Introducing App Engine

Google App Engine

Google Cloud Platform

Agenda

1. Overview of App Engine
2. Design for Scalability And Reliability
3. Understanding How GAE Scales
4. App Engine Architecture

Google App Engine

Simple to Scale
- Autoscale

Easy to develop
- Free to start
- Build and test locally
- Focus on App Code

Trivial to manage
- Fully managed
- No patches/updates
- 24x7 operation by Google **SREs**

Google App Engine

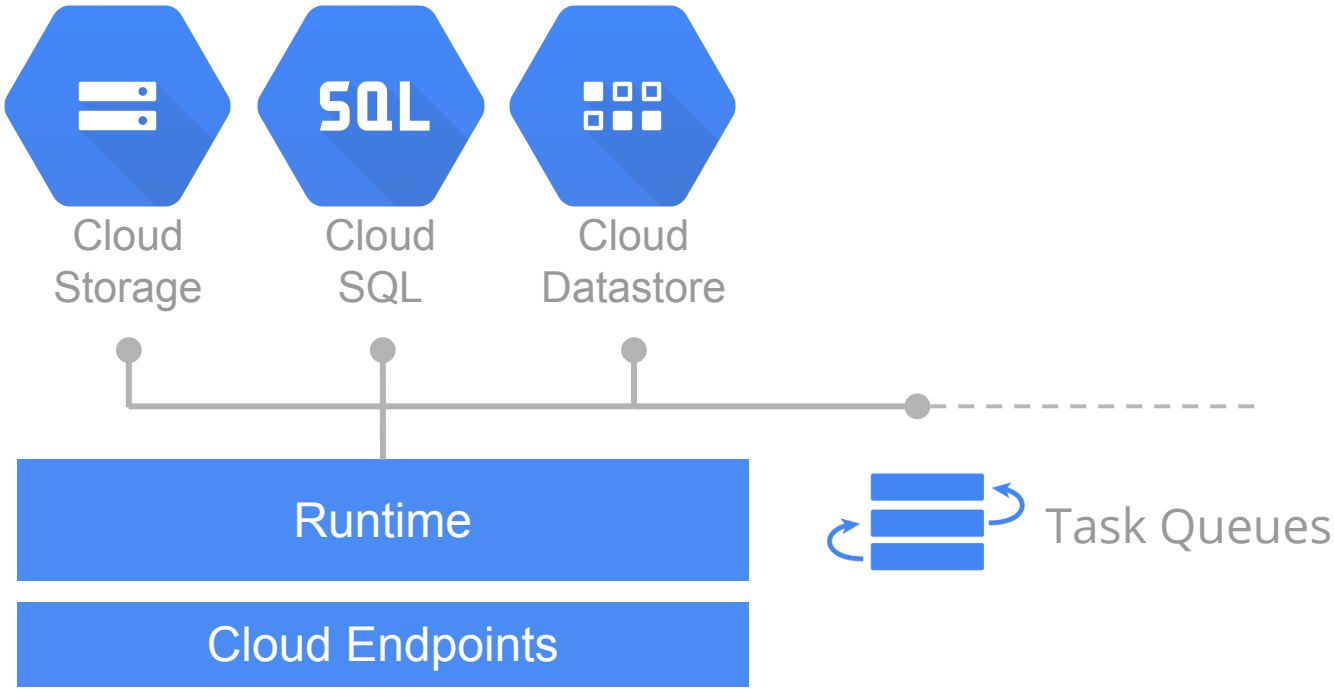
When to use?

- Focus on your code
- Managed environment
- Build micro-services

Capabilities

- Automatic resource provisioning
- Java, Python, PHP Beta, & Go Beta
- Identity, Memcache, Task Queue, Mail, ...

