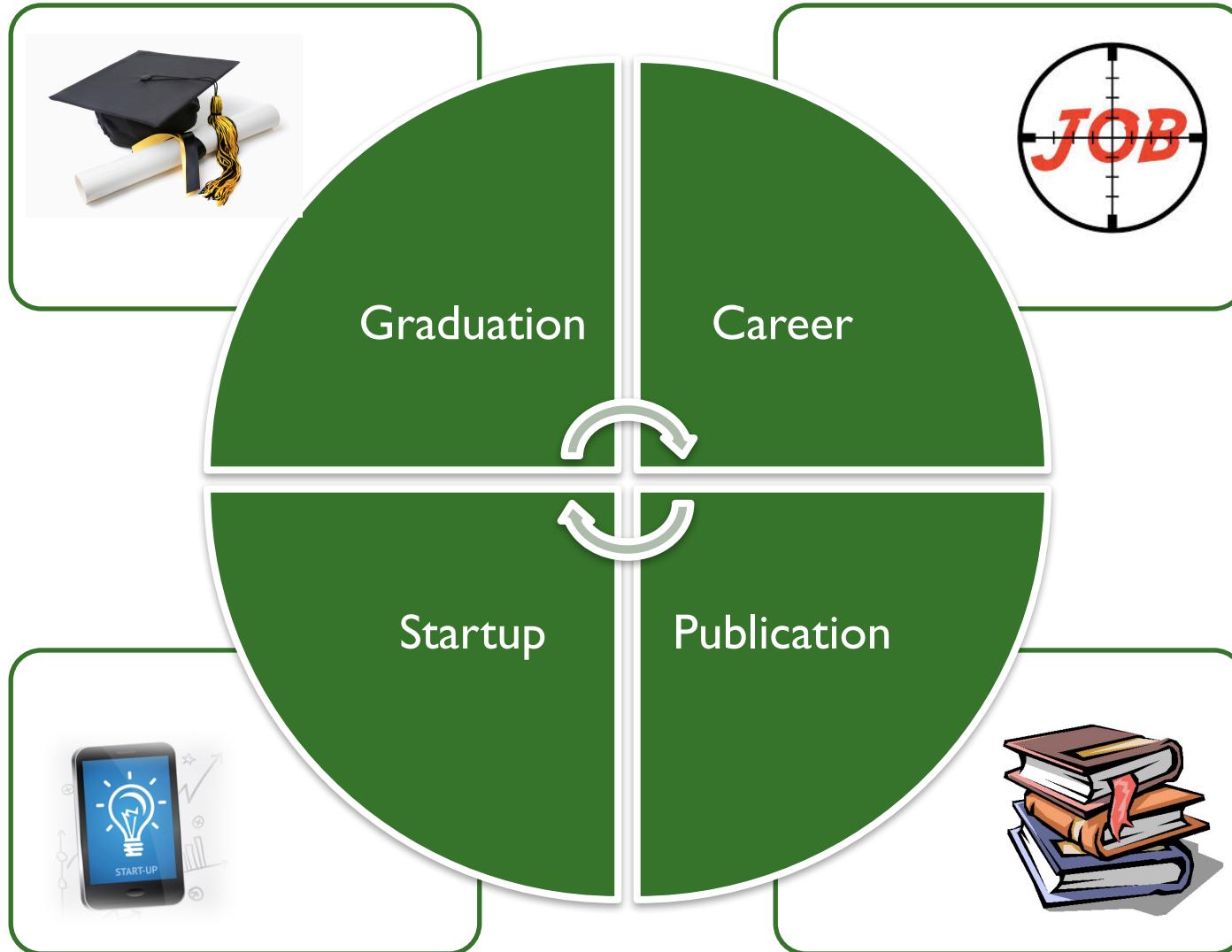


What is a Good Student Project?



Web Service Basics

CS480 Software Engineering

Yu Sun, Ph.D.

<http://yusun.io>

yusun@cpp.edu



CAL POLY POMONA

What is a Web Service?

- ◆ A **web service** is a method of **communication** between two electronic devices over a **network**. It is a software function provided at a network address over the web **with the service always on** as in the concept of utility computing.



Web Service Example

Web Images Maps News Shopping Gmail more ▾



product management software

Search

[Advanced Search](#)

[Preferences](#)

Web

Results 1 - 10 of about 28,300,000 for **product management software**. (0.23 seconds)

[Product Manager Software](#) ★

www.accompa.com/Product-Management

Requirement Management Software for PMs. S

Sponsored Links

[Telelogic - Official Site](#) ★

www.Telelogic.com

Trust Telelogic, the Global Leader In Product Portfolio Management.

[Product Management Tool](#) ★

www.featureplan.com

Product management software to develop market-driven products

[Product Management Software - Featureplan Product Management Software](#) ★

Product Management Software. Featureplan Product Management Software. Product management software program is a single product management software tool that ...

www.featureplan.com/product-management-software.htm - 24k -

[Cached](#) - [Similar pages](#) -

[FeaturePlan - Product Management Software Requirements Management ...](#) ★

FeaturePlan. Product Management Software and Requirements Management Software for the Software Industry. Feature Plan Product Management Software and ...

www.featureplan.com/ - 16k - [Cached](#) - [Similar pages](#) -

[Product Management Software Comparison](#) ★

Interested in finding out what Product Management Software is available to help you do your ... Their Product Management software solution is server based, ...

www.280group.com/productmanagementsoftwarecomparison.htm - 30k -

[Cached](#) - [Similar pages](#) -

[Innovation Management Software - Accept Software](#) ★

Accept Corporation - US company provides industry leading product management software, product marketing software and product planning software.

www.acceptsoftware.com/ - 13k - [Cached](#) - [Similar pages](#) -

Sponsored Links

[Product Data Mgt Software](#) ★

Free download. Full version! Get the Software — Download Now www.Aras.com

[Learn Product Management](#) ★

Build market-driven products by listening to the market. www.pragmaticmarketing.com

[Product Management Tool](#) ★

Manage product lifecycle, software requirements, tasks, more. Free Trial. www.qavantage.com

