Web application development

Software Languages Team
University of Koblenz-Landau
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Introduction
We have XML programming, database programming, etc. What’s „web programming“?
Web development - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/Web_development

Web development is a broad term for the work involved in developing a web site for the Internet (World Wide Web) or an intranet (a private network). This can ...

Web development as an industry - Typical Areas - Practical Web Development
You've visited this page 2 times. Last visit: 6/28/12

Web application framework - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/Web_application_framework

Programmers wanted tighter integration with the web server to enable high traffic web ... This article may require cleanup to meet Wikipedia's quality standards.
You've visited this page 3 times. Last visit: 6/28/12

Programmer - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/Programmer

From Wikipedia, the free encyclopedia ... The term programmer can be used to refer to a software developer, Web Developer, Mobile Applications Developer, ...

Web developer - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/Web_developer
From Wikipedia, the free encyclopedia ... A web developer is a programmer who
Web development is a broad term for the work involved in developing a web site for the Internet (World Wide Web) or an intranet (a private network). This can include web design, web content development, client liaison, client-side/server-side scripting, web server and network security configuration, and e-commerce development. However, among web professionals, "web development" usually refers to the main non-design aspects of building web sites: writing markup and coding. Web development can range from developing the simplest static single page of plain text to the most complex web-based internet applications, electronic businesses, or social network services.

For larger organizations and businesses, web development teams can consist of hundreds of people (web developers). Smaller organizations may only require a single permanent or contracting webmaster, or secondary assignment to related job positions such as a graphic designer and/or information systems technician. Web development may be a collaborative effort between departments rather than the domain of a designated department.
Web engineering

From Wikipedia, the free encyclopedia

The web has become a major delivery platform for a variety of complex and sophisticated enterprise applications in several domains. In addition to their inherent multifaceted functionality, these web applications exhibit complex behavior and place some unique demands on their usability, performance, security and ability to grow and evolve. However, a vast majority of these applications continue to be developed in an ad-hoc way, contributing to problems of usability, maintainability, quality and reliability.[1][2] While web development can benefit from established practices from other related disciplines, it has certain distinguishing characteristics that demand special considerations. In the recent years, there have been some developments towards addressing these problems and requirements. As an emerging discipline, web engineering actively promotes systematic, disciplined and quantifiable approaches towards successful development of high-quality, ubiquitously usable web-based systems and applications.[3] In particular, web engineering focuses on the methodologies, techniques and tools that are the foundation of web application development and which support their design, development, evolution, and evaluation. Web application development has certain characteristics that make it different from traditional software, information system, or computer application development.

Web engineering is multidisciplinary and encompasses contributions from diverse areas: systems analysis and design, software engineering, hypermedia/hypertext engineering, requirements engineering, human-computer interaction, user interface, information engineering, information indexing and retrieval, testing, modelling and simulation, project management, and graphic design and presentation. Web engineering is neither a clone, nor a subset of software engineering, although both involve programming and software development. While web Engineering uses software engineering principles, it encompasses new approaches, methodologies, tools, techniques, and guidelines to meet the unique requirements of web-based applications.

In this short course, we will focus on programming concepts and hands-on programming.
Web application

From Wikipedia, the free encyclopedia

For applications accessed through the web that are executed client-side, see Rich Internet application.

This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed. (January 2010)

A web application is an application that is accessed by users over a network such as the Internet or an intranet.[1] The term may also mean a computer software application that is coded in a browser-supported language (such as JavaScript, combined with a browser-rendered markup language like HTML) and reliant on a common web browser to render the application executable.

Web applications are popular due to the ubiquity of web browsers, and the convenience of using a web browser as a client, sometimes called a thin client. The ability to update and maintain web applications without distributing and installing software on potentially thousands of client computers is a key reason for their popularity, as is the inherent support for cross-platform compatibility. Common web applications include webmail, online retail sales, online auctions, wikis and many other functions.

Google Calendar is a contact- and time-management web application offered by Google.
A Web application (WA) is a software system based on technologies and standards of the WWW that provides Web-specific resources such as content and services and is accessed via a user interface -- the Web browser.

