Google Application Engine

Introduction

Charles Severance
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Web Applications

http://en.wikipedia.org/wiki/HTTP
The diagram illustrates the process of making a request to a server. It shows the flow of data between a browser on your computer, the internet, and a data center.

- **Click** (orange arrow) from your computer to the browser.
- **Browser** to the server via a request (yellow arrow).
- **Response** (yellow arrow) from the server to the browser.
- **Data** (purple arrow) from the server to the data center.
- The internet (red arrows) connects your computer to the server and vice versa.

This diagram represents how websites load pages and respond to user interactions.
Internet

HTML
JavaScript
AJAX
CSS

HTTP Request
GET
POST

Python Templates
Data Store
memcach
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.
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.

Google Search

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

http://www.youtube.com/watch?v=6x0cAzQ7PVs
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
Post-Cloud View

My Code

Your Code

My User

Your User
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

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

Internet Explorer, FireFox, Safari, etc.

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

GET /index.html

HTTP Request

Web Server

HTTP Response

Browser

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

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

Internet Explorer, FireFox, Safari, etc.

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

The Cloud

My Code

Your Code

My Code

My User
Post-Cloud View

The Cloud

My Code

GET

My User

Your Code

My Code
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
Materials

• Google Application Engine

• Free hosted web services using Python

• [http://code.google.com/appengine/](http://code.google.com/appengine/)

• We will be using web materials and making materials as we go.
Overview Video

• Builds a Google App Engine application in 10 minutes
  • Basic structure - GET / POST
  • Form Input
  • Templating
  • Database

http://www.youtube.com/watch?v=tcbpTQXNwac
Google App Engine
Google App Engine

- Expose Google’s worldwide Infrastructure to us as developers

http://www.youtube.com/watch?v=3Ztr-HhWXlc
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.
Why is App Engine Free?

- Make the web better
- Be the first widely used “cloud” environment - beat Amazon, Microsoft, and Yahoo!
Installing Google App Engine
Appendices

• Installing AppEngine
• Windows Vista
• Windows XP
• Macintosh
• Linux
Downloads

- Download the Google App Engine SDK
- Download the Google App Engine Documentation
- Download the Google App Engine Buttons

Download the Google App Engine SDK

Before downloading, please read the Terms that govern your use of the App Engine SDK.

Please note: The App Engine SDK is under active development, please keep this in mind as you explore its capabilities. See the SDK Release Notes for the information on the most recent changes to the App Engine SDK. If you discover any issues, please feel free to notify us via our Issue Tracker.

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For more information on the SDK:

http://code.google.com/appengine/downloads.html
A Simple First Program
app.yaml

application: ce-00-trivial
version: 1
runtime: python
api_version: 1

handlers:
- url: /.*
  script: index.py

index.py

print 'Hello there Chuck'
Last login: Mon Sep 14 13:20:00 on ttys001
67-194-57-14:~ csev$ cd Desktop
67-194-57-14:Desktop csev$ cd si539
67-194-57-14:si539 csev$ ls -l
total 0
drwxr-xr-x 4 csev staff 136 Sep 14 13:15 assn0
67-194-57-14:si539 csev$ /usr/local/bin/dev_appserver.py assn0
INFO 2009-09-14 17:20:45,427 appcfg.py:329] Checking for updates to the SDK.
INFO 2009-09-14 17:20:45,969 dev_appserver_main.py:465] Running application ae-00-trivial on port 8080: http://localhost:8080
Hello there Chuck
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”