

Mobile Web Applications Development with HTML5



Lecture 1: Introduction

**Claudio Riva
Aalto University March 2012**

The Web is Dead!



WIRED AUGUST 2010

2 / 121

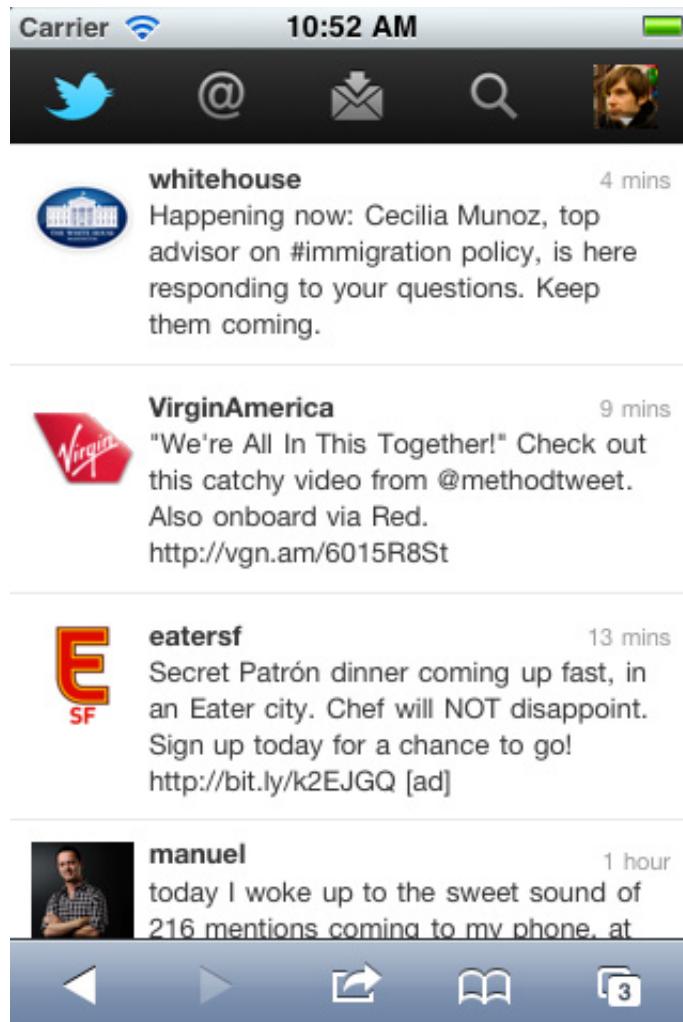
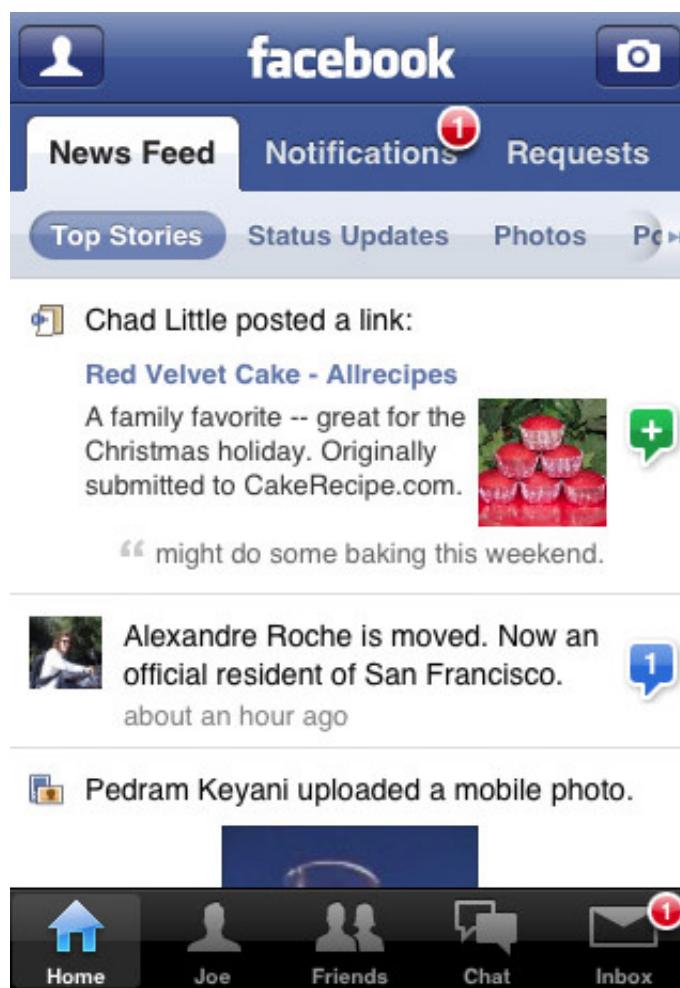
The Web is Dead!



WIRED AUGUST 2010

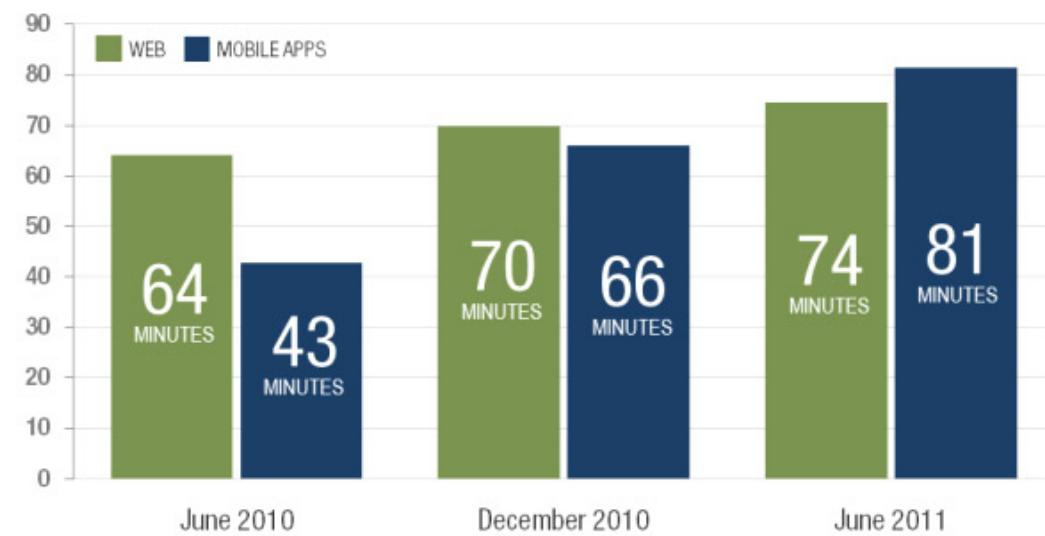


An App for Every Task



More Time is Spent on Mobile Apps

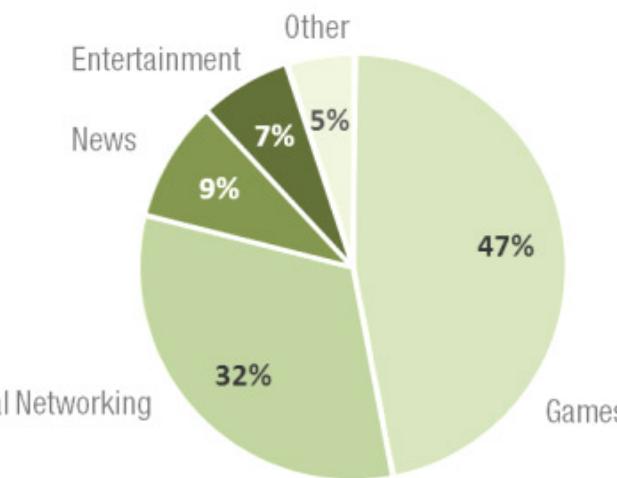
U.S. Mobile Apps vs. Web Consumption, Minutes per Day



FLURRY

Sources: comScore, Alexa, Flurry Analytics

U.S. Mobile App Consumption, Time Spent per Category



Source: Flurry Analytics, May 2011

The Apple Mobile App Economy Asymco

The Apple Mobile App Economy Asymco

- How many total apps have been downloaded on iOS ?

The Apple Mobile App Economy Asymco

- How many total apps have been downloaded on iOS ?
25 billion

The Apple Mobile App Economy Asymco

- How many total apps have been downloaded on iOS ?
25 billion
- What's the gross sales from apps in Q4-11 ?

The Apple Mobile App Economy Asymco

- How many total apps have been downloaded on iOS ?
25 billion
- What's the gross sales from apps in Q4-11 ?
\$1 billion

The Apple Mobile App Economy Asymco

- How many total apps have been downloaded on iOS ?
25 billion
- What's the gross sales from apps in Q4-11 ?
\$1 billion
- How much was paid to developers in Q4-11 ?

The Apple Mobile App Economy Asymco

- How many total apps have been downloaded on iOS ?
25 billion
- What's the gross sales from apps in Q4-11 ?
\$1 billion
- How much was paid to developers in Q4-11 ?
\$700 million

The Apple Mobile App Economy Asymco

- How many total apps have been downloaded on iOS ?
25 billion
- What's the gross sales from apps in Q4-11 ?
\$1 billion
- How much was paid to developers in Q4-11 ?
\$700 million
- On average how many apps were downloaded per unit sold ?

The Apple Mobile App Economy Asymco

- How many total apps have been downloaded on iOS ?
25 billion
- What's the gross sales from apps in Q4-11 ?
\$1 billion
- How much was paid to developers in Q4-11 ?
\$700 million
- On average how many apps were downloaded per unit sold ?
75 apps

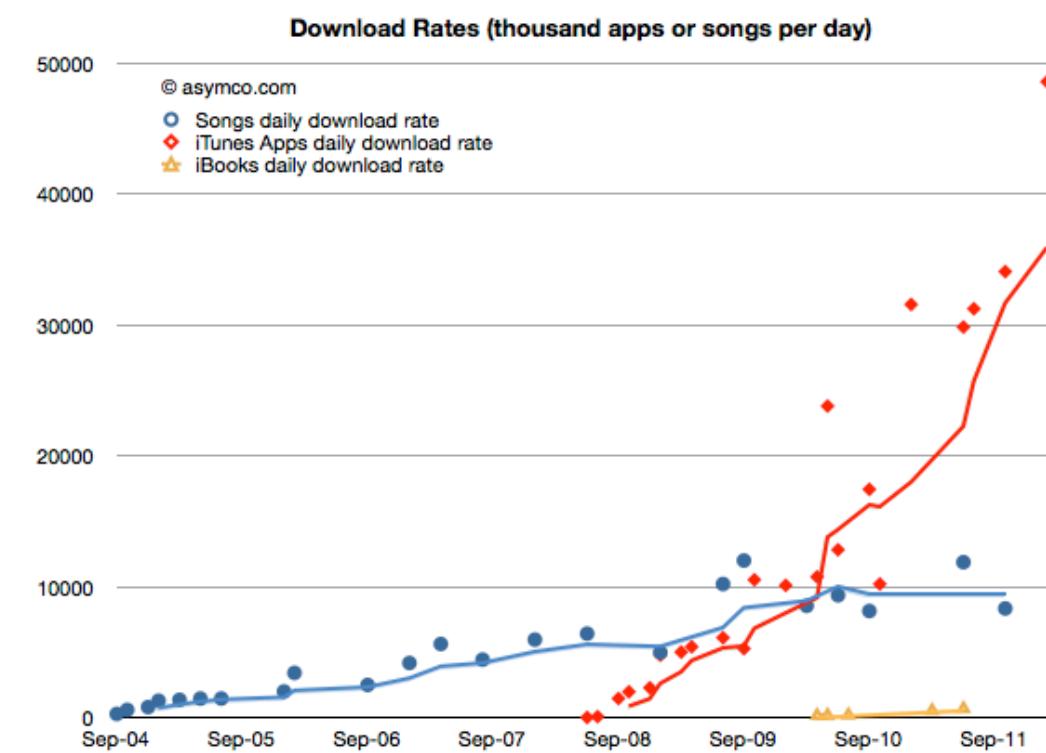
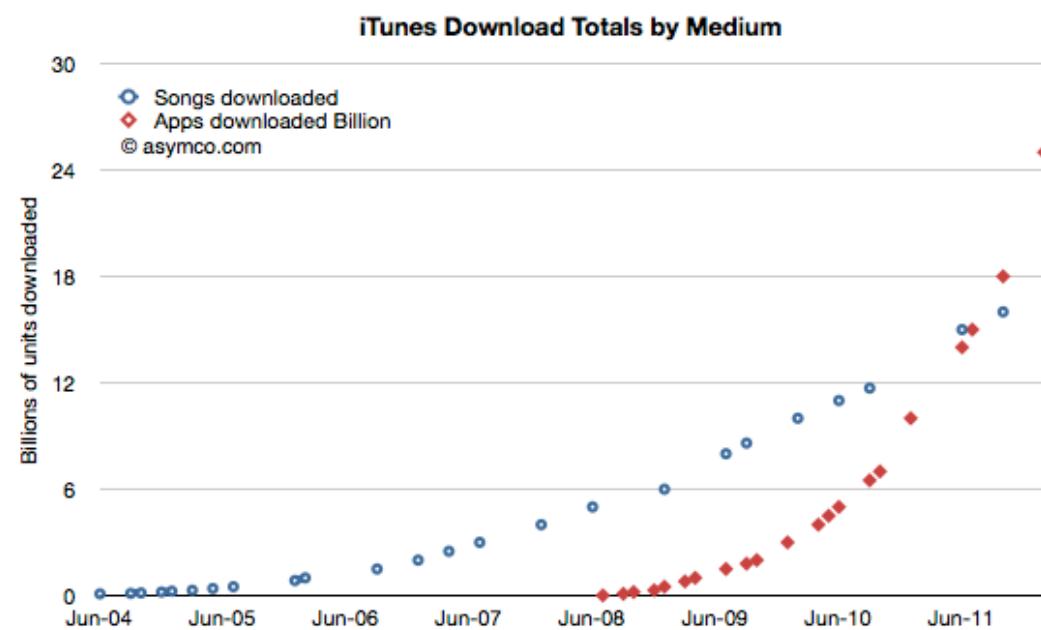
The Apple Mobile App Economy Asymco

- How many total apps have been downloaded on iOS ?
25 billion
- What's the gross sales from apps in Q4-11 ?
\$1 billion
- How much was paid to developers in Q4-11 ?
\$700 million
- On average how many apps were downloaded per unit sold ?
75 apps
- What's the minimum payout to developers per unit sold ?