Principle architecture of WA

- It is essentially a Client-server architecture.
- Endusers access a client (in a Web browser).
- Services are implemented on a (Web) server.
- Services are materialized as documents.
- Client & server cooperate via protocols over the internet.
WA architecture

What if the client does not need a server all the time?

What’s the request?

What if this is a native app?

Is that a complete view, a delta, or what?

What if the server is often unavailable?

What if this is a Web service?
Demo

A Web application for a simple human-resources management system.

http://101companies.org/index.php/101implementation:html5local

No internals are discussed at this point. Appearance and architecture options are discussed.
A **web application framework** ("WAF") is a **software framework** that is designed to support the **development** of **dynamic websites**, **web applications** and **web services**. The framework aims to alleviate the overhead associated with common activities performed in Web development. For example, many frameworks provide libraries for **database** access, **templating** frameworks and **session** management, and they often promote **code reuse**. For a comparison of concrete web application frameworks, see **Comparison of web application frameworks**.

### 3 Features

1. **History**
2. **Types of frameworks**
   2.1 **Model–view–controller (MVC)**
   2.2 **Push-based vs. pull-based**
   2.3 **Three-tier organization**
   2.4 **Content management systems**
3.1 **Web template system**
3.2 **Caching**
3.3 **Security**
3.4 **Database access, mapping and configuration**
3.5 **Scaffolding**
3.6 **URL mapping**
3.7 **Ajax**
3.8 **Web services**
The following 161 pages are in this category, out of 161 total. This list may not reflect recent changes (learn more).

- Comparison of web application frameworks
- List of Ajax frameworks
- Web application framework

A
- AccDC
- Agavi
- AIADA/Web
- Ajax framework
- Ample SDK
- Apache Shalo
- Apache Sling
- Apache Tapestry
- Apache Wicket
- AppFlower
- AppFuse
- Template:Application frameworks
- Apusic OperaMasks
- ASP.NET
- ASP.NET MVC Framework
- ATL Server
- Axiom CMS

B
- Barracuda (Java)
- Base One Foundation Component Library

F cont.
- Fusebox (programming)

G
- Geomajas
- Google Apps Script
- Grails (framework)
- Gurupa

H
- Hamlets
- Hammerkit
- Hobo (software)
- Horde (software)
- Humax Raiya Programming

I
- IBM WebSphere Application Server
- IBM WebSphere Application Server Community Edition
- ICEfaces
- Interchange (software)
- ItsNat

J
- Java Platform, Enterprise Edition
- JavaServer Faces
- Javeline platform

P cont.
- PhpCodeGenie
- PHPRunner
- PhpWebSite
- Pier (software)
- Play Framework
- Plone (software)
- PRADO Framework
- ProcessWire
- Project Zero

Q
- Qcodo
- Quinoa Framework

R
- Ramaze
- Rango (web framework)
- Reaction (software)
- Reasonable Server Faces
- RichFaces
- RIFE
- Rivista
- RNA Framework
- Ruby on Rails
- Run BASIC

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- AppFlower

F cont.
- Fusebox (programming)

G
- Geomajas
- Google Apps Script
- Grails (framework)
- Gurupa

H
- Hamlets
- Hammerkit
- Hobo (software)
- Horde (software)
- Humax Raiya Proc
What are the characteristics of Web applications and their development?
Rich functionality
<table>
<thead>
<tr>
<th>Bahnhof/Haltestelle</th>
<th>Datum</th>
<th>Zeit</th>
<th>Gleis</th>
<th>Produkte</th>
<th>Preis für alle Reisenden*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frankfurt(M) Flughafen Fernbf</td>
<td>Do, 06.09.12</td>
<td>ab 13:58</td>
<td></td>
<td>IC, BUS</td>
<td>26.00 EUR (Teilpreis)</td>
</tr>
<tr>
<td>Metternich Trifrer Weg B258, Koblenz</td>
<td>Do, 06.09.12</td>
<td>an 15:35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hauptbahnhof (ZOB), Koblenz</td>
<td>Do, 06.09.12</td>
<td>ab 15:20</td>
<td></td>
<td>Bus 350</td>
<td></td>
</tr>
<tr>
<td>Fußweg 7 Min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogenous resources
Secure operation
Responsive user interface
Slick appearance
Support for different browsers

http://www.unixmen.com/browser-war-heats-up-again-as-chrome-unseats-ie-for-may-2012/
http://arstechnica.com/business/2012/02/2001-all-over-again-internet-explorer-6-share-grows-and-chrome-falls/
Support for different platforms

Instagram
By Burbn, Inc.
Open iTunes to buy and download apps.