Google App Engine

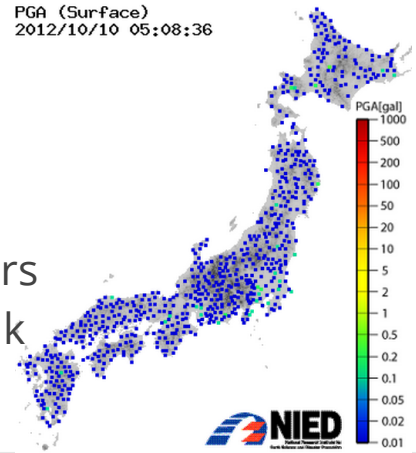


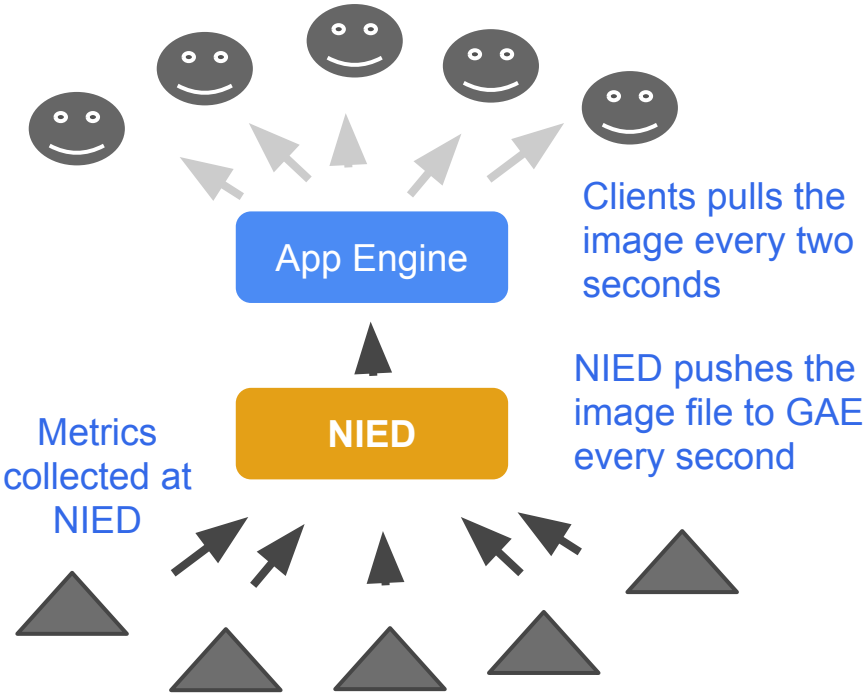
Design for Scalability And Reliability

Google App Engine

Use Case - Real Time Earthquake Monitor

- GAE Web App By NIED Japan + Google
  - National research Institute for Earth science and Disaster prev.
  - The blinking dots represents **real time Peak Ground Acceleration**
- YouTube video
  How it worked at the March 11, 2011 earthquake
- 20,000 concurrent users
  10,000 reqs/sec at peak





Important Requirements

- **Scalability**
  - As it gets spike traffic at the event of earthquake
- **Reliability**
  - It is useless if it does not work at the time of disaster
- **Cost Effectiveness**
  - It would be too expensive to provision the system for peak traffic

Important Requirements

- **Scalability**
  - As it gets spike traffic at the event of earthquake
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How do I design a web service that is **scalable**, **reliable**, and **cost effective** like this?

Important Requirements

What About?

- ❑ Hardware Failures
- ❑ Traffic Spike
- ❑ Growing Data Storage
- ❑ Complex Design
- ❑ Complex Dev.
- ❑ Complex Admin
- ❑ Cost

App Engine Solves it:

- ✓ Hardware Failures
- ✓ Traffic Spike
- ✓ Growing Big Data
- ✓ Simpler Design
- ✓ Simpler Dev
- ✓ No Admin
- ✓ No Initial Funding

App Engine Design Goals

- **Empowers You to Design Your Applications in Google Way**
  - It is not just hosting
  - It is not just data center
- **Encapsulates Google's Best Practice for Scalability And Reliability**
  - Non-relational data model by Datastore/Bigtable
    - Sharding, Denormalization, ...
  - Portable and service-oriented app design
    - Independent to each physical server or data center
    - Fast request handling that is horizontally scalable

App Engine Design Goals ...

- **Significant Lower TCO - Total Cost of Ownership**
  - Economy of scale
  - Easy to develop and deploy
  - Free to start - no initial cost
  - Lower operation cost
    - No security patch, system upgrade etc
    - 24 x 7 operation by Google Site Reliability Engineers (SREs)

