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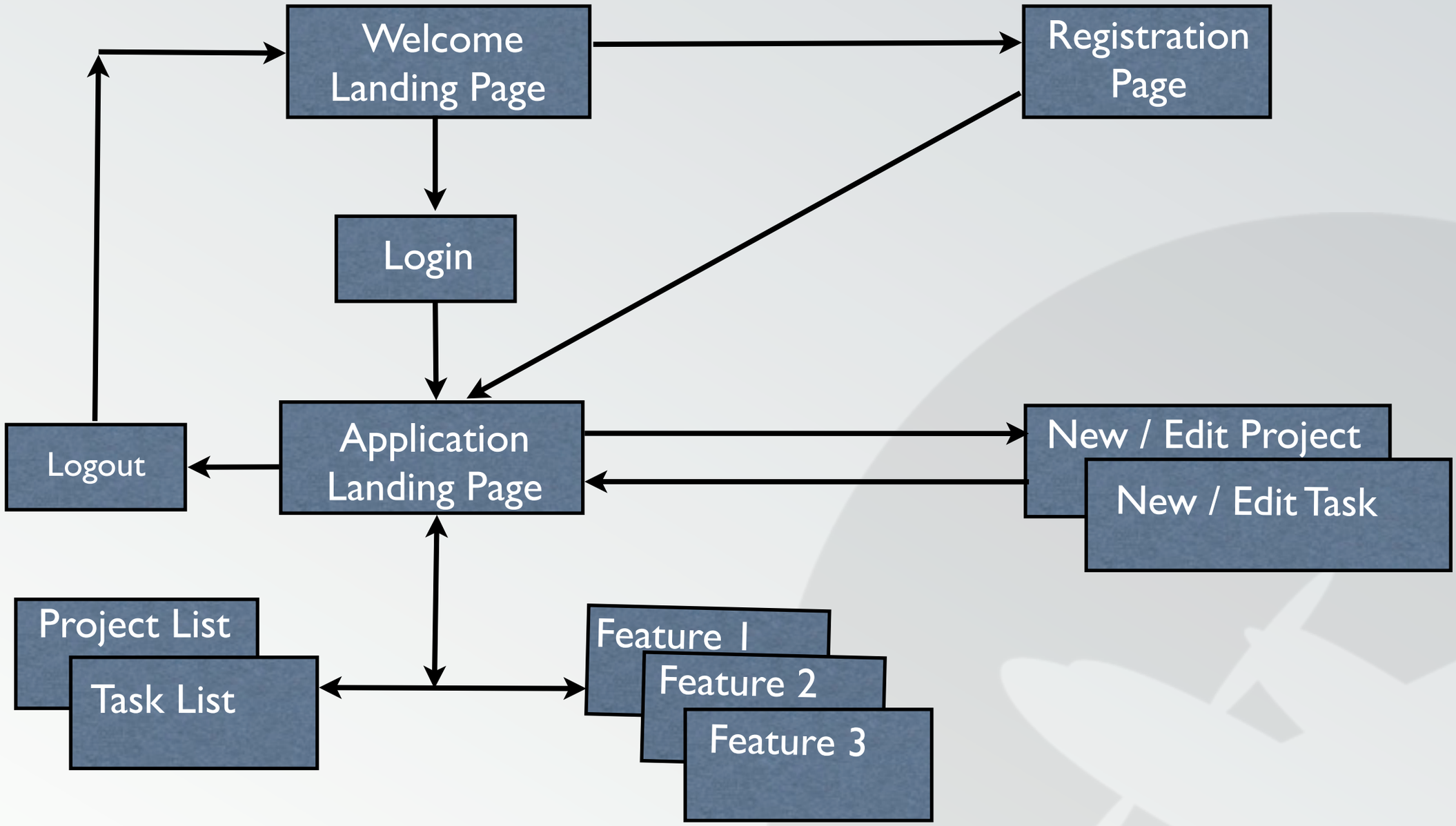
programming for web applications 2

javascript.libraries

due.**Dates**

Item	Due Dates
Branding / Logo	10/01/13 - After Lab on the First Day
Project Pitch	10/05/13 - Before Lecture on 3
Creative Brief - Finished Document	10/8/13 - Before Lecture 4
Site Prototype (html/css)	10/12/13 - After Last Lab of the 2nd Week
Development Milestone (javascript)	10/15/13 - Due End of Lab 7
Inclusion of 5 media center items	10/24/13 - Last Day of Class After Lab
Aesthetics & Usability (finished site)	10/24/13 - Last Day of Class After Lab
Functionality (finished site)	10/24/13 - Last Day of Class After Lab
Professionalism	The duration of the course
Class Participation	The duration of the course

project.**Flowchart** (example)



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javascript.**Libraries**

- JavaScript is a fast language, but the DOM is a third-party (inconsistent) browser API.

DOM API

```
var items = document.qSA('#nav li');
ryu(items).each(function(){
    this.style.display = 'block';
});
```

```
<ul id="nav">
  <li>Home</li>
  <li>Blog</li>
</ul>
```

jQuery

```
$('#nav li').show();
```

javascript.**Libraries**

- Top JavaScript Libraries
  - In PWA1 you explored the concept of creating a library of code.
  - Libraries exist to provide frameworks of reusable code, for the largest amount of common developer needs.
  - Some of the top libraries are:
  - *Dojo, Prototype, Mootools, YUI, Ext, jQuery*

Dojo

- Dojo was one of the **first large-scale javascript libraries**, startup around 2004
- Dojo is **considered a Toolkit**, in that it **focuses on widgets.** Most of the widgets provided simulate popular needs in Rich Internet Applications, such as:
  - **form validation, tree displays, dynamic charts, calendar and time selectors,** etc
- Dojo also provides methods for tying into Flash players, managing local data storage, auto-code compression, and Adobe AIR integration.
- Dojo is sponsored by AOL, IBM, Sun, and Sitepen
- http://dojotoolkit.org/

- Dojo
  - Like most modern libraries, **Dojo uses a *modular* system**, through which the library's core can be extended by including optional js files**.**
  - ***free license ... paid support via Sitepen***

- Prototype
  - Prototype was the **first library to bring massive popularity to the library concept**, with startup around 2005.
  - Prototype is stand-alone, focused on providing **utility**.
  - *Utility frameworks* tend to provide **methods for extremely common needs**, such as accessing and manipulating the DOM/CSS and performing AJAX calls.
  - **Prototype focuses on *mimicking* Classes**, something that JavaScript normally lacks. Most functionality and plugins for Prototype are based on their class constructor.
  - http://prototypejs.org/
  - ***Free license***

- # Prototype / script.aculo.us
  - Prototype is also the base of the popular effects library called **scriptaculous.**
  - Provides a massive set of pre-written animation effects and controls:
    - draggable/droppables, sortables, autocompleters, sliders
    - appear, slidedown/up, fade, appear, grow, fold, highlight, morph, move, parallel, puff, pulsate, scale, scrollto, shake, shrink, squish, tween, etc..
  - *Was used for the original Lightbox javascript plugin.*
  - *http://script.aculo.us/*
  - ***Free license***

Mootools

- Mootools is another stand-alone, very similar to Prototype. It provides **utility functionality for DOM and AJAX scripting, and effects.**
- While Scriptaculous focuses on pre-built effects, Mootool's effects provides core methods that can be combined, and has the smoothest speeds.
- One of the **first to release color-animation, css-morphing effects, and easing options.**
- Mootools also provides **widgets**, such as:
  - tooltips, slider controls, sortables, drag/drop, accordion, form autocompleter, and mouse effects.

- Mootools
  - Mootools was also the **first to release a modular downloader.** Their website **allows you to pick and choose which effects and components you want, and then builds and minifies a custom js file for you.**
  - http://mootools.net/
  - ***Core (with no extras) is only 4kb***
  - ***free license***

- Ext
  - Ext is a highly detailed framework for RIA development. It was **originally developed for use only in Yahoo's YUI**, but now provides tie-ins to jQuery and Prototype, and also has a standalone version.
  - Ext's focus is on providing RIA-style widgets for Graphical User Interfaces (known as GUIs). Some of the GUI components are:
    - modal dialog windows, toolbars, tabs, menu systems, regional panel layouts, grid layouts, tree menus, client data management, etc.
  - http://www.sencha.com/products/extjs/
  - ***commercial license***

YAHOO! DEVELOPER NETWORK

- YUI
  - Yahoo's javascript UI library (as YUI), is an extensive library **aimed at being all-encompassing**. It provides several utility, effects, and RIA methods such as we've already discussed.
  - YUI uses a modular class system for all of its namespacing, similar to Dojo but more intense. While making **YUI highly customizable,** this also means there are dozens of individual files that must be combined for any piece of utility or widget. *YUI 3 makes this process easier.*
  - On the YUI team is JavaScript legend **Douglas Crockford**, who has a popular open source compression tool, the "YUI Compressor".