Description
80 million users love Instagram! It's a free, fun,
Burbn, Inc. Web Site > Instagram Support >

What's New in Version 3.0.0
> View your photos on a map (visit your profile
on the map)
> Redesign profile screen

Free
Category: Photo & Video
Updated: Aug 16, 2012
Version: 3.0.0
Size: 14.8 MB
Languages: English, Chinese, French, German, Italian,
Japanese, Korean, Portuguese, Spanish
Seller: Burbn, Inc.
© 2011 Burbn, Inc.
Rated 4+ for the following:
Infrquent/Mild Sexual Content or Nudity
Infrquent/Mild Profanity or Crude Humor
Infrquent/Mild Mature / Suggestive Themes
Infrquent/Mild Alcohol, Tobacco, or Drug Use or References

Instagram
Instagram
(4,760,181)
INSTALLED

This app is compatible with all
of your devices.

Users who viewed this also viewed

Facebook
FACEBOOK
3.5 stars
4,668,036
Free

Twitter
TWITTER, INC.
3 stars
149,086
Free

App Screenshots

Visit Developer's Website > Email Developer > Privacy Policy

Support for different platforms
Instagram – A beautiful way to share your world. It's fast, free and fun!

Pick from one of several gorgeous filtered effects to breathe a new life into your mobile photos. Transform everyday moments into works of art you’ll want to share with friends and family.

Share your photos in a simple photo stream with friends to see - and follow your friends’ photos with the click of a single button. Every day you open up Instagram, you'll see new photos from your closest friends, and creative people from around the world.

OVERVIEW | USER REVIEWS | WHATS NEW | PERMISSIONS
**Instagram**

By Burbn, Inc.

Open iTunes to buy and download apps.

**Description**

🌟🌟🌟🌟🌟 Instagram

80 million users love Instagram! It's a free, fun, and simple way to make and share gorgeous photos on your

**Burbn, Inc. Web Site › Instagram Support › ...More**

**What's New in Version 3.0.0**

- View your photos on a map (visit your profile and tap Photo Map to select which of your photos will be viewable on the map)
- Redesigned profile screen

**iPhone Screenshot**

- View your photos on a map (visit your profile and tap Photo Map to select which of your photos will be viewable on the map)
- Redesigned profile screen
Reliance on browser plug-ins
Get Silverlight 5

Silverlight is a powerful development tool for creating engaging, interactive user experiences for Web and mobile applications. Silverlight is a free plug-in, powered by the .NET framework and compatible with multiple browsers, devices and operating systems, bringing a new level of interactivity wherever the Web works.

DOWNLOAD NOW
Adobe AIR

Adobe AIR 3.4 (23.4 MB)

Your system: Macintosh, English
Different operating system?

Learn more | System requirements | Distribute Adobe AIR

Download now

You may have to temporarily disable your antivirus software.
By clicking the Download now button, you acknowledge that you have read and agree to the Adobe Software Licensing Agreement.
Top 5 Tools for Multi-Platform Mobile App Development

Useful Tools for Cross-Platform Mobile Apps

By Priya Viswanathan, About.com Guide

1. RhoMobile

Reliance on cross-platform tools

2. PhoneGap

3. Appcelerator

4. MoSync

5. WidgetPad

public class HelloWorldApplication {
    public static void main(String[] args) {
        System.out.println("Hello, World!");
    }
}

Recommended resources: ‘HTML5 for the Java developer’
http://www.youtube.com/watch?v=l-GD4ro9fh4
http://www.youtube.com/watch?v=2msljsOQcls
Anything else you want to emphasize as a characteristic?
Basics of web-application development
Good old times