Understanding How GAE Scales

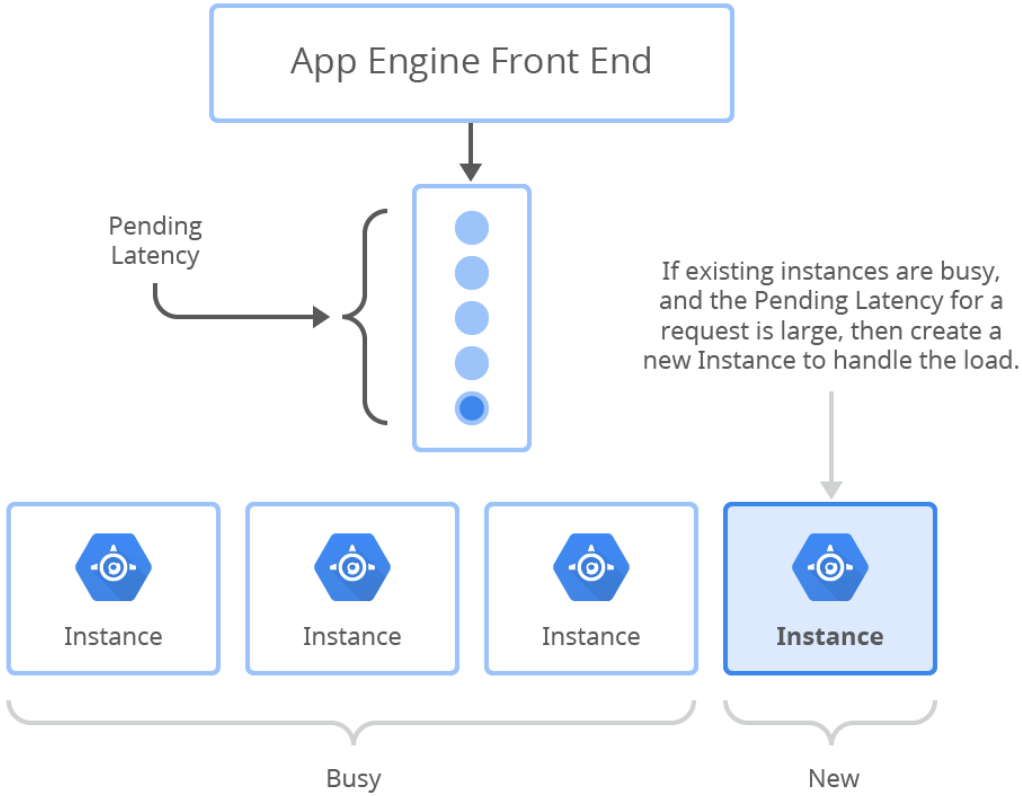
Google App Engine

How GAE Application Scales?

App Engine watches **Pending Request Queue** of each *app version*

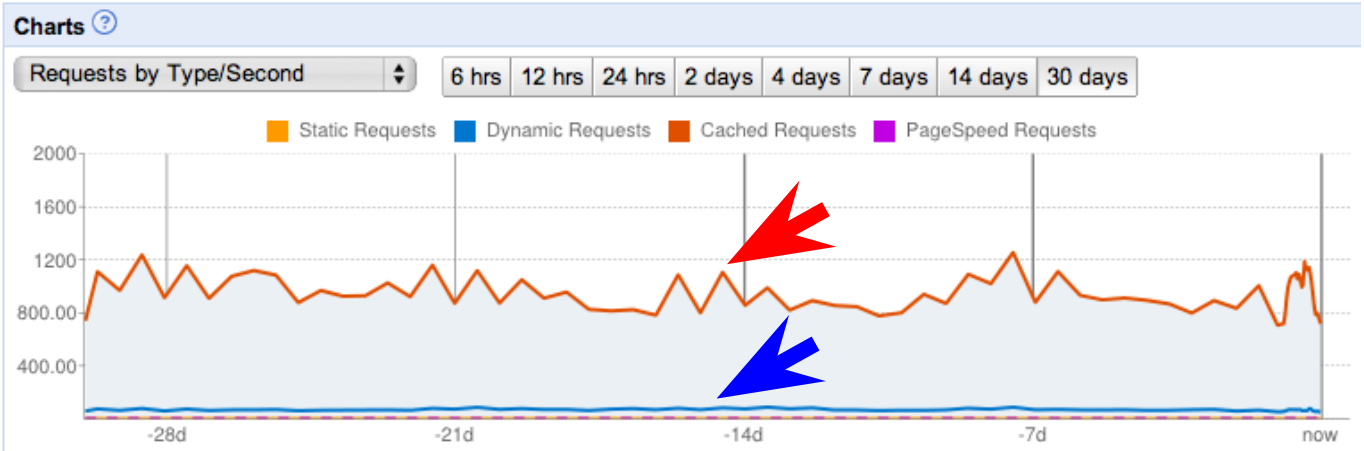
Let's see what would happen if your app gets a traffic spike

- Instances dynamically added/removed based on queue size



Benefits of Auto Scaling

Notice the huge difference between the traffic volume on the **red line** (the number of requests) and **blue line** (the number of requests handled by the application).



