LET THE TRANSFORMATION BEGIN
Solutions to Cloud Native Applications

Bassam Zantout - Advisory vSpecialist SE
THE TRENDS

Remove friction across software supply chain

DevOps
- NOT MY PROBLEM
- Separate tools, varied incentives, opaque process

Continuous Delivery
- RELEASE EARLY AND OFTEN
- Higher quality of code

Microservices
- LOOSELY COUPLED COMPONENTS
- Automated deploy without waiting on individual components

- TIGHTLY COUPLED COMPONENTS
- Slow deployment cycles waiting on integrated test teams

- SHARED RESPONSIBILITY
- Common incentives, tools, process, and culture

AGILE
Adaptive rather than predictive
THE TRENDS

Long Development Cycle for Monolithic Applications

- Everything must be tested

Business Application V1.0

- Affected by Other Parts of the Business

- Too Complex to Maintain

Business Application V2.0

Continuous Delivery

RELEASE EARLY AND OFTEN

- Higher quality of code

RELEASE ONCE EVERY 6 MONTHS

- More bugs in production
THE TRENDS

Small Autonomous Services that Work Together

Communicate over API
Focused on Doing One Thing Very Well

Microservices

TIGHTLY COUPLED COMPONENTS
Slow deployment cycles waiting on integrated test teams

LOOSELY COUPLED COMPONENTS
Automated deploy without waiting on individual components
THE TRENDS

Small Autonomous Services that Work Together

Continuous Delivery

RELEASE ONCE
EVERY 6 MONTHS
More bugs in production

RELEASE EARLY AND OFTEN
Higher quality of code

AGILE  Adaptive rather than predictive

Respond to the Business Faster!

Shipping V2.0

Returns V1.1

Invoicing V1.0

Inventory V1.6

Accounts V1.0
THE TRENDS

DevOps

NOT MY PROBLEM
Separate tools, varied incentives, opaque process

Offering

SHARED RESPONSIBILITY
Common incentives, tools, process, and culture

Infrastructure as Code
Automated Testing and Deployment
Streamlined SDLC Processes
Cross Functional Teams

DEVELOPMENT
OPERATIONS
THE TRENDS

**DevOps**

**NOT MY PROBLEM**
Separate tools, varied incentives, opaque process

**SHARED RESPONSIBILITY**
Common incentives, tools, process, and culture

- Shipping V2.0
- Shipping V2.0
- Customer Service
- Customer Service
- Customer Service
- Accounts
- Accounts
- Inventory V1.6
- Inventory V1.6
- Invoicing
- Invoicing
- Invoicing
- Returns V1.1
- Returns V1.1
- Returns V1.1

**Horizontal Scalability**
Traditional Applications

IT Investments $:

2015: $2.7 trillion
Traditional APPLICATIONS

Optimize mode
IT transformation

2015: $2.7 trillion
Traditional WORKLOADS

Cloud-native WORKLOADS
Traditional Cloud-native IT centric Client-server scale-up apps Infrastructure resiliency

DevOps centric Distributed scale-out apps Application resiliency

Modern IT

Pets

Chickens

IT centric

DevOps centric
Traditional

Cloud-native

Hybrid cloud
Hybrid cloud

- 24% Cost savings vs. traditional infrastructure
- 40% Savings reallocated to new initiatives
- 3x More likely to be approaching digital business goals
Hybrid cloud

Or is this what is optimal really?

Are you sure your applications will move in this direction?
A Brownfield Maturity Level

1. RUNS ON CLOUD
   - No file-system requirements or uses S3 API
   - Self contained app (Fat JAR)
   - Platform managed ports and addressing
   - Consume off platform services using platform semantics

2. RUNS WELL ON CLOUD
   - Adherence with all 12-Factor App principals*
   - Horizontally scalable
   - Leverage platform for HA

3. RUNS GREAT ON CLOUD
   - Use CI / CD tooling and methodology
   - Design for failure, Proactive testing for failure (TDD)
   - Apps unaffected by dependent service failure
   - Metrics and Monitoring baked-in
   - Cloud Agnostic runtime implementation