$ telnet www.microsoft.com 80
Trying 65.55.57.27...
Connected to lb1.www.ms.akadns.net.
Escape character is '^]'.
HEAD / HTTP/1.0

HTTP/1.1 200 OK
Cache-Control: no-cache
Content-Length: 1020
Content-Type: text/html
Last-Modified: Mon, 16 Mar 2009 20:35:26 GMT
Accept-Ranges: bytes
ETag: "67991fbd76a6c91:0"
Server: Microsoft-IIS/7.5
X-Powered-By: ASP.NET
Date: Fri, 07 Sep 2012 04:45:28 GMT
Connection: close

Connection closed by foreign host.
Telnet

Telnet is a network protocol used on the Internet or local area networks to provide a bidirectional interactive text-oriented communications facility using a virtual terminal connection. User data is interspersed in-band with Telnet control information in an 8-bit byte oriented data connection over the Transmission Control Protocol (TCP).

http://en.wikipedia.org/wiki/Telnet
29 June 2012
Hypertext Transfer Protocol


- **GET**  
  Request representation for resource

- **HEAD**  
  Like GET but without response body

- **PUT**  
  Upload representation for resource

- **POST**  
  Submit data for resource

- **OPTIONS**  
  Query for available methods

- **CONNECT**  
  Facilitate SSL-encrypted communication

- **DELETE**  
  Delete specified resource

- **TRACE**  
  Return request as it arrived at server

- **PATCH**  
  Partial modification of resource
Hypertext Transfer Protocol

- Safe: HEAD, GET, OPTIONS, TRACE
- Unsafe: POST, PUT, DELETE
- Idempotent: PUT, DELETE + safe methods
- HTTP is a **stateless protocol**.

*We skip the underlying TCP/IP.*

*More on HTTP, when we talk about ‘REST’.*
Static web pages


Hello World!

<html>
<head>
<title>Hello World WebApp</title>
</head>
<body>
<p>Hello World!</p>
</body>
</html>

localhost/helloWorld.html

HTML markup
Dynamic web pages


```perl
#!/usr/bin/perl
print "Content-type: text/html\n\n";
print "<html>
<head>
<title>Hello World WebApp</title>
</head>
<body>
<p>Hello World!</p>
</body>
</html>
exit;
```

localhost/helloWorld.cgi

HTML markup
# Perl

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paradigm(s)</strong></td>
<td>multi-paradigm: functional, imperative, object-oriented (class-based), reflective, procedural, generic</td>
</tr>
<tr>
<td><strong>Appeared in</strong></td>
<td>1987</td>
</tr>
<tr>
<td><strong>Designed by</strong></td>
<td>Larry Wall</td>
</tr>
<tr>
<td><strong>Developer</strong></td>
<td>Larry Wall</td>
</tr>
<tr>
<td><strong>Stable release</strong></td>
<td>5.16.1[^1] (August 8, 2012; 29 days ago)</td>
</tr>
<tr>
<td><strong>Preview release</strong></td>
<td>5.17.2[^2] (July 20, 2012; 48 days ago)</td>
</tr>
<tr>
<td><strong>Typing discipline</strong></td>
<td>Dynamic</td>
</tr>
<tr>
<td><strong>Influenced by</strong></td>
<td>AWK, Smalltalk 80, Lisp, C, C++, sed, Unix shell, Pascal</td>
</tr>
<tr>
<td><strong>Influenced</strong></td>
<td>Python, PHP, Ruby, ECMAScript, LPC, Windows PowerShell, JavaScript, Falcon, Perl 6, Qore</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>C language</td>
</tr>
<tr>
<td><strong>OS</strong></td>
<td>Cross-platform</td>
</tr>
<tr>
<td><strong>License</strong></td>
<td>GNU General Public License or Artistic License[^3]</td>
</tr>
<tr>
<td><strong>Usual filename</strong></td>
<td>.pl, .pm, .t</td>
</tr>
<tr>
<td><strong>Website</strong></td>
<td><a href="http://www.perl.org%5B%5E4">www.perl.org[^4</a>]</td>
</tr>
</tbody>
</table>

