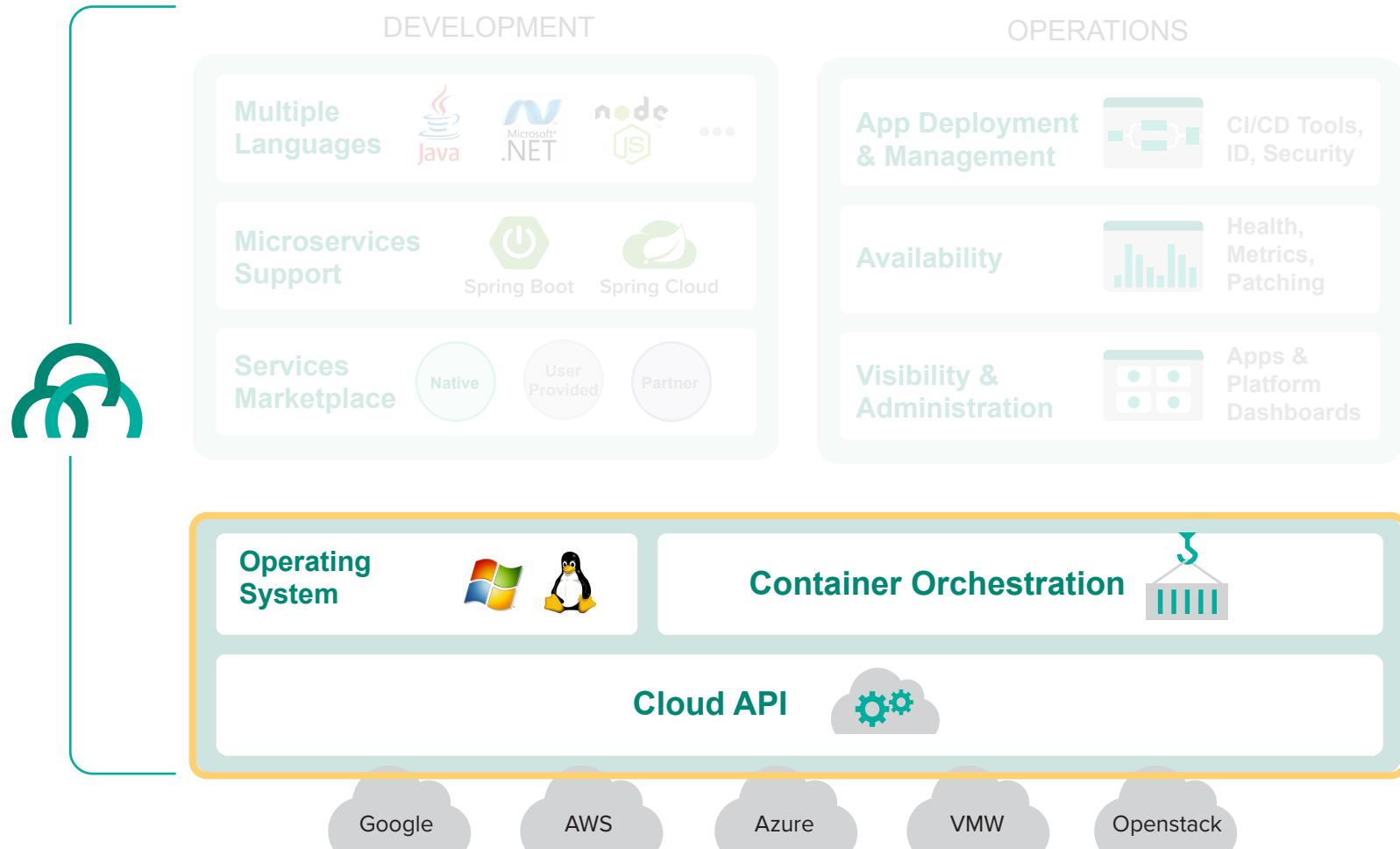
The dashboard shows the following information:

- ORG**: system
- SPACES**: app-usage-service, apps-manager, autoscaling, Marketplace
- SYSTEM**: Accounting Report
- DOCS**, **SUPPORT**, **TOOLS** links.