The Apple Mobile App Economy Asymco

- How many total apps have been downloaded on iOS ?
25 billion
- What's the gross sales from apps in Q4-11 ?
\$1 billion
- How much was paid to developers in Q4-11 ?
\$700 million
- On average how many apps were downloaded per unit sold ?
75 apps
- What's the minimum payout to developers per unit sold ?
\$12

App Downloads on iTunes



Is the Web Dead ?



WIRED AUGUST 2010

Is the Web Dead ?

- If you are reading this, it's not.



WIRED AUGUST 2010

Is the Web Dead ?

- If you are reading this, it's not.
- Wired article was read and discussed mostly on the web



WIRED AUGUST 2010

Is the Web Dead ?

- If you are reading this, it's not.
- Wired article was read and discussed mostly on the web
- HTML5 brings a lot of new cool stuff for web developers



WIRED AUGUST 2010

Is the Web Dead ?

- If you are reading this, it's not.
- Wired article was read and discussed mostly on the web
- HTML5 brings a lot of new cool stuff for web developers
- Companies like Google, Apple, Adobe, Microsoft are embracing HTML5



WIRED AUGUST 2010

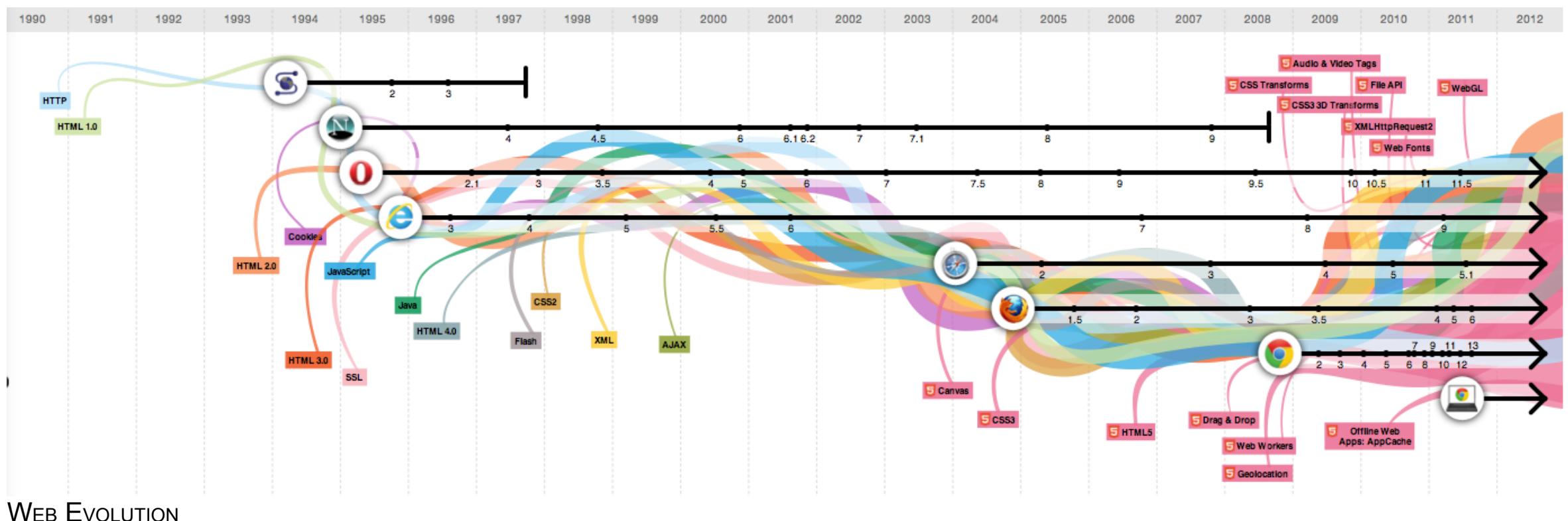
Is the Web Dead ?

- If you are reading this, it's not.
- Wired article was read and discussed mostly on the web
- HTML5 brings a lot of new cool stuff for web developers
- Companies like Google, Apple, Adobe, Microsoft are embracing HTML5
- Many apps are built in HTML5 and wrapped with a native shell



WIRED AUGUST 2010

Evolution of the Web (Browsers)



Shifting from the "Document Web" to the "App Web"

Shifting from the "Document Web" to the "App Web"

Hyperlinked documents

Page reloading

Static pages

Web servers

Static content

Shifting from the "Document Web" to the "App Web"

Hyperlinked documents

Interactive web apps

Page reloading

Asynchronous API calls

Static pages

HTML + CSS + JS

Web servers

Data hubs (web apis)

Static content

Real-time communication

Shifting from the "Document Web" to the "App Web"

Hyperlinked documents

Interactive web apps

Page reloading

Asynchronous API calls

Static pages

HTML + CSS + JS

Web servers

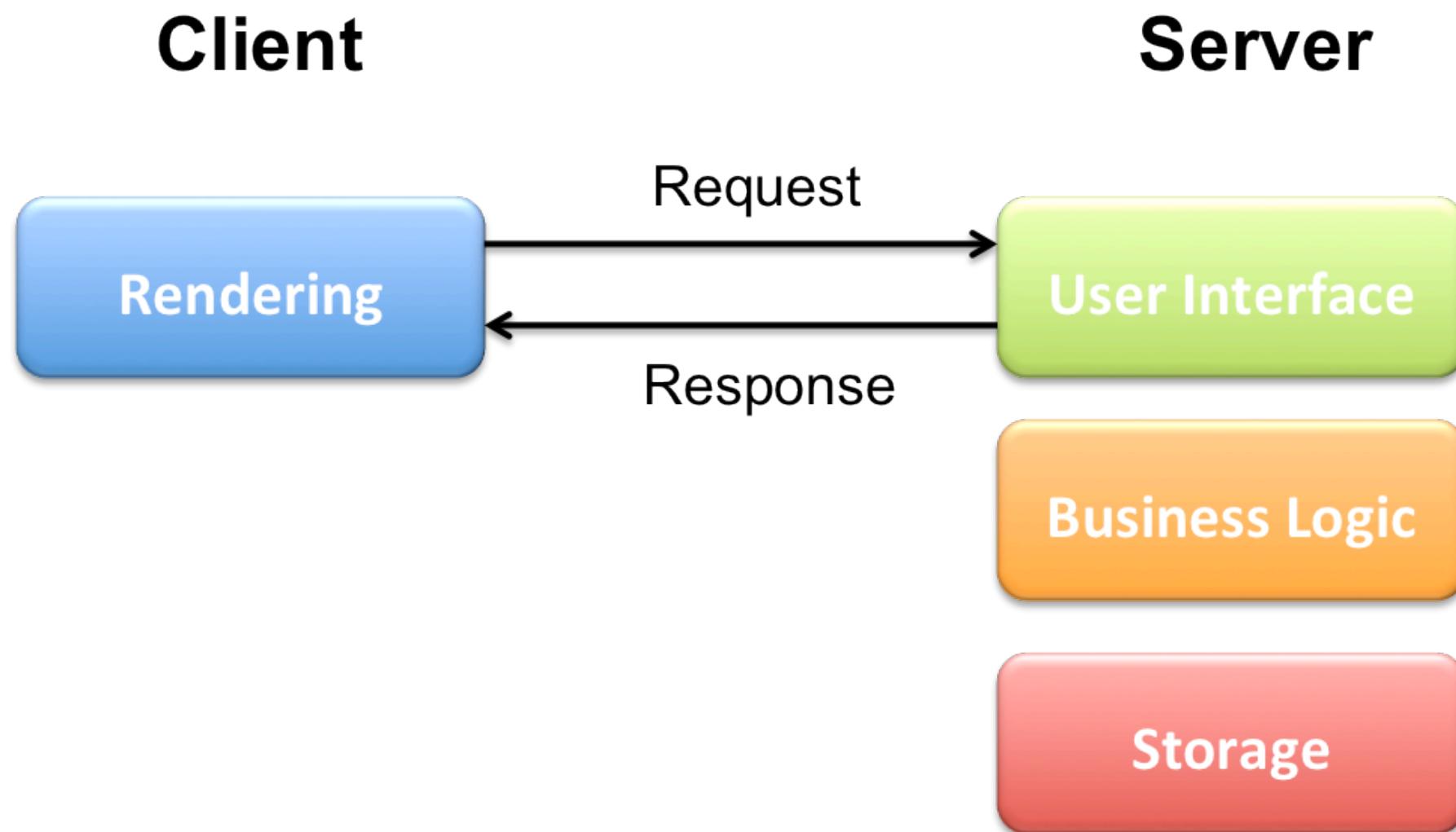
Data hubs (web apis)

Static content

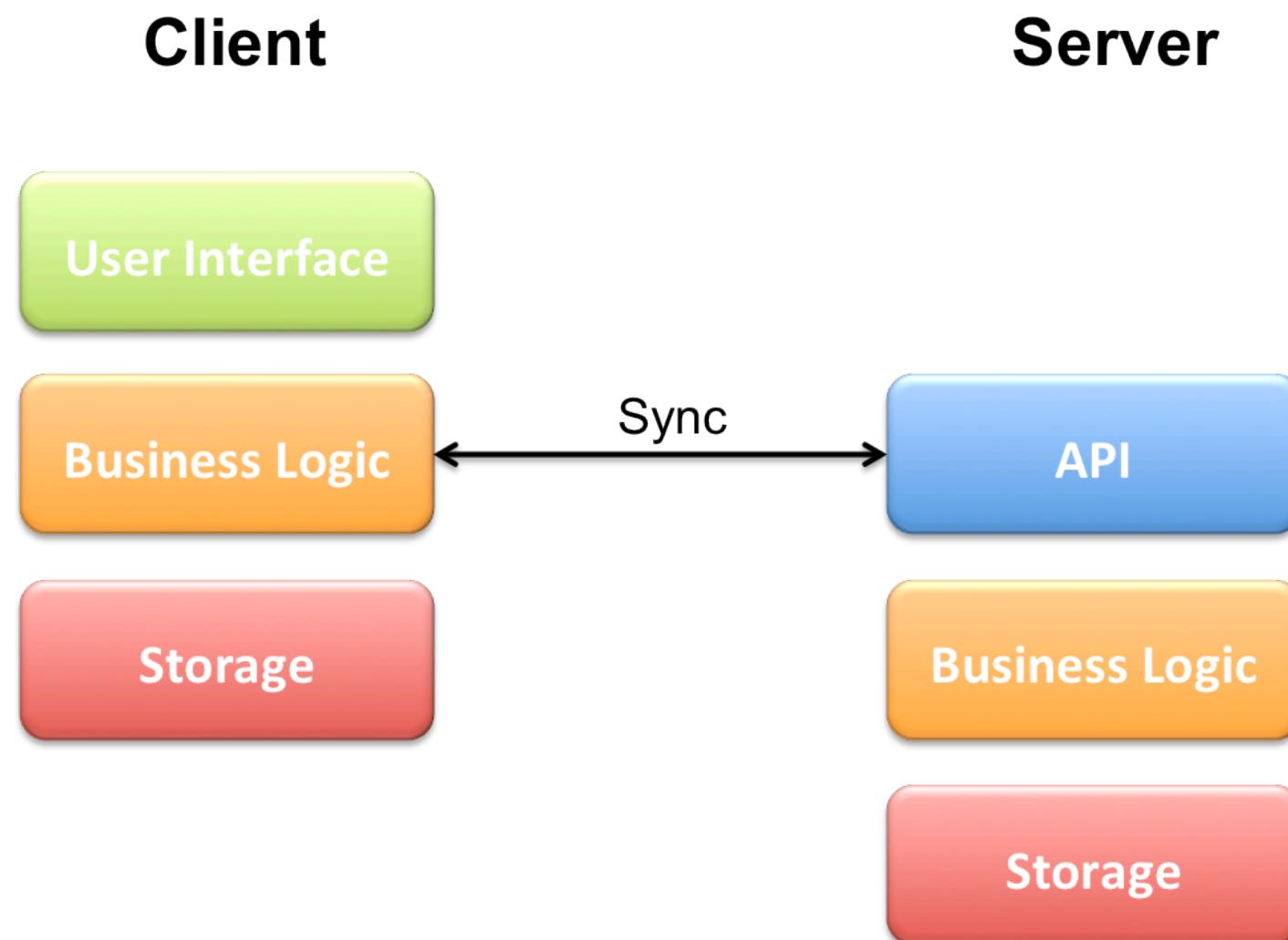
Real-time communication

Web apps are built with open standards that are referred as "Web Technologies"

