Cloud Platform Roadshow
Keynote
Key Trends, Technologies, and Ideas
of CEOs see technology change as the #1 external force that could most impact their organization over the next 3-5 years.
Big Trends

- **Any Device**: enabling a new world via mobile
- **Any Time**: global connections at any moment
- **Any Place**: connections virtually everywhere
- **Any Team**: minds of many need to collaborate
- **Speed**: vitally important to stay ahead
- **Adoption**: consumer leads, business follows
40% own a smartphone

95% using cloud services

230k Years social media per month
Decreasing cost enables virtually limitless storage in the cloud. $600 can buy enough storage for the world's music.  
(Source: McKinsey Global Institute May 2011)

Computing as a utility is now available for easy purchase, provided from massively efficient data centers.  
(Source: Nicholas Carr, The Big Switch, 2008)

The internet allows for a model of real-time access to new innovation, information, and applications from a wide range of devices.
75 years (average age of a company joining the S&P 500)
“Organize the world’s information and make it universally accessible and useful.”

- Google’s Mission Statement
For the past 15 years, Google has been building out the world’s fastest, most powerful, highest quality cloud infrastructure on the planet.
Google has been running some of the world’s largest distributed systems with unique and stringent requirements.
A Network that Spans the Globe
Innovating Software & Driving Technology Forward

- MapReduce
- Bigtable
- Dremel
- Spanner
- GFS
- Colossus
- Compute Engine

Years:
- 2002
- 2004
- 2006
- 2008
- 2010
- 2012
- 2013
Google Cloud Platform is built on the same infrastructure that powers Google.
Google Cloud Platform

Compute
- App Engine
- Compute Engine

Storage
- Cloud Storage
- Cloud SQL
- Cloud Datastore

App Services
- BigQuery
- Cloud Endpoints
Why Are Developers Moving to Cloud

- **Always Lower Cost**: Economies of scale from sharing infrastructure with other developers and reduction of “fragmentation”.

- **Flexibility + Adaptability**: Infrastructure changes too rapidly to be locked into physical platforms - you could miss the next competitive advantage.

- **Lets You Focus on Customers**: Every second spent on infrastructure and operations is time **not** spent on your applications, your customers, or your business.
Cloud Economics
Cloud Economics
10x cost benefit for large scale agencies
Computing Patterns

On and Off

- On & off workloads (e.g. batch job)
- Over provisioned capacity is wasted

Growth

- Successful services need to scale
- Difficult to provision hardware

Bursting

- Unexpected/unplanned peak in demand
- Sudden spike impacts performance
- Can't over-provision for extreme cases
Prices are falling

• Public cloud prices have dropped **6-8%** annually

Source: Google Internal Data
But prices are not falling fast enough

- Public cloud prices have dropped 6-8% annually
- Hardware costs have dropped 20-30% annually

Source: Google Internal Data
Sustained-use discounts

<table>
<thead>
<tr>
<th>Sustained Use</th>
<th>Net Price Per Hour</th>
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<tr>
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Previous On Demand

New On Demand
Cloud is still too hard
Developers often make trade offs to work around the weaknesses and limitations of today’s public clouds.
Cloud is still too hard

- Time to Market
- or
- Scalability

- Flexibility
  - or
  - Automatic Management

- Big Data
  - or
  - Real Time
We are changing or to and
Developer Productivity

Time to Market and Scale
Developer Productivity

- Use the tools you know and love
- Fast, reliable deployments
- Isolate and fix issues in production
Cloud Monitoring

- Single interface for monitoring all of your cloud resources
- Rich dashboards and alerting capabilities
- Find and fix performance problems quickly
Cloud Debugger

- Debug Production Applications without Stopping the process
- Inspect Stack, locals, parameters
- Safe for production: No user noticeable effects
Cloud Trace

- Visualize time spent in your application
- Quickly identify performance bottlenecks
- Compare performance from release to release
IaaS vs. PaaS

Flexibility

Management
IaaS vs. PaaS

Turnkey Platform

Flexible VMs
What You Need from Compute Resources

- Flexibility
- and
- Management
Compute as a Spectrum

Flexibility

Your Code

Your Code

Your Code

App Engine Managed Runtimes

Managed VMs

Replica Pools

Google Compute Engine

Agility

Manage your serving stack

OS management, deployments

Provisioning and health checking

Manage your infrastructure
Managed VMs

- Flexibility of Compute Engine with productivity of App Engine
- Provides best of both worlds
Containers and Kubernetes

- Package applications Independent of the VM layer
- Predictability
- Quality of service
- Efficient overcommit
- Resource accounting

At Google, we have been doing this for many years...
Networking

• Projects are isolated private networks
• Networks can be global
• Addresses
  • public and private: free while in use
• Routes, gateways, VPNs, and IP Forwarding
• Google has a massive backbone with best in class throughput and performance
  • This makes GCP the prime-move for latency and throughput sensitive information -- ie content and data
Big Data

Real Time
Big Data and Real Time
Complex technical infrastructure to support distributed computing

Requires specialized expertise

Time consuming

Storage costs scale with larger datasets

Personnel are expensive

Computing resources must be provisioned for peak-loads

Big Data remains inaccessible
Google is making Big Data accessible

Big Data is Hard

- Use the technical and product skillsets you already have
- No complex data architecture required
- Query within seconds and get real-time results

Big Data is Expensive

- Pay on-demand for only the resources you use
- Reduce infrastructure management burden
- Take advantage of falling prices & Moore's Law
We help you manage the entire lifecycle of Big Data

**Capture**
- Pub/Sub

**Store**
- Storage
  - SQL
  - Datastore

**Process**
- Dataflow

**Analyze**
- BigQuery
- Dataflow
- Open Source Tools
Streaming+Batch+Graph

- Near real-time analysis
- High fidelity, low latency
- Focus on results, not sharding and transforming

Batch: Volumes of Data
Streaming: Real-Time Data
Graph: Variable Analysis
Summary

1. Cloud is the real deal
2. Harness the power and flexibility of Google
3. Big innovations are coming of age