YAHOO! DEVELOPER NETWORK

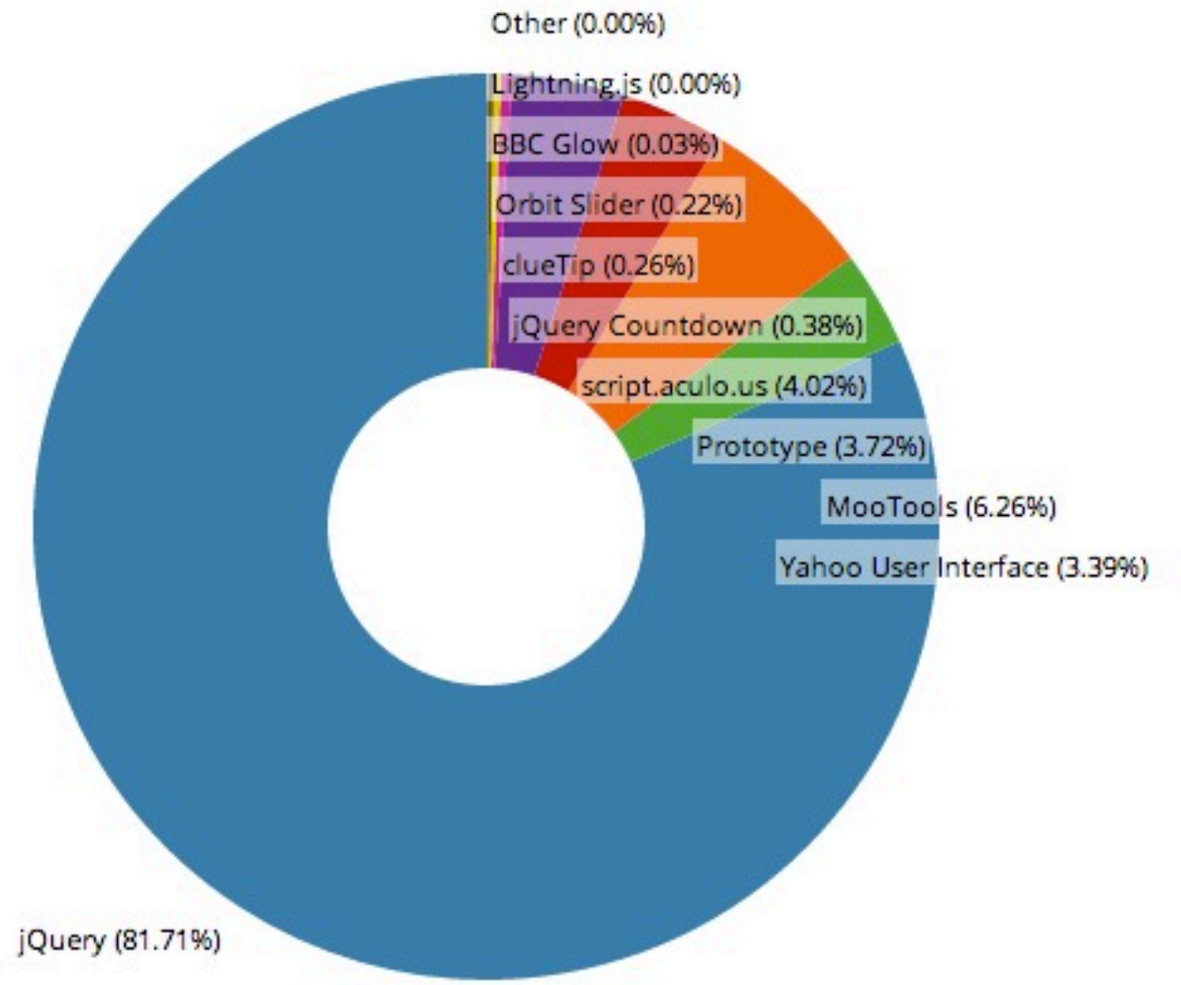
- YUI
  - YUI's primary focus is open source, highly documented sharing of javascript ideas, and **pushing the boundaries of what's possible in js.**
  - Some of their innovations worth looking at: **YQL, YSlow, YUI Theater**
  - The **YUI Theater** is a public storage for dozens of lectures and conference talks by the biggest advocates of JavaScript development. *I would recommend watching any videos by Douglas Crockford or John Resig.*
  - *http://yuilibrary.com/*
  - ***free license***

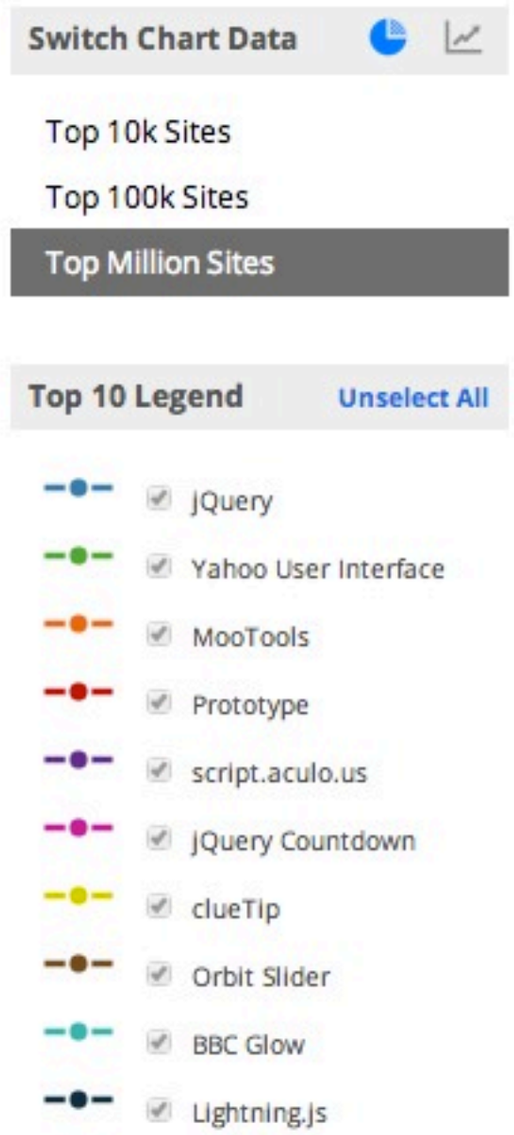
- jQuery
  - And finally, the Library we'll be focusing on this month is jQuery.
  - **Founded by John Resig of the Mozilla Corporation**, jQuery is a relatively **simple and efficient library,** and currently the **most widely used among developers and designers.**
  - Supporters: Mozilla, Wordpress, Microsoft *(.NET)*, Google.
  - http://jquery.com/
  - ***free license, open source on github***