The Classic Web Architecture



Towards a New Web Architecture



Shom me a "Mobile Web App"



FT Web App [\(more info\)](#)

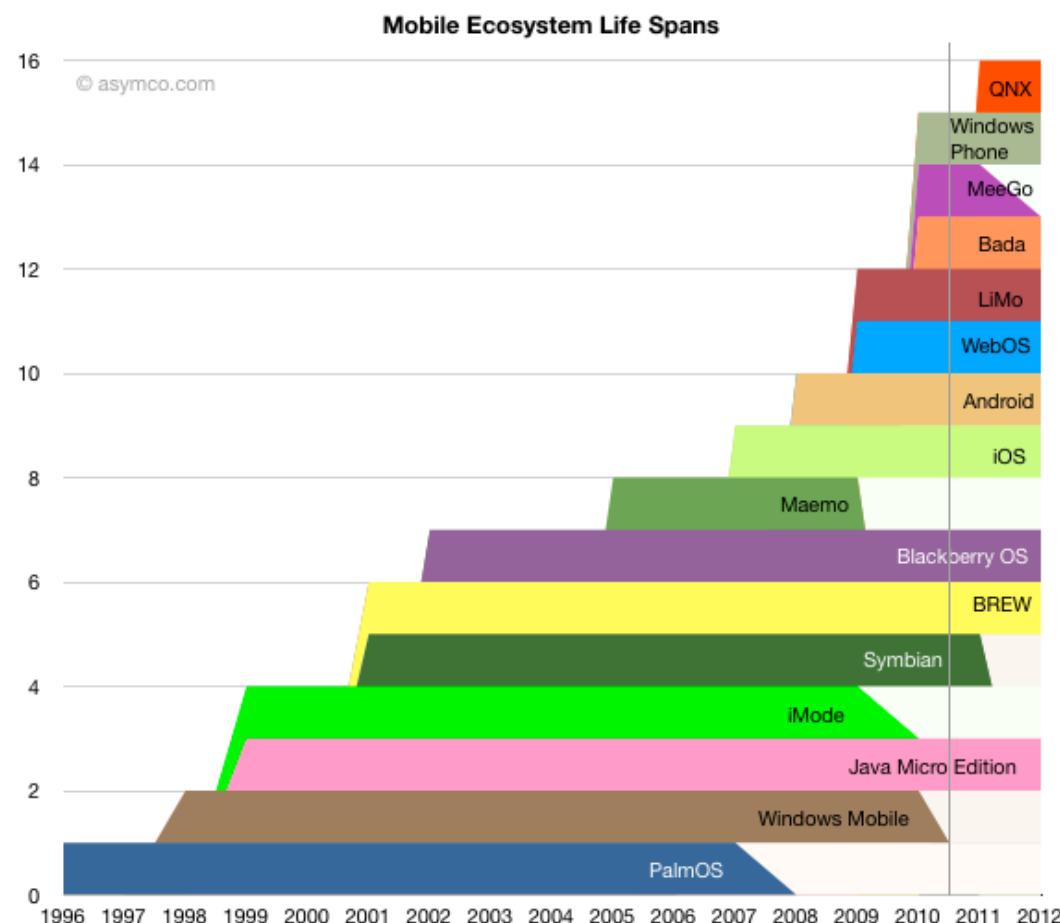
- Developed in 8 months by 3 people
- Hugely optimized for iOS
- Great and responsive UI design
 - Content balancing based on device type
 - Audio playing while moving to other pages
 - Continuos carousel
 - Preloading of content
 - Swipes using touch gestures
- Offline access
- More engagement than native app

LinkedIn App



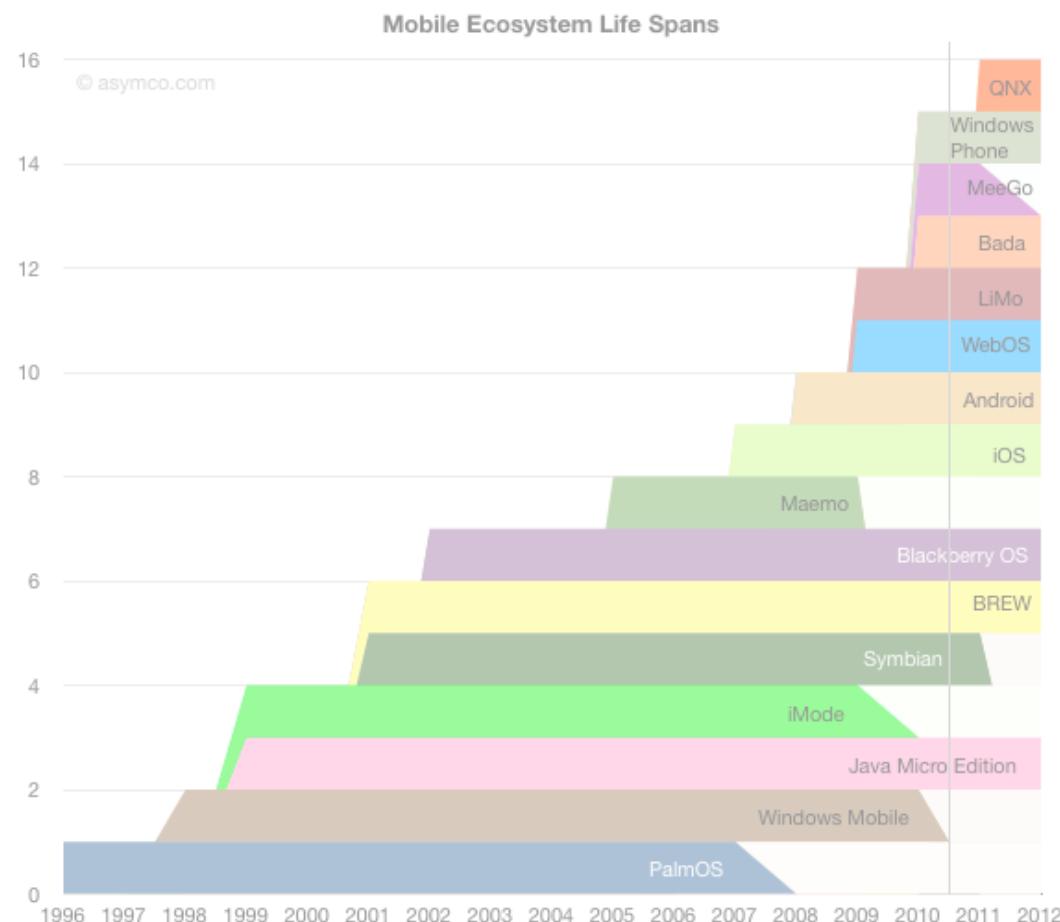
Developing Native Apps for Multiple Platforms

Developing Native Apps for Multiple Platforms



ASYMCO FEB 2011

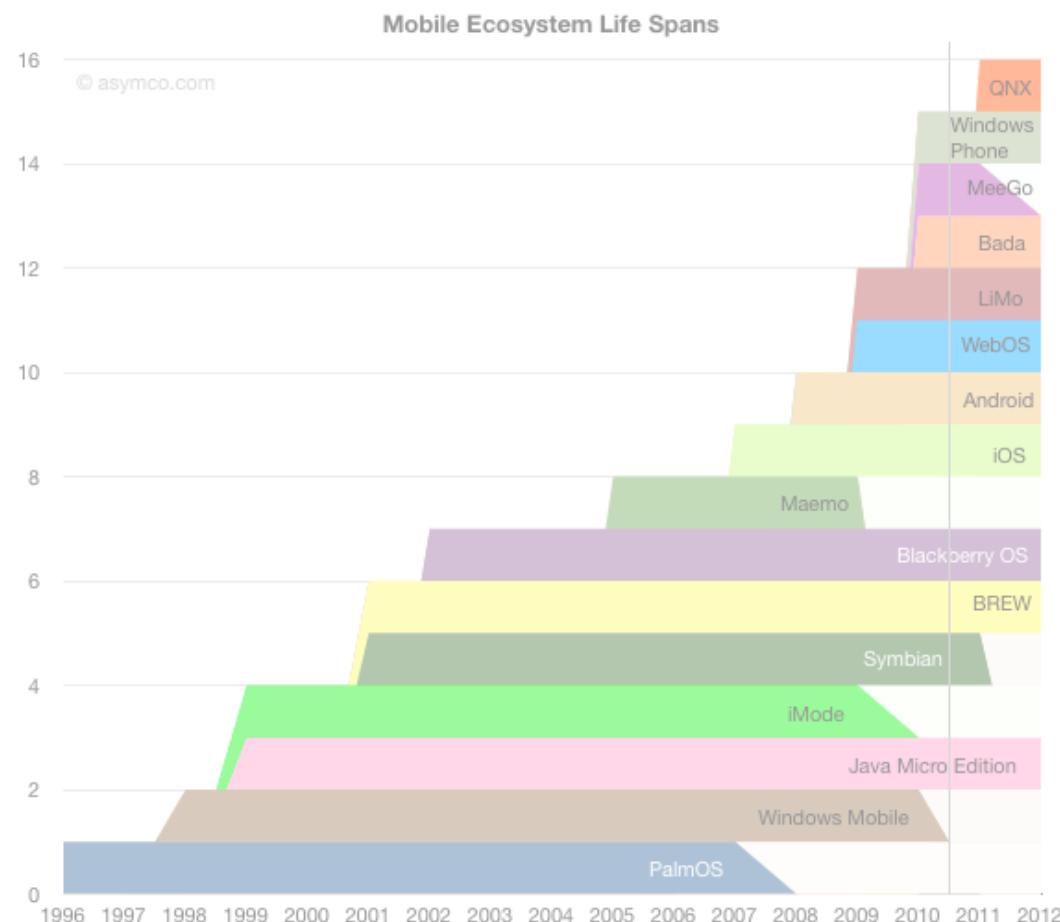
Developing Native Apps for Multiple Platforms



We must have:

