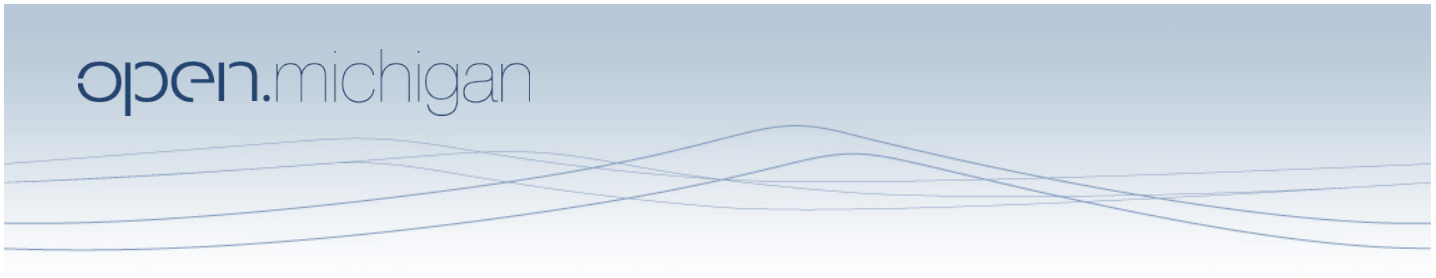
# Google Application Engine

# Introduction

Charles Severance

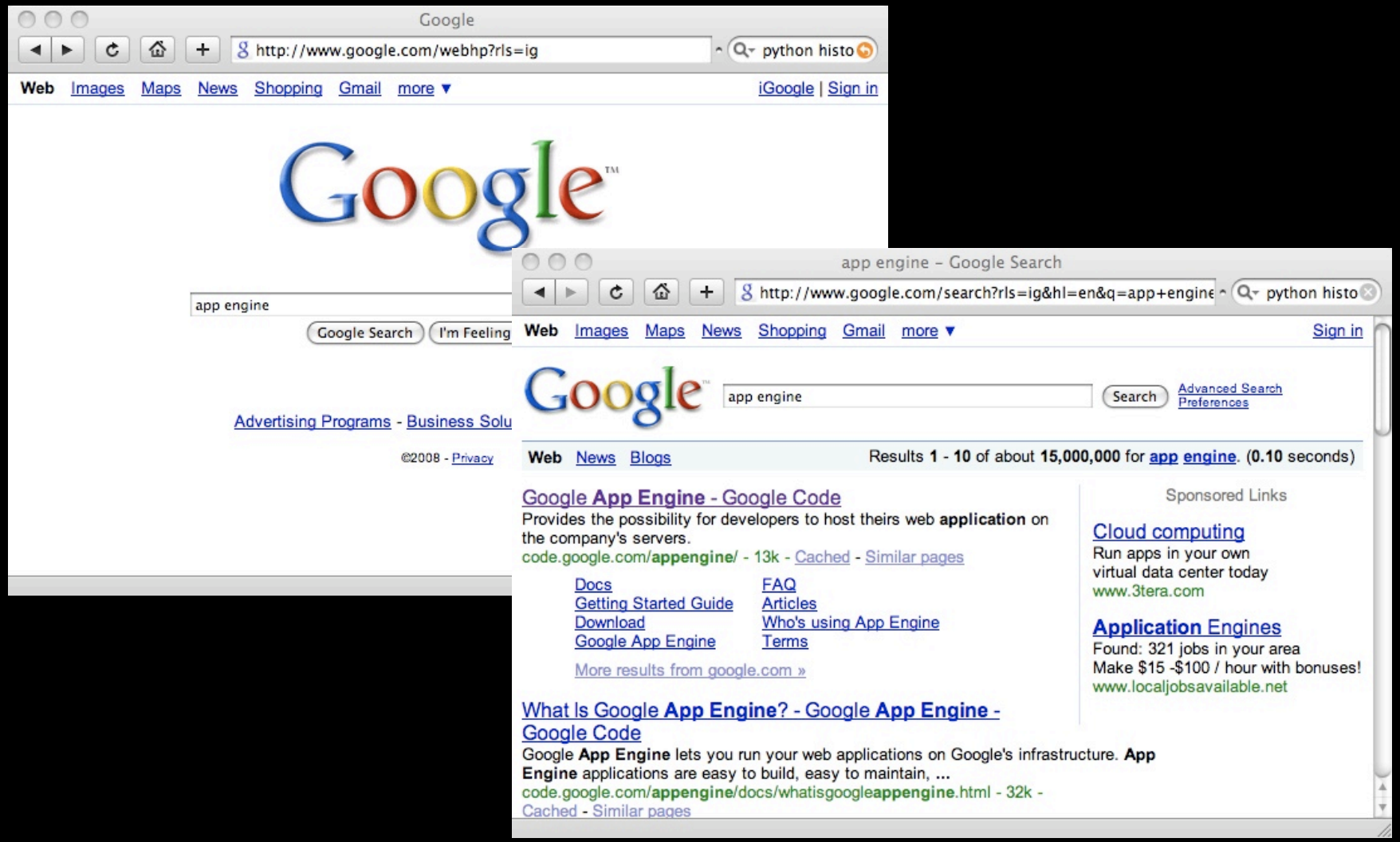







# Web Applications

http://en.wikipedia.org/wiki/HTTP


Google
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Google™
app engine
Google Search
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Preferences
Web News Blogs
Results 1 - 10 of about 15,000,000 for app engine. (0.10 seconds)
Google App Engine - Google Code
Provides the possibility for developers to host theirs web application on the company's servers.
code.google.com/appengine/ - 13k - Cached - Similar pages
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Getting Started Guide
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What Is Google App Engine? - Google App Engine - Google Code