4. CLOUD NATIVE
   - Microservice Architecture and Principals
   - API First Design

Work up from #2 to #4 at your own pace

Start here
The NEW Digital CUSTOMER

Rising EXPECTATIONS are the NEW FACE of Business

- Always Available
- Real-Time Updates
- Intelligent Interactions

APPLICATIONS

The NEW Digital CUSTOMER

Expectations are ANYTIME Experiences
NEW BUSINESS NORM FOR COMPANIES INNOVATE & DIFFERENTIATE WITH APPLICATIONS

RAPID, ITERATIVE DEVELOPMENT MODEL

Applications Transform Business

SPEED

Analytics Drives New Functionality

Data Generated by New Applications

Rapid, iterative development model is the key to innovation.
How Do You Get There?

SPEED of Business

Driven by

MICROSERVICES

CONTINUOUS DELIVERY

INNOVATION

DEVOPS

CLOUD-NATIVE APPLICATIONS
RESULTING IN NEW PLATFORM REQUIREMENTS

Remove friction across software supply chain

Here is my source code
Run it in the Cloud for me. I do not care how

INNOVATE & COMPETE
REMOVE FRICTION
OPERATIONAL EFFICIENCY

Application
Cloud Native Platform
Infrastructure
Analytics
Operations

Developer Tools

Business Ideas

Developer
What Is PaaS?

Application is the new unit of deployment and control
YOU Have CHOICES
# BUY vs BUILD

## DNS, NAT, IPAM, SDN
- Service Monitoring and Dependency Mapping
- Blue/Green Deployment
- HTTP / Reverse Proxy
- Cloud Provider Management Console Audit

## Firewalls
- Capacity & Inventory Reporting
- Lifecycle Management
  - Deploy | Patch | Retire
- Java Runtime
- Security Event & Incident Management

## Load Balancers
- Financial Reporting
- Release Packaging & Management
- In-Memory Object Cache
- Secrets Management

## WAN & VPN
- Log Aggregation, Index, Search, Analytics & Reporting
- Provisioning Orchestration
- Search
- Certificate Management

## Storage
- Event Management & Routing
- CI Orchestration
- Messaging
- Identity Management

## Network
- Metrics Analytics & Visualization
- Artifact Repository
- NoSQL Document Store
- Threat & Vulnerability Scanning

## Compute
- Metrics Collection, Storage, and Retrieval
- Source Control Management
- NoSQL Database
- Network Security

## Infrastructure
- Operations
- Continuous Delivery
- Middleware & Data
- Security

[https://blog.pivotal.io/pivotal-cloud-foundry/case-studies/5-confessions-of-a-platform-builder](https://blog.pivotal.io/pivotal-cloud-foundry/case-studies/5-confessions-of-a-platform-builder)
DEPLOY APPLICATIONS

Deploy Code (cf push)

Deploy to dev

App Deployed

CLOUD NATIVE PLATFORM

Install runtime and container images (db, hadoop, ...)

Setup load-balancing, SSL termination and dynamic routing

Setup / config High Availability

Setup APM

Setup log streaming
Cloud Foundry: An Application Centric Approach

Common Access Tier (App1, App2)

Built-in Middleware Services

Container 1
JVM, etc.
App Srv

Container 2
JVM, etc.
App Srv

Pre-Provisioned Pool of VMs

IaaS Agnostic

App1
Configurations
JVM
App Server
VM

App2
Configurations
JVM
App Server
VM

Infrastructure Specific

Pivotal CF™
Foundation Based on Choice

Clouds

- Cloud Provider Interface (CPI)
  - Amazon Web Services
  - VMware
  - OpenStack

- Open Source
  - Google Cloud
  - ... and Other Clouds

Runtime/Frameworks

- Buildpacks
  - Java
  - Spring
  - Ruby
  - Node

- ... and Other Runtimes

App Services

- Brokers & “User-Provided”
  - Pivotal HD
  - GemFire XD
  - Pivotal MySQL Dev
  - Pivotal RabbitMQ

- ... and Other Services
  - New Relic
  - Redis
  - MongoDB
  - PostgreSQL
  - AppDirect
  - SendGrid
CLOUD FOUNDRY: LARGEST OPEN PAAS ECOSYSTEM
Deployment - ... And After!