ASYMCO FEB 2011

Developing Native Apps for Multiple Platforms

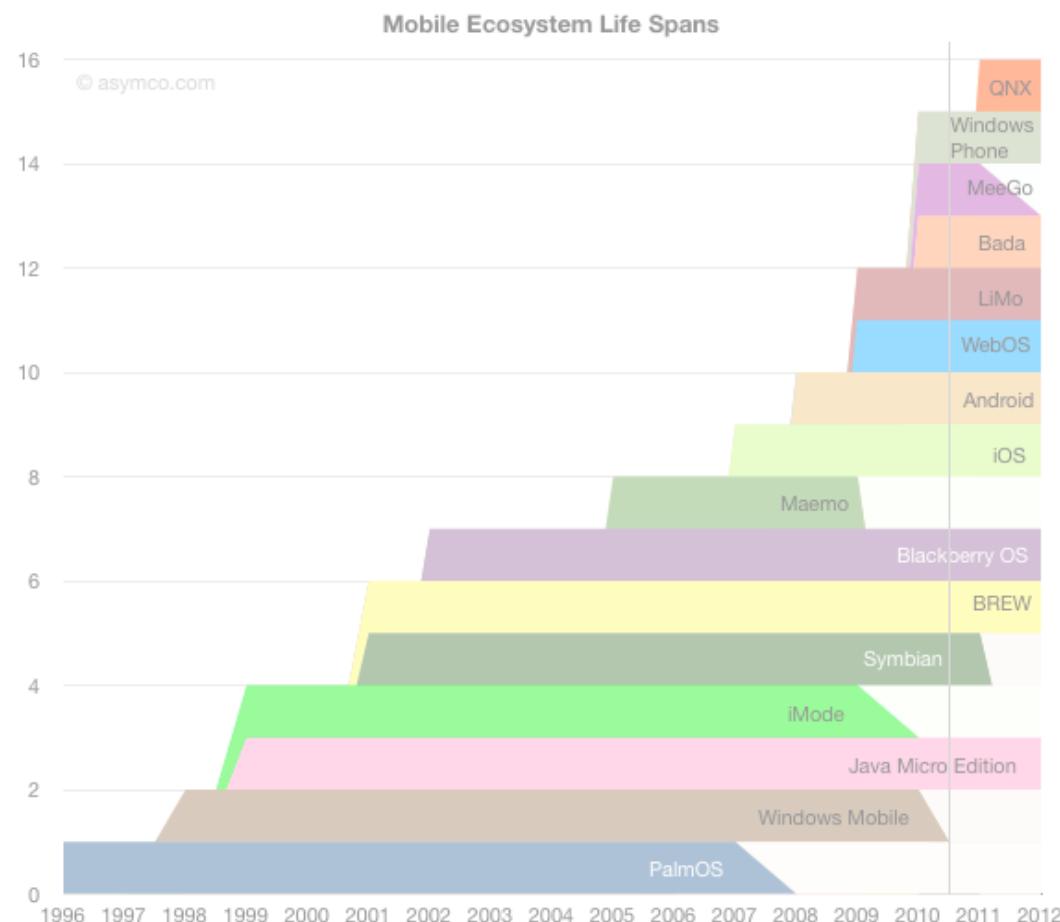


We must have:

- 2008 - iPhone Apps

ASYMCO FEB 2011

Developing Native Apps for Multiple Platforms

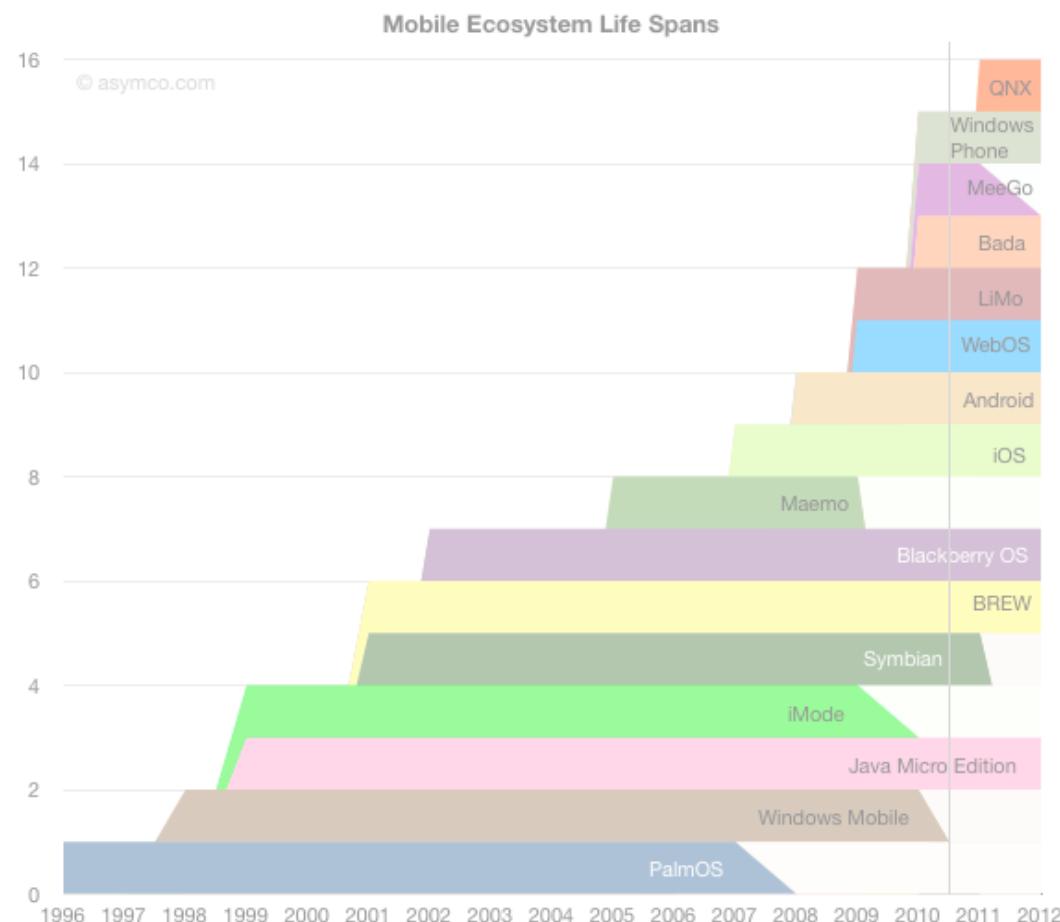


We must have:

- 2008 - iPhone Apps
- 2009 - Android App

ASYMCO FEB 2011

Developing Native Apps for Multiple Platforms

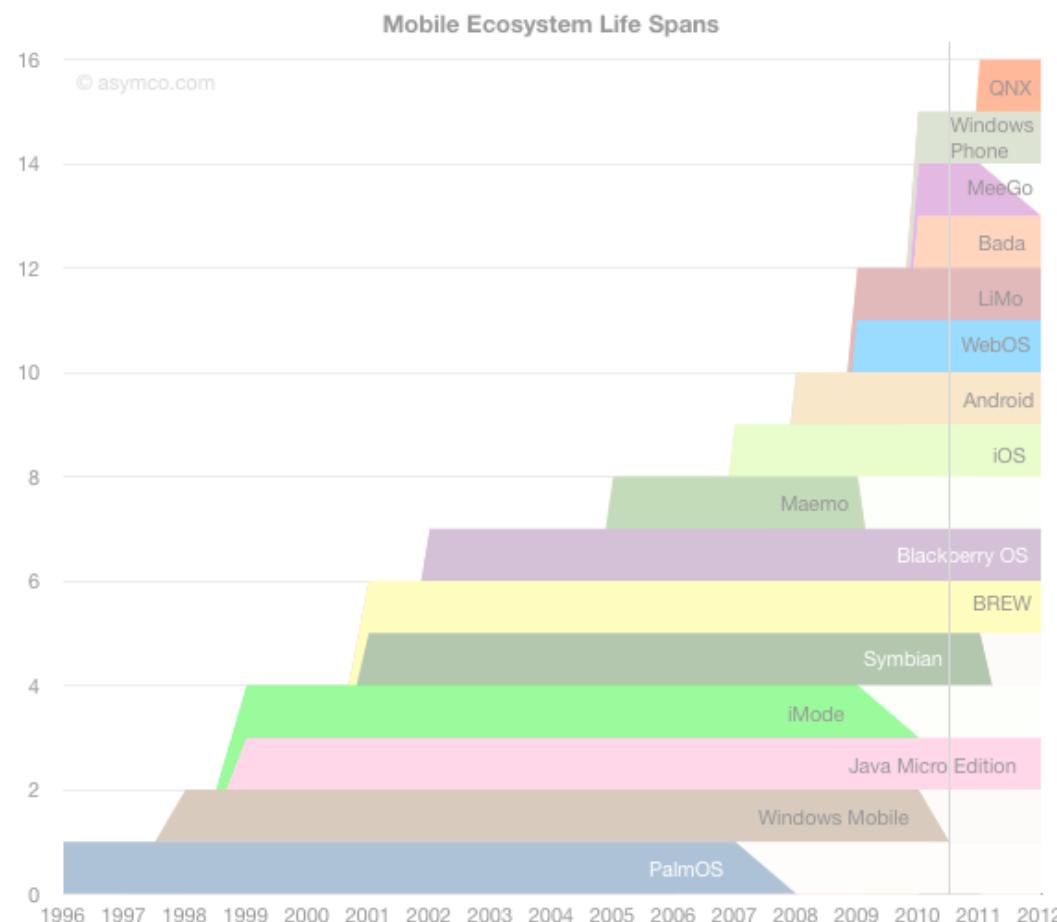


We must have:

- 2008 - iPhone Apps
- 2009 - Android App
- 2010 - iPad App

ASYMCO FEB 2011

Developing Native Apps for Multiple Platforms



ASYMCO FEB 2011

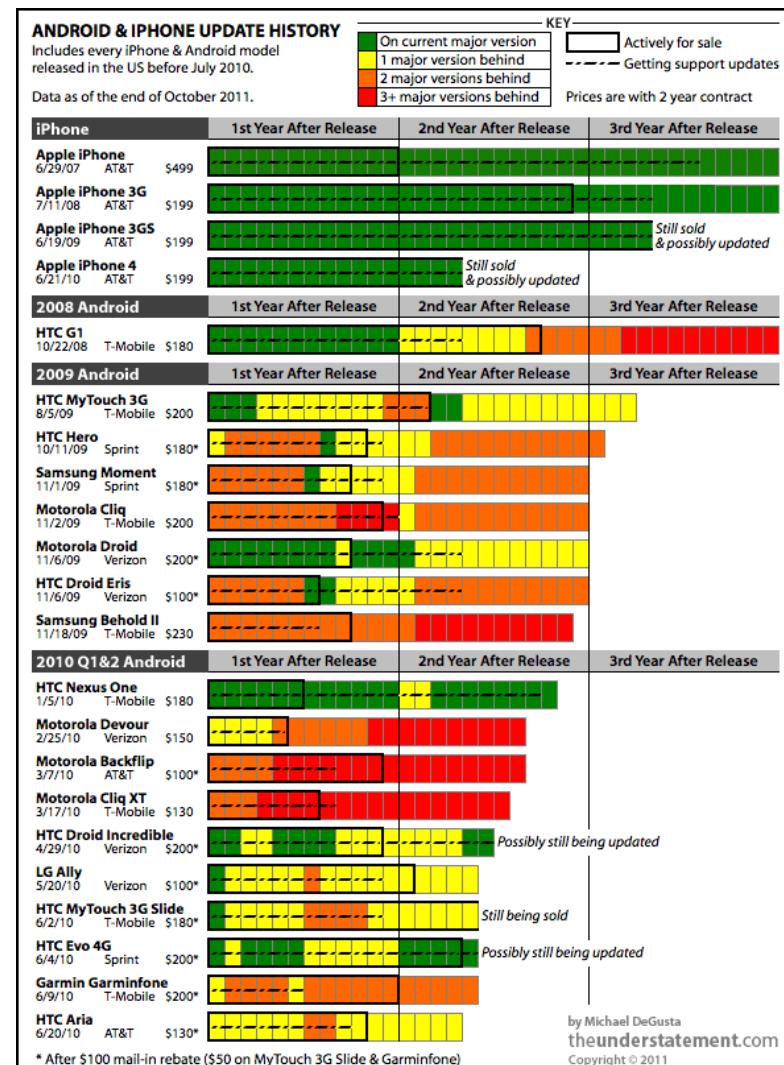
We must have:

- 2008 - iPhone Apps
- 2009 - Android App
- 2010 - iPad App
- 2011 - maintain them ???