Google App Engine lets you run your web applications on Google's infrastructure. App Engine applications are easy to build, easy to maintain, ...
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Application Engines
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Make $15 -$100 / hour with bonuses!
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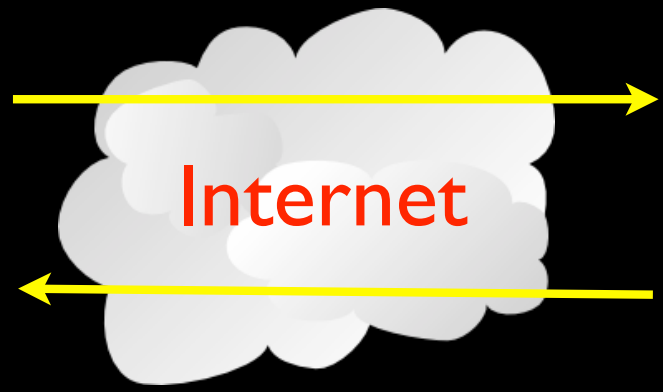
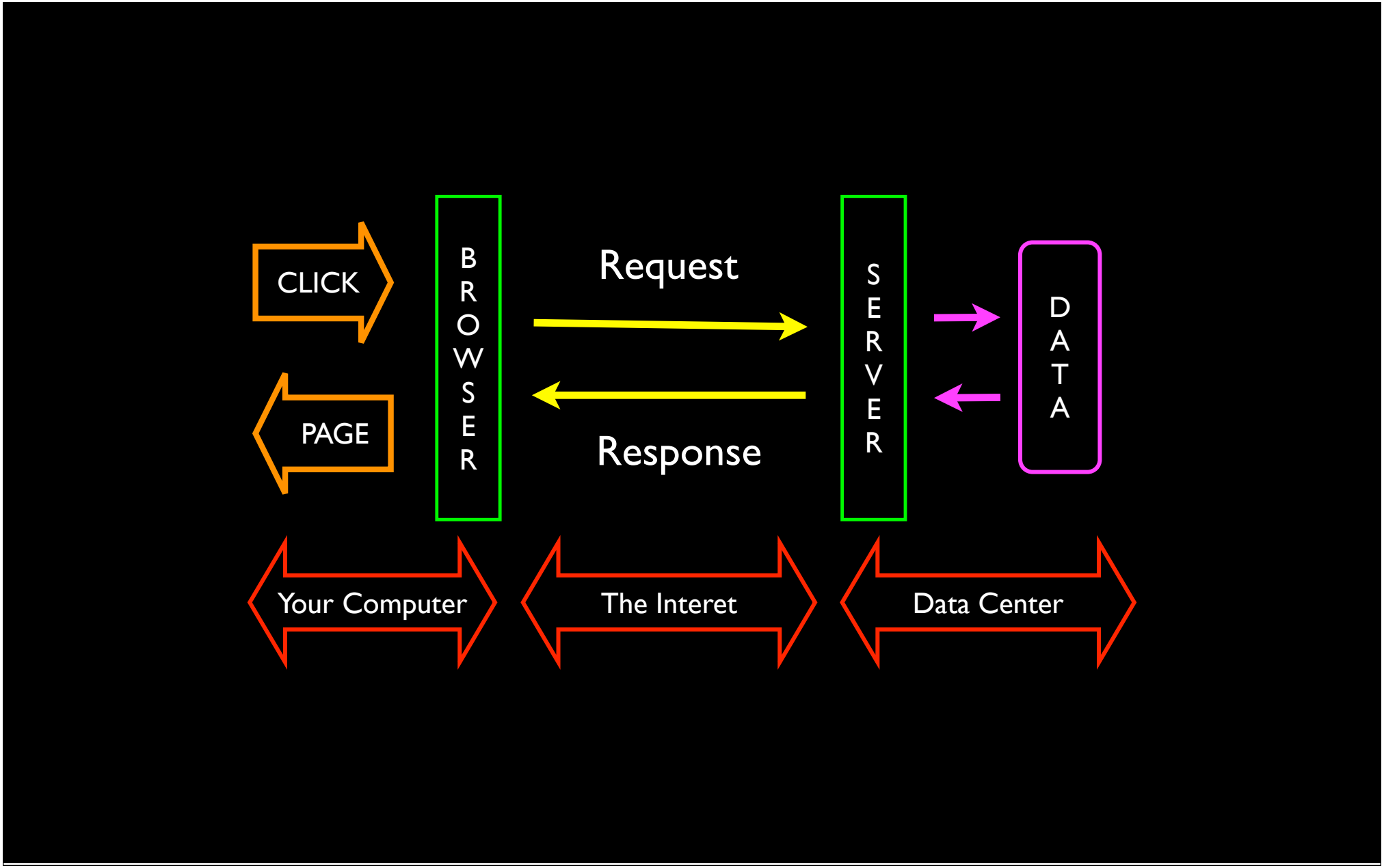
Web Results 1 - 10 of about 3,620,000 for hiking trails. (0.10
LocalHikes - Hikes and trails near U.S. Metropolitan Areas
See pictures, topo maps, elevation profiles, and ratings for great day hikes and hiking trails near US Metropolitan Areas.
www.localhikes.com/ - 19k - Cached - Similar pages
Where to Hike: Top US Hiking Trails | GORP.com
GORP's Hiking guide offers information and resources on the
T-Mobile
MENU


Internet


CLICK
PAGE
BROWSER
Request
Response
SERVER
DATA
Your Computer
The Interet
Data Center