so why **jQuery?**

JavaScript Library Usage

Statistics for websites using JavaScript Library technologies





top 1 million sites

trends.builtwith.com

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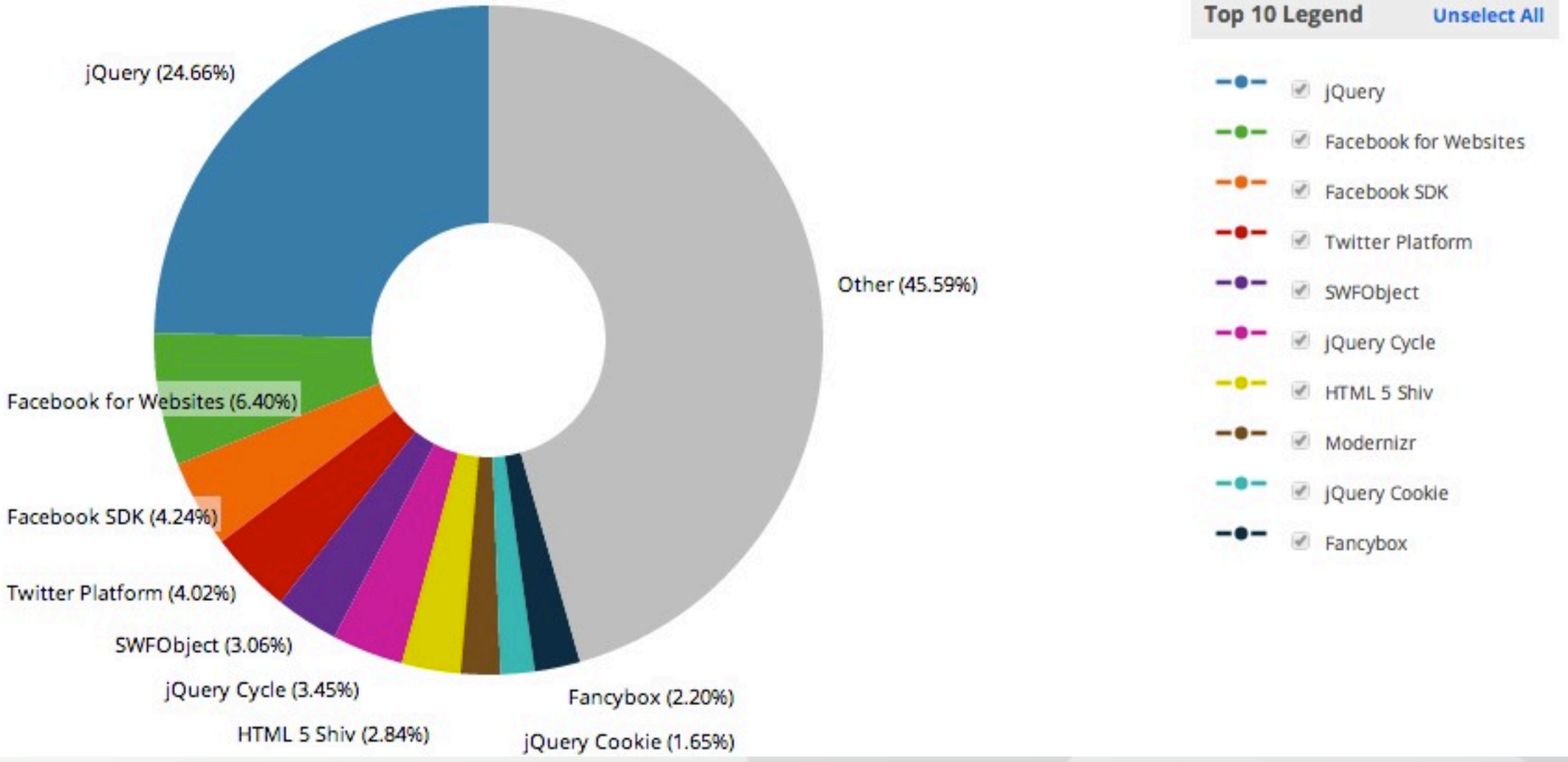
JavaScript Usage Statistics

Statistics for websites using JavaScript technologies



top 1 million sites

trends.builtwith.com

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jQuery, dojo, yui, mootools, extjs, Job Trends

Indeed.com searches millions of jobs from thousands of job sites.
This job trends graph shows the percentage of jobs we find that contain your search

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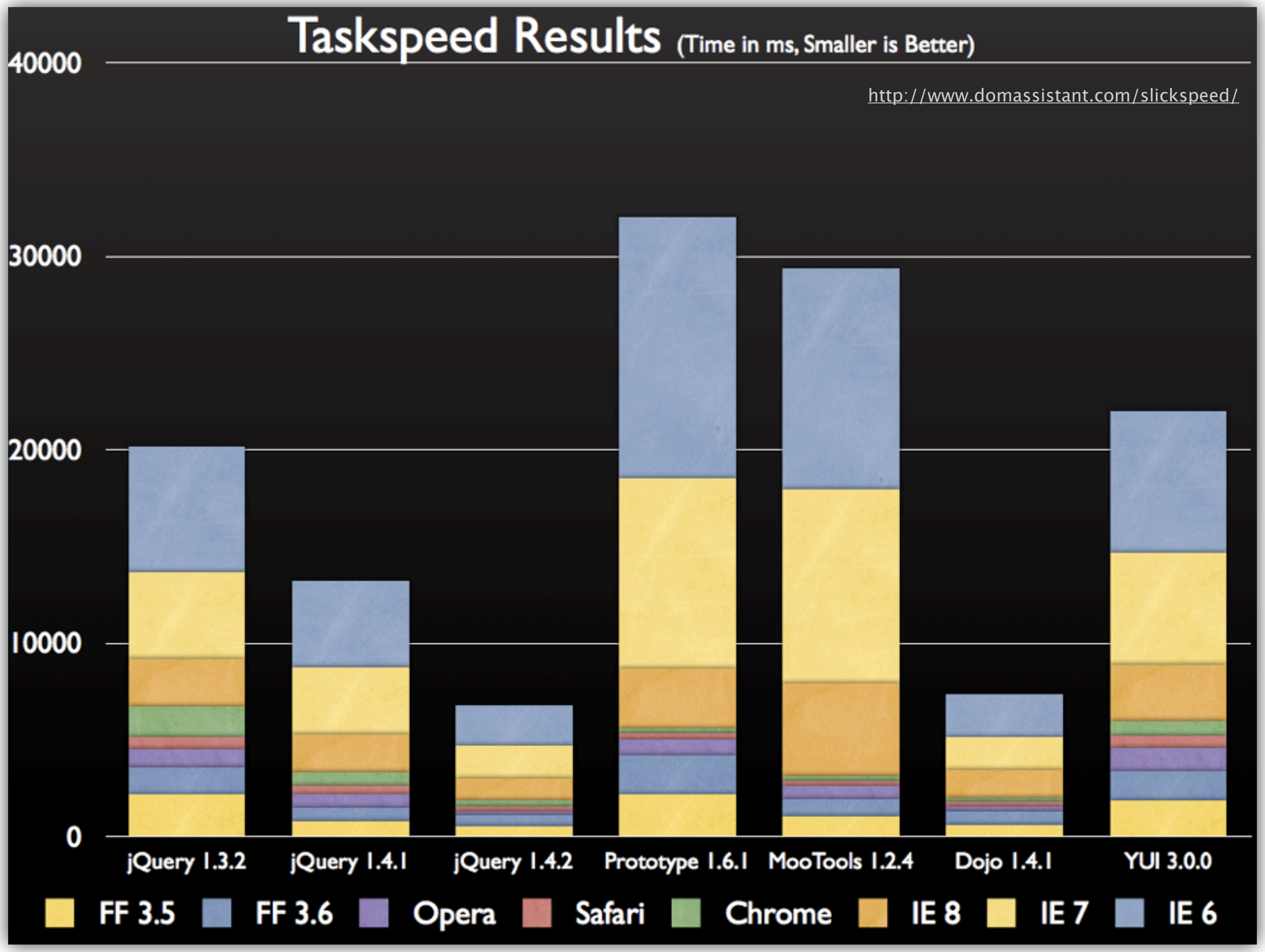
Taskspeed Results (Time in ms, Smaller is Better)

http://www.domassistant.com/slickspeed/



see.Code

a simplified library comparison

W3C JavaScript w/o Any Library

- Using JavaScript to apply event handlers using modern specs

```
window.addEventListener('DOMContentLoaded', function(){
    document.getElementById('somelink')
        .addEventListener('click', myFn);
});
```

mootools.Library

```
window.addEvent('domready', function(){
    $('mylink').addEvent('click', myFn);
});
```

prototype.Library

```
document.observe('dom:loaded', function(){
    $('somelink').observe('click', myFn, false);
});
```

dojo.Library

```
dojo.addOnLoad(function(){
    dojo.connect(dojo.byid('somelink'), 'click', myFn);
});
```

yahooYUI3.Library

```
YUI().use('*', function(Y){
    Y.on('domready', function(){
        Y.on('click', myFn, '#somelink');
    }, Y);
});
```