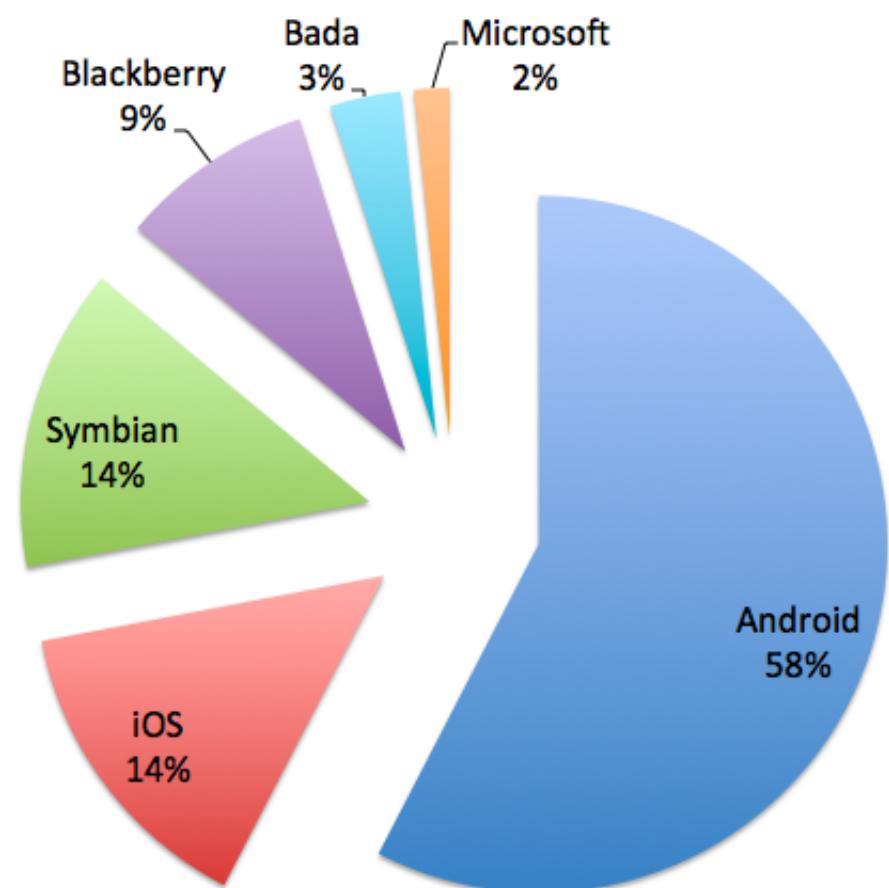
Develop, Test and Maintain



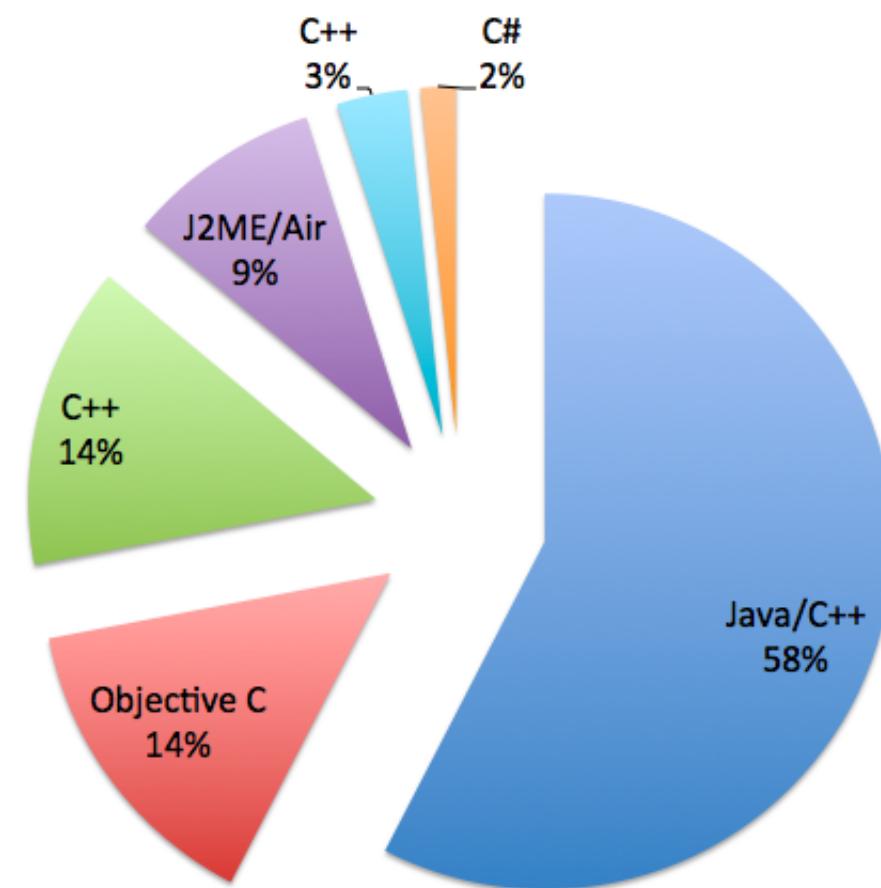
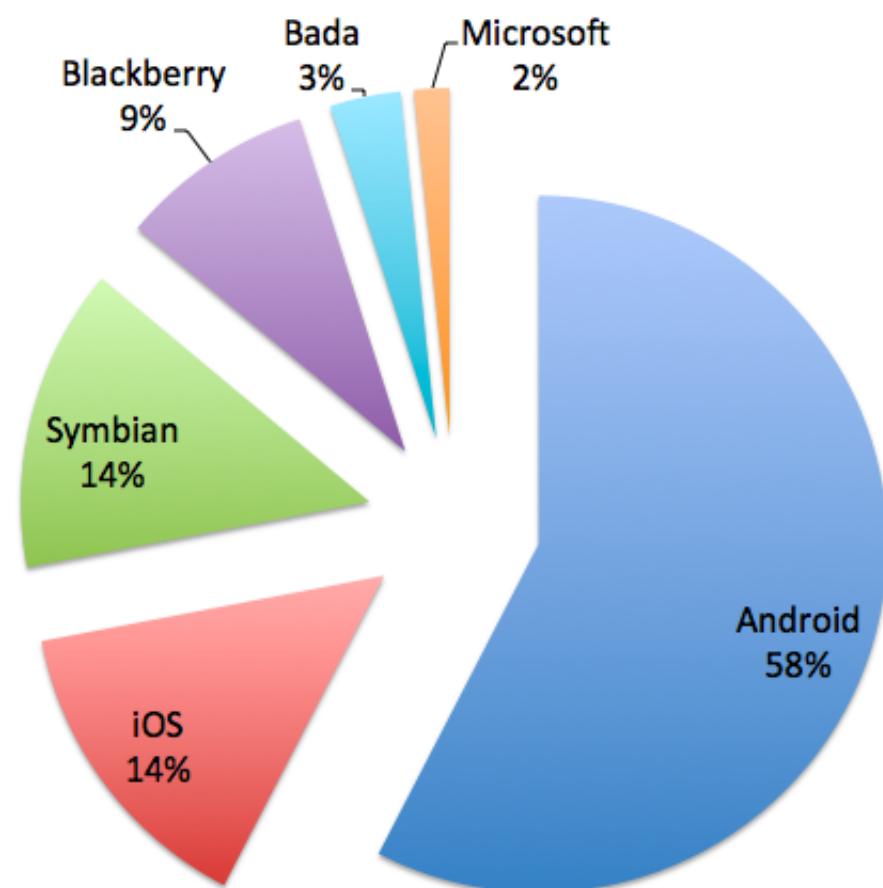
Fragmentation of OS Versions



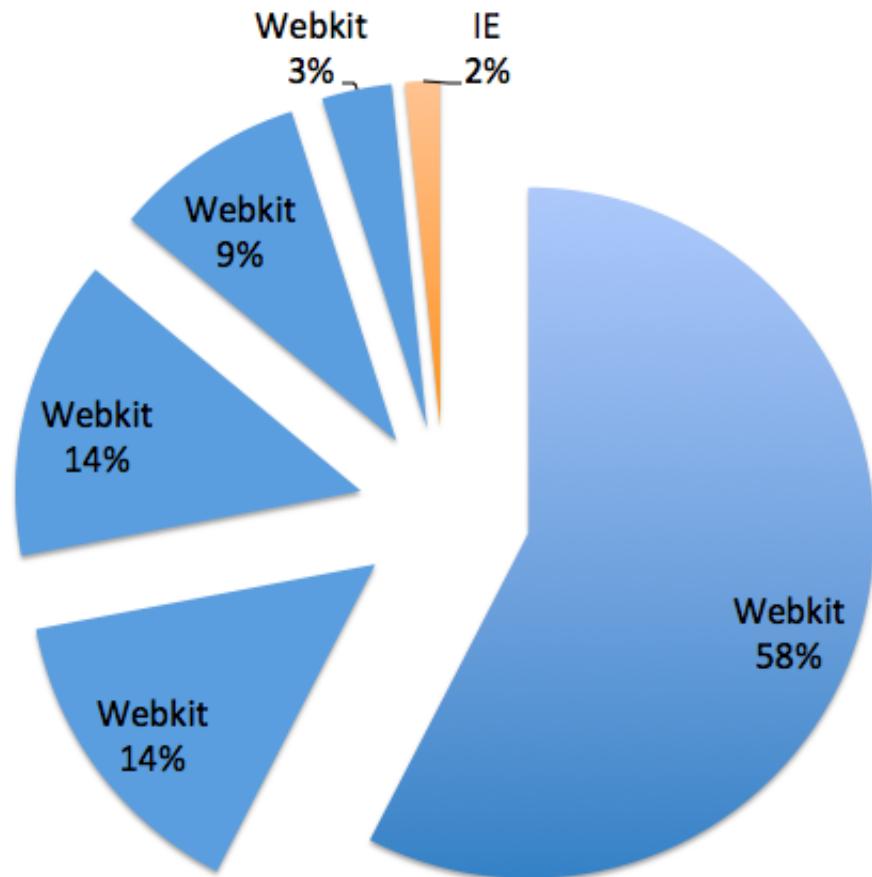
Smartphone Platforms Shares (units shipped Q4 2011)



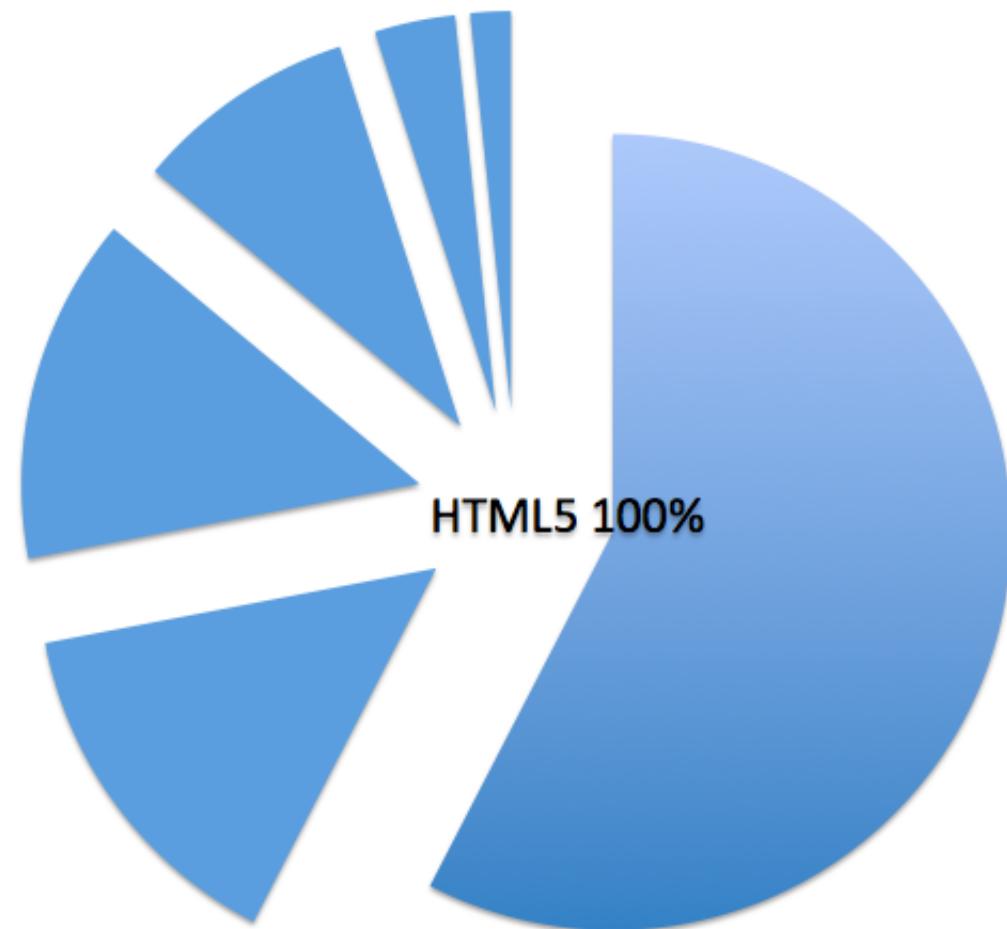
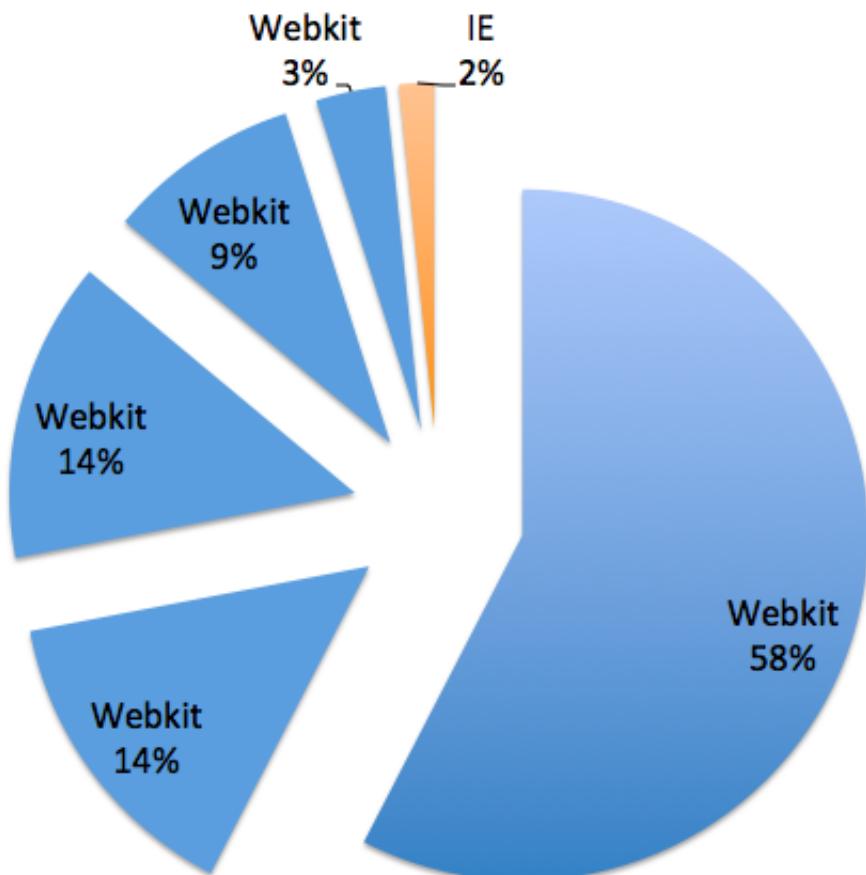
Smartphone Platforms Shares (units shipped Q4 2011)