[^1]: 5.16.1 is the stable release version as of August 8, 2012.
[^2]: 5.17.2 is the stable release version as of July 20, 2012.
[^3]: The license is permissive and is similar to the Berkeley Software Distribution (BSD) License.
[^4]: Perl Programming at Wikibooks
CGI - Common Gateway Interface


Diagram:

- Web browser
- HTTP server
- CGI program
- Database

HTTP requests and responses
The Common Gateway Interface (CGI) is a standard (see RFC 3875: CGI Version 1.1) method for web server software to delegate the generation of web content to executable files. Such files are known as CGI scripts; they are programs, often stand-alone applications, usually written in a scripting language.


We do not go into detail here. There is, for example, also the advancement *FastCGI*. 
Access to server-side resources

localhost/showFile.cgi

#!usr/bin/perl
open FILE, "demo.txt"
my $lines = <FILE>
print "Content-type: text/html\n\n"
print "<html>
<head>
<title>Spying WebApp</title>
</head>
<body>
<p>
HTML
print $lines;
print "<html>
</p>
</body>
</html>
HTML
exit;
HTTP request parameters

```perl
#!/usr/bin/perl

local ($buffer, @pairs, $pair, $name, $value, %FORM);

# Read in text
$ENV{'REQUEST_METHOD'} =~ tr/a-z/A-Z/;
if ($ENV{'REQUEST_METHOD'} eq "GET") {
    $buffer = $ENV{'QUERY_STRING'};
}

# Split information into name/value pairs
@pairs = split(/&/, $buffer);
foreach $pair (@pairs) {
    ($key, $val) = split(/=/, $pair);
    $val =~ tr/+/-/;
    $val =~ s/%(\..+)/pack("C", hex($1))/eg;
    %FORM{$key} = $val;
}
$name = %FORM{name};

print "Content-type:text/html\n\n";
print "<html>";
print "<head>";
print "<title>HelloName WebApp</title>";
print "</head>";
print "<body>";
print "<h2>Hello $name!</h2>";
print "</body>";
print "</html>";
1;
```

Hello Ralf!

localhost/helloName.cgi?name=Ralf
HTML forms

http://en.wikipedia.org/wiki/Form_(web)

localhost/helloName.html

HTML FORM

```
<FORM action="helloName.cgi" method="GET">
    Name: <input type="text" name="name">
    <br>
    <input type="submit" value="Submit">
</FORM>
```
Code embedded into HTML

localhost/helloWorld.php

Hello World!

<html>
<head>
  <title>HelloWorld WebApp</title>
</head>
<body>
  <?php echo '<p>Hello World!</p>'; ?>
</body>
</html>
PHP - The PHP Hypertext Processor
http://en.wikipedia.org/wiki/PHP

<table>
<thead>
<tr>
<th>PHP: Hypertext Preprocessor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paradigm(s)</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>Stable release</td>
</tr>
<tr>
<td>Typing discipline</td>
</tr>
</tbody>
</table>

| Major implementations | Zend Engine, Phalanger, Quercus, Project Zero, HipHop |
| Influenced by | C, C++, Java, Perl, Tcl[^1] |
| Implementation language | C |
| OS | Cross-platform |
| License | PHP License |
| Usual filename extensions | Common extensions .php |
| Older, now uncommon extensions | .phtml, .php4, .php3, .php5, .phps |
| Website | www.php.net |

Summary of basics

You learned about ...

- the difference between static and dynamic pages,
- the use of HTML forms,
- the architecture of CGI,
- basic techniques of writing CGI scripts,
- environment variables in CGI programs,
- and some bits of Perl and PHP.
Server-side Scripting
Local Computer
http://www.example.com/login.php

Web server
The web server is processing the request
PHP interpreter
HARD DISK
MySQL db

Server-side scripting is a technique used in website design which involves embedding scripts in an HTML source code which results in a user's (client's) request to the server website being handled by a script running server-side before the server responds to the client's request.

What is scripting?