jquery.Library

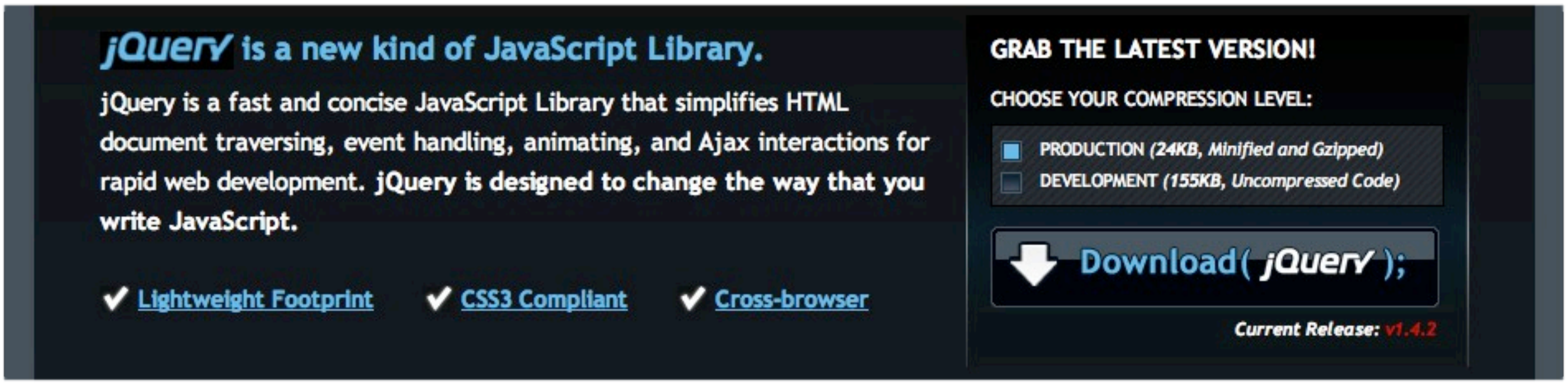
```
$(document).ready(function(){
    $('#somelink').on('click', myFn);
});
```

- ***Compact***: jQuery weighs in at 72kb *(minified)* or 24kb *(minified/gzip)*

- ***Simplicity***: all of jQuery's methods are easy to catch on to:
  - *jQuery.css( )*
  - *jQuery.ajax( )*
  - *jQuery.html( )*
  - *jQuery.animate( )*

- ***Efficiency***: jQuery highly utilizes OOP coding structures for efficient code, which can turn several lines of code into 1.

go to: jquery.com



download both *(minified and uncompressed)*

jQuery hosted by Google CDN

- Bookmark the following url:

  http://ajax.googleapis.com/ajax/libs/jquery/1.10.2./jquery.min.js

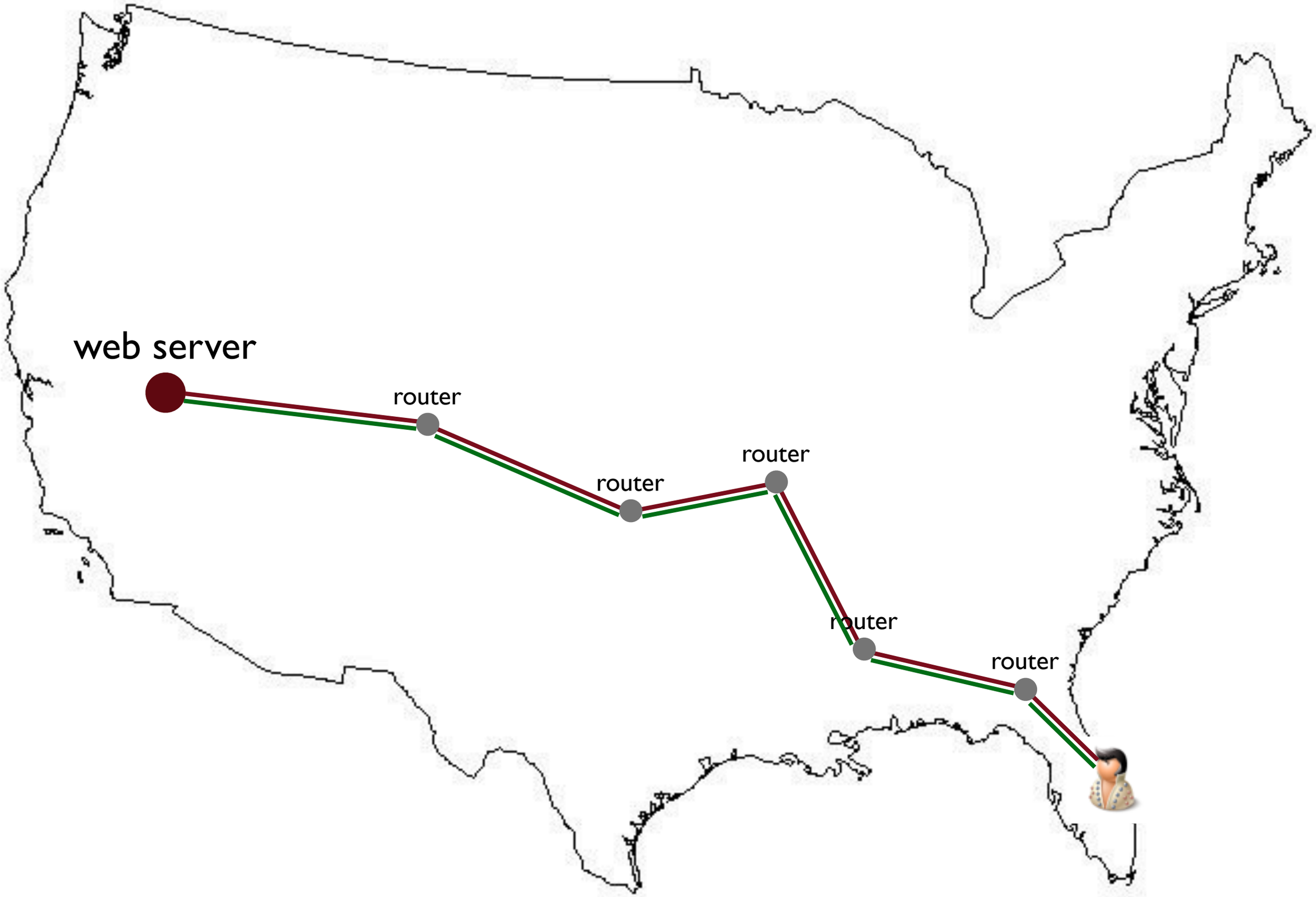
---

- *Has the benefit of **worldwide caching***
- *Required for final turn-in*

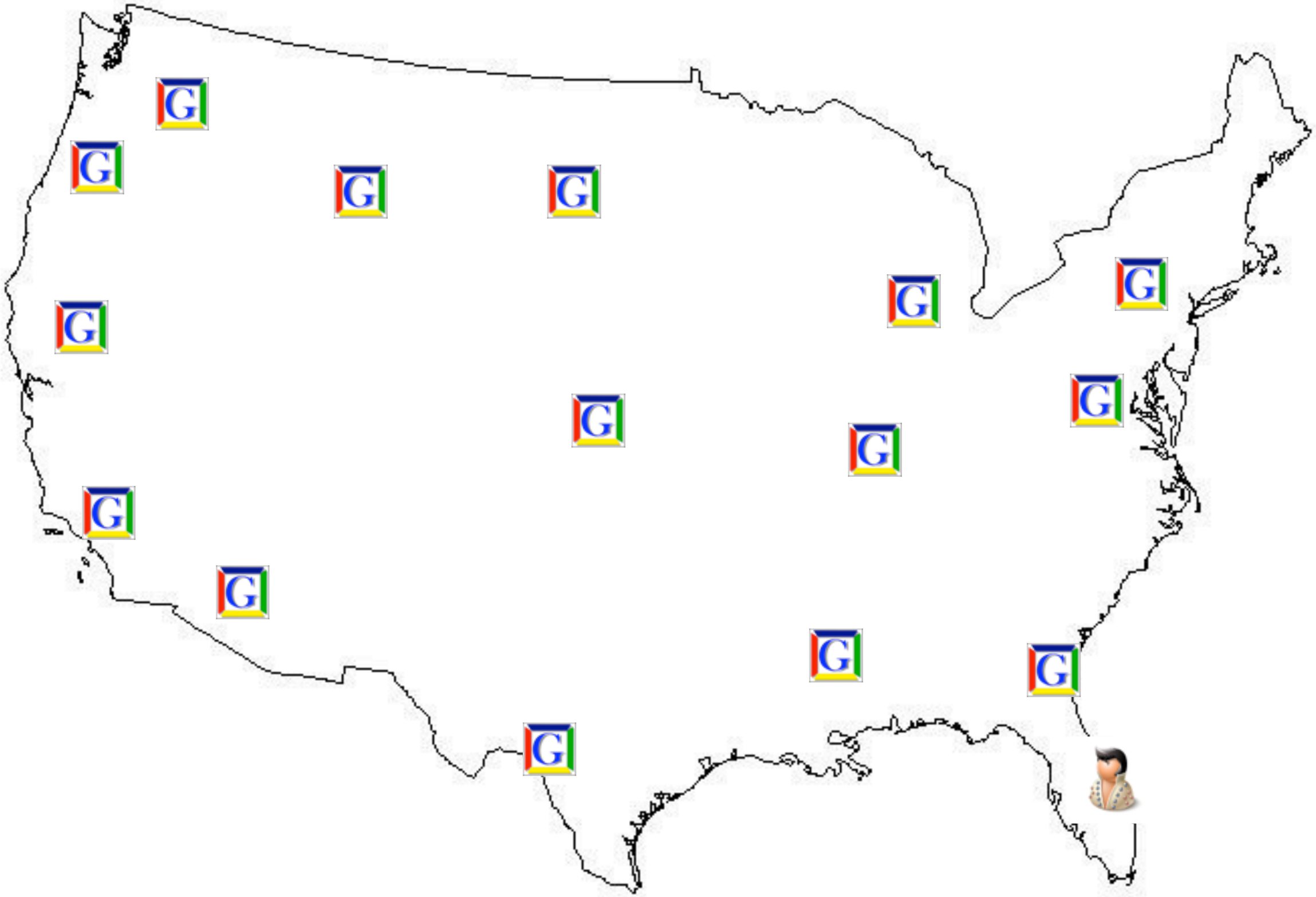
CDN - Content Delivery Networks

- One of the problems with web hosting tends to be bandwidth and the sheer number of requests that a server has to handle.
  - *Especially in large websites, this can cause noticeable server strain, reducing bandwidth speeds for the end user.*
- **A CDN is a network of servers that share your content, allowing you to push off some of the strain of your own server.** Most are pay-services, such as Amazon's CloudFront CDN, or Rackspace.

Normal Web Request



Google CDN



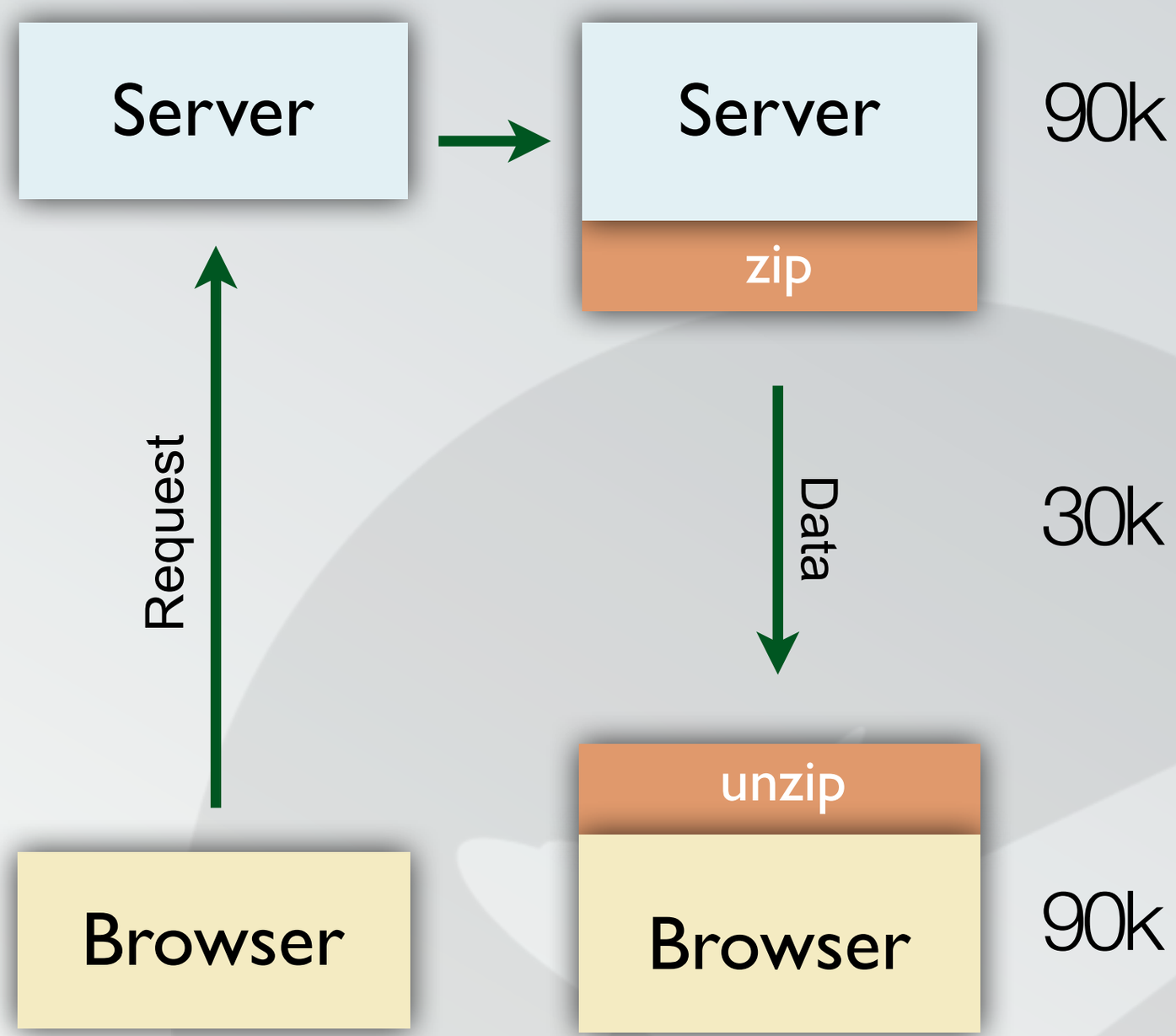
GZip Compression

GZip is a compression format similar to zipping, but for single files.

The server can be instructed to gzip any files it passes to the browser, making transfers faster.

The browser has the engine to uncompress the file and then read it as normal.

- example...



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GZip.Compression

Since most media files are already compressed, usually the only things needed zipped are html, css, and javascript.

The easiest way with an apache server is to add an htaccess file

```
<FilesMatch "\.(php|html|css|js)$">
SetOutputFilter DEFLATE
</FilesMatch>
```

. htaccess

jQuery.Resources

Website	*Description*
wddbs.com/javascript/sfw/campus	JS / jQuery Lectures
api.jquery.com	Official Documentation
yayquery.com	Best jQuery Podcast Ever....
podcast.jquery.com	Official Podcast

Twitter	*Person*
jeresig	John Resig *founder of jQuery, duh.*
cowboy	Ben Alman (benalman.com) *amazing plugin developer*
bennadel	Ben Nadel (bennadel.com) *jquery / coldfusion developer*
paul_irish	Paul Irish (paulirish.com) *google / jquery developer*
rem	Remy Sharp (remysharp.com) *js / jquery / mobile developer*
codylindley	Cody Lindly (codylindley.com) *core js / prototype developer*

IRC	*Description*
#jQuery on irc.freenode.net	Official jQuery Chat *(free software: colloquy)*

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jQuery.Namespace

jQuery.Namespace

- ALL javascript libraries has a namespace to contain their functionality. This is a forward-thinking developer initiative so that multiple frameworks can occupy the same global space without causing browser conflicts.
- Keep in mind that in JavaScript, **a namespace is simply GLOBAL *object*, with methods and properties.**

jQuery.Namespace

- jQuery namespace **GLOBAL object is represented using: jQuery**
- jQuery also provides a shortcut to itself, as **$**

```
$("#superman").addClass("sun");
jQuery("#superman").addClass("sun");
```

- **$** is a more efficient identifier, so you'll notice it is used in nearly all documentation and tutorials, and among most developers.
- The only conflict that arises is if either *Mootools* or *Prototype* are also used in the same page, since all 3 libraries utilize a global **$** in some way.

