

HTML5, CSS3, Javascript for Mobile Web

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Well, you could build native, but...

- Which platforms do you choose?
- How many codebases do you want to (or even can you) support?
- How long will it take to build native on N number of platforms?
- How much effort will be duplicated?
- What if you bet on the wrong platform?
- Who writes the code? Hire out? Retrain/retool yourself or your devs?

The Web Is An Option...

- ...and should be preferred when feasible
- Mobile browsers are progressing fast and converging around WebKit
- But there are limitations
- Native apps are inherently more capable than web apps
- Native apps run faster and smoother on resource constrained devices



Common Components

- Web documents
- Server-side programming
- Client-side programming
- Web services
- JQuery



HTML5

+



CSS3

+



JavaScript

HyperText Markup Language

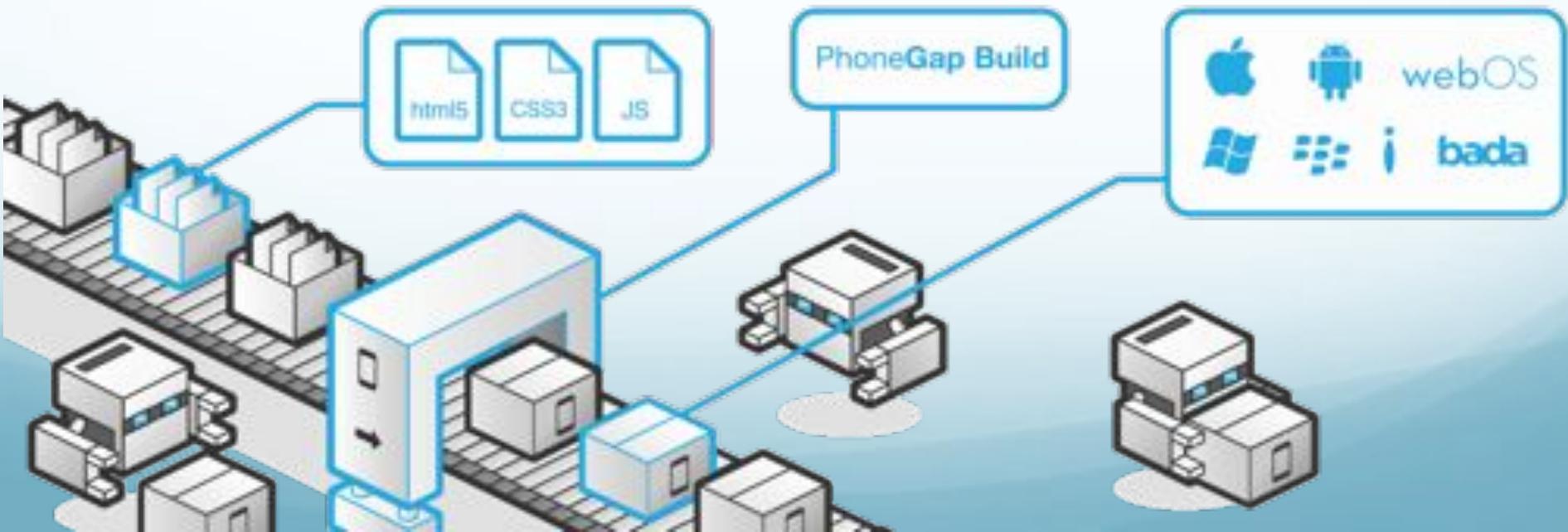
- Disagreement about HTML's role
 - Only give the content and structure of the document, leave visualization to the browser
 - Browsers vary (graphical, text based, mobile devices)
 - User preferences vary (some people like larger fonts)
 - Environment varies (screen sizes, fonts available, etc.)
 - But authors want to control what the document looks like
- Trend towards separating content from presentation
 - Cascading Style Sheets – presentation information only
 - HTML documents contain little formatting

Many Choices...