Smartphone Browsers Shares (units shipped Q4 2011)



Smartphone Browsers Shares (units shipped Q4 2011)



What is HTML5 ?

1998 - W3C decided they will stop evolving HTML beyond version 4.01

2000 - W3C released XHTML 1.0 and force the world to use XML

2002 - W3C released first draft of XHTML 2.0, no backwards compatibility

2004 - WHATWG started working on HTML v5 (Opera, Mozilla and Apple)

2006 - W3C agrees to use WHATWG proposal for HTML5

2009 - W3C stops works on XHTML 2.0 and resources are diverted to HTML5

Philposphy of HTML5

Philosophy of HTML5

- Specify undocumented features (e.g. XMLHttpRequest)
- Browser behaviour with invalid markup
- Support web applications
- Define an open standard (opposed to Flash)
- Don't break the Web

[HTML5 Spec at WHATWG](#)

[Some additional specs at W3C](#)

HTML5



New semantics



CSS3



3D, Graphics and Effects



Offline & Storage



Connectivity



Device Access



Multimedia



Performance & Integration



New Semantics

New Semantics

section, header, footer, nav, ...

New Form Controls & Types

date, range, email, url, tel, ...

New Form Validation

by type, required, :valid, :invalid, :required

Offline Storage

Offline Usage

- Install a package on the device
- Buggy on some platforms
- online/offline events
- iOS full screen metatag

Storage

- Persistent and Session Storage
- key/value (strings)
- limited to 5Mb
- IndexDB and SQL storage



Multimedia

Audio and Video Tags

Javascript API & events

Some codecs supported



3D, Graphics and Effects

2D Canvas API

SVG support

WebGL

Device Access

Accelerometer / gyroscope / magnetometer

Orientation change

Touch events (touchstart, touchmove, touchend)

File API and File Reader

(Media Camera API)

CSS3 and Styling

New styling

Rounded borders, shadows, opacity

2D & 3D transforms

rotate, scale, skew, translate

Transitions

basic animations between 2 states

keyframe animations

prefixes (-webkit, -o, -moz, -ms)



WebSockets

Web Sockets

Server-sent Events



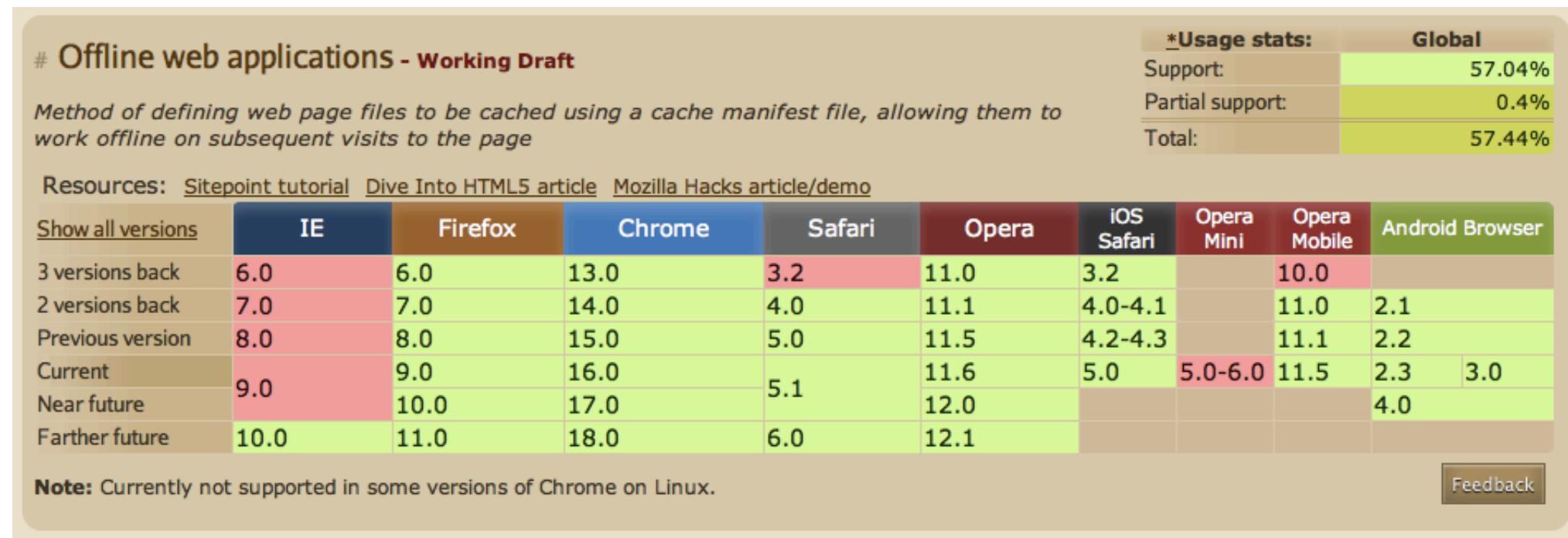
Performance & Integration

Notifications API

XMLHttpRequest 2

Web Workers

Browser Support for HTML5



WHEN CAN I USE ...

Test your Browser for HTML5 support

your browser scores

373

AND 15 BONUS POINTS

out of a total of 475 points

You are using Chrome 16.0.912.63 on Mac OS X Correct? ✓ ✗

Parsing rules 2 bonus points **11**

<!DOCTYPE html> triggers standards mode	Yes ✓
HTML5 tokenizer	Yes ✓
HTML5 tree building	Yes ✓

HTML5 defines rules for embedding SVG and MathML inside a document.

ABOUT THE TEST

The HTML5 test score is an indication of how well your browser supports the upcoming HTML5 standard and related specifications. Even though the specification isn't finalized yet, all major browser manufacturers are making sure their browser is ready for the future. Find out which parts of HTML5 are already supported by your browser today and compare the results with other browsers.

HTML5

SPONSORS

directCanvas Makes **HTML5** **BLAZINGLY FAST**

THE HTML5 TEST

Mobile Browsers

Mobile Browsers

Too many

Mobile Browsers

Too many

Some are limited

Mobile Browsers

Too many

Some are limited

Some are too innovative

Mobile Browsers

Too many

Some are limited

Some are too innovative

Some are proxy based

Mobile Browsers

Too many

Some are limited

Some are too innovative

Some are proxy based

Most have little documentation

Mobile Browsers

Too many

Some are limited

Some are too innovative

Some are proxy based

Most have little documentation

Most have little debugging support

Mobile Browsers

Too many

Some are limited

Some are too innovative

Some are proxy based

Most have little documentation

Most have little debugging support

Focus, cursor, touch or multi-touch based

Mobile HTML5 Compatibility Table

Feature	Safari on iOS	Android Browser		BlackBerry Browser		Nokia Browser		Internet Explorer	Opera		Firefox	webOS Browser
Version tested	iPhone, iPad	Phones (1-2.3, 4.0)	Tablets (3.0+)	Phones	Tablet	Meego - Nokia N9	Symbian	Windows Phone	Mobile	Mini	Android	
Minimum version tested	3.2	1.5	3.0	5.0	1.0	1.2	^3	9	11	5	6	1.4
Application Cache <small>W3C API</small> Offline package installation.	✓	✓ 2.1+	✓	✓ 6.0+	✓	✓			✓		✓	✓
Web storage <small>W3C API</small> Persistent and session storage.	✓	✓ 2.0+	✓	✓ 6.0+	✓	✓		✓	✓		✓	✓
Web SQL storage <small>W3C API (no active)</small> Persistent SQLite storage.	✓	✓ 2.0+	✓	✓ 6.0+	✓	✓			✓			✓
Geolocation <small>W3C API</small> Geolocation & tracking using GPS, cells or Wi-Fi.	✓	✓ 2.0+	✓	✓ 6.0+	✓	✓		✓	✓		✓	✓
Multimedia <small>W3C API</small> Video & Audio Players	✓	✓ 2.3+	✓	✓ 7.0+	✓	✓		✓	✓		✓	✓
Server-Sent Events <small>W3C API</small> EventSource pattern to maintain the connection to the server open	✓ 4.1+					✓			✓		✓	
Web Sockets <small>W3C API</small> New bidirectional protocol over HTTP	✓ 4.2+			✓ 6.1+	✓				✓		✓ 7+	

Mobile Web Challenges

Mobile Web Challenges

Server-side detection

Mobile Web Challenges

Server-side detection

Responsive design

Mobile Web Challenges

Server-side detection

Responsive design

Mobile usability

Mobile Web Challenges

Server-side detection

Responsive design

Mobile usability

Best experience based on context

Mobile Web Challenges

Server-side detection

Responsive design

Mobile usability

Best experience based on context

Performance optimization

Mobile Web Challenges

Server-side detection

Responsive design

Mobile usability

Best experience based on context

Performance optimization

The viewport and pixel density

Mobile Web Challenges

Server-side detection

Responsive design

Mobile usability

Best experience based on context

Performance optimization

The viewport and pixel density

Data URI - inlining content

HTML5 Frameworks & Tools

UI



Helpers



BACKBONE.JS



handlebars

Dev Tools



CoffeeScript

Sass.

Haml.