[Product Management Advice](#) ★

Define Product Management Roles Improve Product Manager Performance www.lifecycl.com

[Product Data Management](#) ★

SolidWorks Enterprise PDM Software Demos. Efficiency = Results SolidWorks.com/OnlineTour



[Change Management Form](#) ★

Change Control Management Form for FDA/ISO Environment White Paper www.MasterControl.com

Web Service Example



- Wall
- Info**
- Photos (826)
- Questions

Family

- Karen Zuckerberg
Mother
- Edward Zuckerberg
Father
- Randi Zuckerberg
Sister
- Donna Zuckerberg
Sister

Mark Zuckerberg

Has worked at Facebook • Studied Computer Science at Harvard University • Lives in Palo Alto, California • From Dobbs Ferry, New York • Born on May 14, 1984



Education and Work

Employers

	Facebook Feb 2004 to present - Palo Alto, California	<ul style="list-style-type: none">FBX Profile
---	---	---

College

	Harvard University Computer Science · Psychology	<ul style="list-style-type: none">CS182. Intelligent Machines with Andrew BosworthCS121. Introduction to Computational Theory with James Wang and Kang-Xing Jin
---	---	--

High School

	Ardsley High School	
--	---------------------	--

Philosophy

You and Mark

3 Mutual Friends

Sponsored

Police Auctions
gsaauctions.gov

Like a slick deal? Now you can get up to 90% retail with police seized auctions. Get in on the action.

Create an Ad

SF Bucket List
partners.livingsocial.com

Things to do in San Francisco before you die. One huge coupon emailed daily.

Stay close to your team

Check the score and see high big gam High Sp only \$1

Craft Beer Attorney



Web Service Example

Weather Channel    

Weather Lifestyle Social Maps Video News TV

[Local](#) [National](#) [Severe](#) [Hurricane Central](#)

Rancho Santa Margarita, CA

 31 °F
Snow
Feels like 31°
 Love! 

Right Now Updated: 3:25pm EST

From NNE 20 mph WIND	12% HUMIDITY	9° DEW POINT
8.0 mi VISIBILITY	30.35 in → PRESSURE	1 - Low UV INDEX

Through 10pm:
Partly to mostly clear with temperatures falling into the low 70s. Winds E at 15 to 20 mph.

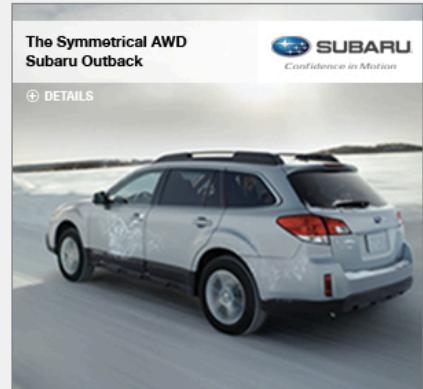
Stories That Affect Me

 
Your Allergies & The Weather
The weather plays a significant role when it comes to seasonal allergies. Select a ...
EAGLE MOUNTAIN LAKE, TX
From KXAS 
Boaters happy about rising lake levels
After two heavy rains in the last month, North Texas ...

Today's Forecast ▶

Radar Updated: 3:25pm EST   Change Map ▾




The Symmetrical AWD
Subaru Outback

[+ DETAILS](#)

Ice
Rancho Santa Margarita
Tip: "Keep up your momentum. Once you stop in deep snow or slippery ice your chances of getting going again are reduced."
- GoSwerve.com

See the Driving Difficulty Index on Interactive Maps.

The Weather Channel

Web Service Example

CAL POLY POMONA

A Legacy of W.K. Kellogg

SEARCH



ABOUT OUR UNIVERSITY

ADMISSIONS

ACADEMICS

CAMPUS LIFE

ATHLETICS

GIVING

Expand
Menu

Public Class Schedule

Home » Public Class Schedule

This schedule is intended for guests of Cal Poly Pomona, and does not contain all the information listed in the complete schedule available to students, instructors, and advisors through [BroncoDirect](#).

Note: Class information is updated nightly and may not reflect current offerings.

Class Search Criteria

Term

Winter Quarter 2015

Class Subject

cs

example: MAT or ENG

[Display Subjects](#)