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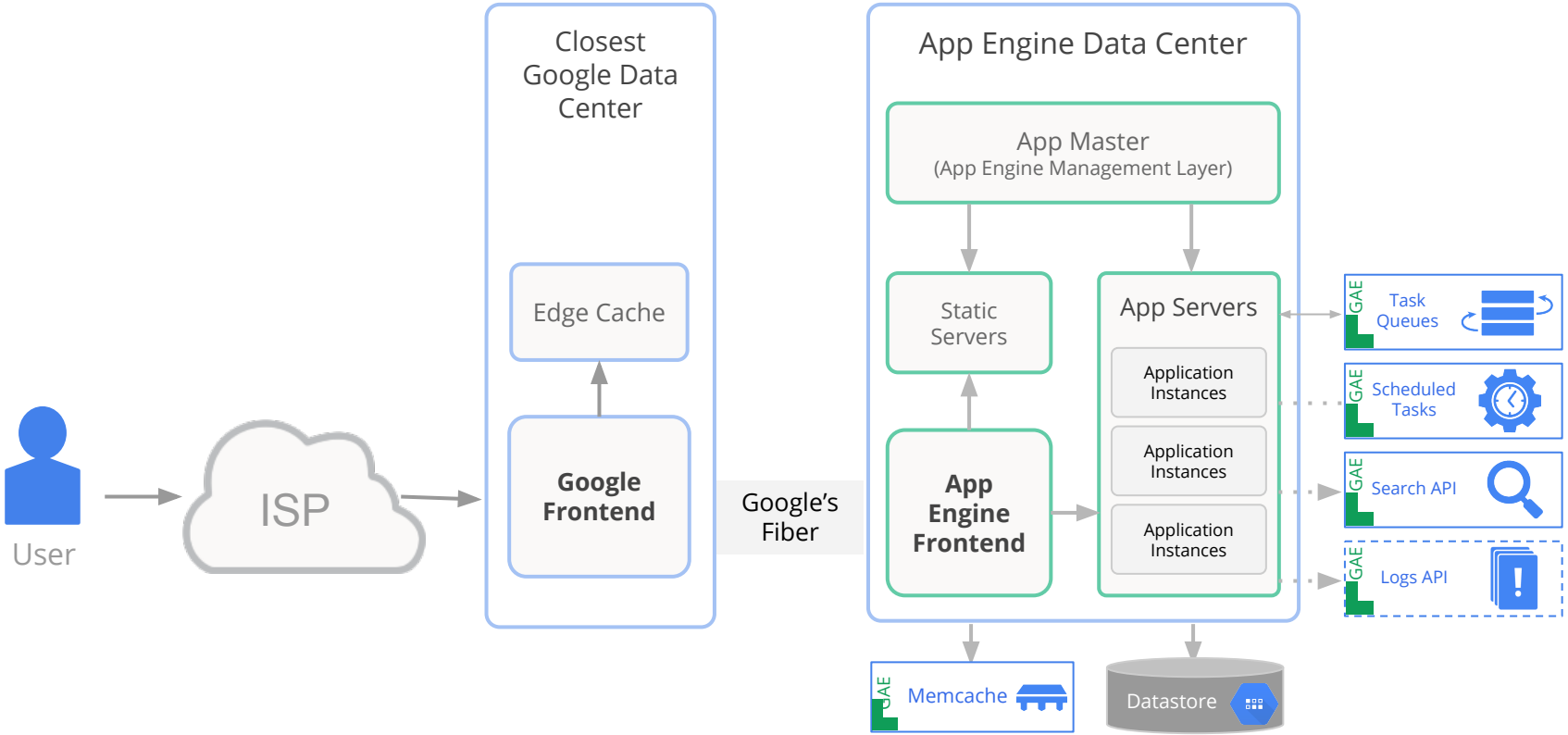
The Earthquake site broadcasts the image file to thousands of users **without handling all the requests by the app**. How does it do that?

App Engine Architecture

Google App Engine

App Engine Architecture



Key Takeaways

App Engine encapsulates all the costs and efforts

- Build and operate a web app with Google scale and reliability
- Encourage Google's best practices for scalability and reliability
- Significantly lower Total Cost of Ownership

Frontends provides scalability and reliability

- *Google* Frontend
  - Edge Caching and Networking
- *App Engine* Frontend
  - Static Content delivery
  - Load Balancing

App Engine infrastructure manages scaling

- Automatic scaling of App Engine instances
- Manages Pending Latency and Idle Instances

Quiz

Which of the following **runtimes** is it possible to access from within App Engine using the features you've learnt about in this Module?
*(pick **one** answer)*

- ❑ Perl
- ❑ Node.js
- ❑ Ruby
- ❑ Java
- ❑ All of the above
- ❑ None of the above

Resources

- Google App Engine: Platform as a Service
  https://cloud.google.com/appengine/docs

- Overview of App Engine Features
  https://cloud.google.com/appengine/features/

- Unleashing App Engine Scalability
  https://cloud.google.com/developers/articles/unleashing-appengine-scalability/


cloud.google.com
Images by Connie Zhou