- Build a Native app (for specific platform) that runs like a website (WebView).
- Build a Native “bare bone” app that connects to a website. The app is actually located on the website (Sencha, jQTouch, jQuery Mobile, etc.)
- Build your app in the Cloud and don't mess with Xcode or Eclipse (PhoneGap).
- Build your app using a third party dev tool.

PhoneGap (phonegap.com)

- Easily create apps with the “only free open source framework that supports 7 mobile platforms”
- Build apps in the cloud so the entire app is in a “www” directory.
- No Java, Objective-C programming language skills required.



Build in the Adobe Cloud

- <https://build.phonegap.com/>
- ZIP your www directory
- Upload it to the server
- After a few minutes, download your .apk or other app files for installation on your devices

- Supply your paid (\$99 /year) Apple Developer Account info for iOS use.
- NO compiling or using of ANY app development build tools on your local system.

Use WebKit Based Browser

- Every browser is backed by a rendering engine to draw the HTML/CSS web page.

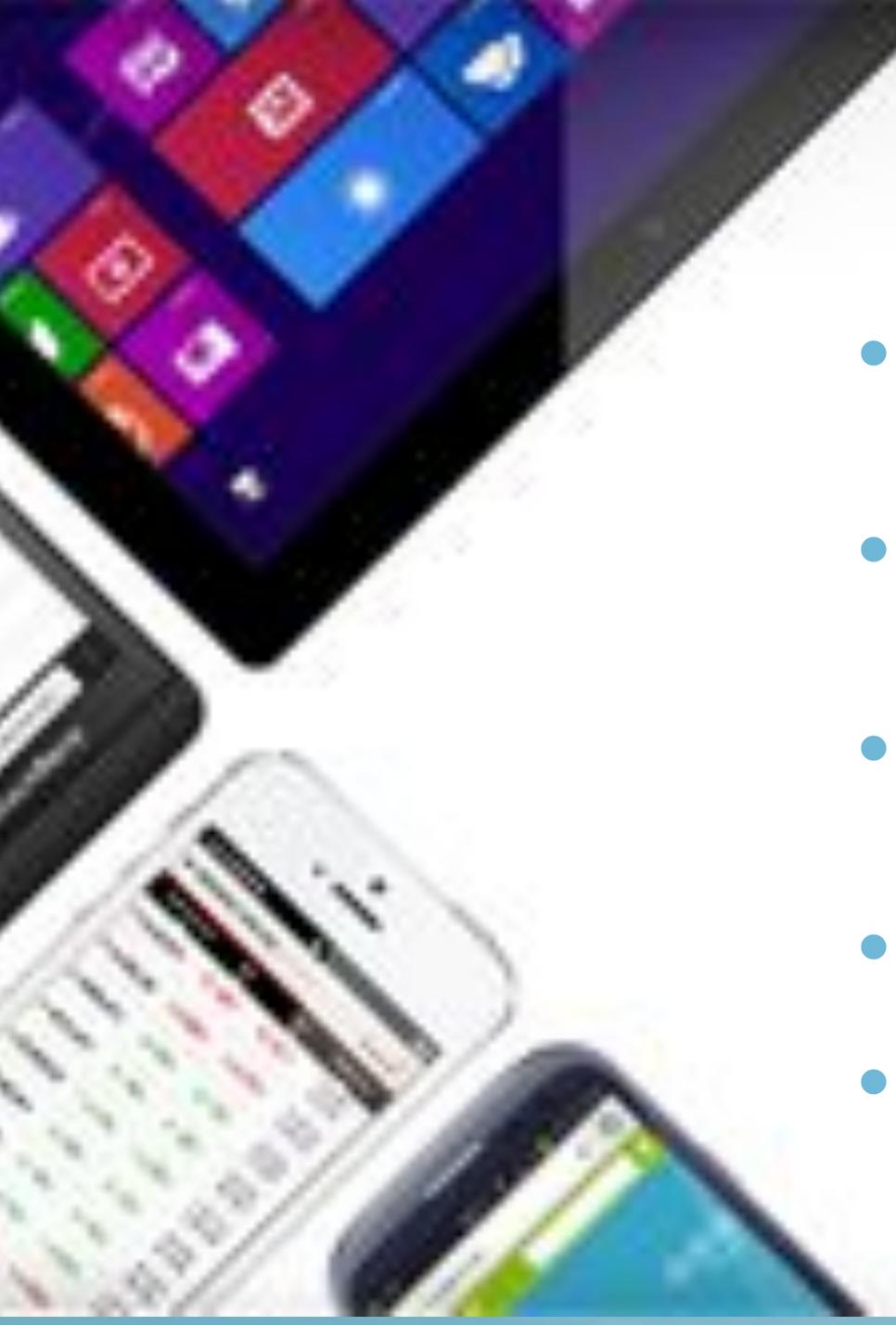
IE → Trident

Firefox/Sea Monkey → Gecko

Opera → Presto

Safari/Chrome → WebKit

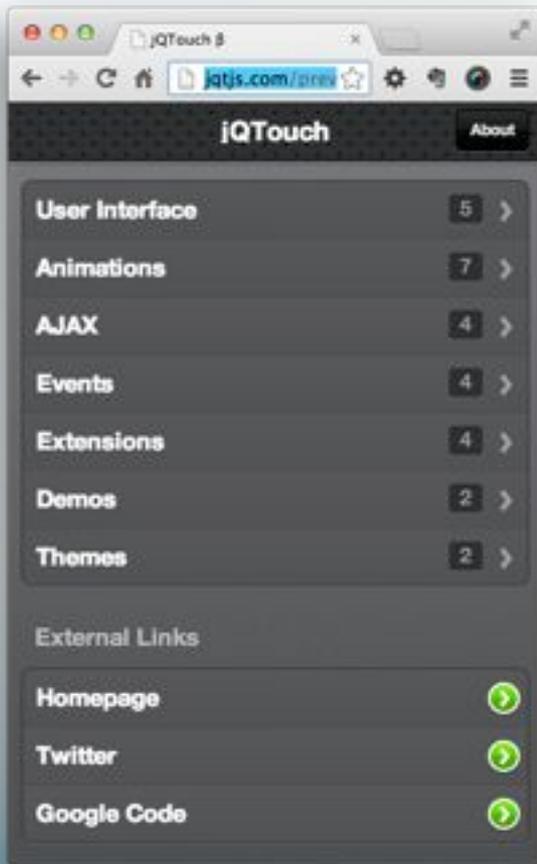
- Most App interfaces will only function on **WebKit** based browsers.



Sencha

- Build mobile apps for iPhone, Android and Blackberry with **HTML5**
- Commercial and open source Sencha Touch Library versions (Free).
- Sencha Touch is available free charge for commercial and open source application development
- Full service IDE app building tools – Not Free
- Plug-ins for Eclipse, iPhone libraries - Free

jQT (jqts.com)



- Zepto/jQuery plugin for mobile web development on the iPhone, Android, iPod Touch, and other devices.
- Native WebKit Animations
Image Preloading
- Callback Events
Flexible Themes - MIT Licensed
- Swipe Detection - Extensions

Dashcode



jQuery Mobile (jquerymobile.com)