Cloud Operator:
- provision <my cloud>
- upgrade/scale <my cloud>

Developer / DevOps:
- target <my cloud>
- push <my app>
- create <my services>
- bind <my app, my service>
- scale <my app> +100

Cloud Deployment: 2-4 hours
App Deployment: 30-90 seconds
Developer Self Service Market Place

NHC-demo $ cf marketplace

Getting services from marketplace in org **NHC-Sales** / space **development** as ...

OK

<table>
<thead>
<tr>
<th>service</th>
<th>plans</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>app-autoscaler</td>
<td>bronze, gold</td>
<td>Scales bound applications in response to load</td>
</tr>
<tr>
<td>p-mysql</td>
<td>100mb</td>
<td>MySQL databases on demand</td>
</tr>
<tr>
<td>p-rabbitmq</td>
<td>standard</td>
<td>RabbitMQ is a robust and scalable high-performance multi-protocol messaging broker.</td>
</tr>
<tr>
<td>p-redis</td>
<td>shared-vm, dedicated-vm</td>
<td>Redis service to provide a key-value store</td>
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</table>
Org.jwatters.org has 22 days left in its free trial, which includes 2GB of app memory and 10 of the free Marketplace services. Upgrade now.

### Applications

<table>
<thead>
<tr>
<th>Status</th>
<th>App</th>
<th>Instances</th>
<th>Memory</th>
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<tbody>
<tr>
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<td>autoscale-monitor:2840</td>
<td>1</td>
<td>512MB</td>
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<tr>
<td>active</td>
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<tr>
<td>active</td>
<td>autoscales-process</td>
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<td>512MB</td>
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<tr>
<td>stopped</td>
<td>cf-demo</td>
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<tr>
<td>active</td>
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</tr>
<tr>
<td></td>
<td>worker-process</td>
<td>2</td>
<td>512MB</td>
</tr>
</tbody>
</table>

### Policy Zones

- Developer
- Apps
- ID/Teams
- Services

### Services

<table>
<thead>
<tr>
<th>Service Instance</th>
<th>Service Plan</th>
<th>Round Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>cloudamqp-autoscale</td>
<td>CloudAMQP bunny</td>
<td>4</td>
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<tr>
<td>loadimpact:4540</td>
<td>Load Impact liftree</td>
<td>0</td>
</tr>
<tr>
<td>new relic:19795</td>
<td>New Relic standard</td>
<td>0</td>
</tr>
</tbody>
</table>
DEVELOPER SERVICES

- Integrates into deployment pipeline tools for Continuous Integration and Delivery.
- Platform Integrates into developer eco-system tool sets.
- Immediate access to new Cloud Native technologies via self-service marketplace.
- Support for deploying Docker images
BLUE GREEN DEPLOYMENT

Blue
(existing production environment)

Green
(parallel environment
Running a different version
of the application)

Deployment
(ability to switch traffic between the
environments, and once the new
version is good retire the older version)

PaaS Platform

AppBlue v2.0

AppBlue v3.0 Beta
Who does what

Cloud Operator

(1) Provision a "turnkey" PaaS, Cloud Foundry Operations Manager
(7) Scale the cloud, no application downtime

Developer / User

(2) Create an app space
(3) Create a MySQL service
(4) “Just push” a (music) app to QA environment.
(5) Bind app to data store
(6) Scale the app, memory and number of instances
Agile Methodologies Meets Agile Platforms