Catalog Number

example: 10 or 323L

Exact matches

Title

Course Component

Any Component

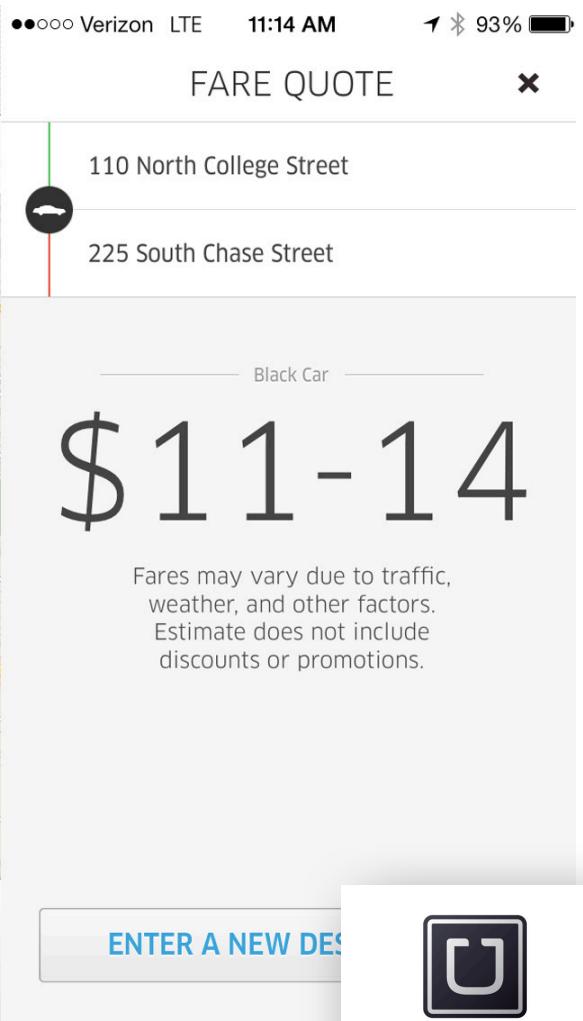
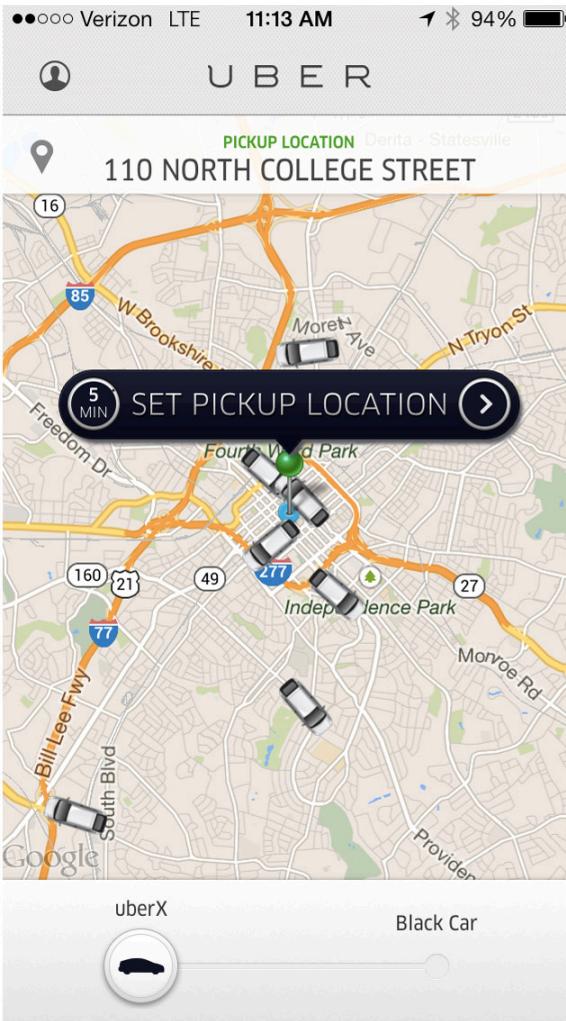
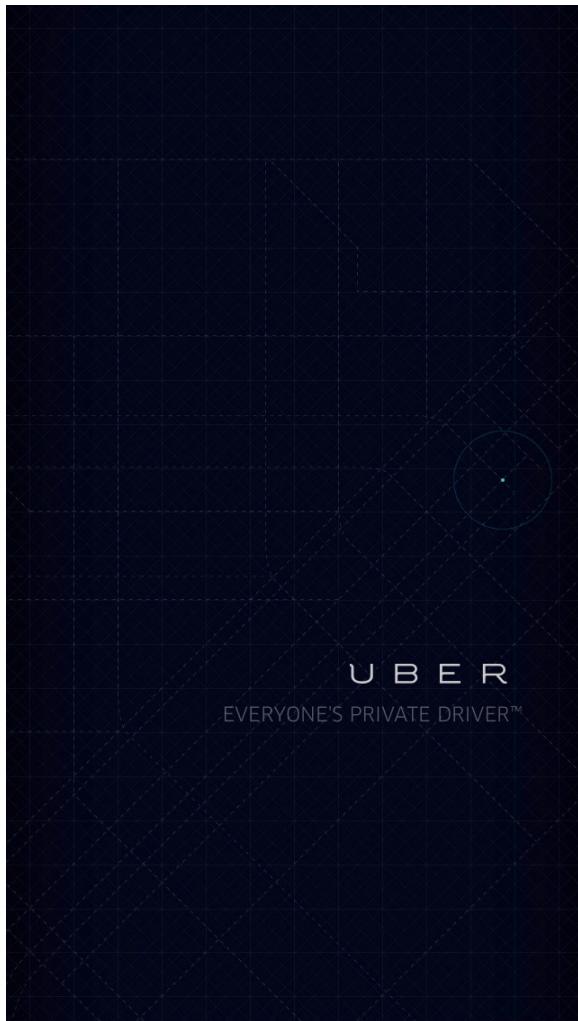
Course Attribute