Backend



Sinatra



django[®]

Database

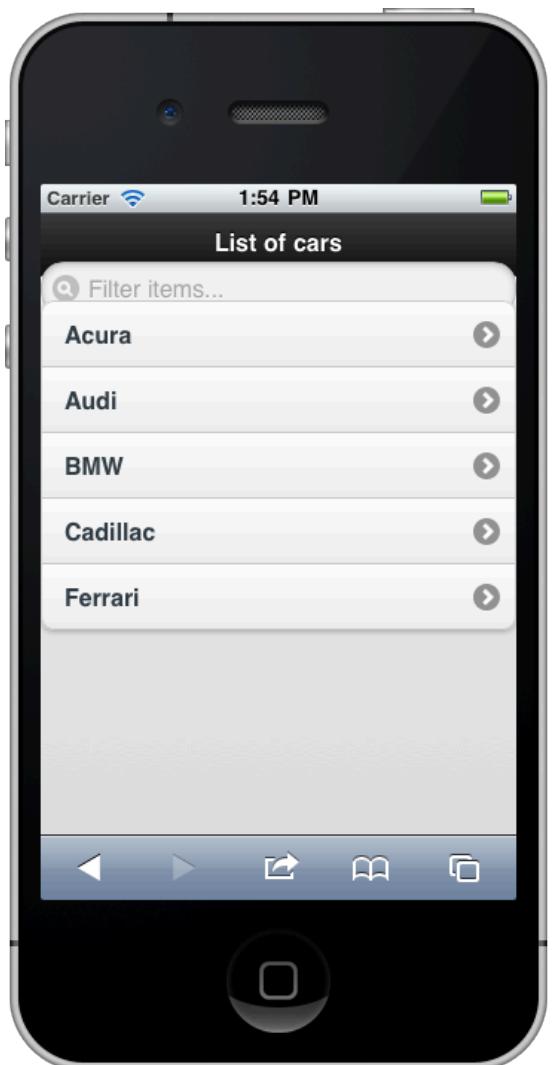


apache
CouchDB

jQuery Mobile Example jQuerySimple

```
<!DOCTYPE html>
<html>
  <head>
    <title>Hello World</title>
    <meta name="viewport" content="width=device-width, initial-scale=1">
    <link rel="stylesheet" href="http://code.jquery.com/mobile/1.0/jquery.mobile-1.0.min.css" />
    <script type="text/javascript" src="http://code.jquery.com/jquery-1.6.4.min.js"></script>
    <script type="text/javascript" src="http://code.jquery.com/mobile/1.0/jquery.mobile-1.0.min.js"></script>
  </head>
  <body>
    <div data-role="page">
      <div data-role="header">
        <h1>List of cars</h1>
      </div><!-- /header -->
      <ul data-role="listview" data-inset="true" data-filter="true">
        <li><a href="#">Acura</a></li>
        <li><a href="#">Audi</a></li>
        <li><a href="#">BMW</a></li>
        <li><a href="#">Cadillac</a></li>
        <li><a href="#">Ferrari</a></li>
      </ul>
    </div><!-- /page -->
  </body>
</html>
```

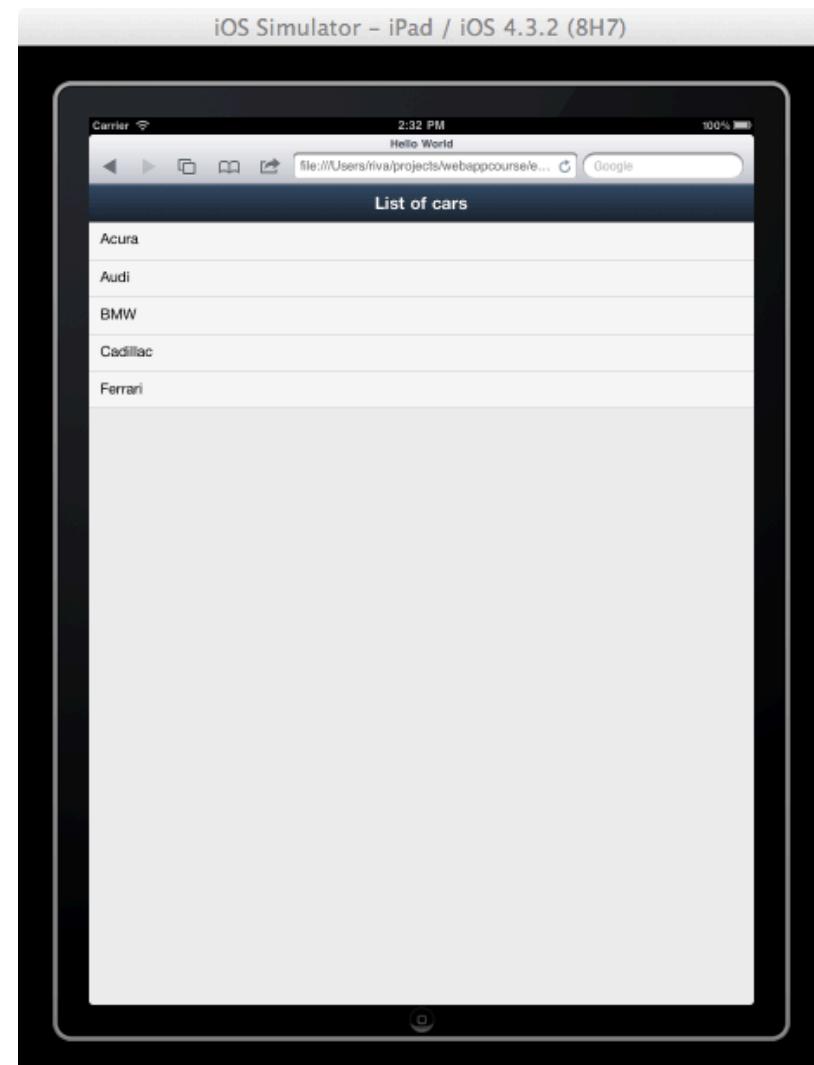
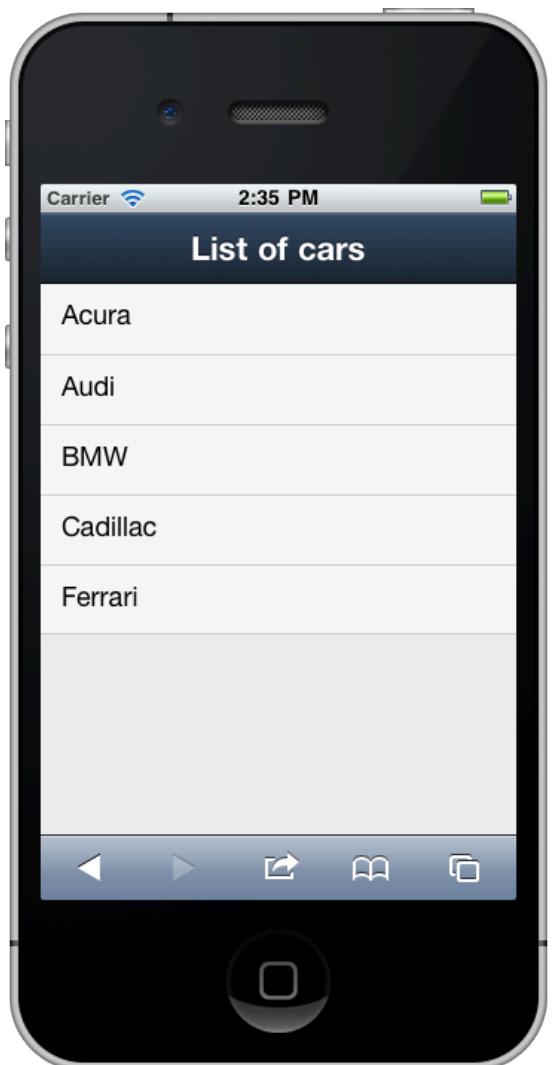
jQuerySimple on a iPhone and iPad



Sencha Example senchaSimple

```
<!DOCTYPE html>
<html>
  <head>
    <meta http-equiv="Content-Type" content="text/html; charset=utf-8">
    <title>Hello World</title>
    <script src="sencha-touch.js" type="text/javascript"></script>
    <link href="sencha-touch.css" rel="stylesheet" type="text/css" />
    <script type="text/javascript">
      new Ext.Application({
        launch: function() {
          var cars = new Ext.data.Store({
            model: Ext.regModel('', {fields: ['name', 'link']}),
            data: [
              {name: 'Acura', link:'na'},
              {name: 'Audi', link:'sa'},
              {name: 'BMW', link:'eu'},
              {name: 'Cadillac', link:'eu'},
              {name: 'Ferrari', link:'eu'}
            ]
          });
          new Ext.Panel({
            fullscreen: true,
            dockedItems: [{ xtype: 'toolbar', title: 'List of cars' }],
            items: [{ xtype: 'list', store: cars, itemTpl: '{name}' }]
          });
        }
      });
    </script>
  </head>
  <body></body>
</html>
```

senchaSimple on a iPhone and iPad



Hey dude, native is better!

Hey dude, native is better!

- Is HTML5 a silver bullet ?

Hey dude, native is better!

- Is HTML5 a silver bullet ?
No, but silver bullets don't exist.

Hey dude, native is better!

- Is HTML5 a silver bullet ?
No, but silver bullets don't exist.
- HTML5 performance is not good enough ?

Hey dude, native is better!

- Is HTML5 a silver bullet ?
No, but silver bullets don't exist.
- HTML5 performance is not good enough ?
Sometimes, it is not enough.

Hey dude, native is better!

- Is HTML5 a silver bullet ?
No, but silver bullets don't exist.
- HTML5 performance is not good enough ?
Sometimes, it is not enough.
- HTML5 is more efficient to develop ?

Hey dude, native is better!

- Is HTML5 a silver bullet ?
No, but silver bullets don't exist.
- HTML5 performance is not good enough ?
Sometimes, it is not enough.
- HTML5 is more efficient to develop ?
Yes, sometimes. Look at FT case.

Hey dude, native is better!

- Is HTML5 a silver bullet ?
No, but silver bullets don't exist.
- HTML5 performance is not good enough ?
Sometimes, it is not enough.
- HTML5 is more efficient to develop ?
Yes, sometimes. Look at FT case.
- HTML5 lacks good tools

Hey dude, native is better!

- Is HTML5 a silver bullet ?
No, but silver bullets don't exist.
- HTML5 performance is not good enough ?
Sometimes, it is not enough.
- HTML5 is more efficient to develop ?
Yes, sometimes. Look at FT case.
- HTML5 lacks good tools
Changing fast (check Sencha)

Hey dude, native is better!

- Is HTML5 a silver bullet ?
No, but silver bullets don't exist.
- HTML5 performance is not good enough ?
Sometimes, it is not enough.
- HTML5 is more efficient to develop ?
Yes, sometimes. Look at FT case.
- HTML5 lacks good tools
Changing fast (check Sencha)
- HTML5 doesn't have an appstore

Hey dude, native is better!

- Is HTML5 a silver bullet ?
No, but silver bullets don't exist.
- HTML5 performance is not good enough ?
Sometimes, it is not enough.
- HTML5 is more efficient to develop ?
Yes, sometimes. Look at FT case.
- HTML5 lacks good tools
Changing fast (check Sencha)
- HTML5 doesn't have an appstore
Hybrid apps

Hey dude, native is better!

- Is HTML5 a silver bullet ?
No, but silver bullets don't exist.
- HTML5 performance is not good enough ?
Sometimes, it is not enough.
- HTML5 is more efficient to develop ?
Yes, sometimes. Look at FT case.
- HTML5 lacks good tools
Changing fast (check Sencha)
- HTML5 doesn't have an appstore
Hybrid apps
- Can HTML5 help in development cost saving ?

Hey dude, native is better!

- Is HTML5 a silver bullet ?
No, but silver bullets don't exist.
- HTML5 performance is not good enough ?
Sometimes, it is not enough.
- HTML5 is more efficient to develop ?
Yes, sometimes. Look at FT case.
- HTML5 lacks good tools
Changing fast (check Sencha)
- HTML5 doesn't have an appstore
Hybrid apps
- Can HTML5 help in development cost saving ?
Possibly

Organization of the course

Lectures : Introduction of key concepts, technologies and frameworks

Labs : Hands-on classes with practical exercises on selected topics

Assignment : Team work development of a mobile web app

Lectures & Labs

Lecture 1: Introduction

Lecture 2: Building a Mobile Web App

Lecture 3: Templating and MVC

Lecture 4: File and Device Access

Lecture 5: CSS3 & Canvas

Lecture 6: Websockets & Webworkers

Lecture 7: Developing native apps

Lab 1: Assignment Kick-off

Lab 2: jQuery Mobile

Lab 3: Backbone.js

Lab 4: Device Access

Lab 5: Ruby on Rails 3

Lab 6: Designing REST interfaces

Lab 7: PhoneGap

Course Material and Communication

Slides are available at aaltowebapps.com

The slides are best viewed with Google Chrome

Exercises are available at [GitHub](#)

Communication channels:

- Twitter: [@aaltowebapps](#)
- Noppa

The Staff

Claudio Riva , Nokia, Main Instructor

Antti Vuorela , Futurice, Course Assistant

Kimmo Karhu , Aalto University, Assignment Coordinator

Häkan Mitts , Aalto University, Program Coordinator

Mikael Blomberg , SC5, jQuery and Backbone Instructor

Matias Korhonen , Kisko Labs, Ruby On Rails Instructor

Lauri Jutila , Kisko Labs, Ruby on Rails Instructor

THE FUNDAMENTALS

Git

JAVASCRIPT & JSON

JQUERY

RUBY & SINATRA

HAML

Tools

99 / 121

Git

Start using git

```
cd yourproject  
git init
```

```
git clone git@github.com....
```