No code or configuration changes!
INTRODUCING
NATIVE HYBRID CLOUD

DESIGNED, SUPPORTED & SUSTAINED AS ONE

DEVELOPER & IT OPS SERVICES
PLATFORM AS-A-SERVICE
INFRASTRUCTURE AS-A-SERVICE

INNOVATE FASTER
EMPOWER DEVELOPERS
ACCELERATE IT OPS

Cloud-Native Apps
At the SPEED OF BUSINESS

TURNKEY
Pivotal Cloud Foundry
DEVELOPER PLATFORM
BRIDGING DEVELOPERS and IT OPS

INTRODUCING NATIVE HYBRID CLOUD

Rapid App Development
DEVELOPERS
Code and Push Applications

Consume Based on Business Needs

Agile IT

IT OPERATIONS
Monitor Apps & Infrastructure

Full Visibility & Control

BUSINESS
Innovation Velocity
NATIVE HYBRID CLOUD ARCHITECTURE

DEVELOPER PLATFORM IN A DAY
Build, Deploy, Scale

INFRASTRUCTURE SERVICES IN A DAY
Deploy, Configure, Connect

ACCELERATE CLOUD-NATIVE APPLICATIONS
BUILD, DEPLOY, MANAGE & OPERATE

Continuous Integration & Delivery
Application Performance Management

SELF SERVICE MARKETPLACE

Reporting & Showback
Data & Business Analytics

Pivotal Cloud Foundry®

Cloud-Native Platform

Developer & IT Ops Services

Consistent Experience – On- and Off-Premises

ON-PREM / SELF-RUN

OFF-PREM / MANAGED

Deploy, Configure, Connect

This slide contains forward looking statements, products and features that are subject to change at anytime without written or verbal warning.
TAKE ADVANTAGE of HYBRID OPTIONS
USE CASES FOR ON-PREM AND OFF-PREM

Native Hybrid Cloud Monitoring & Reporting

Pivotal Cloud Foundry

ON-PREM/SELF-RUN

OFF-PREM

READY FOR PRODUCTION

DEVELOP AND TEST
Path to Cloud-native apps

Get Ready

In As Little As 2 Days
Install Infrastructure Service
Install Developer Platform

Days to Weeks
Initial Testing
Customization

Get Set

Ready for Application Development

GO!

Native Hybrid Cloud

93% faster time to code compared to build your own*

* Compared to equivalent environments
From IDEA to PRODUCTION 77% Faster*

*Metrics based on average results from customers utilizing Pivotal Cloud Foundry
NATIVE Hybrid Cloud

Developer & IT OPS
“IT Just Works” User Experience

Push & Scale Apps with Single Command
Instant Access to Application Services
Application Availability & Integrated Security
Simplified Monitoring & Reporting

2x Boost to Developer Productivity*
10x Improvement Operational Efficiency*

EMPOWER

*Metrics based on average results from customers utilizing Pivotal Cloud Foundry across EMC Federation.
Developer

"It Just Works"

NATIVE
Hybrid Cloud

Auto-Detect Languages
Selects Runtimes
INNOVATE
Binds Services
PUSH CF
Hybrid Cloud
NATIVE
Scale Vertically
OPPORTUNITIES

Push and Scale Apps
with Single Command

Developer

EMPOWER

Push and Scale Apps
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Hybrid Cloud

"It Just Works"

Developer

NATIVE

Developer

Messaging
Data Analytics
App Performance
Monitoring
Continuous Integration & Delivery

Instant Access to App Services

EMPOWER

DEVELOPER

PRODUCTIVITY

INCREASE
DEVOPS
"It Just Works"

Developer
Operator

NATIVE
Hybrid Cloud

Highly Available Applications
Restart, Recreate, Redeploy

Backup & Restore
Apps, App Code & Core Components

AUTOMATED
REDUCE
RISK

Integrated Security
Identity & Access Management

Application Availability & Integrated Security

EMPOWER
Hybrid Cloud Monitoring & Reporting

Application to Infrastructure Visibility:
- Performance Metrics
- Capacity Planning
- Alerts
- Logs
- Showback

DEVELOPS
“IT JUST WORKS”

Developer
Operator

EMPOWER
NATIVE
Hybrid Cloud

TURNKEY
Developer Platform

ACCELERATE

Turn Key Deployment
Single-Contact Support
Sustained as One Product
DEPLOY in DAYS

NATIVE Hybrid Cloud

Complete solution deployed & verified on premises

Entire integrated stack certified & supported

Optional: Prepare, Extend, & Manage Services

Hardware arrives fully racked

Turnkey Deployment
CROSS-TRAINED
FEDERATION
RESOURCES

NATIVE
Hybrid Cloud

FULLY
Engineered
Solution

ACCELERATE

One Contact Support
Simplified Support & MAINTENANCE

NATIVE Hybrid Cloud

Thousands of Engineering Hours
Integrated & Tested to Work Together

Simplified Upgrades
Tested & Validated Across Components

Roadmap of New Capabilities
Added as Part of the Solution Release Cycles

Sustained as one Product