Any Attribute

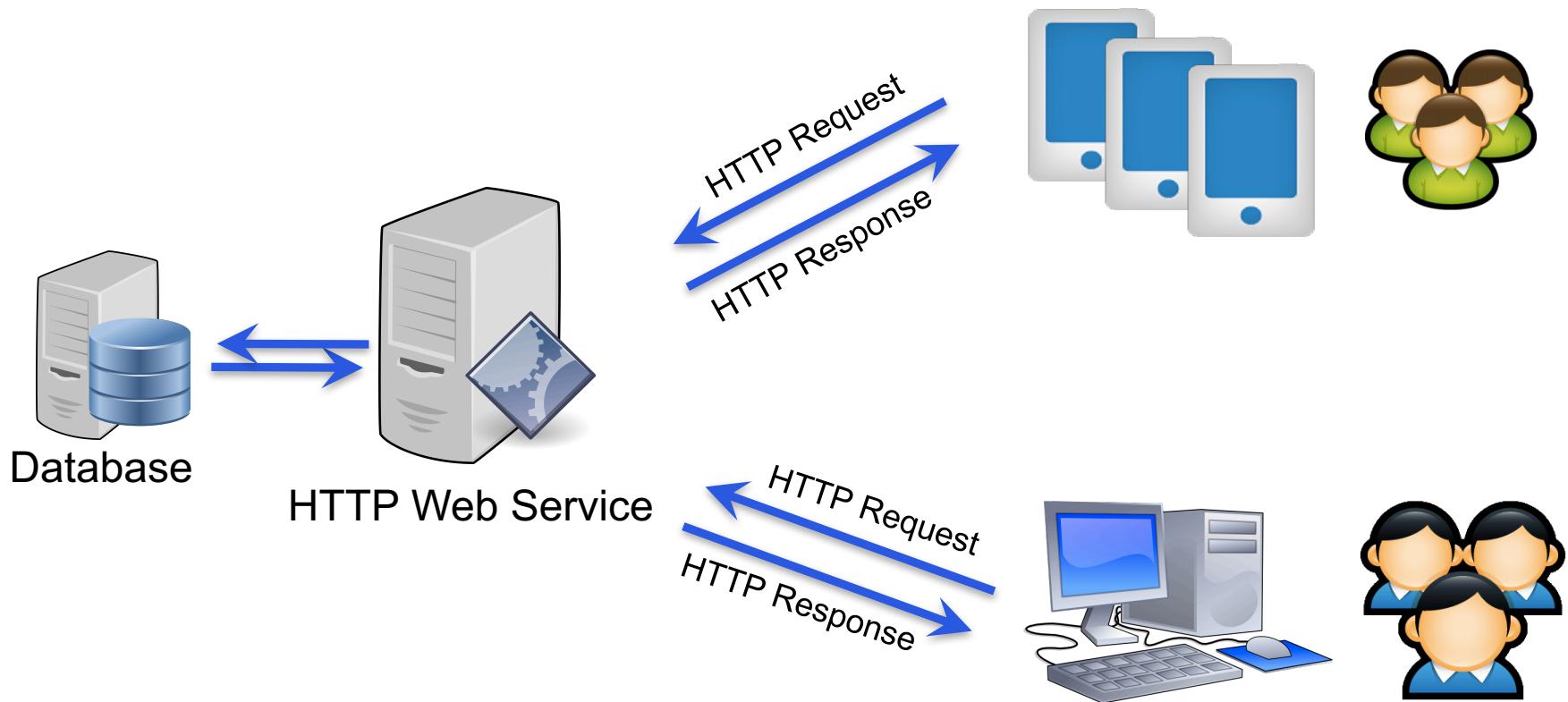


CAL POLY POMONA

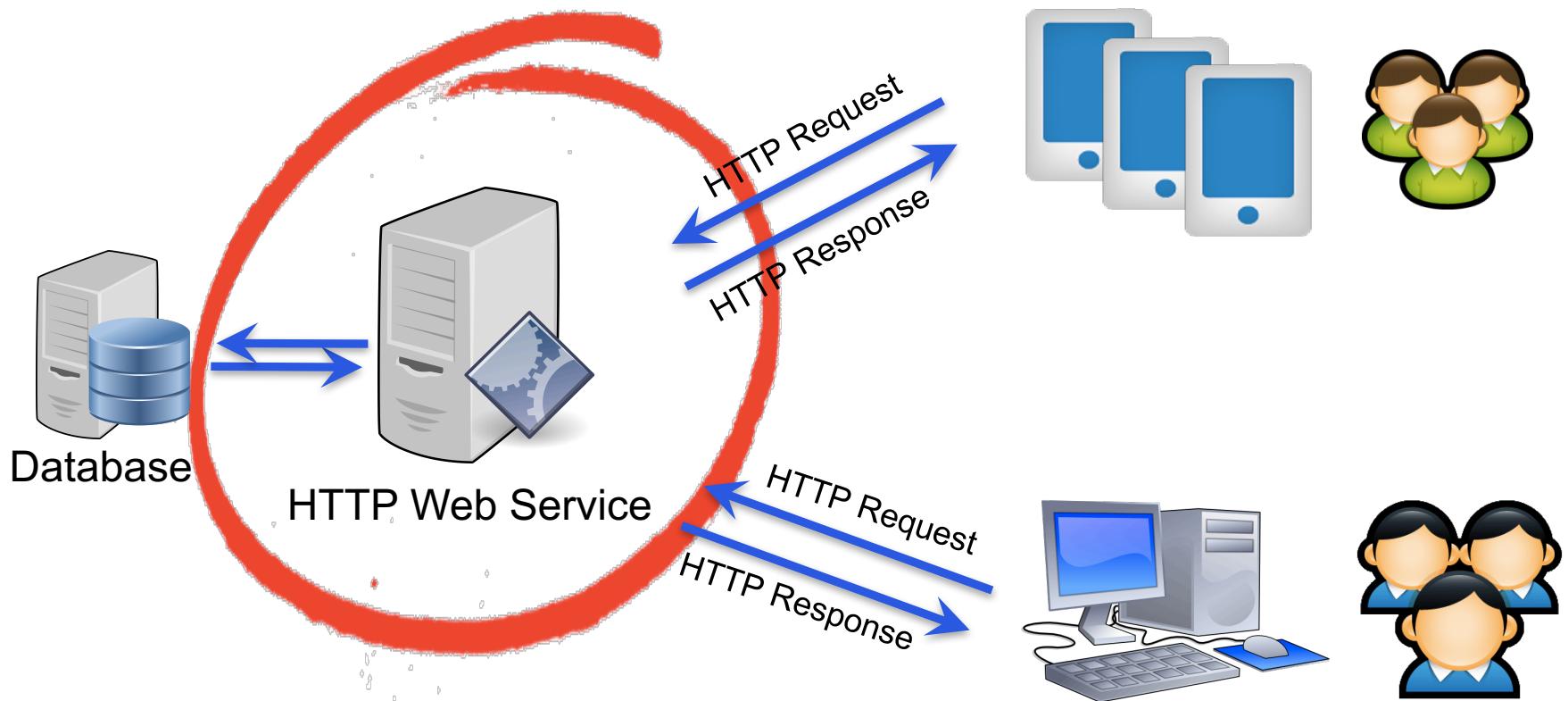
Web Service Example



The Key Components

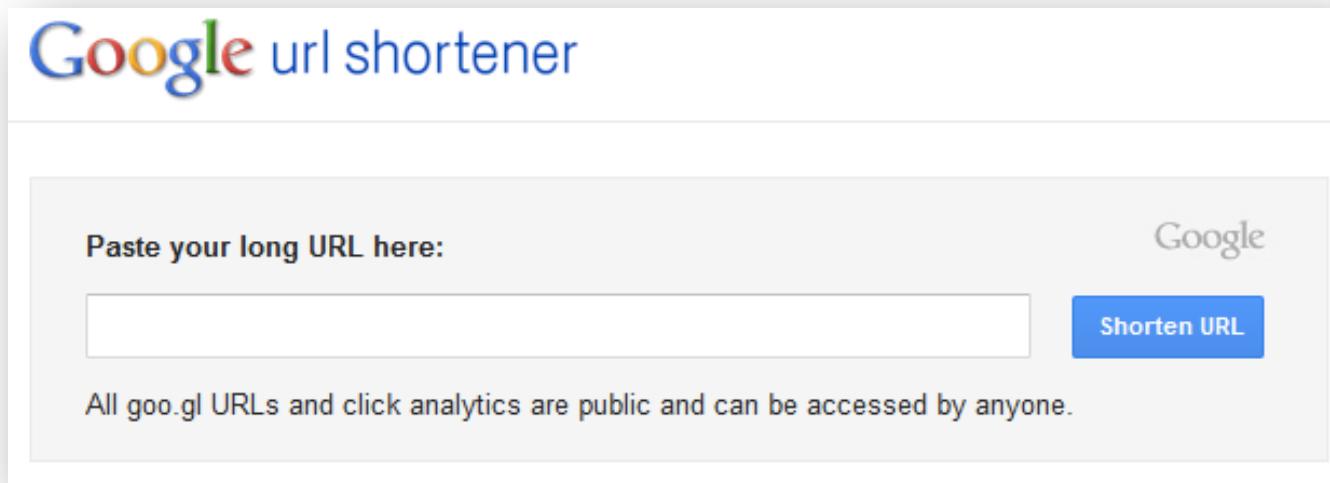


The Key Components



Web Request/Response

- ◆ Google Short URL Service



For more info: https://developers.google.com/url-shortener/v1/getting_started
<https://goo.gl/>

Web Request/Response

- ◆ Google Short URL Service

Google url shortener

Paste your long URL here:

Google

Shorten URL

All goo.gl URLs and click analytics are public and can be accessed by anyone.



How to communicate with Google?

For more info: https://developers.google.com/url-shortener/v1/getting_started
<https://goo.gl/>

Web Request/Response

◆ Google Short URL Service – Under The Hood



Chrome Postman HTTP Client:

<https://chrome.google.com/webstore/detail/postman-rest-client/fdmmgilgnpjigdojojpjoooidkmcomcm?hl=en>

Web Request/Response

◆ Google Short URL Service – Under The Hood



- How to wrap/format the data?
- How to transmit the data over the web?