Add all files in a directory

```
git add .
```

Check status

```
git status -s
```

Commit

```
git commit -m "First commit"  
git commit -am "First commit"
```

Show all branches

```
git branch  
git branch -a
```

Create a new branch

```
git branch newfeature
```

Switch branch

```
git checkout newfeature
```

Add a remote

```
git remote add
```

View the remotes

```
git remote -v
```

Link a local to a remote branch

```
git branch --track local remote
```

Fetch changes from remotes

```
git fetch
```

Push changes to remotes

```
git push
```

Review changes between different branches

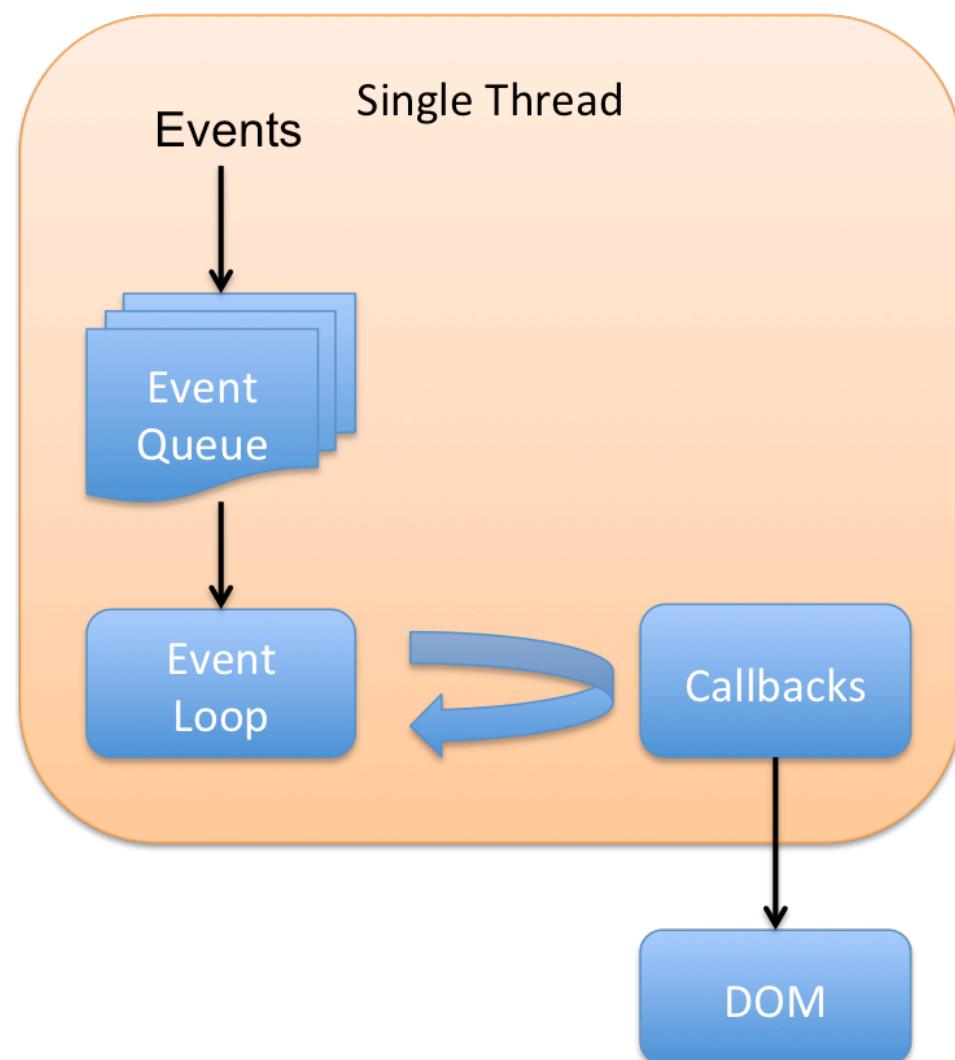
```
git log origin/master ^master
```

Merge changes

```
git checkout master  
git merge origin/master
```

Must Read: Git Reference

Javascript Event Loop



- One thread of execution. If a function is blocked, the UI is frozen.
- Asynchronous operations
- Blocking I/O operations must not block the UI thread (callbacks)
- Keep callbacks short and fast
- Use closures for creating callbacks

Javascript: Asynchronous calls

Javascript has one thread of execution

Blocking operations (e.g. network) must use callbacks

```
var jqxhr = $.getJSON("example.json", function() {  
    alert("success");  
});
```

```
$('#target').click(function() {  
    alert('Handler for .click() called.');  
});
```

Javascript: Lambda Functions

Lambda functions are created at runtime when the execution reaches that point of the flow. This allows functions to be defined conditionally

Function Declaration

```
...
function square(x) {
    return x * x;
}
var b = square(2); //b gets assigned 4
...
```

Function Statement

```
...
var square = function(x) {
    return x * x;
}
var b = square(2); //b gets assigned 4
...
```

Lambda functions are normal objects and can be passed as function parameters (e.g. callbacks)

```
$('#target').click( square );
```

Javascript: Iterators (jQuery)

\$.each : iterates over a list

```
var list = [1,2,3,4,5];
var a = $.each(list, function(index, value) {
    alert(index + ": " + value);
}); //It produces 5 alerts
```

or a map

```
var map = {'a': 'b', 'c': 'd'};
var a = $.each(map, function(key, value) {
    alert(key + ": " + value);
}); //It produces 2 alerts
```

\$.map : applies a function to each element of the array and maps the results into a new array

```
var list = [1,2,3,4,5];
var a = $.map(list, function(value, index) {
    return square(value);
}); // a gets [1,4,9,16,25]
```

Javascript: Iterators (underscore.js)

each : `_.each (list, iterator, [context])`

```
_.each([1, 2, 3], function(n){ alert(n); });
_.each({one : 1, two : 2, three : 3},
function(n, k){ alert(n); });
```

find : `_.find(list, iterator, [context])`

```
_.find([1, 2, 3, 4, 5, 6], function(n){ return n
% 2 == 0; });
=> 2
```

map : `_.map(list, iterator, [context])`

```
_.map({one : 1, two : 2, three : 3},
function(n, k){ return n*3; });
=> [3, 6, 9]
```

filter : `_.filter(list, iterator, [context])`

```
_.filter([1, 2, 3, 4, 5, 6], function(n){ return
n % 2 == 0; });
=> [2, 4, 6]
```

reduce : `_.reduce(list, iter, memo,`
`[context])`

```
var sum = _.reduce([1, 2, 3], function(memo, n)
{ return memo + n; }, 0);
=> 6
```

groupBy : `_.groupBy(list, iterator)`

```
_.groupBy(['one', 'two', 'three'], 'length');
=> {3: ["one", "two"], 5: ["three"]}
```

Javascript: Closure

A closure is formed by returning a function object that was created within an execution context of a function call from that function call and assigning a reference to that inner function to a property of another object. Or by directly assigning a reference to such a function object to, for example, a global variable, a property of a globally accessible object or an object passed by reference as an argument to the outer function call ([Closures](#)).

```
function closureBuilder(arg1, arg2){ //outer function (builder)
    var localVar = 8;
    function exampleReturned(innerArg){ //inner function
        return ((arg1 + arg2)/(innerArg + localVar));
    }
    return exampleReturned; //return a reference to the inner fucntion
}
var globalVar = closureBuilder(2, 4);
var secondGlobalVar = exampleClosureForm(12, 3);

globalVar(2); //Result ?
secondGlobalVar(5); // Result ?
```

Javascript: Closure Example with Google Maps

```
var infoWindow = new google.maps.InfoWindow();

function addInfoWindow(marker, id, name) {
    google.maps.event.addListener(marker, 'click', function () {
        infoWindow.close();
        infoWindow.setContent('<p>' + name + '</p>');
        infoWindow.open(map, marker);
    });
}

function addMarkers(json) {
    var markers = [];
    for (i=0; i<json.length; i++) {
        var place = json[i];

        var point = new google.maps.LatLng(place.coordinates[0], place.coordinates[1]);
        var marker = new google.maps.Marker({position:point, title:place.name});

        addInfoWindow(marker, place.slug, place.name);
        ...
    }
}
```

Javascript Object Notation (JSON)

Lightweight data-interchange format

Human readable and easy to comprehend

Easy for machines to parse

Array

```
["first", "second", 3, 4]
```

Hash table

```
{"name": "John", "address": "London", "age": 38}
```

Serialize/Deserialize

```
JSON.stringify( ['first', 'second', 3, 4] );
=> ["first", "second", 3, 4]
```

```
JSON.parse( ' ["first", "second", 3, 4] ' );
=> Object
```

jQuery

[more info](#)

Fast Javascript library for **document traversing , event handling , animations and Ajax interactions**

HTML

```
...
<body>
  <div id="button">Click me</div>
</body>
```

JS

```
$(document).ready(function(){
  $("#button").click( function(event) {
    alert("Button pressed");
    $("#button").toggleClass("red");
    $("#button").fadeOut().fadeIn();
  });
});
```

Test here: Click me

Ruby

Ruby is a dynamic programming language that combines functional and imperative programming (a mix of Perl, Smalltalk, Eifel, Ada and Lisp)

Online resources to start with:

- [Ruby in Twenty Minutes](#)
- [Ruby on One Page](#)
- [Enumerables](#)
- [Programming Ruby](#)

Ruby Blocks

```
3.times { puts 'Hello' }  
Hello  
Hello  
Hello  
=> 3
```

```
array = [1, 2, 3, 4]  
array.collect do |n|  
  n ** 2  
end  
=> [1, 4, 9, 16]
```

```
@names = %w(John Anne Lukas)  
@names.each do |name|  
  puts "Hello #{name}!"  
end  
Hello John!  
Hello Anne!  
Hello Lukas!  
=> ["John", "Anne", "Lukas"]
```

```
#iterator for Fibonacci numbers  
def fibUpTo(max)  
  n1, n2 = 1, 1  
  while n1 <= max  
    yield n1 # invoke block with value  
    n1, n2 = n2, n1+n2 # and calculate next  
  end  
end  
  
fibUpTo(1000) { |term| print term, " " }  
=>  
1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987  
  
a = []  
fibUpTo(1000) { |term| a << term }  
a  
=> [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144,  
233, 377, 610, 987]
```

Sinatra [more info](#)

Sinatra is a DSL for quickly creating web applications in Ruby

Single file web app

Runs on Rack (fast Ruby web server)

Supports many template engines

```
require 'sinatra'

get '/hi' do
  "Hello World!"
end
```

Sinatra - HTTP Methods (REST)

```
get '/' do
  .. show something ..
end

post '/' do
  .. create something ..
end

put '/' do
  .. replace something ..
end

delete '/' do
  .. annihilate something ..
end
```

Sinatra - Routes

Simple Routes

```
get '/hello' do  
  'Hello World'  
end
```

Named parameters

```
get '/hello/:name' do  
  # matches "GET /hello/foo" and "GET /hello/bar"  
  # params[:name] is 'foo' or 'bar'  
  "Hello #{params[:name]}!"  
end
```

Sinatra - Views

```
# erb => renders /views/index.erb (using /views/layout.erb if it exists)
get '/' do
  erb :index
end
```

```
#haml => renders /views/index.haml embedded in the views/post.haml
get '/' do
  haml :index, :layout => :post
end
```

```
#Inline templates
get '/' do
  haml '%div.title Hello World'
end
```

HAML [more info](#)

Template Language

- Mix Ruby code with HAML
- Haml generates HTML code

Clarity

- Indentation = structure
- Tags begin with %
- Tags close themselves
- Use of hashes for attributes

HAML - Syntax

%tag content

```
%h1 Hello HAML
%p HAML is
%ul
  %li Beautiful
  %li Easy
  %li Well-indented
```

<tag>content</tag>

```
<h1>Hello HAML</h1>
<p>HAML is</p>
<ul>
  <li>Beautiful</li>
  <li>Easy</li>
  <li>Well-indented</li>
</ul>
```

HAML - Attributes

```
%a{href => "http://bbc.com", id => "title"}  
BBC
```

```
<a href="http://bbc.com" id="title">BBC</a>
```

```
%a(href="http://haml-lang.com" id="title")  
BBC
```

```
<a href="http://bbc.com" id="title">BBC</a>
```

HAML - Shortcuts

```
%p{class => "bio"} Hello  
%p.bio Hello
```

```
<p class = "bio">Hello</p>
```

```
%p{id=> "title"} Hello  
%p#title Hello
```

```
<p id = "title">Hello</p>
```

```
#title  
.red  
%p Hello
```

```
<div id = title>  
  <div class = red>  
    <p>Hello</p>  
  </div>  
</div>
```

HAML - Ruby Evaluation

```
%h1 My Blog
- for article in @articles
  .post
    .title
      %h1= article.title
    .date
      =article.date.strftime("%d %m %Y")
    .article
      %p= article.body
```

Tools

Browsers on PC with debugging capability:

- Google Chrome
- Firefox + Firebug
- Safari ([iWebInspector](#))

Mobile Browser Emulators ([guide](#)):

- iOS Browser: XCode contains iPhone/iPad emulators
- Android SDK
- [Opera Mobile Emulator + Dragonfly](#)

Devices:

- iPhone/iPad: iOS browser
- Android: native browser, Firefox 11, Chrome for Andorid, Opera Mobile
- Nokia N9: native browser, Firefox 10, Opera Mobile