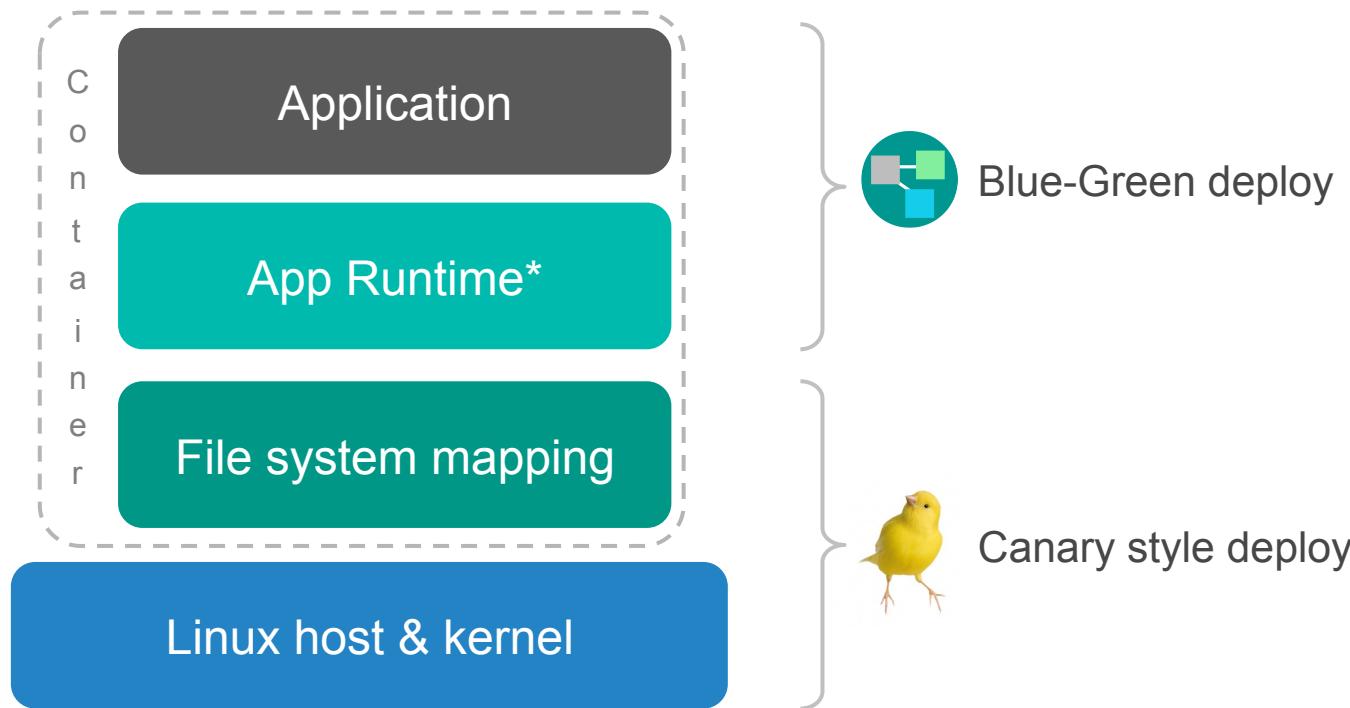
system section:

- QUOTA**: 5 GB of 100 GB Limit (5% used)
- 3 Spaces**, **1 Domain**, **3 Members**
- SPACE app-usage-service**: APPS 3 (3%), SERVICES 0
- SPACE apps-manager**: APPS 2 (1%), SERVICES 0 (1% Org Quota)
- SPACE autoscaling**: APPS 1 (1%), SERVICES 0 (1% Org Quota)