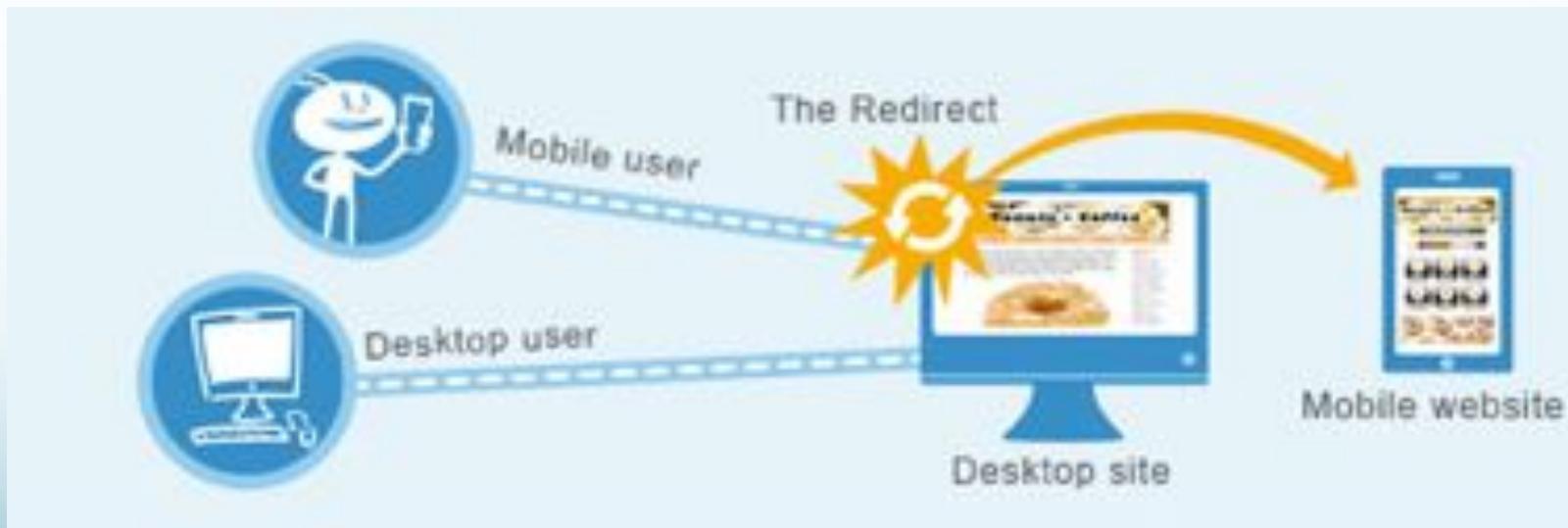


- jQuery Mobile isn't a full application framework like SproutCore or Sencha Touch, but the new initiative does aim to bring more native controls to mobile web apps.
- Not supported on all browsers.

<http://jquerymobile.com/gbs>

The Redirect

- It's not a bad idea to also redirect your main company website to a mobile interpretation of it.
- Use your App version hosted on the internet!