JavaScript Object Notation (JSON)

- ◆ An open standard format that uses human-readable text to transmit data objects consisting of attribute–value pairs
- ◆ JSON text can be converted to language-specific objects, such as Java, JavaScript

- <http://www.w3schools.com/json/>

```
{  
  "firstName": "John",  
  "lastName": "Smith",  
  "isAlive": true,  
  "age": 25,  
  "height_cm": 167.6,  
  "address": {  
    "streetAddress": "21 2nd Street",  
    "city": "New York",  
    "state": "NY",  
    "postalCode": "10021-3100"  
  },  
  "phoneNumbers": [  
    {  
      "type": "home",  
      "number": "212 555-1234"  
    },  
    {  
      "type": "office",  
      "number": "646 555-4567"  
    }  
],  
  "children": [],  
  "spouse": null  
}
```

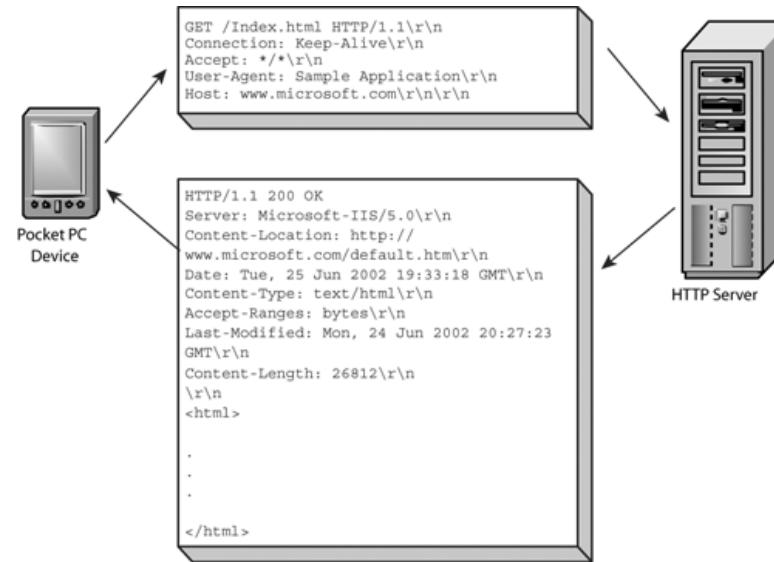
How Does a Web Page Get to Your Laptop?

- ◆ The Hypertext Transfer Protocol (HTTP) is an application-level request/response protocol for sending web content
- ◆ Every web page that you visit, including Facebook, is retrieved using HTTP

