Mastering the Microservices, Fast Data & Hybrid Cloud Trifecta

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Cloud... On Who’s Terms?
Three Definitions of Cloud

Sourcing Model

Operating Model

Architecture (Cloud-Native)
Finding the Right Approach
Managing Disruption and Uncertainty

Most CIOs see risk to revenue due to new entrants

How CIOs are Tackling Digital Transformation

- **Optimize**: 85%
- **Both**: 59%
- **Transform**: 74%

Overall 66% have yet to declare success

2X more likely to succeed by Optimizing first

14 out 15 fail focusing only on transformation

Gartner: Digital Business Transformation: A CIO Perspective (September 2018, n=372)
Taking Control of Digital Transformation Economics

MOST ENTERPRISES

Transform 30%

TYPICAL 5 YEAR GOAL

Run 70%

50%

YOUR NEW COMPETITION

70%

30%

Innovation Gap

Existing pressure to reduce costs

5-10% shift YoY

New Digital Entrants

Gartner: Run, Grow and Transform the Business IT Spending: Approaches to Categorization and Interpretation
Gartner: 2017 CEO Survey: CIOs Must Scale Up Digital Business
What Companies Need to Do

- Run
  - 70%

- Transform
  - 30%

Existing pressure to reduce costs

- Find Force Multipliers to Maximize Impact
- Dramatically Reduce While Managing Risk
The Trifecta

Containerized Microservices

Data Services & AI/ML Tools

Hybrid Cloud & Edge
Reality of Changing IT Landscape

TRADITIONAL APPLICATION
- Users (Employees)
- Monolith
- Relational DB
- DC or Cloud

MODERN DATA-DRIVEN APPLICATION
- Always-connected customers & devices
- Containerized microservices (your code)
- Data services & AI/ML tools (their code)
- Hybrid Cloud & Edge

18 Billion connected users & devices

Source: 2017 IHS Markit estimates
What this Means for Enterprise IT

EXISTING APPLICATIONS

PRESENTATION

BUSINESS LOGIC

DATABASE

NEW APPLICATIONS

Analyze
Apache Spark analytics engine

Serve
Kubernetes container orchestrator

Transport
Apache Kafka message queue

Store
Apache Cassandra distributed DB
This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path.

github.com/cncf/landscape
Hybrid Cloud Is Gaining...

Source: Mesosphere Cloud Native Ecosystem Survey, n~500
Multi-Cloud is a Thing

One out of four use more than one cloud provider

Source: Mesosphere Cloud Native Ecosystem Survey, n~500
How “Hybrid” Are You?

Source: Mesosphere Cloud Native Ecosystem Survey, n~500
What Workloads Are They Running?

**General Classifications**

What workloads are you running on Mesosphere?

- Containers - microservices architecture: 84%
- Monolithic & Legacy Apps: 48%
- Data services: 45%
- Analytics, AI/ML: 43%
- Jobs/Batch: 40%
- CI/CD: 18%

**Named Workloads**

Volume of ecosystem workloads launched on Mesosphere. Indexed to Kafka, July 2017

- Kubernetes: 3.42
- Kafka: 3.11
- Jenkins: 2.66
- Spark: 2.52
- Cassandra: 2.40
- Elastic: 1.05
- Flink: 1.00

Source: Mesosphere Cloud Native Ecosystem Survey, n~500; DC/OS Catalog Download Statistics July 2017 & 2018
Connecting it All Together
Creating Automated Services on Hybrid Cloud and Edge

**Traditional Approach:**
Slow, Expensive, Hard

- Manual & application-specific configurations
- Cluster sprawl and low utilization
- High risk with “snowflake” configurations in silos

**Mesosphere Approach:**
Optimize and Transform on a single platform

1. Workload consolidation
2. Agile platform for digital innovation
3. Unified multi-cloud operations
Workload Consolidation - workloads new and existing
## Workload Consolidation - Kubernetes and Data Services

### Traditional Approach

- Virtualization & guest operating system cost & infrastructure overhead

### Mesosphere Approach

- Secure resource isolation

**Virtualization required**

**High-density pooling without virtualization**
2 Agile Platform for Digital Innovation
Any Technology Become Automated Services

1. Prerequisites
2. Installing the Client Tools
3. Provisioning Compute Resources
4. Provisioning the CA and Generating TLS Certificates
5. Generating Kubernetes Configuration Files for Authentication
6. Generating the Data Encryption Config and Key
7. Bootstrapping the etcd Cluster... 3x for HA
10. Bootstrapping the Kubernetes Control Plane... 3x for HA
13. Bootstrapping the Kubernetes Worker Nodes
14. Configuring kubectl for Remote Access
15. Provisioning Pod Network Routes
16. Deploying the DNS Cluster Add-on... Deploying other Add-ons
20. Smoke Test
21. Cleaning Up

Running on your own

$ dcos package install kubernetes
Agile Platform for Digital Innovation
Any Technology Become Automated Services
Unified Multi-Cloud Operations

- Linked control plane for consistent operations across clusters

**Stretched AMER / EMEA Cluster**
- Easy migration of applications between clouds
- Cross-cloud disaster recovery
- Burst across clouds as needed

**APJ Cluster**

Internet

**DC/OS**

- **Zone 1**
  - **East-1a**
  - **East-1b**
  - **East-1c**
  - **AWS US-East-1 Region (N-Virginia)**