Internet

HTML JavaScript

AJAX CSS

HTTP Request

Response GET

POST

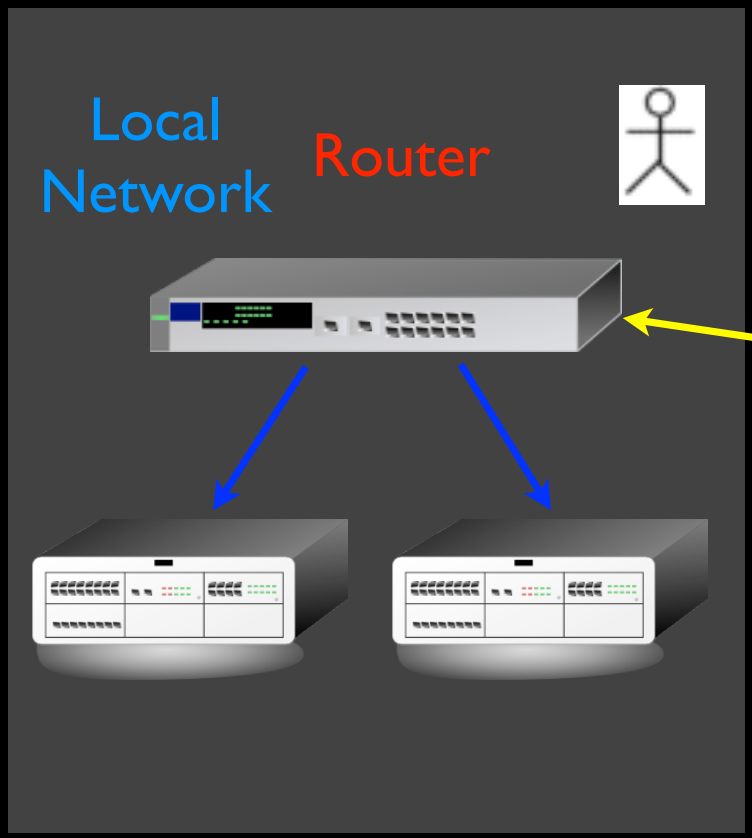
Python Data Store

Templates memcache

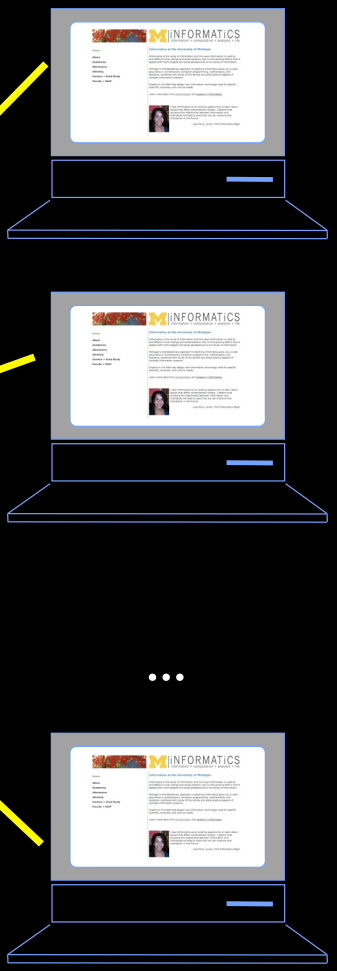
# Cloud Computing

http://en.wikipedia.org/wiki/Cloud_computing

# Pre-Cloud View



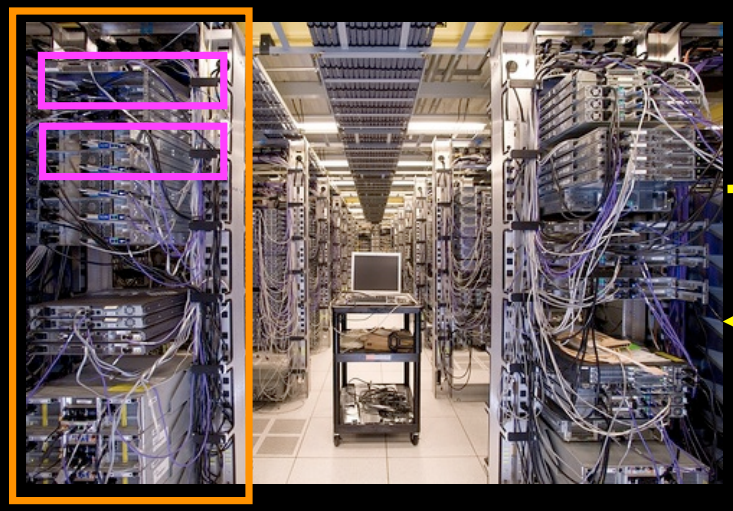


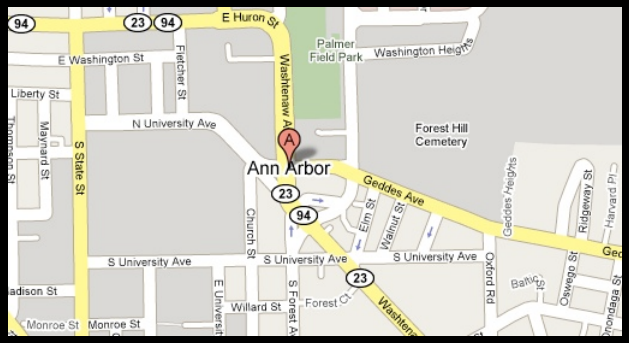


ctools.umich.edu

Hardware

Software



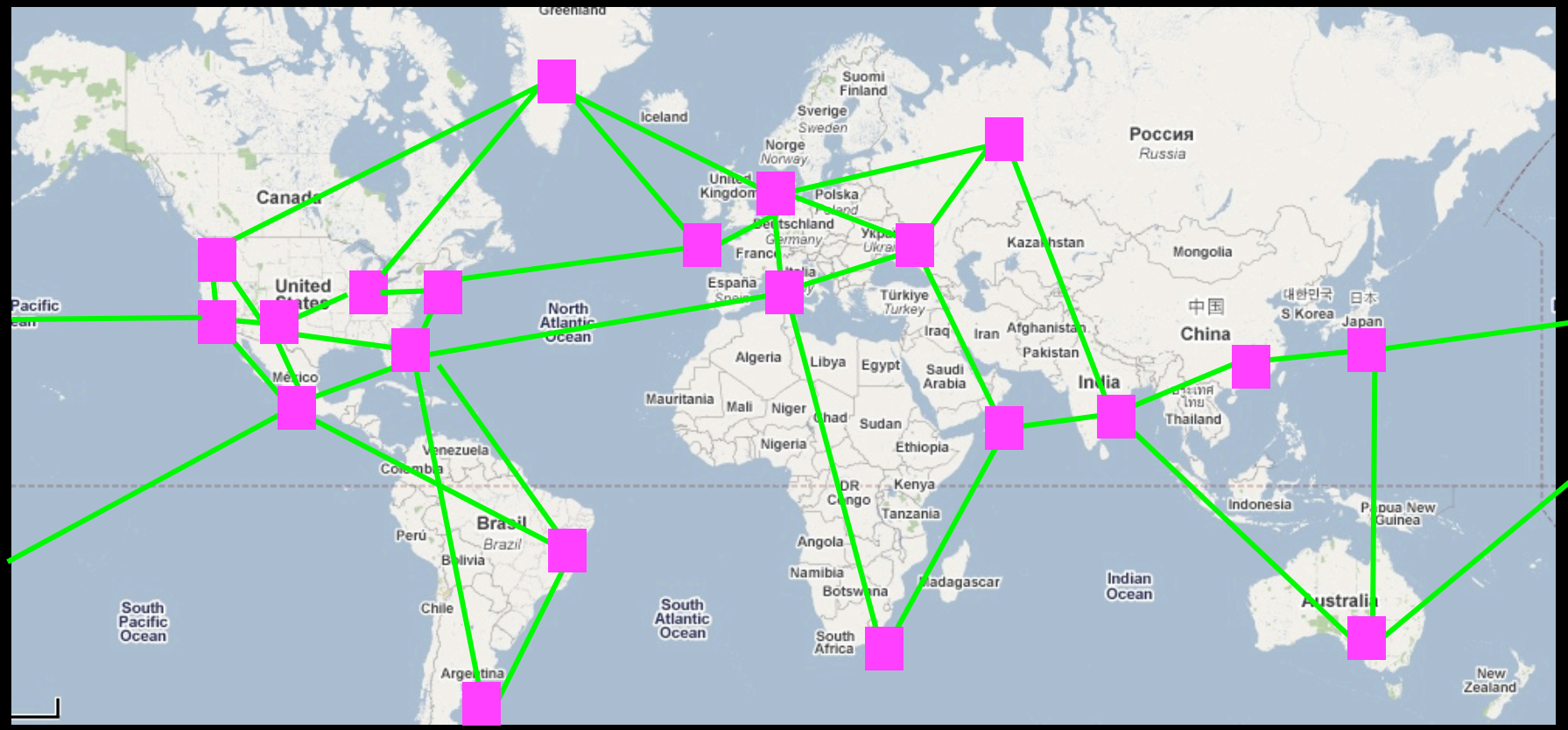

In a pre-cloud view servers have a geographic location and we use the Internet to exchange data with those servers.