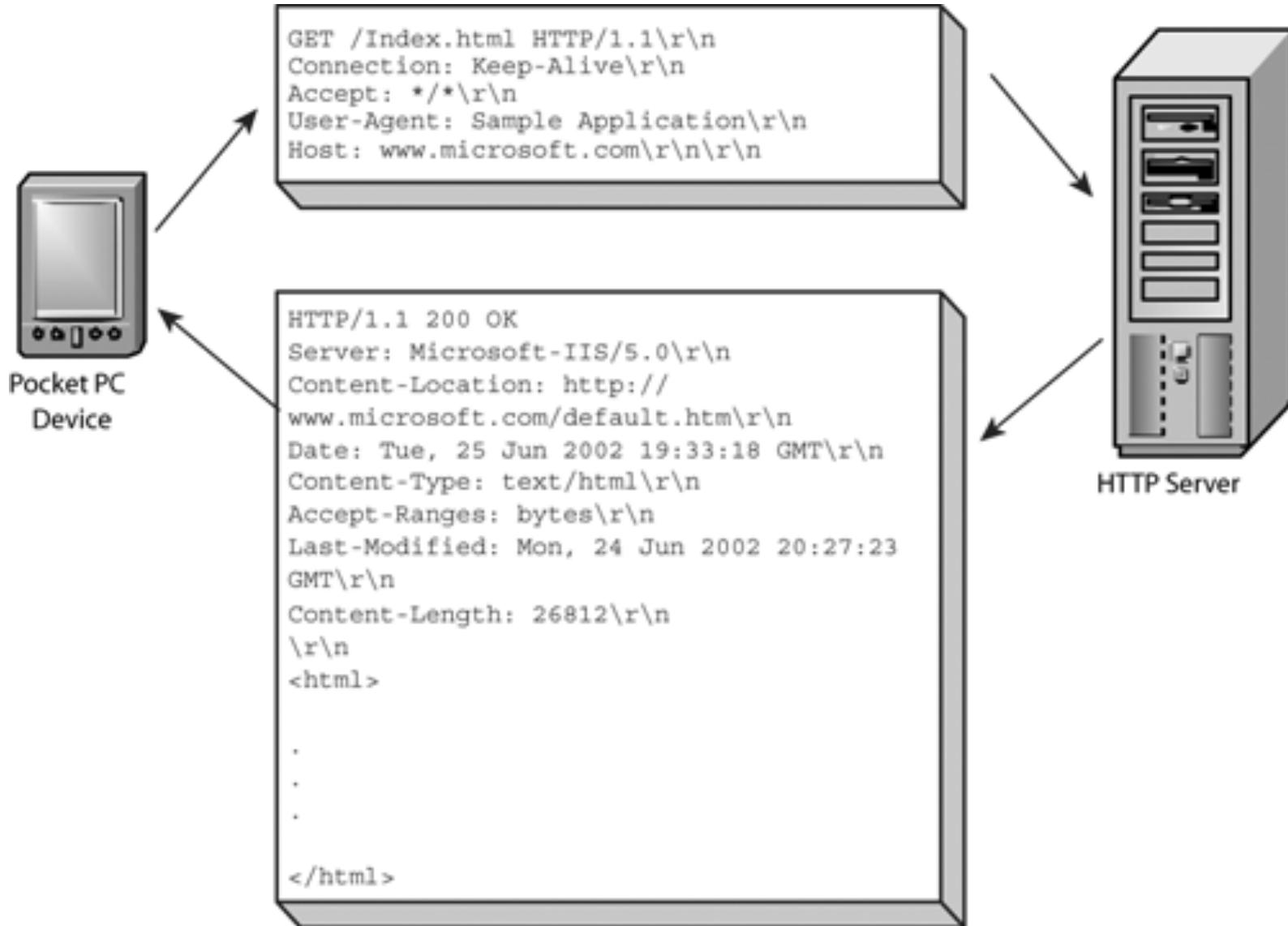


What is a Network Protocol?

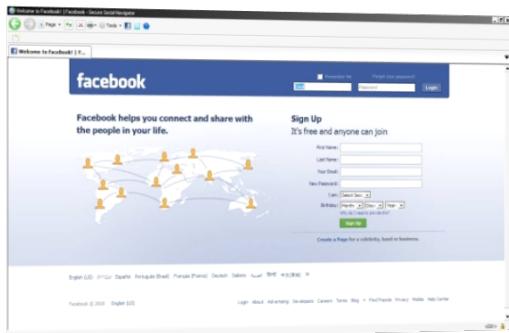
- ◆ A network protocol defines the rules and conventions for exchanging messages between two entities on a network
- ◆ A network protocol is defined by:
 - ◆ Syntax – the rules for structuring messages
 - ◆ Semantics – a definition of what each message means and what should happen when a message is received
 - ◆ Timing – a set of rules governing when messages should be sent and in what order



What is a Network Protocol?



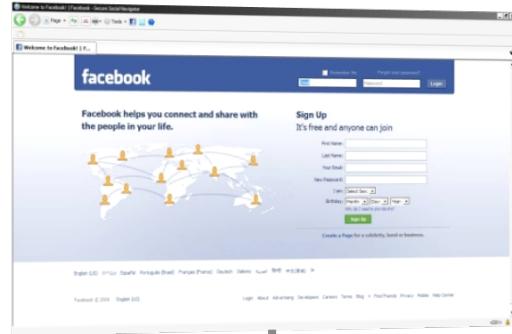
HTTP To Get Your Feed



GET /home.php

HTTP/1.1 200 OK, followed by your feed

HTTP Request Method



Request
Method

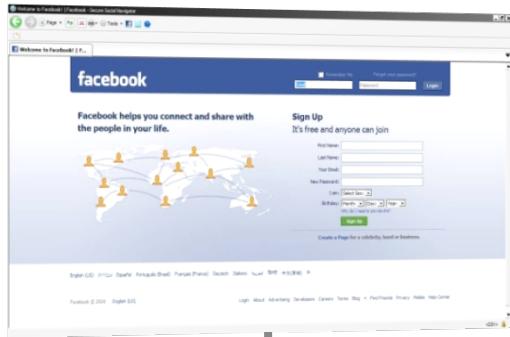
GET /home.php

HTTP/1.1 200 OK, followed by your feed

HTTP Request Method

- ◆ The “request method” tells the server what action to apply to the resource that you have indicated in your request
 - ◆ The most basic/common request method is to GET a resource from the server
 - ◆ GET my feed and send it to me
 - ◆ There are a variety of request methods:
 - ◆ GET
 - ◆ POST
 - ◆ DELETE
 - ◆ PUT
 - ◆ HEAD
 - ◆ TRACE
 - ◆ OPTIONS
 - ◆ CONNECT
 - ◆ PATCH
- 
- These are by far the most important and common request methods