jQuery.Namespace

```
$("#superman").addClass("sun");
```

- So.. if **jQuery** and **$** are the global namespace objects, why are they being executed as functions? ie.. **$()**
- Remember that objects in JavaScript are very loose, they can be arrays, objects, or functions at the same time.
- The genius is that jQuery is all of the above! *(an object, an array, and a function)*

jQuery.Namespace

- As an object, **$** has methods...

```
$.each()
```

- As a function, we passed arguments that result in a *selector target:*

```
$("#superman").addClass("sun");
```

jQuery.Namespace

Utility methods

```
$.support()
$.each()
$.extend()
$.merge()
$.trim()
...
```

Factory methods

```
$().addClass()
$().css()
$().animate()
$().html()
$().slideUp()
...
```

how jQuery works

how jQuery works

- Almost any line of code we write will begin with a *target*, using jQuery's **Factory**

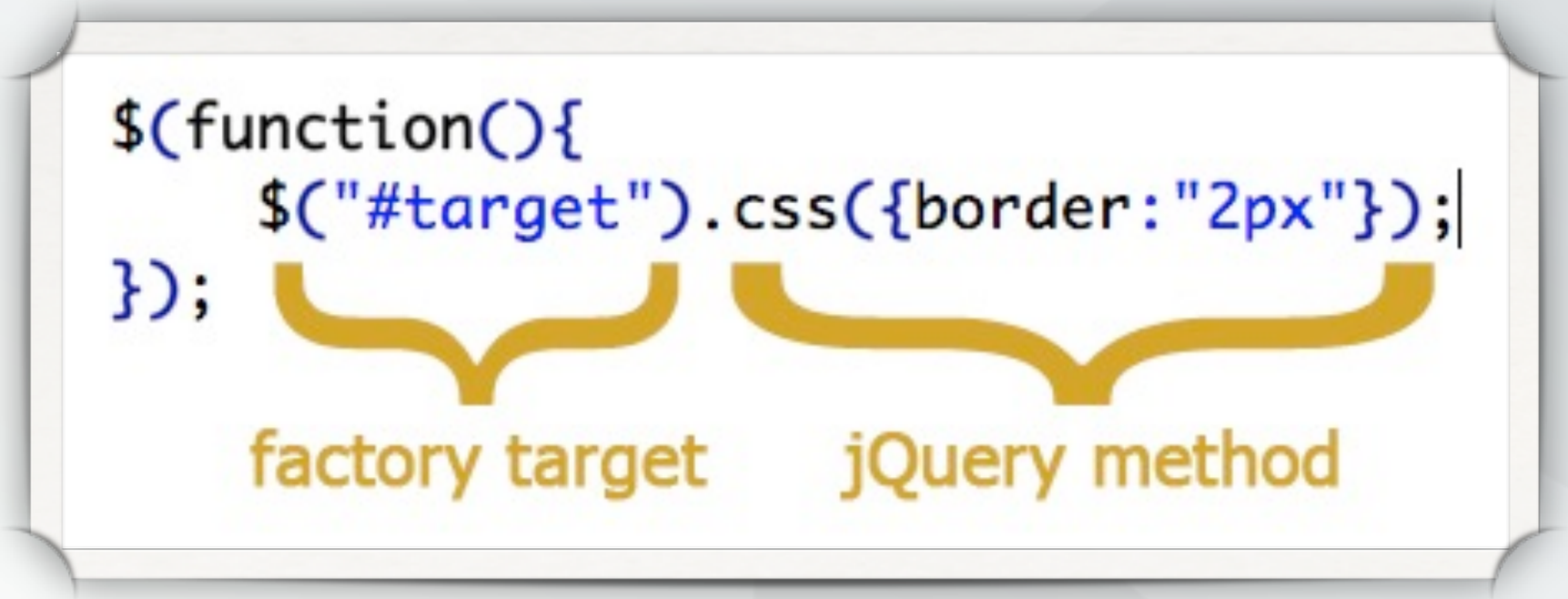
```
$("#mydiv").animate();
```

← ***jQuery's Object Factory***

- A *factory* is an object-oriented design pattern, that can **most closely be described as an object creator** *(like a Class),* although more dynamic**.**

how jQuery works

- jQuery factory arguments: #ID, .class, or HTML Tag
- Most jQuery methods will return the factory object for chaining, unless a different data type is specified
- CSS *methods*: **`.css()  .attr()  .height()  .offset()`**



how jQuery works

```
$(".superman").addClass("sun").fadeIn().slideUp();
```

- What's actually happening is that the **$** factory is **first finding the element based on the *selector argument***, and then **creating and returning a new internal object.** This new internal object inherits **all** of the methods of the jQuery library.
- We can see the **.addClass** method being used. It's important to note that this method of creation is **NOT attaching methods to the DOM element**, it is creating an internal object as a reference.

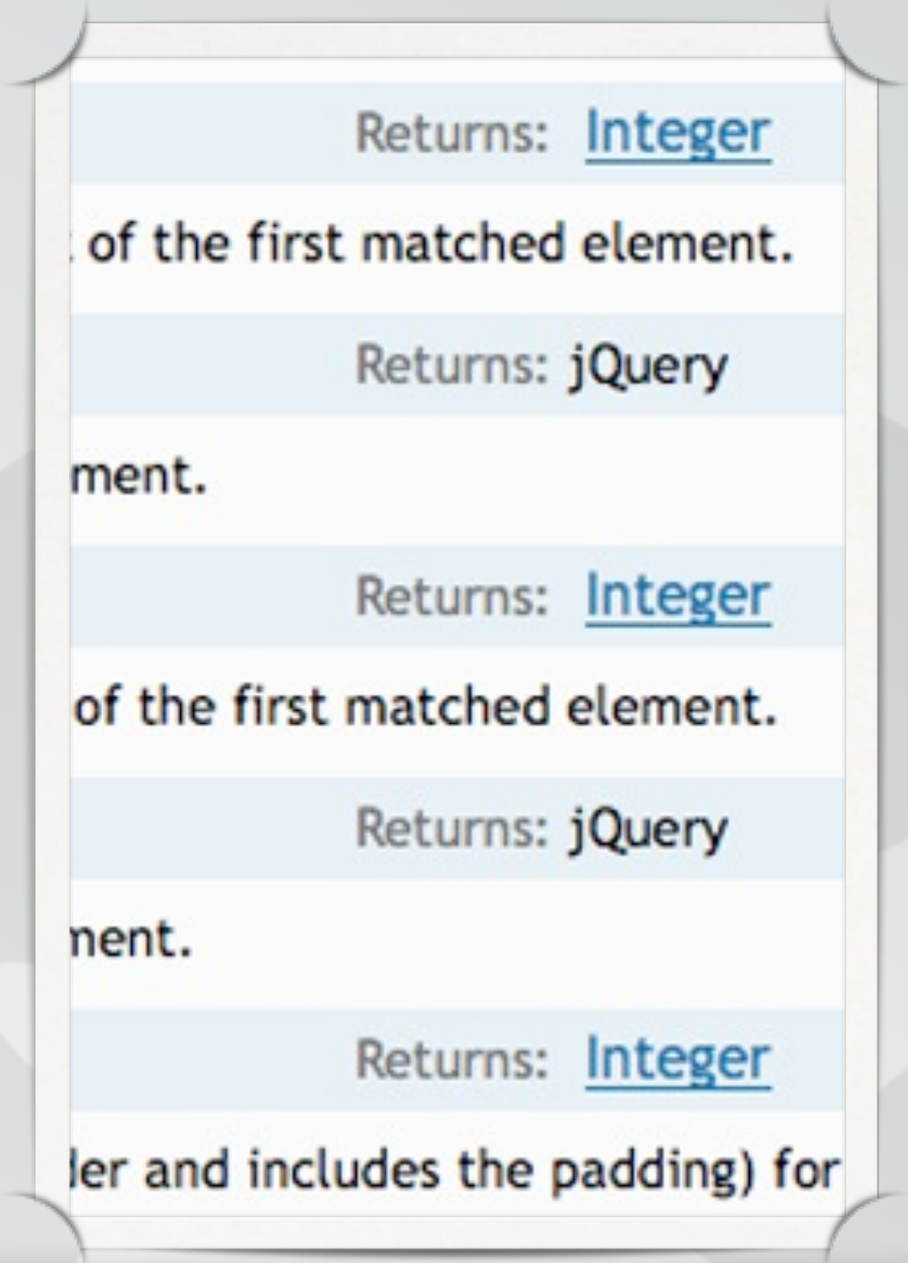
how jQuery works

```
$(".superman").addClass("sun").fadeIn().slideUp();
```

- The next important thing to note is that almost all methods in jQuery return the jQuery object to itself.
- So, when **.addClass** is called, it uses the $("superman") factory object as a target, and returns the factory object *(remember that functions can **return** any data type)*.
- This is why **fadeIn** and **slideUp** are able to be called, because each new method call is re-returning the factory object from the beginning of the code line.

how jQuery works

- You'll notice that jQuery's documentation *at http://api.jquery.com* will always indicate what the return value of any method is.
  - Most will return the jQuery object, which means they can be chained.
  - Others may return a specific value (such as an integer or string), which means it is NOT chainable.