Applications Manager



Each Layer Upgradable with No Downtime

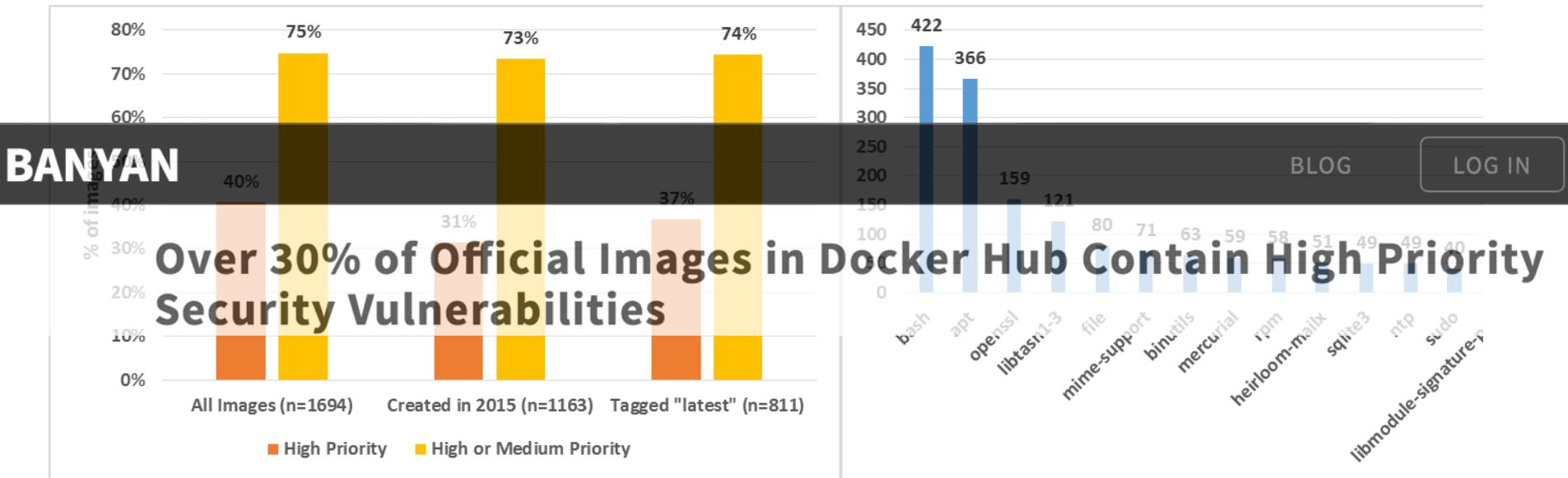


* e.g. Embedded webserver, app configurations, JRE, agents for services packaged as buildpacks

Patch With Rolling Deploys



Vulnerabilities in Docker images



Improve Enterprise Security Culture

- Makes it easier to do the right things
- Prevents vulnerabilities due to
 - Leaked/misused credentials
 - Misconfigured/Unpatched software
 - Slow & rigid processes



Platform Trust



- Repave, Repair, Rotate - more secure architecture
- Zero downtime deployments and upgrades
- Explicit, known dependencies
- Homogeneity in the environment, no drift
- Combined CVE / vulnerability management
- Federated login with enterprise directories
- Control access to services and other resources
- Enforce policies (server, runtime, libraries, etc.)
- IPSec on every network segment
- Custom monitoring agents
- (Soon) runC integration for AppArmor and user namespaces

App Modernization

Cloud Native



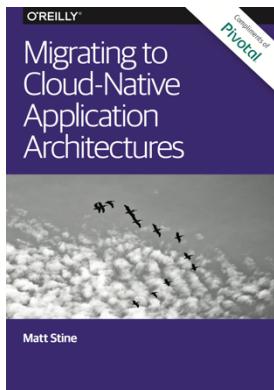
- Believer in opinionated platforms, enforcing cloud-native design
 - Shipping microservices with full CI/CD, automated lifecycle management
 - Struggling with modernizing applications, reskilling
-
- Believer in reproducible builds, operational visibility, open-source
 - Shipping a container runtime, microservices, automated provisioning
 - Struggling with adhoc operations, manual CI/CD, unintegrated tools, curating OSS
-
- Believer in automation, opinionated software, microservices, 12 Factor
 - Shipping API-first applications,
 - Struggling with adhoc operations, lack of tooling and monitoring, security
-
- Believer in agile, speed to market, software as a differentiator
 - Shipping greenfield projects in public cloud because on-premise is too slow
 - Struggling with CI/CD, provisioning environments, lack of operational visibility
-
- Believer in IT as a cost center, large projects, customizing off-the-shelf software
 - Shipping completed software projects
 - Struggling with failed projects, long lead times, business advantages of software

Traditional

Pivotal

Modernization Strategies

Evaluate your application portfolio, which apps are under active development, and the cost/benefit of refactoring an app to a 12 Factor design.



- A. Rehost 12 Factor apps
- B. Refactor/rebuild app to 12 Factor and containerize
- C. Refactor/rebuild app to BOSH virtual machine
- D. Large scale rearchitecture for service and data decomposition

Modernize with microservice components and integrate legacy apps via APIs. Professional service options for knowledge transfer, app evaluation and delivery.

Traditional App Environment



Load Balancer



Web Server



App Server



Database



ERP

Rehost, Refactor & Rearchitect Strategies

Platform Runtime



API
Gateway



Microservice
App



12 Factor
App

BOSH VMs



App
Server

Backing Services



Database



Dynamic
Router



Service
Discovery

Off Platform



ERP

Evaluate Your Microservices Competency

Rapid Provisioning

Fast Deployments

DevOps Culture

Basic Monitoring

- Martin Fowler





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Transforming How The World Builds Software