HTTP Resources



Resource



GET /home.php

HTTP/1.1 200 OK, followed by your feed

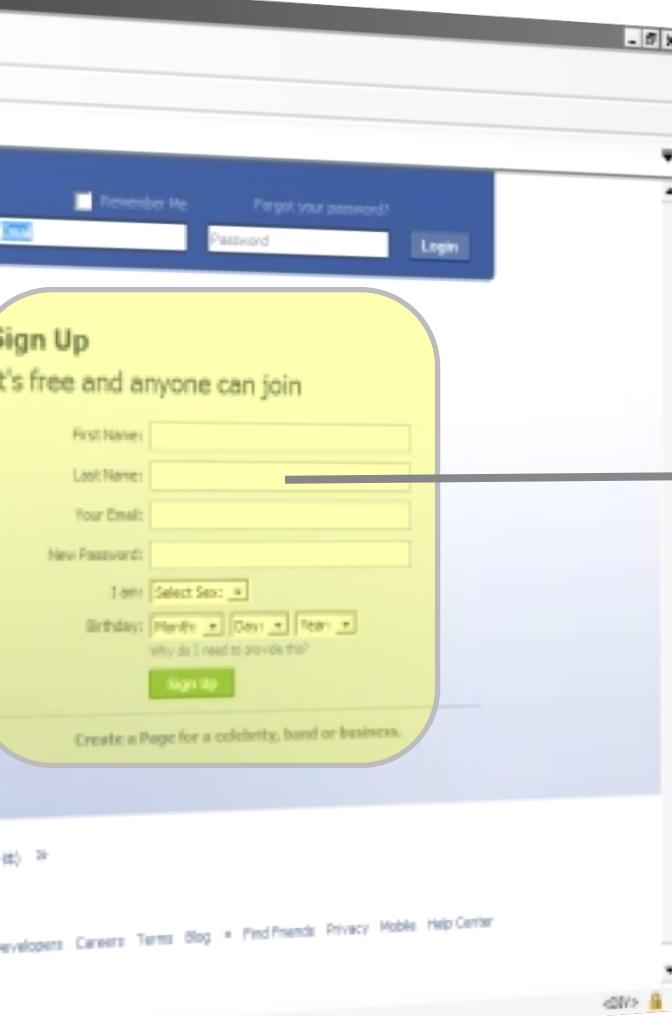
Resources / URLs

- ◆ The resource is the *thing* or data on the server that you want the action to affect
- ◆ Resources are referred to by Uniform Resource Locators
- ◆ A URL is built of multiple parts:

`<scheme>://<server>:<port>/<resource>`

- ◆ Example: `http://www.facebook.com/home.php`
- ◆ The **scheme** is how to access the resource, http:// means that the resource should be accessed using HTTP
- ◆ The **server** is the network location that hosts the resource
 - ◆ Example: www.facebook.com
- ◆ The **port** is the port number running the server program
 - ◆ 80 is the default
- ◆ The **resource** is the thing that you want to act on
 - ◆ Example: `home.php`

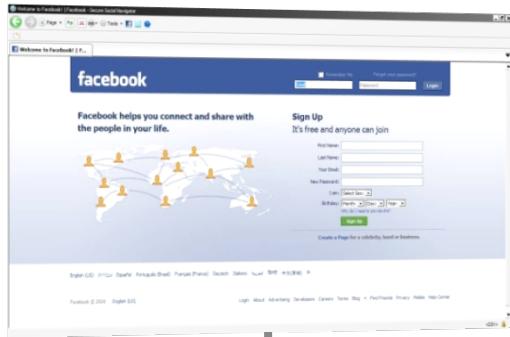
Sending Data with Requests



When you sign up for Facebook, how does the data get sent to their server?



HTTP POST



POST allows you to send extra data with the request



POST /signup.php + DATA

HTTP/1.1 200 OK, followed by terms and

conditions to sign away your privacy

HTTP POST

- ◆ A POST request can include additional parameters other than the resource to access
- ◆ These parameters are a series of Key/Value pairs that are sent to the server
- ◆ The data is sent in the body of the message
- ◆ Example:
 - ◆ FirstName=John
 - ◆ LastName=Doe
 - ◆ SignAwayPrivacy=True
- ◆ A POST request can also include a raw string in a certain format

```
POST https://www.googleapis.com/urlshortener/v1/url
```

```
Content-Type: application/json
```

```
{"longUrl": "http://www.google.com/"}
```

Example POST Request

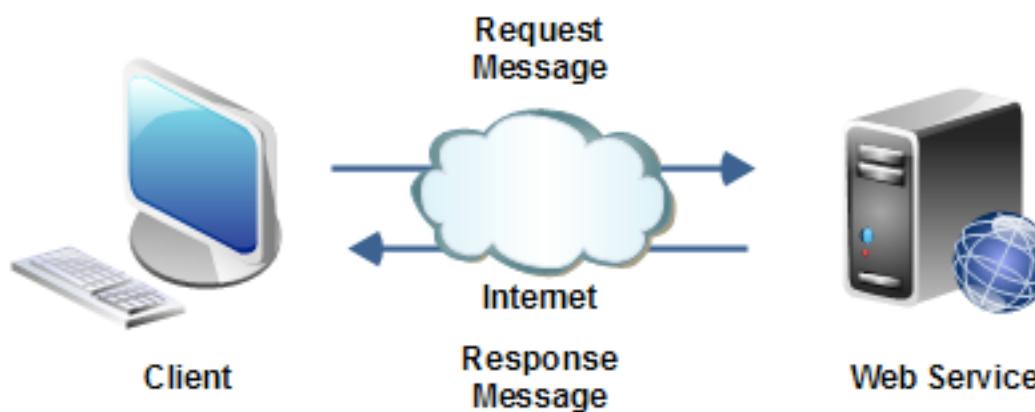
```
POST /login.php?login_attempt=1 HTTP/1.1
Accept:application/xml,application/xhtml+xml,text/html;q=0.9,text/plain;q=0.8,image/png,*/*;q=0.5
Content-Type:application/x-www-form-urlencoded
Origin:http://www.facebook.com
Referer:http://www.facebook.com/
User-Agent:Mozilla/5.0 (Macintosh; U; Intel Mac OS X 10_6_3; en-US) AppleWebKit/533.4
(KHTML, like Gecko) Chrome/5.0.375.53 Safari/533.4
charset_test:€՝€՝Դ,Ը
locale:en_US
email:john.doe@gmail.com
pass:somepassword
```

What is a Network Protocol?



What is a HTTP Web Service?