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jQuery.Fundamentals

The “dom ready” callback

```
$(function(){
    // all site code
});
```

```
$(document).ready(function(){
    // all site code
});
```

- This argument is a nameless function literal. It should already look familiar, as this is how our **DOMReady** method worked last month.
- In the same manner, any code inside this function is run when the DOM is loaded.

Using $

- Your logical next question should be, what arguments does the **$ factory function** take in?
- *There are 4 possibilities:*
  - **CSS selector expressions**
  - **DOM element objects**
  - **HTML strings**
  - **or a callback function**

jQuery.Fundamentals

CSS Selector Expressions

```
$(“#id > .class”)
```

- The above is an example of a CSS selector method.
- In this parameter, a string is passed that contains references to css selectors, combined with some special selector characters that jQuery defines. *Note that **selectors** must be strings, using quotes.*
- This returns the factory-created library object, containing a reference to the element you were searching for that is used as a target.

CSS Selector Expressions

```
$(“.myclass”).slideUp();
```

- The next important thing to note relates to the above example. Notice that this selector string is targeting all elements with a specific css class name. In this, the factory works the same way, only it **creates an array of objects**, just like how **getElementsByTagName** works.
  - The benefit here is that any jQuery methods used on this wrapper will automatically be applied to each matching element.
- If there were 4 divs with a class of “myclass” in this example, all 4 would animate up at the same time, with this one line of code.

DOM Element Objects

- The factory can also be used in targeting DOM elements directly, by their normal object names... *(notice that strings are not being used, only object names)*

- *Keep "window" and "document.body" in mind for later...*

```
$(window)...
$(document.body)...
```

- *also...*

```
var el = document.getElementsByTagName('div');
$(el)...
```

jQuery.Fundamentals

HTML Strings

```
$('<a href="">Click me</a>')
```

- This option of the **$** factory will ***create* a new block of html code**, and store it by creating a factory object as normal, with all of the methods of the library attached.

- It's important to note that, while **this *creates* an object of html code, it does NOT insert into the DOM**, until you tell it to... for which there are jQuery methods.

DOM.**Manipulation**

jQuery vs JavaScript

- Always remember that the jQuery factory is returning an *object*.
- Once we enter a ***jQuery chain***, most raw JavaScript will not be accessible.

```
$("#mydiv").innerHTML="hi";
```

← ***jQuery's Object Factory***

does nothing

jQuery stops most errors

- innerHTML is a property of DOM objects, not a property of the jQuery object.

DOM.**Manipulation**

What's To Come

- Most of the functionality of jQuery is well documented in their website, and broken up by categories of toolsets which we'll be covering in-depth:
  - **selectors** (factory targets)
  - **element manipulation, walking, and attributes**
  - **events**
  - **animations and effects**
  - **ajax methods**
  - and for today's finish, **css**

DOM.**Manipulation**

Testing Elements

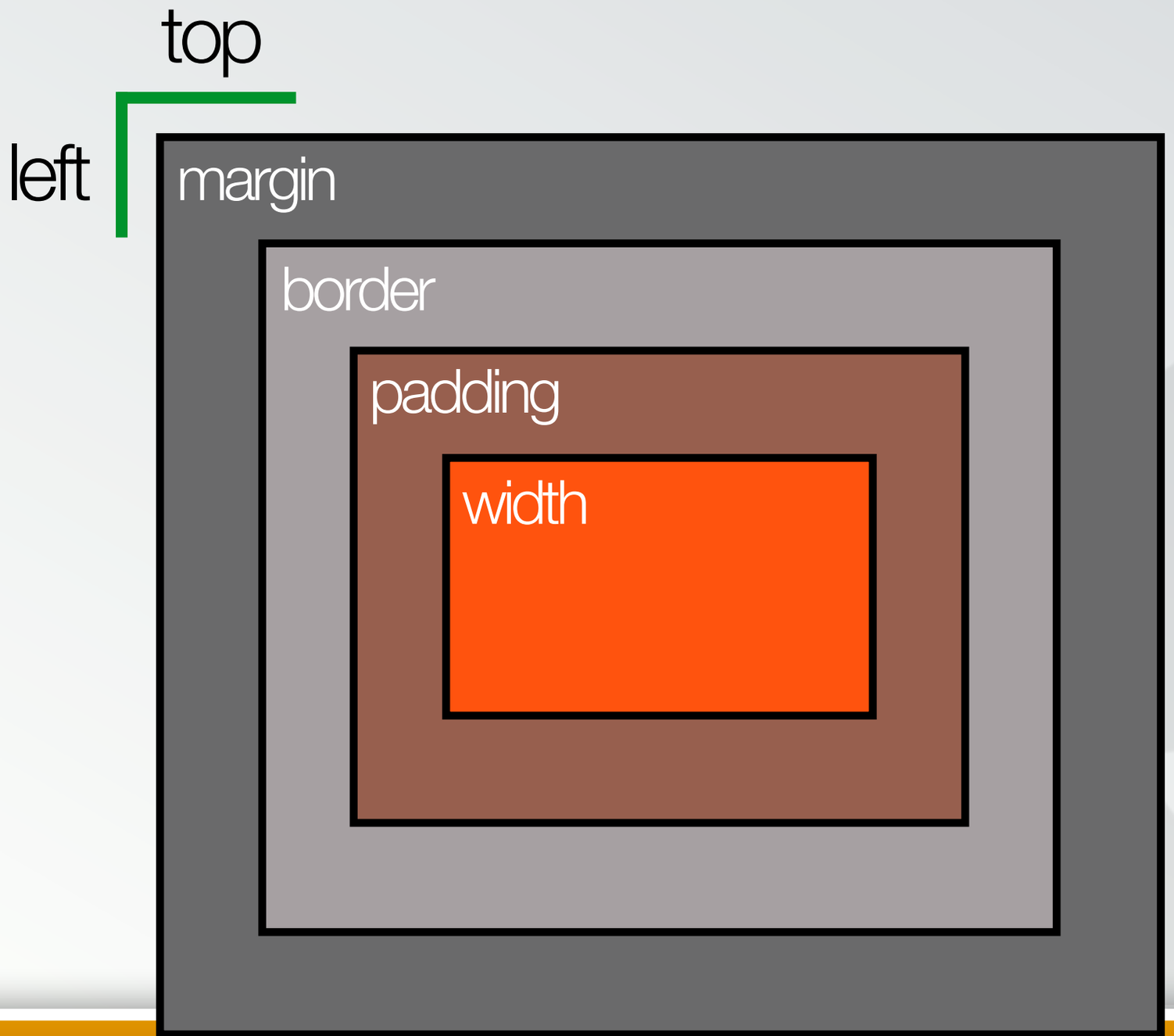
- Since jQuery won't throw errors on bad selectors, sometimes you may need to test.
- jQuery objects come with a **.length** property

```
var nav = $('#nav');
if( nav.length === 0 ){
    // elements don't exist
};
```

jquery

css, classes, and attributes

box.**Model** (size & position)



size.**Methods**

Method	*Returns*	*Description*
$().height()	*number*	Returns the numeric size *(not including padding/ border)*
$().width()	*number*	...
$().innerHeight()	*number*	Returns size including padding but not border
$().innerWidth()	*number*	...
$().outerHeight(*bool*)	*number*	Returns size including padding AND border. If the *boolean* is *true*, the value also includes the margin.
$().outerWidth(*bool*)	*number*	...