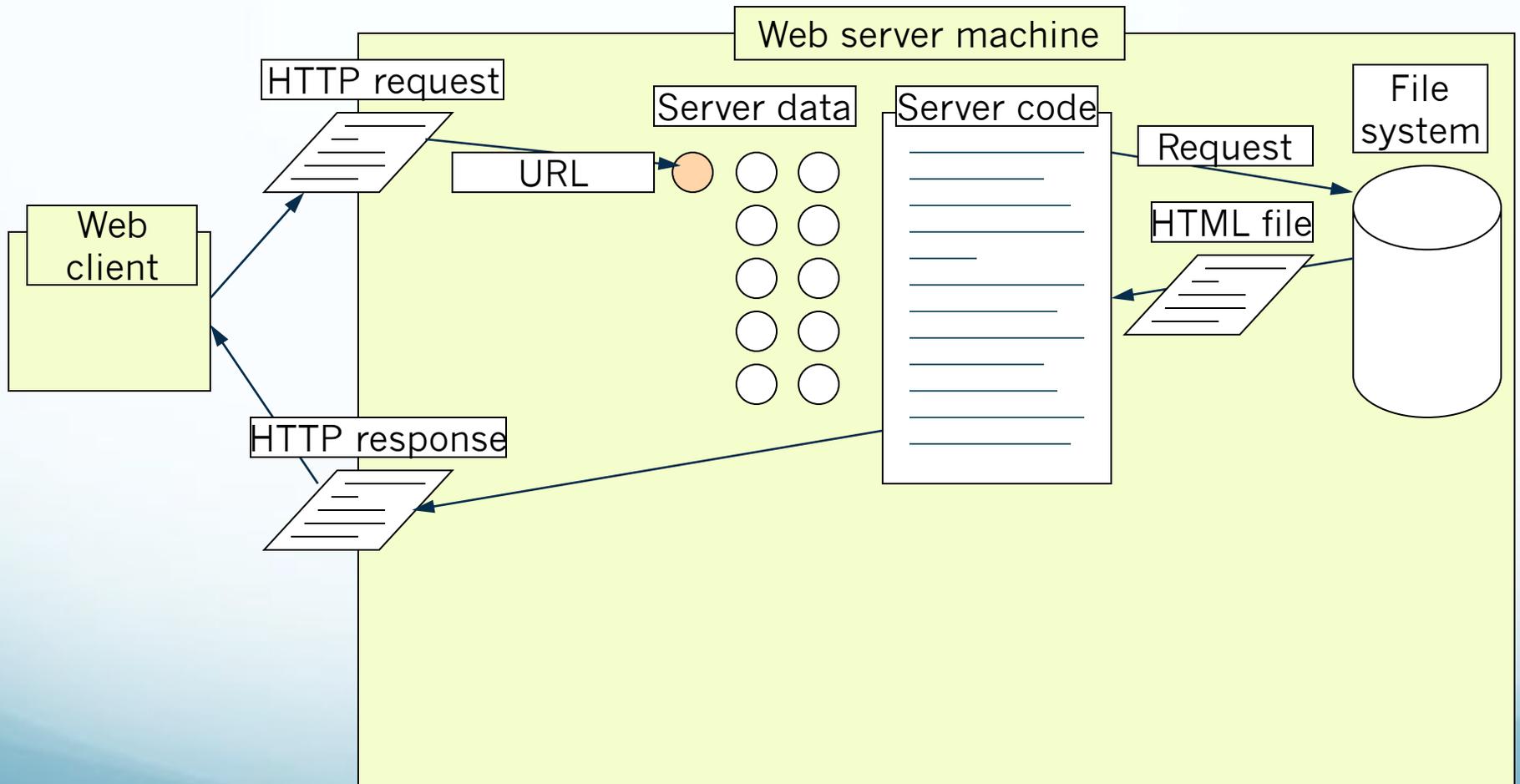
Server Side Programming

Web Programming

Server side programming

- Short history
 - CGI – separate programs launched by web server
 - They produce an HTML document as output
 - They receive arguments as input
 - Strong isolation, bad performance
 - Programs embedded inside web page (php, ASP, JSP)
 - Program executed inside web server process
- What are dynamic pages used for?
 - Personalizing based on user identity
 - Interacting with databases (e.g. online banking)
 - Web applications (e.g. web based email)
- Separate database keeps persistent data

"Lifecycle" of web page



Client Side Programming

Why is JavaScript important?

- Web pages can contain JavaScript programs executed inside the browser
 - Supported by all major browsers
 - Microsoft's version called Jscript (the language is the same)
 - User may disable JavaScript due to security fears
 - This is default for some newer versions of Internet Explorer
- Client-side programming important for web because
 - Can promptly validate user input
 - Can update the web page without postback to server
 - Allows page to react to user actions other than pushing a “submit” button – more interactivity
 - Can be used to create interaction and navigation for mobile applications

What is JavaScript?

- Interpreted, object-oriented programming language with dynamic typing
 - Introduced by Netscape with Netscape 2.0 in 1995
 - Standardized as ECMAScript by ECMA (European Computer Manufacturers Association)
 - Not related to Java other than the name
- Tightly integrated with browser
 - Can handle many types of events generated by the normal interaction between user and browser
 - Can modify the internal objects based on which the browser renders the web page

