Google Application Engine

Introduction

Charles Severance
Web Applications

http://en.wikipedia.org/wiki/HTTP
Internet
Click the link in your browser to request data from the server. The server sends data back to the data center, which is then displayed on your computer via the internet.
Cloud Computing
http://en.wikipedia.org/wiki/Cloud_computing
Pre-Cloud View

Local Network

Router

The Internet

...
In a pre-cloud view, servers have a geographic location and we use the Internet to exchange data with those servers.
Google I/O 2008 Keynote

- Google I/O '08 Keynote by Marissa Mayer
- Usability / User Experience / User Testing / Architecture / Philosophy

http://www.youtube.com/watch?v=6x0cAzQ7PVs
Lessons

- The cloud is wide - we can touch 1000 servers in 0.1 seconds
- For things that seem “intelligent” 0.2 seconds is fast enough - as long as you can do a lot of them
- Lots of spread-out storage and a fast scan is important
- Data - Information - Knowledge - starts with data and the ability to look through that data quickly
Scalable Infrastructure

http://www.youtube.com/watch?v=zRwPSFpLX8I
Infrastructure

- The only sustainable scalability is when you scale with inexpensive, green solutions
- Tape Backup is a rate limiting factor - so we need something creative
- Disaster recovery - “Of course!”
World-Scale Applications

- For world-scale applications - the servers must be distributed around the world
- But users must see a uniform “single image” - www.google.com
- Also the programmers cannot know the structure or geography of the servers - because this always changes
Google Server Locations


This is an educated guess.
Programming in the Cloud

- Programmers operate in a controlled environment
- Programs do their programming thing - code + data
- A complex software framework manages getting the right code and data to/from the right servers.
- Software developers are unaware of geography
The geographic location no longer matters - the software “runs somewhere in the cloud”.

Resources can be dynamically adjusted as load changes.
Pre-Cloud View

Local Network
Router

Server Busy?

The Internet

Software
HTTP - Request / Response

• The nature of the HTTP Request/Response cycle makes the cloud possible

• Since clients are not connected for very long - the cloud can be changed in between requests

• As long as the cloud “fakes” everything about the protocol - no one is the wiser..

• The cloud engineers at Google/Amazon/Yahoo are pretty clever.
HTTP Request / Response Cycle

Web Server

HTTP Request

HTTP Response

Browser

Internet Explorer, FireFox, Safari, etc.

Hello there my name is Chuck.
Go ahead and click on here.

http://www.oreilly.com/openbook/cgi/ch04_02.html
HTTP Request / Response Cycle

GET /index.html

HTTP Request

HTTP Response

Web Server

_browser>

<body>
<h1>Welcome to my application</h1>
....
</body>

Browser

Internet Explorer, FireFox, Safari, etc.

Hello there my name is Chuck.
Go ahead and click on here.

http://www.oreilly.com/openbook/cgi/ch04_02.html
Post-Cloud View

The Cloud

My Code

Your Code

My User

My Code
Post-Cloud View

The Cloud

My Code

Your Code

My Code

GET

My User
Cloud Summary

• The cloud is the Internet plus computing that is “embedded” “inside” the network

• Companies like Google, Amazon, and Yahoo put servers all over the world

• Software runs on whichever server is most appropriate and data/code is moved around and the cloud can be reconfigured dynamically
Google App Engine
Google App Engine

- Expose Google’s worldwide Infrastructure to us as developers

http://www.youtube.com/watch?v=3Ztr-HhWX1c
http://www.youtube.com/watch?v=oTFL7FPLnXY
Google App Engine

• When you write a Google Application Engine Application - you are running in the Google Cloud
• Just like you were a Google Developer
• You don’t know where you are running or if one copy of a thousand copies of you are running
• Google hosts small applications for *free* - larger applications pay by usage
Free Accounts

- A free account can use up to 500MB of persistent storage and enough CPU and bandwidth for about 5 million page views a month.

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Why is App Engine Free?

• Make the web better

• Be the first widely used “cloud” environment - beat Amazon, Microsoft, and Yahoo!
Summary

- We introduced Cloud Computing - servers move “into” the network cloud
- Google App Engine allows us to use the Google Cloud for free
- To make use of this resource we need to “learn the rules of the road”