- **Zone 2**
  - **Cisco CSR 1000V**

- **Zone 3**

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**DC/OS**

- **Zone 1**
  - **UK-S0**
  - **UK-S1**

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**APJ Cluster**

- **Zone 1**
  - **Japan-1**
  - **DC/OS Master 1**

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**DC/OS**

- **Zone 2**
  - **Google Cloud**
  - **Japan**
Unified Hybrid Cloud Operations: Live Migration of Workloads Between Clouds

“dcos-website” service live migration from AWS to Azure
What Enterprises Are Doing
Delivering Modern, Data-Driven Applications

On Premises Datacenter

- Monolithic Application

Public Clouds

- App Fabric
  - Developer Code
  - Source Code Management
  - CI/CD Automation
  - Artifact Repository
  - Container Orchestration

- Data Fabric
  - Analytics Engine
  - Message Queue
  - Kafka
  - Spark
  - Graph Database
  - Machine Learning

- Legacy Infrastructure
  - Oracle Database
  - Spark
  - Kafka

MESOSPHERE DC/OS

- Analysis of Oracle DB data with output passed via Kafka to other data fabric services

- Elastic multi-tenant platform for running app fabric and data fabric services
- Complete lifecycle automation of data services (e.g., install, upgrade, scalout)
- Secure and compliant with support for multiple development teams
- High performance and low latency queries for powering new end-user services
Create Compelling Offers and New Application Services

- Customer 360 profiles
- Campaign planning and behavioral analysis
- Long-term data persistence
- Sync customer and cruise data to shipside edge cloud
- App development on AWS, production infrastructure in corporate datacenter

Deliver Personalized Experiences

- Customer manifest and data
- Campaign execution of timely, in-context offers
- Data capture of shipboard activities and preferences
- Sync customer profile to enterprise cloud
Optimizing Mobile Connectivity through Machine Learning

- Directs the concurrent streams of data from speed tests conducted on mobile networks to the machine learning platform
- Device connects to fastest network
- Based on results of machine learning analysis

- Conducts real-time analysis of speed test data using Apache Spark machine learning
- Utilizes open source data services such as Spark, Cassandra, Kafka, and Akka
- Leverages custom Spring applications in containers
- Builds on elastic public cloud for near limitless scale

- Telcom Rank: 6
- Global Rank: 77

- Public Cloud: 100%
- On Premises: 0%

- CPU: 78%
- Memory: 52%
- Storage: 80%

- Max CPU Utilization 80% before scaling
Delivering New Digital Services and Reducing Infrastructure Spend

**Datacenter at China Unicom**

- Single platform to run all software applications and data services
- Improved simplicity of moving apps quickly to production
- Resource optimization to save costs

**Regional Edge Clouds (30 Deployments)**

- Ubiquitous resource fabric that expands to all regions
- Key use cases: Billing applications and customer-facing applications
- Services are hosted in-region for optimal quality of service
Global Automotive Leader’s Connected Car Infrastructure

Corporate Regional Datacenters
- Container Orchestration
- Analytics Engine
- Distributed Database
- Distributed File System

Third Party Mapping Provider Cloud
- Container Orchestration
- CI/CD Automation

Telecom Provider Local Edge Cloud
- Microservices
- Message Queue

MESOSPHERE DC/OS
- Localized route optimization stack
- Data Ingestion at scale
- Short latency response

MESOSPHERE DC/OS
- Fast new service rollout with elastic CI/CD toolchain
- Telemetry analytics on vehicle usage for preventative maintenance
- Compliance with data privacy regulations (e.g., customer opt-out)
- Support mobile on-demand car club service
Leading Global Bank’s Strategic Innovation Platform

Data Sources
- Market Activity
- Customer Interactions
- Financial Transactions
- Cyber Devices

Global Technology Services
- Cloud Solutions
  - Kafka
  - Cassandra
  - HDFS
  - Spark
  - Analytics Engine
- Data Solutions
  - CI/CD Automation
  - Container Orchestration
- DevOps Toolchains
  - Jenkins
  - Marathon
  - Elastic

Mesosphere DC/OS Enterprise
- Infrastructure Services
  - Hybrid Cloud Portability
  - Non-disruptive Upgrades
- Multi-tenancy
  - Resource Co-location
  - Isolation Guarantees
- Security & Compliance
  - Encrypted Control Plane
  - Access Controls & Audit
- Operations
  - Automated Runbooks
  - Monitoring & Logging
Mastering the Microservices, Fast Data & Hybrid Cloud Trifecta

Consider Each Definition of Cloud Separately

Don’t drive digital transformation projects in isolation

Using a software layer for multi-cloud operations can be beneficial
Thank You
## Why Industry Leaders Choose Mesosphere

<table>
<thead>
<tr>
<th>Agility &amp; Efficiency</th>
<th>Strategic Platform</th>
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<tbody>
<tr>
<td><strong>Accelerate Time to Value</strong></td>
<td><strong>Hybrid Cloud Portability</strong></td>
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<td>Build and deploy time from</td>
<td>“I do not want to go down that path where I lock myself into a provider. If I was ever told to migrate off a cloud provider, it would only be two days worth of work. And of course, DC/OS runs anywhere.”</td>
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<tr>
<td><strong>Save on Infrastructure</strong></td>
<td><strong>Fast Data + Microservices</strong></td>
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<td>Save 50%+ on AWS Bill</td>
<td>“With Kubernetes on DC/OS we are thrilled to offer our engineering teams their preferred container orchestrator alongside big data services with a common set of security, maintenance, and management tools.”</td>
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**Examples:**
- Athenahealth
- Yelp
- NBCUniversal
- Here