• Embed simple code in HTML pages.
• The HTML pages use the code to decide what elements and data to display.
• Existing APIs can be invoked to compute information for inclusion in the web page.
Key components of Server-side scripting

- **Web Server** -- makes available documents and handles requests.
- **Server-side processor** -- interprets scripts and generates HTML.
Web server can refer to either the hardware (the computer) or the software (the computer application) that helps to deliver Web content that can be accessed through the Internet.

Apache web server

- Apache http server project
- http://httpd.apache.org
- Apache foundation started to support the web server project, but eventually extended to a multitude of other projects.
Configuration of Apache to work with PHP:

Configure directory DocumentRoot

This is the directory from which the Web server will serve the documents (html, php, etc). That is, by default, requests are resolved to this directory.

Configuration entry:

DocumentRoot "/Library/WebServer/Documents"
What happens when we open a PHP file in the browser?

Non-processed HTML is shown unless PHP is enabled.

`php5_module` should be enabled to handle *.php

LoadModule php5_module libexec/apache2/libphp5.so
Remember --
Code embedded into HTML

<html>
<head>
  <title>HelloWorld WebApp</title>
</head>
<body>
  <?php echo '<p>Hello World!</p>'; ?>
</body>
</html>

localhost/helloWorld.php

HTML with PHP
PHP is a general-purpose server-side scripting language originally designed for Web development to produce dynamic Web pages. It is one of the first developed server-side scripting languages to be embedded into an HTML source document rather than calling an external file to process data. The code is interpreted by a Web server with a PHP processor module which generates the resulting Web page.

PHP Flow

HTML is substituted for PHP code

Raw .php source

Browser

Internet

Request for .php file

Web Server

PHP Preprocessor

.php source file
Adding interaction

Welcome Andrei!
You are 27 years old.
Underlying source

intro.html

```html
<html>
<body>

<form action="welcome.php" method="post">
Name: <input type="text" name="fname" />
Age: <input type="text" name="age" />
<input type="submit" />
</form>

</body>
</html>
```

welcome.php

```html
<html>
<body>

Welcome ?php echo $_POST["fname"];?>!<br />
You are ?php echo $_POST["age"]; ?> years old.

</body>
</html>
```
<?php

$lines = preg_split('~\s*\[\r\n]+\s*~', file_get_contents('prod.txt'));

foreach($lines as $i => $line) {
    $pairs = explode(';', $line);
    foreach($pairs as $pair) {
        list($column, $value) = explode('=', $pair, 2);
        $columns[$column] = true;
        $rows[$i][$column] = $value;
    }
}
$columns = array_keys($columns);

echo '<table><thead><tr>';

    foreach($columns as $column) {
        echo '<th>'.$column.'</th>
    }

echo '</tr></thead><tbody>';

    foreach($rows as $row) {
        echo '<tr>';
        foreach($columns as $column) {
            echo '<td>'.$row[$column].'</td>';
        }
        echo '</tr>';
    }

echo '</tbody></table>';
?>

Scripting example:
Compute HTML table from CSV file
difficult to read
and
difficult to maintain
DEMO?

http://101companies.org/wiki/Contribution:php

- Show the implementation in action.
- Explain the architecture of the implementation.
- Show details of server-side scripting.
- Cover accidental complexity such as DB access.
Summary on SSS

You learned about ...

• the principles behind server-side scripting,
• the role of a Web server in Web applications,
• Apache Web server basic configuration,
• the generation of dynamic web pages with PHP,
• and, in fact, web programming with PHP.
Resources on SSS

- http://www.w3schools.com/php/default.asp
REpresentational State Transfer (REST)
REST -- *a set of principles* that define how Web standards, such as HTTP and URIs, are supposed to be used in Web applications.
Resources and Resource Identifiers

- The key abstraction of information in REST is a resource.
- Each resource has a resource identifier.