# 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 grography of the servers - because this always changes

# Google Server Locations


http://royal.pingdom.com/2008/04/11/map-of-all-google-data-center-locations/


Canada
United States
Pacific
North Atlantic Ocean
Iceland
Suomi Finland
Sverige Sweden
Norge Norway
United Kingdom
Polska
Deutschland Germany
France
España
Россия Russia
Kazakhstan
Mongolia
Türkiye Turkey
Iraq
Iran
Afghanistan
Pakistan
China
S Korea
Japan
India
Thailand
Saudi Arabia
Algeria
Libya
Egypt
Mauritania
Mali
Niger
Chad
Sudan
Nigeria
Ethiopia
Kenya
Tanzania
Angola
Namibia
Botswana
South Africa
Madagascar
Indian Ocean
Indonesia
Papua New Guinea
Australia
New Zealand
México
Venezuela
Colombia
Brasil Brazil
Perú
Bolivia
Chile
Argentina
South Pacific Ocean
South Atlantic Ocean

# Google Search

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

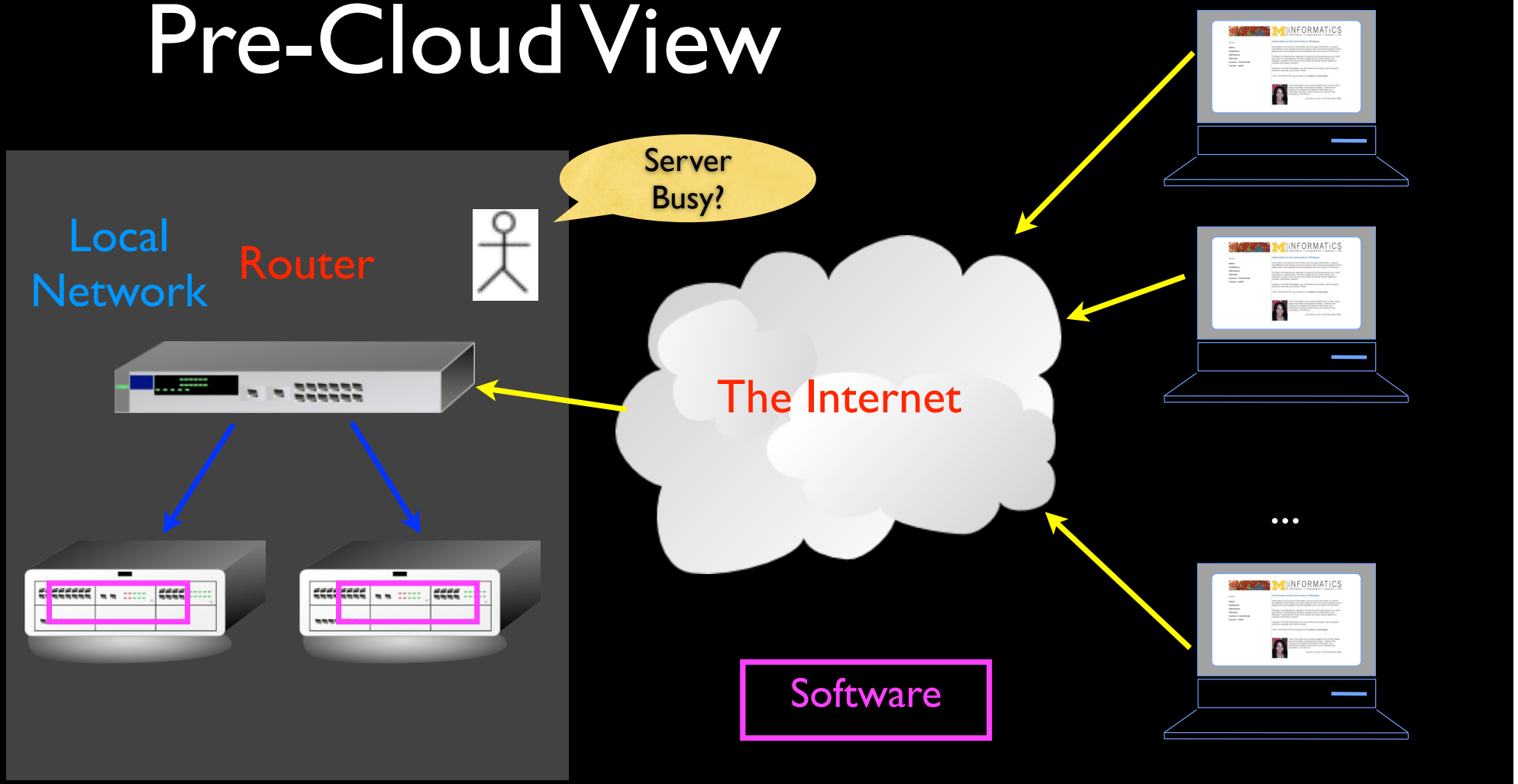
http://www.youtube.com/watch?v=6x0cAzQ7PVs