http://jsfiddle.net/user/sfw2/

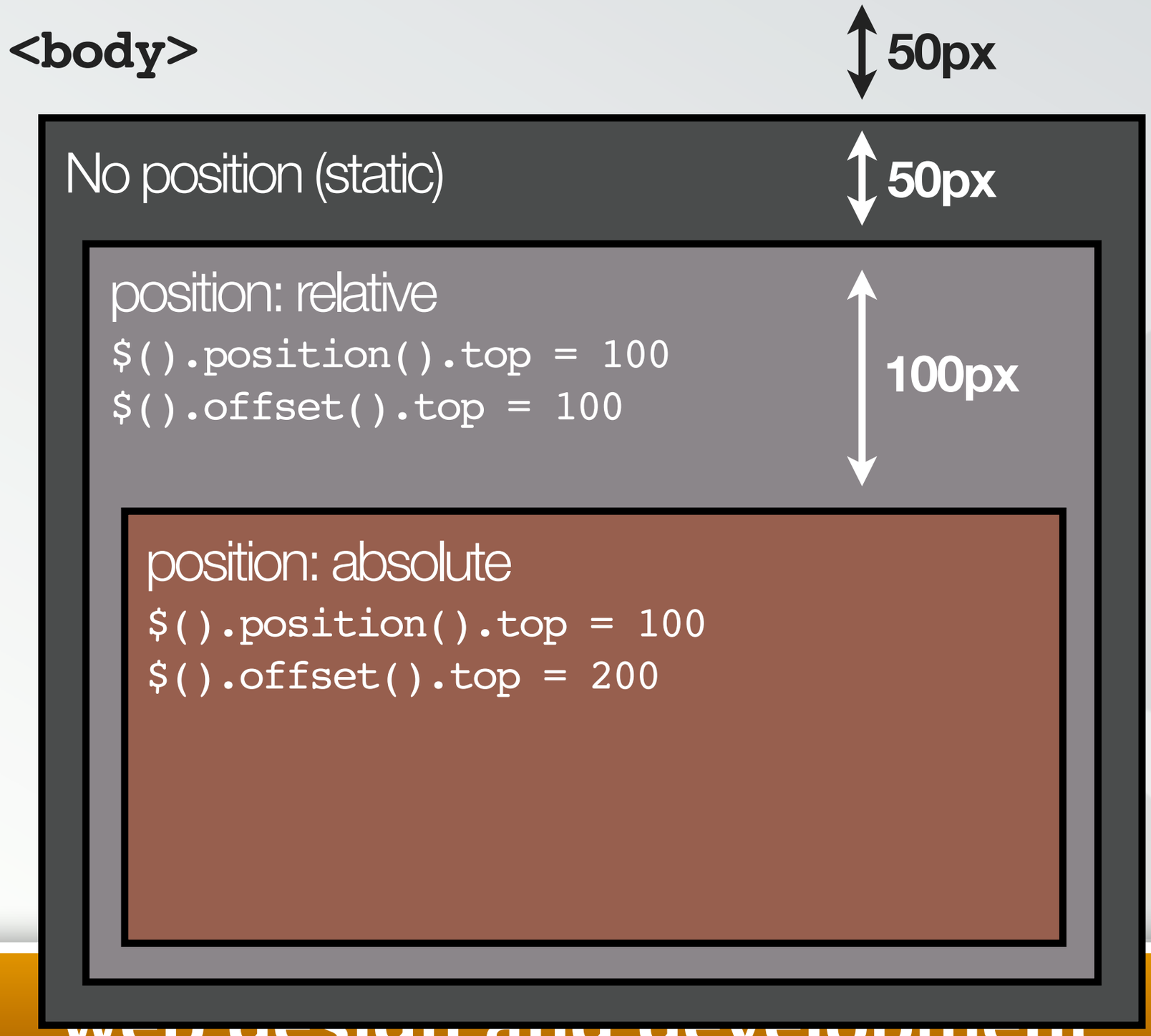
position.**Methods**

Method	*Returns*	*Description*
$().position()	*object*	Returns *top* and *left* properties relative to the first offset parent of the given element.
$().offset()	*object*	Returns *top* and *left* properties relative to the entire document for the given element.

```
var ptop = $('div').position().top;          ex: 100
var pleft = $('div').position().left;
```

```
var otop = $('div').offset().top;
var oleft = $('div').offset().left;
```

box.**Model** (size & position)



position is based on non-static
offset is based on document

location.**Shortcuts**

Method	*Returns*	*Description*
$().scrollTop()	*number*	Returns vertical scroll position of given element.
$().scrollLeft()	*number*	Returns horizontal scroll position of given element.
$().scrollTop(*number*)	*jQuery*	Changes the vertical scroll position of given element.
$().scrollLeft(*number*)	*jQuery*	Changes the horizontal scroll position of given element.

```
var btop = $('div').scrollTop();
$('div').scrollLeft(50);
```

attribute.**Manipulator**

Method	*Returns*	*Description*
$().attr(*string*)	*string*	Returns the value of requested html attribute.
$().attr(*string, string*)	*jQuery*	Changes a single html attribute on all given elements.
$().attr(*object*)	*jQuery*	Changes multiple html attributes on all given elements.

```
var navalt = $('a').attr("alt");

$('a').attr("href", "http://google.com");


$('a').attr({
    title: "link",
    href: "http://google.com",
    alt: "Google"
});
```

attribute.**Manipulator**

Method	*Returns*	*Description*
$().removeAttr(*string*)	*jQuery*	Removes the given attribute from the element.

```
<a alt="not for long"></a>
```

```
$('a').removeAttr("alt");
```

```
<a></a>
```

CSS.Manipulator

Method	*Returns*	*Description*
$().css(*string*)	*string*	Returns the value of requested css property.
$().css(*string, string*)	*jQuery*	Changes a single css property on all given elements.
$().css(*object*)	*jQuery*	Changes multiple css properties on all given elements.

```
var padbot = $('#nav').css("paddingBottom");

$('#nav').css("backgroundColor", "#ff0000");


$('#nav').css({
    backgroundColor: "#ffffff",
    height: 100,
    padding: "5px"
});
```

class.Manipulator

Method	*Returns*	*Description*
$().addClass(*string*)	*jQuery*	Adds the class to all given elements.
$().removeClass(*string*)	*jQuery*	Removes the class from all given elements.
$().toggleClass(*string*)	*jQuery*	Toggles the given css class.
$().hasClass(*string*)	*boolean*	If any of the elements have this class, returns *true*.

```
$('div').addClass("myClass");
$('div').addClass("myClass anotherClass");
$('div').removeClass("myClass");
$('div').toggleClass("myClass");
var bool = $('div').hasClass("myClass");
```

formValue.**Manipulator**

Method	*Returns*	*Description*
$().val( )	*string*	Returns the value of form input or textarea
$().val(*string*)	*jQuery*	Sets the value of a form input or textarea

```
<input type="text" id="username" value="" />
```

getter

```
var username = $("#username").val();
```

setter

```
$("username").val('Enter username');
```

javascript.Performance

javascript.**Performance**

- Always use css classes for everything
- Only use IDs in HTML for high-level singular targets (header, footer, nav, etc)
- Try to reduce DOM calls (bad DOM touching) when possible
- Use addClass and removeClass when possible
- JavaScript can be hard to debug, use console.log when in doubt

javascript.Performance

Manipulating Styles

- Using the .style property can be efficient for small changes to CSS, but it is largely inefficient for mass changes.

```
var mydiv = document.getElementById(“mydiv”);

mydiv.style.backgroundColor = “#FF0000”;
mydiv.style.width = “400px”;
mydiv.style.border = “2px solid black”;
mydiv.style.margin = “0 auto”;
```

← *inefficient*

javascript.**Performance**

Manipulating Styles

- Adding too many inline styles bloats the DOM, and slows down our access to it.
- Instead, use methods like **`addClass`** and **`removeClass`** when possible.

```
var mydiv = document.getElementById('mydiv');
ryu(mydiv).addClass("active");
```

← *better*

```
.active{
    background-color: #FF0000;
    margin: 0 auto;
    color: #FFF;
};
```

stylesheet rule

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lecture.Activity

in FSO's Reference Tab:
Course Material - Lecture Activities1
'Activity for Goal2-1'

assignment.Goal2 (see schedule for due dates)

- **Continue to work on your Project Pitch & Creative Brief**
- **Next Milestone: Project Pitch & Draft of your Creative Brief**
  - **must have:**

1. Your Project Pitch Video COMPLETED
2. Your Creative Brief COMPLETED
3. Turn your deliverable into your PWA2 Repo.
   - Name your video file: “**lastname_firstname_pitch.mov**”
   - Name your document file: “**lastname_firstname_pitch.pdf**”