Adding JavaScript to a page

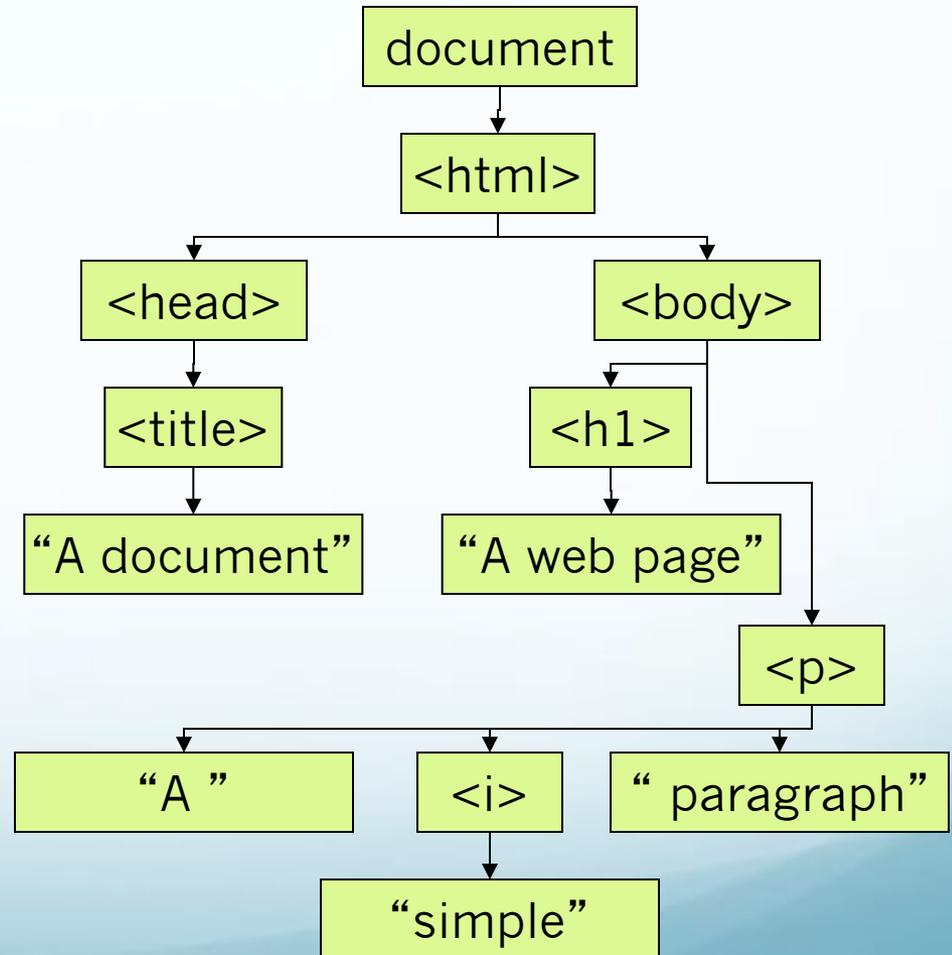
- Using the `<script>` `</script>` tag
 - Text between tags is JavaScript program
 - Can specify external file using `src` attribute
 - Executed as the document is loading
- Value of an attribute such as `onclick`
 - This type of code is called event handler
 - Executed when event happens
 - Can define event handlers for almost any HTML element in page

Document Object Model

- Describes how the document object from JavaScript can be traversed and modified
 - Represented as tree structure
 - Can add new elements to the page
 - Can change attributes of existing elements
- DOM has levels 0-3 and many sub-standards
- The DOM interface used in other contexts with other languages (C++, Java, python, etc.)

The document as a tree

```
<html>
  <head>
    <title>A Document</title>
  </head>
  <body>
    <h1>A web page</h1>
    <p>A <i>simple</i>
paragraph</p>
  </body>
</html>
```



Web Services

What are web services?