# Programming in the Cloud

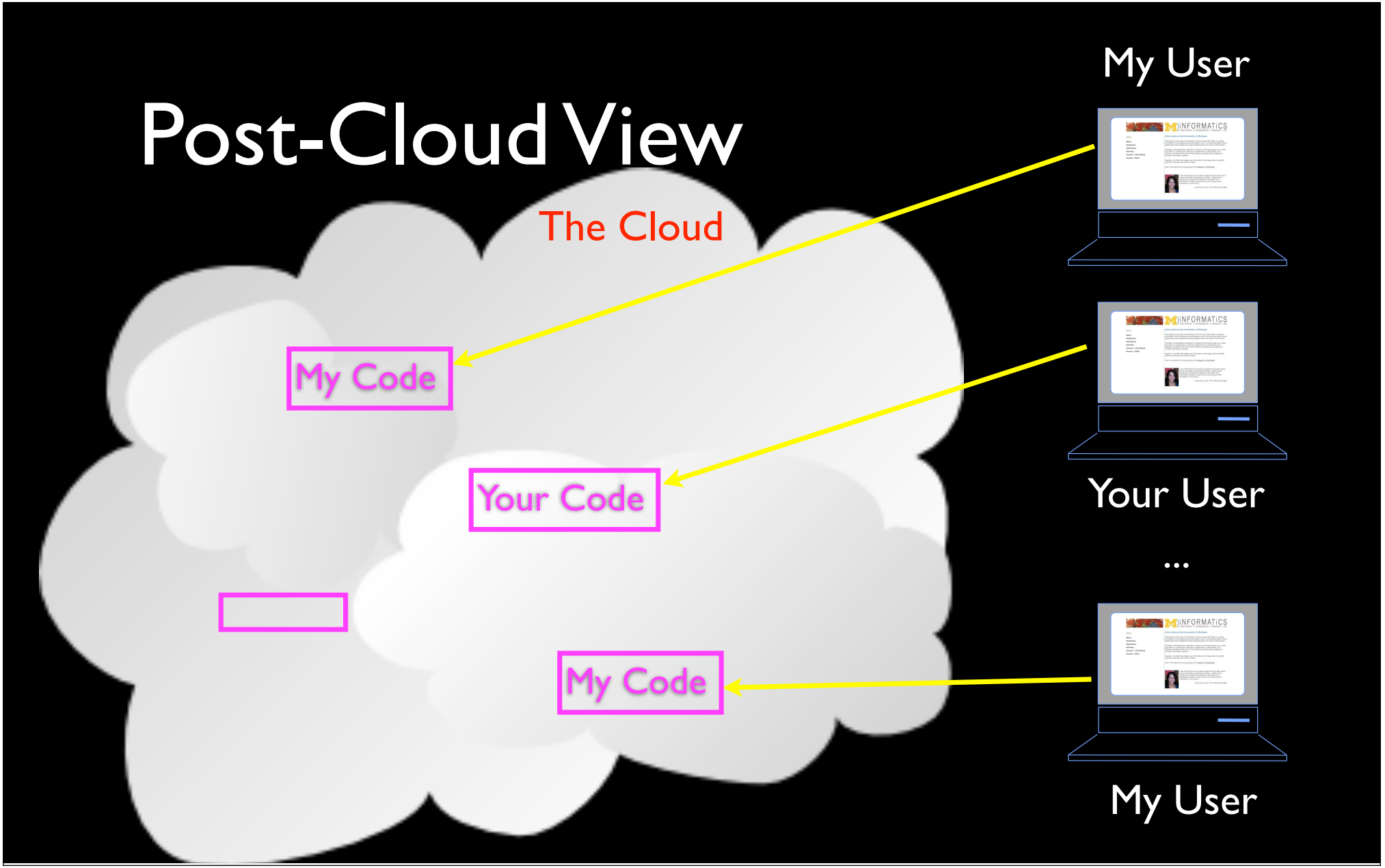
- Programmers operate in a controlled environment
  - Programs do their programming thing - code + data
  - A complex software framework manages getting the right code and data to/from the right servers.
- Software developers are unaware of geography


Resources can be dynamically adjusted as load changes.

# Pre-Cloud View



# Post-Cloud View



# 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

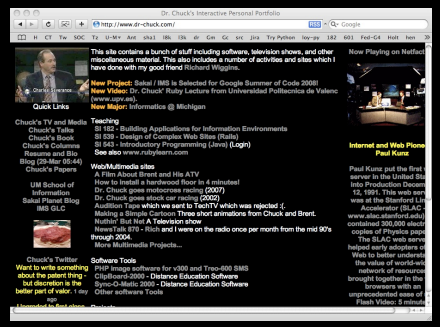
HTTP Response

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

Web Server

GET /index.html

HTTP Request

HTTP Response

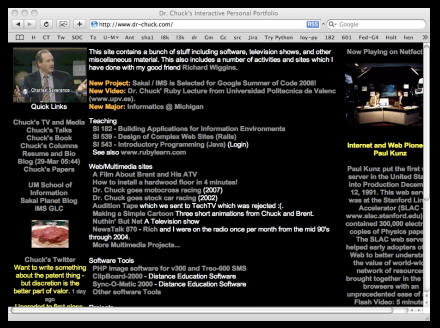
```
<head> .. </head>
<body>
<h1>Welcome to my
  application</h1>
....
</body>
```

Browser

Hello there my name is Chuck.

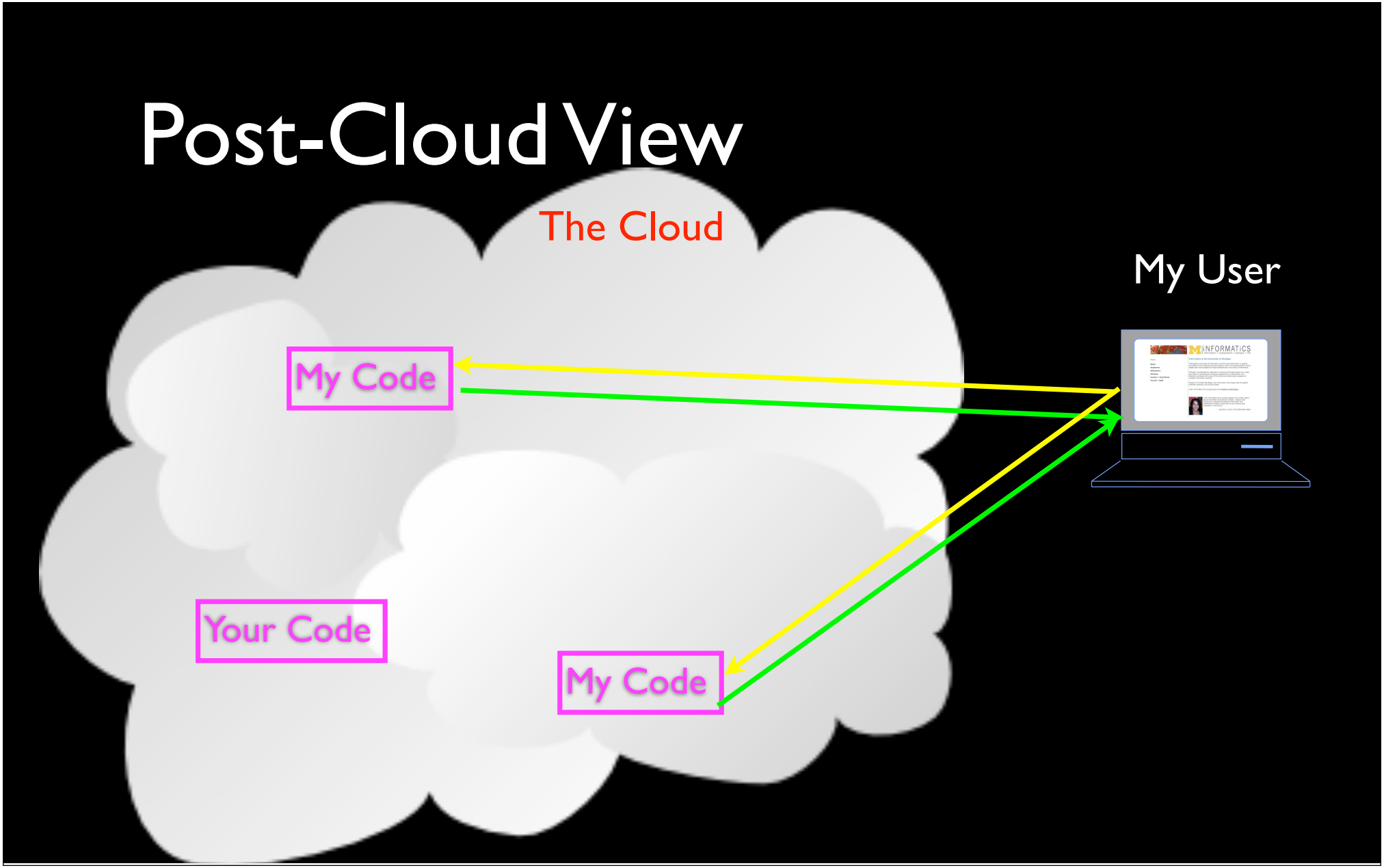
Go ahead and click on here.

