The Cloud to the rescue!

What the Google Cloud Platform can make for you

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So ... what is the cloud?
The Google Cloud Platform
The Google Cloud Platform

Compute

Storage

Services
Standing on the shoulders of giants

- MapReduce
- Dremel
- Spanner
- More!

- GFS
- Big Table
- Colossus
- Compute Engine

Compute
IaaS vs. PaaS: How to Choose?

IaaS
Infrastructure-as-a-Service
Compute Engine

PaaS
Platform-as-a-Service
App Engine
Google Compute Engine

- Infrastructure-as-a-Service
- High performance virtual machines that run on Google’s infrastructure
- Connected with the Google Network
- Run Linux and Windows OS
**Instance Types**

**standard**
- For workloads with balanced CPU-memory requirements

**highmem**
- For workloads with higher memory requirements

**highcpu**
- For CPU intensive workloads

**Shared Core Instances**
- g1-small, f1-micro
- For inexpensive prototyping and staging workloads

<table>
<thead>
<tr>
<th>Instance Type</th>
<th>Virtual Cores</th>
<th>Memory (GB)</th>
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</thead>
<tbody>
<tr>
<td>n1-standard-1</td>
<td>1</td>
<td>3.75</td>
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<tr>
<td>n1-standard-2</td>
<td>2</td>
<td>7.5</td>
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<tr>
<td>n1-standard-4</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>n1-standard-8</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>n1-standard-16</td>
<td>16</td>
<td>60</td>
</tr>
<tr>
<td>n1-highmem-2</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>n1-highmem-4</td>
<td>4</td>
<td>26</td>
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<tr>
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<td>n1-highmem-16</td>
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<td>n1-highcpu-2</td>
<td>2</td>
<td>1.8</td>
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<tr>
<td>n1-highcpu-4</td>
<td>4</td>
<td>3.6</td>
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<td>n1-highcpu-8</td>
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<td>7.2</td>
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<tr>
<td>n1-highcpu-16</td>
<td>16</td>
<td>14.4</td>
</tr>
</tbody>
</table>
$ gcloud auth login

$ gcloud compute instances create my-instance --zone us-central1-a

$ gcloud compute instances list
Typical serving stack

- Guest environment
  - app code
  - libraries
  - app environment
  - guest kernel
- Hypervisor
Typical application serving stack

Load balancer
Typical application serving stack
Typical application serving stack

- HTTP(s) frontend
- Feed aggregation
- Billing pipeline
- Third-party API

Load balancer
Auto scaler
### Typical application serving stack

<table>
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<tr>
<th>Load balancer</th>
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</thead>
<tbody>
<tr>
<td>Auto scaler</td>
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</tr>
</tbody>
</table>

- **HTTP(s) frontend**
- **Feed aggregation**
- **Billing pipeline**
- **Third-party API**
- ...
Typical application serving stack

Zone 1

Zone 2
Complexity emerges quickly...
Complexity emerges quickly...

updates, rollouts, rollbacks, traffic splitting, experiments, monitoring, and logging
Google App Engine

- Platform-as-a-service
- “I’ll write the app, you manage my servers.”
- Easy to build, easy to maintain, and easy to scale
- Support for Python, Java, PHP, Go and more languages on the way
Available services:
- Memcache
- Mail Service
- Datastore
- User Service
- Logs API
- Task Queue
- Sockets
- Search
- URL Fetch
- Multi-tenant
- Cloud SQL
- and more...

Guest environment
- app code
- libraries

Global cluster environment

User provided

Google managed
Volatile Demand Fluctuation

With App Engine
only pay for what you use

Steady Demand Growth

With App Engine
scale with efficiency and reliability
Storage
Storage Options for All Needs

- Cloud Datastore
- Cloud SQL
- Cloud Storage
- Compute Engine (Persistent Disk)

- NoSQL
- SQL
- Blob
- Block
Google Cloud Datastore

- Fully managed, schemaless NoSQL storage service for non-relational data
- Native App Engine support and REST API access
- Built for scale and reliability
- SQL-like syntax for querying
BigTable and Megastore: Built on Google’s Technology
### Cloud Datastore Key Concepts

<table>
<thead>
<tr>
<th></th>
<th>Datastore</th>
<th>RDBMS</th>
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</thead>
<tbody>
<tr>
<td>Category of object</td>
<td>Kind</td>
<td>Table</td>
</tr>
<tr>
<td>One entry/object</td>
<td>Entity</td>
<td>Row</td>
</tr>
<tr>
<td>Unique id of entry</td>
<td>Key</td>
<td>Primary Key</td>
</tr>
<tr>
<td>Individual data</td>
<td>Properties</td>
<td>Field</td>
</tr>
</tbody>
</table>
Google Cloud Storage

- Store big files on the cloud
- Standard, highly durable storage or more cost-effective Durable Reduced Availability (DRA) storage
- Global Edge Caching
- Server-side encryption
- Powerful access controls and OAuth 2.0 authentication
Strong Global Consistency

Atomic uploads

Storage | Google Cloud Storage
Google Cloud Storage vs. Google Drive

**Google Cloud Storage**
Durable, scalable, and highly available storage service.

**Google Drive**
File storage and synchronization service with collaboration features.
Using gsutil

$ gsutil mb gs://cats gs://dogs

$ gsutil cp -m *.jpg gs://cats

$ gsutil acl set bucket-owner-full-control gs://cats
Persistent Disk

- Disk storage for your VM
- Networked set of disks
- Up to 10 TB Persistent Disk
- Encryption on the wire and at rest
- IOPS scale with volume size
BigQuery

- Crunch TBs in seconds!
- Interactive queries with SQL style
Open Source
Kubernetes

- Container Orchestration
- Easily deploy and scale Docker containers
- Easy service discovery
- Completely developed in the open
Tensor Flow

- Originally developed by the Google Brain Team
- Easy to use Machine Learning
- Any computation you can express as a computational flow graph you can compute with Tensor Flow
- Completely developed in the open
A use case
LGBT events on a map
LGBT events on a map

Goals:
● globally accessible

● anyone can submit events

● ready for success
  ○ what if we get a million visits per day?
  ○ and ... what if we get zero visits?
Our data

Event:
- Title
- Description
- Location
- Date
Our server

REST API:

- list events
- add event
- search events by location
- search events by name
- etc ...
Architecture
Making it better

Fetching events from the web

● using multiple APIs

○ meetup.com

○ eventful.com

○ any others!
Architecture
Ask me anything!
Thank you!

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