- ◆ A **running** server program
- ◆ The server program accepts a list of **HTTP requests** based on **URLs**, and sends back **HTTP responses**
- ◆ Each URL does a specific task with **data**
- ◆ Data is well **formatted** and understood by both sides



Web Service Frameworks



Spring Boot Framework

- ◆ <http://projects.spring.io/spring-boot/>

Java Spring Framework

- ◆ Java
- ◆ Web Services
 - ◆ HTTP
 - ◆ Java Servlet
 - ◆ Spring Framework
 - ◆ <http://spring.io/>
 - ◆ Spring Boot
 - ◆ <http://projects.spring.io/spring-boot/>
- ◆ MOOC Course
 - ◆ Programming Cloud Services for Android Handheld Systems
 - ◆ <https://class.coursera.org/mobilecloud-001>

@RequestMapping

- ◆ Map the URL Path to Java method
- ◆ <http://www.journaldev.com/3358/spring-mvc-requestmapping-annotation-example-with-controller-methods-headers-params-requestparam-pathvariable>

Store the Data

- ◆ Store your data in the file system is a simple option if only a small amount of data is required
- ◆ Jackson ObjectMapper
- ◆ <http://wiki.fasterxml.com/JacksonInFiveMinutes>

@Autowired

- ◆ Manage how to instantiate object instances
- ◆ http://www.tutorialspoint.com/spring/spring_autowired_annotation.htm

Front-End UI: HTML/CSS

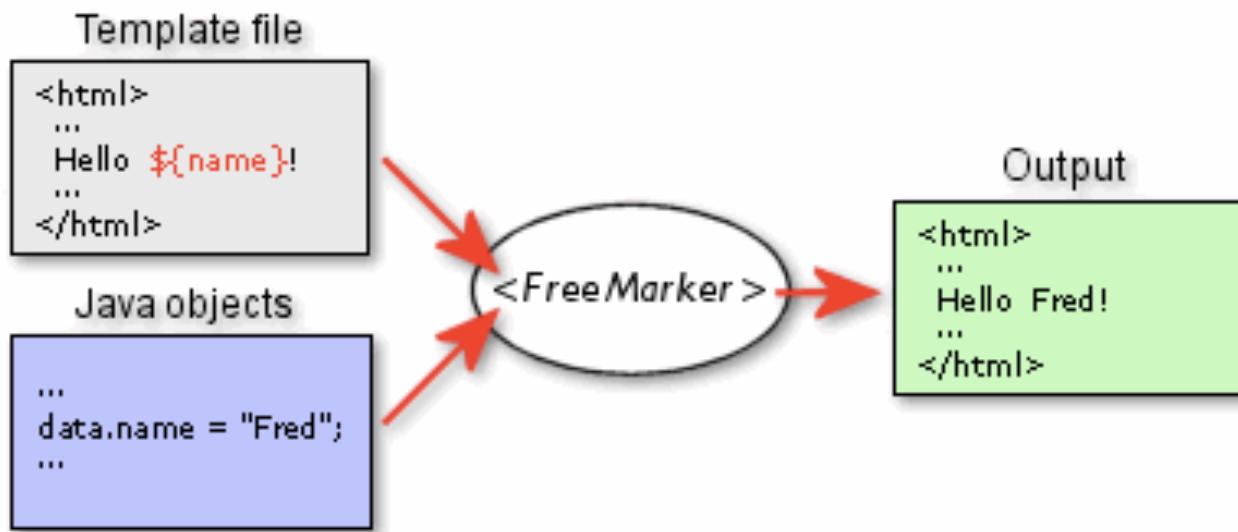
- ◆ Make nice UI for your web services



HTML & CSS

Generate Web Pages Dynamically: FreeMarker

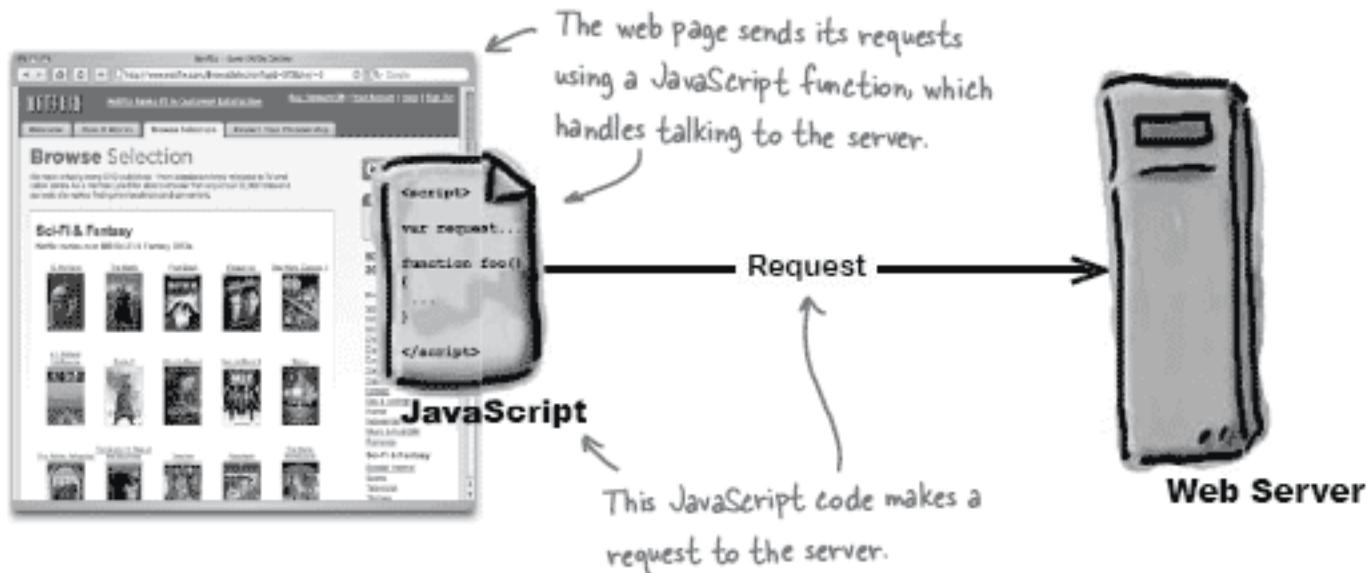
- ◆ Define a template, feed the data and generate the final HTML



Interact with Web Service: JS/Ajax

- ◆ Asynchronous JavaScript and XML (AJAX)
- ◆ Make HTTP calls in JavaScript

No more waiting around...



The Trending Technology: AngularJS