Internet Explorer,
FireFox, Safari, etc.

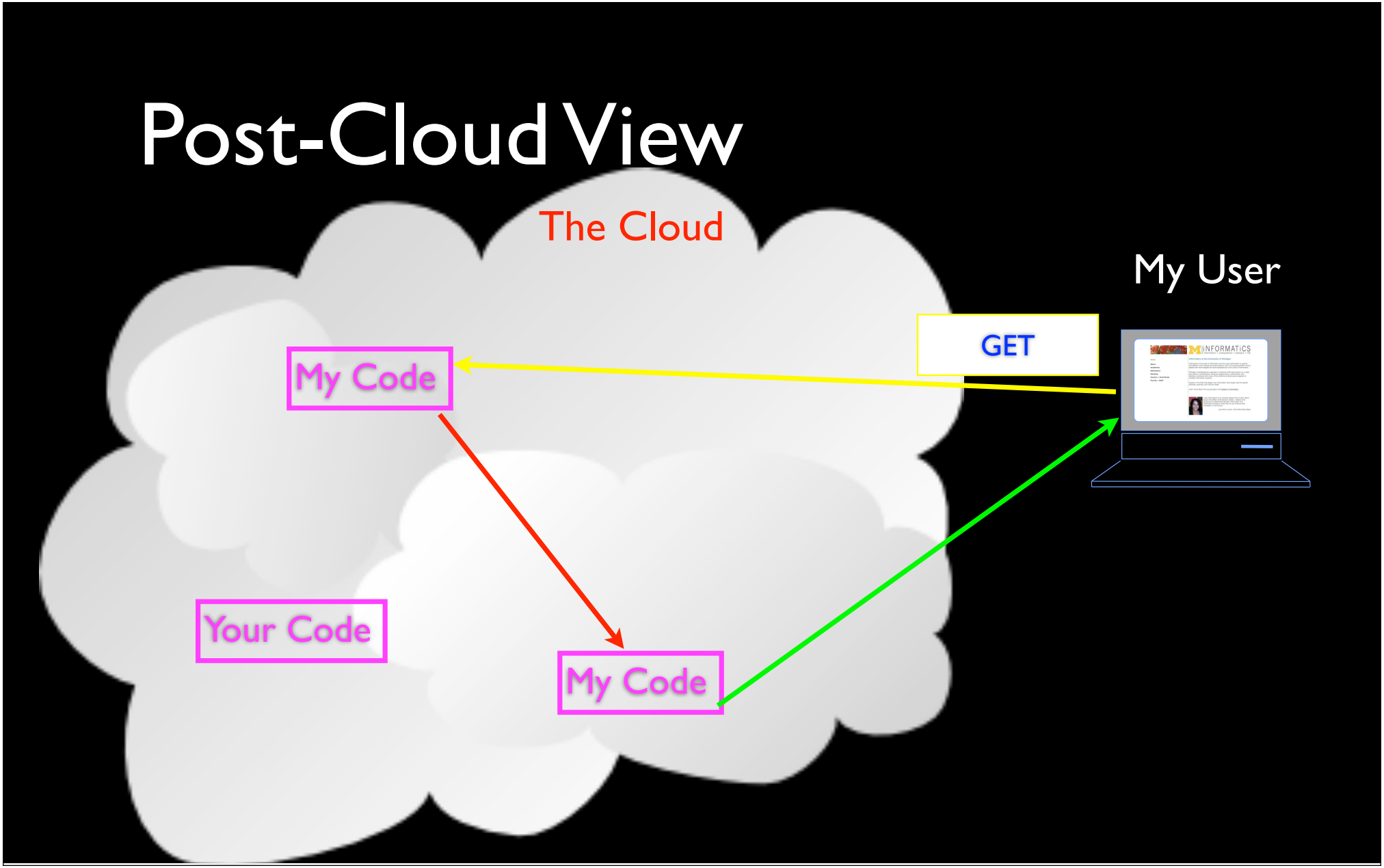


http://www.oreilly.com/openbook/cgi/ch04_02.html

# Post-Cloud View



# Post-Cloud View

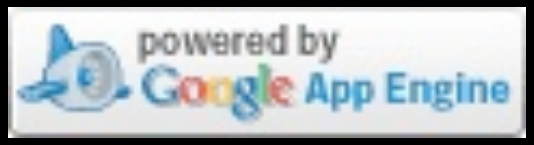


# Cloud Summary

- 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

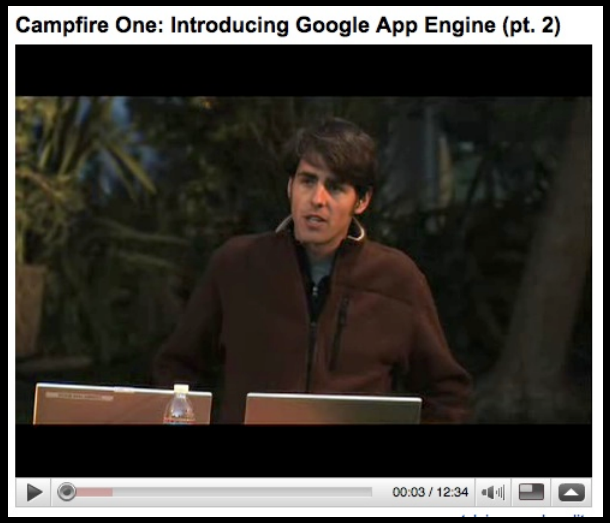
# Materials

- Google Application Engine
  - Free hosted web services using Python
- http://code.google.com/appengine/
- 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