Examples of identifiers

- http://example.com/customers/1234
- http://example.com/products/4554
- http://example.com/processes/salary-increase-234
Resources can have multiple representations, e.g., JSON/XML/HTML.
Example: the resource of ‘all companies’

HTML → JSON

```json
[
  {
    "created_at": "2012-09-06T14:51:42Z",
    "updated_at": "2012-09-06T14:51:42Z",
    "id": 2,
    "name": "meganalysis"
  },
  {
    "created_at": "2012-09-06T15:16:43Z",
    "updated_at": "2012-09-06T15:16:43Z",
    "id": 3,
    "name": "google"
  }
]
```
What is JSON?
JSON (JavaScript Object Notation)

- It is easy for humans to read and write.
- It is easy for machines to parse and generate.
- Native support in JavaScript

http://www.json.org/
JSON

{ "color": "black", "model": "BMW", "year": 2011 }

Types:
- string
- number
- object
- array
- true
- false
- null

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Arrays in JSON

```
[ {
  "color": "black",
  "model": "BMW",
  "year": 2011
},
  {
  "color": "white",
  "model": "Audi",
  "year": 2010
},
  {"x": 5} ]
```
public class Car {
    private String color;
    private String model;
    private Integer year;

    public Car(String color, String model, Integer year) {
        this.color = color;
        this.model = model;
        this.year = year;
    }

    ..... 
}

Gson gson = new Gson();
Car car = new Car("black", "BMW", 2011);
String json = gson.toJson(car);

{"color":"black","model":"BMW","year":2011}
Back to REST
Remember:
Hypertext Transfer Protocol


• **GET**  Request representation for resource
• **HEAD** Like GET but without response body
• **PUT**  Upload representation for resource
• **POST** Submit data for resource
• **OPTIONS** Query for available methods
• **CONNECT** Facilitate SSL-encrypted communication
• **DELETE** Delete specified resource
• **TRACE** Return request as it arrived at server
• **PATCH** Partial modification of resource
RESTful Web Service HTTP methods

- **Collection** URI, such as [http://example.com/companies/](http://example.com/companies/)
- **GET:** List the URIs and perhaps other details of the collection's members
- **PUT:** Replace the entire collection with another collection.
- **POST:** Create a new entry in the collection. The new entry's URL is assigned automatically and is usually returned by the operation.
- **DELETE:** Delete the entire collection.
RESTful Web Service HTTP methods

- **Element** URI, such as http://example.com/companies/32

- GET: **Retrieve** a representation of the addressed member of the collection, expressed in an appropriate Internet media type.

- PUT: **Replace** the addressed member of the collection, or if it doesn't exist, **create** it.

- POST: Treat the addressed member as a collection in its own right and **create** a new entry in it.

- DELETE: **Delete** the addressed member of the collection.
DEMO

https://github.com/rlaemmel/startup14/

- Show the look and feel of the Polls app
- Explain the URL scheme in relation to REST
- Show JSON representation versus HTML
Properties of REST

- Client-server
- Stateless: user data is not stored between requests
- Cache

HTTP 304: Not modified
Summary

You learned about ...

• the REST architecture pattern,
• working with "resources" via HTTP,
• the JSON format,
• and some bits of Django.
Resources on REST

• A Brief Introduction to REST: http://www.infoq.com/articles/rest-introduction

Model-View-Controller (MVC)
in Web Application Development
MVC - a classic definition

• The Model is the application object
• The View is its screen presentation
• The Controller defines the way the user interface reacts to user input
Model–View–Controller (MVC) is a computer software design pattern that separates the representation of information from the user's interaction with it. The model consists of application data and business rules, and the controller mediates input, converting it to commands for the model or view. A view can be any output representation of data, such as a chart or a diagram. Multiple views of the same data are possible.

http://en.wikipedia.org/wiki/Model%E2%80%93view%E2%80%93controller
The Model-View-Controller Architecture

Here: server side

1. Browser sends request
2. Controller interacts with model
3. Controller invokes view
4. View renders next browser screen

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What is Django?

• A web application development framework written in the Python language.

• It makes the assumption that there is a ‘best’ way to do things, and it’s designed to encourage that way – and in some cases to discourage alternatives.
Philosophy (Django or Rails)

• **DRY** – “Don’t Repeat Yourself” – suggests that writing the same code over and over again is a bad thing.

• **Convention Over Configuration** – means that Django makes assumptions about what you want to do and how you’re going to do it, rather than requiring you to specify every little thing through endless configuration files.

• **REST is the best pattern** for web applications – organizing your application around resources and standard HTTP verbs is the fastest way to go.