- A form of remote procedure call (RPC): your app (the client) asks another computer (the server) to run a procedure for you
 - Parameters sent over the network from client to server
 - Results sent over network from server to client
- Why would you ever want to do a remote procedure call?
 - Data needed for answer not (easily) accessible in app
 - You want to re-use existing procedures that run in a different environment than your app
 - Your device lacks the resources (i.e. processor capacity, memory, network connection speed) to compute the result
- There are many other forms of RPC older than web services
 - CORBA, DCOM, SunRPC, RMI

Internals of an RPC framework

- Code for marshalling/un-marshalling – encoding and decoding parameters/results
 - A.k.a. serializing objects
- Description of the available procedures (methods)
 - Using an interface description language (IDL)
- Framework that turns these descriptions into “stubs”
 - On the client the stub makes it look to your program like the stub is executing the procedure locally
 - On the server the stub invokes the procedure
 - The client and server stub interact over the network

Specific to web services

- They run over http
 - Procedure call is in an http request
 - Result is in an http response
- They use XML to
 - Encode responses
 - Encode requests (sometimes)
 - Describe the procedures (incl. arguments and results)
- Client and server often use different languages
 - Client may be JavaScript code in browser – AJAX
- Client and server are often in different organizations



JQuery

- Powerful JavaScript library
 - Access parts of a page using CSS or XPath-like expressions
 - Modify the appearance of a page
 - Alter the content of a page
 - Change the user's interaction with a page
 - Rich library of methods for AJAX development (AJAX = Asynchronous JavaScript and XML)
 - With jQuery and AJAX, you can request text, HTML, XML, or JSON from a remote server using both HTTP Get and HTTP Post.

Basic JQuery

- Selecting part of a document is a fundamental operation
- A JQuery object is a wrapper for a selected group of DOM nodes
- `$()` function is a factory method that creates JQuery objects
- `$("dt")` is a JQuery object containing all the “dt” elements in the document

Basic JQuery

- `.addClass()` method changes the DOM nodes by adding a 'class' attribute
- The 'class' attribute is a special CSS construct that provides a visual architecture independent of the element structures
- `$("dt").addClass("emphasize")` will change all occurrences of `<dt>` to `<dt class="emphasize">`

Basic JQuery

- To make this change, put it in a function and call it when the document has been loaded and the DOM is created. Example Function:

```
function doEmph() {  
    $("dt").addClass("emphasize")  
}  
<body onLoad="doEmph()">
```

- Structure and appearance should be separated!

Basic JQuery

- JQuery provides an independent scheduling point after DOM is created and before images are loaded:

```
$(document).ready(doEmph);
```

- No HTML changes required. All done in the script.
- Better solution:

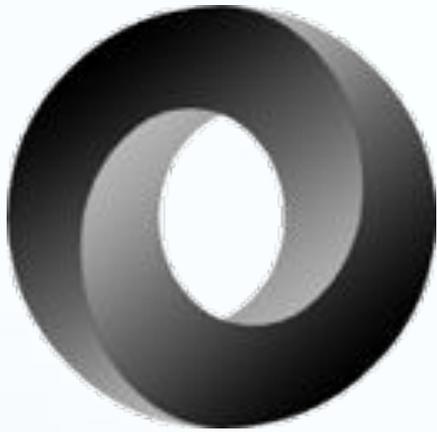
```
$(document).ready(function(){  
    $("dt").addClass("emphasize")  
});
```

```
<html><head>  
<script src="jquery.js" type="text/javascript"></script>  
<script src="test.js" type="text/javascript"></script>  
...
```

JQuery Changes DOM

- `.attr({ 'name', 'value' })`
 - sets a new attribute (or many)
- `$(' <i>hello</i>')`
 - Creates a new element
- `$(' <i>hello</i>').insertAfter('div.chapter p');`
 - Creates element and inserts it into the document
- `.html()` or `.text()` or `.empty()`
 - will replace matched elements with newly created elements

Have you met JSON?



- JSON (JavaScript Object Notation) is a lightweight data-interchange format. It is easy for humans to read and write. It is easy for machines to parse and generate.
- Based on a subset of JavaScript
- JSON is a text format that is completely language independent but uses conventions that are familiar to programmers of the C-family of languages, including C, C++, C#, Java, JavaScript, Perl, Python, and many others.
- These properties make JSON an ideal data-interchange language.

Questions?