Campfire One: Introducing Google App Engine (pt. 1)

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.

| Quota | Limit |
|---|---|
| Apps per Developer | 10 |
| Storage per App | 500MB |
| Files per App | 1,000 |
| Size per File | 1MB |

| Quota | Limit |
|---|---|
| Emails per Day | 2,000 |
| Bandwidth In per Day | 10,000 MB |
| Bandwidth Out per Day | 10,000 MB |
| CPU Megacycles per Day | 200,000,000 |
| HTTP Requests per Day | 650,000 |
| Datastore API Calls per Day | 2,500,000 |
| URLFetch API Calls per Day | 160,000 |

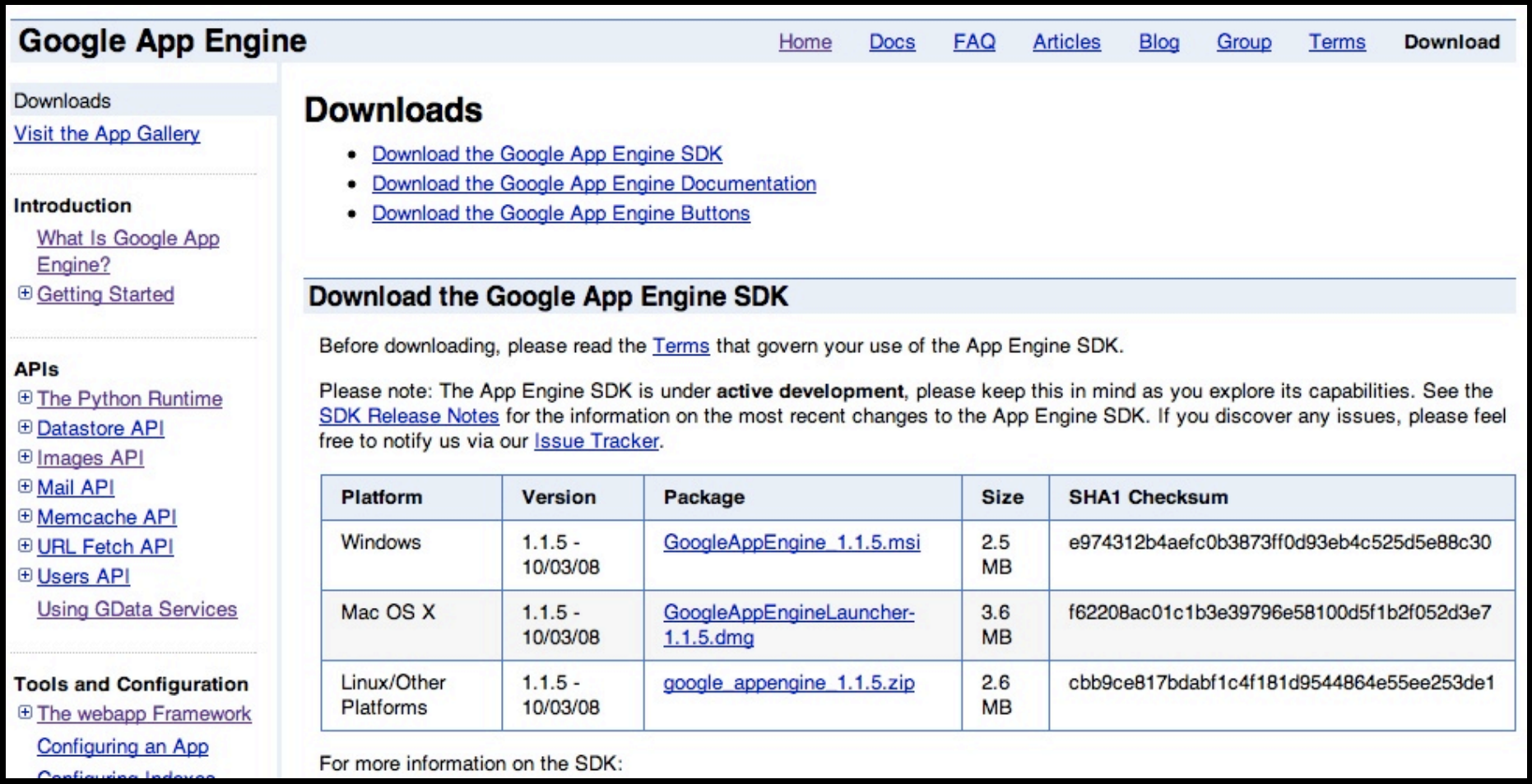
# Why is App Engine Free?

- Make the web better
- Be the first widely used “cloud” envionment - beat Amazon, Microsoft, and Yahoo!

# Installing Google App Engine

# Appendices

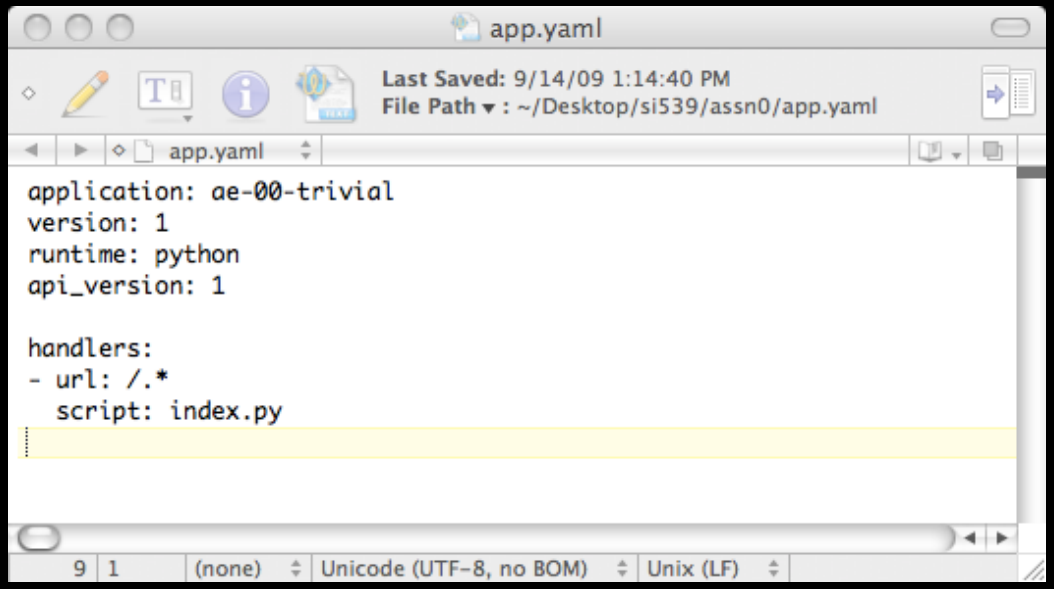
- Installing AppEngine
  - Windows Vista
  - Windows XP
  - Macintosh
  - Linux



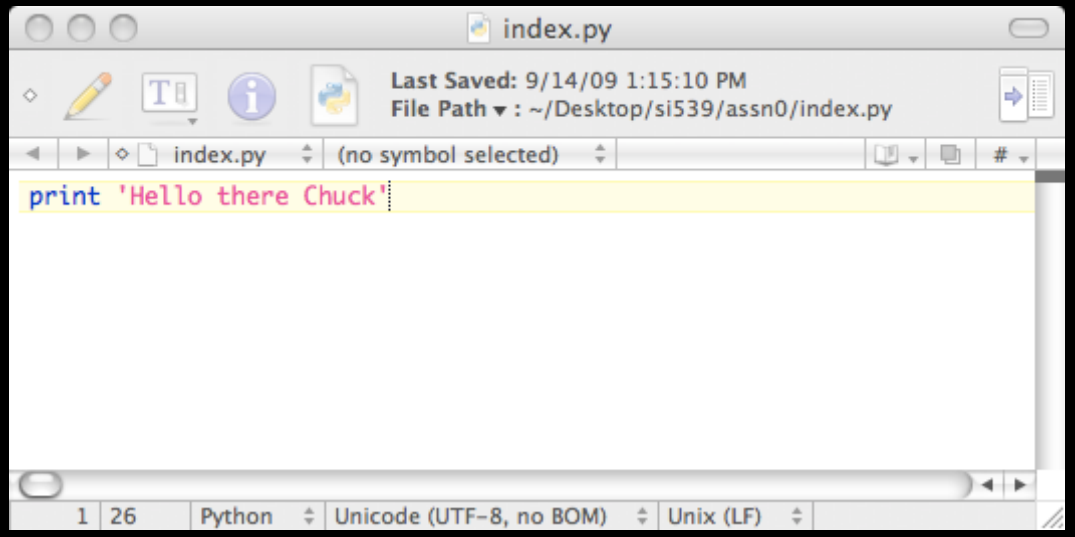

http://code.google.com/appengine/downloads.html

# A Simple First Program

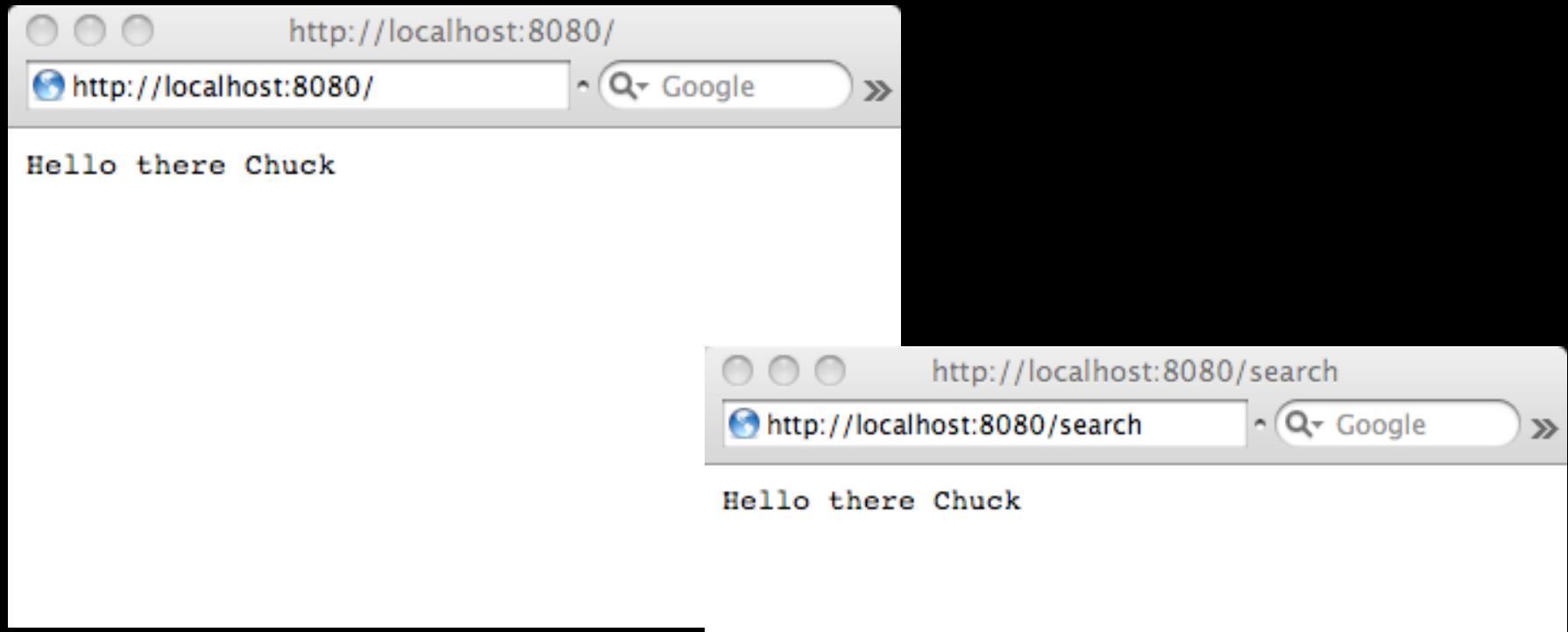
app.yaml




index.py



```
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 17:20:45,397 appengine_rpc.py:157] Server:
appengine.google.com
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
```


http://localhost:8080/
http://localhost:8080/
Google
Hello there Chuck
http://localhost:8080/search
http://localhost:8080/search
Google
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"