

Google™



# HTML5 versus Android: Apps or Web for Mobile Development?

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May 11, 2011

Feedback: <http://goo.gl/AoHur>  
Hashtags: #io2011 #android

# HTML



OR



# HTML



## The Case for HTML5

# HTML



"HTML5"==HTML, CSS,  
JavaScript and related standards.

# HTML



HTML5 is mobile.

HTML5 is capable.

HTML5 is open.

Therefore, mobile HTML5 rocks!

# HTML



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# Native? Which Native?

## *Linux based Operating Systems:*

Android 1.5, 1.6, 2.0, 2.1, 2.2, 2.3, 3.0 ...

Nokia Maemo/Meego 5.0, 6.0

Intel Moblin 2.0, 2.1

Palm WebOS 1.0, 1.2, 1.4, 2.0, 2.1, 2.2, 3.0

## *Microsoft Operating Systems:*

Windows CE: 5.0, 6.0, 6.1, 6.5

Windows Phone: 7.0

Kin OS: 1.0

Zune OS 1.0, 2.0, 3.0, 4.0

## *Apple:*

iOS: 1.0, 1.1, 2.0, 2.1, 2.2, 3.0, 3.1, 3.2, 4.0, 4.1, 4.2, 4.3

## *RIM:*

4.1, 4.2, 4.5, 4.6, 4.7, 5.0,

## *Symbian:*

^1, ^2, ^3, ...

Source: Wikipedia (including <http://goo.gl/8KokZ>)

# Native? Which Native?

<b>Android</b>	Dalvik
<b>iOS</b>	Objective C
<b>Windows Mobile 7</b>	XNA/Silverlight
<b>BlackBerry</b>	Java
<b>WebOS</b>	HTML5

Magazine publishers are ... trying to design for an **ever-growing variety of devices and formats**. The result is wreaking havoc with traditional print production schedules and, in some cases, budgets."

**Paid Content** [emphasis added]

<http://paidcontent.org/article/419-magazine-publishers-scramble-to-streamline-their-app-production/>

# HTML

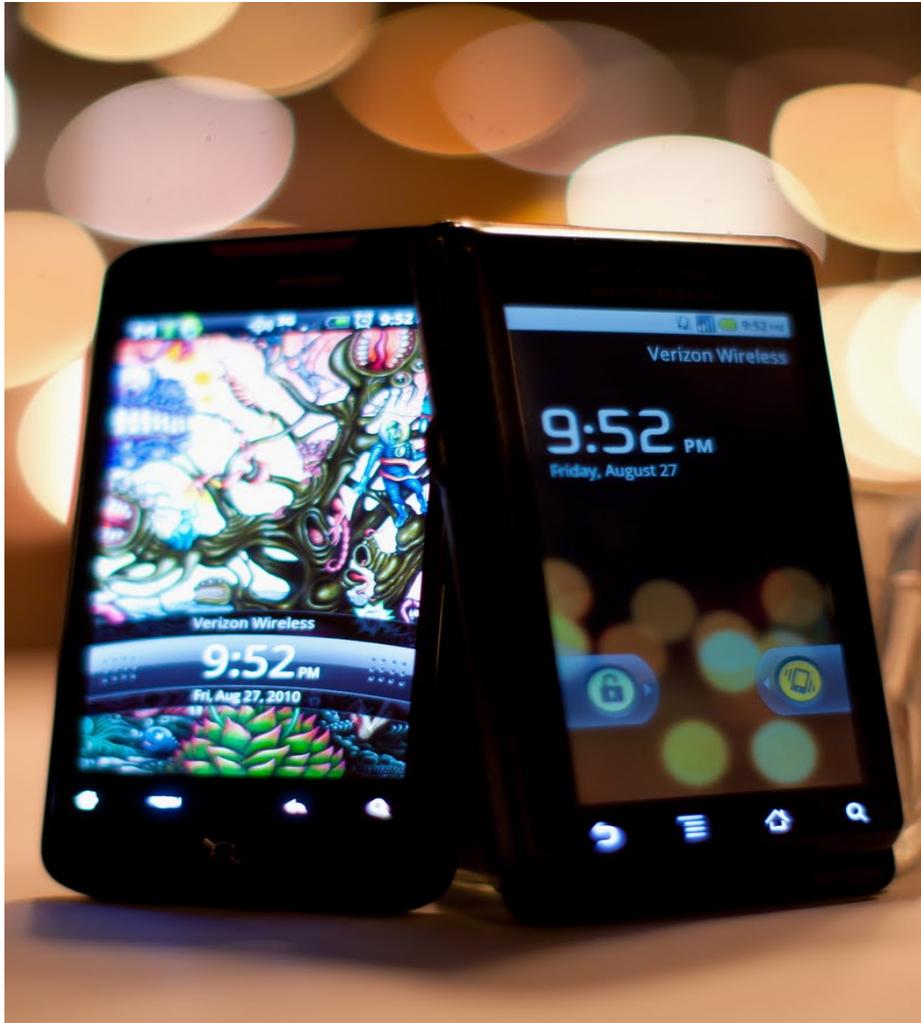


One platform.

Many devices.

# HTML5 is Everywhere

## Mobiles



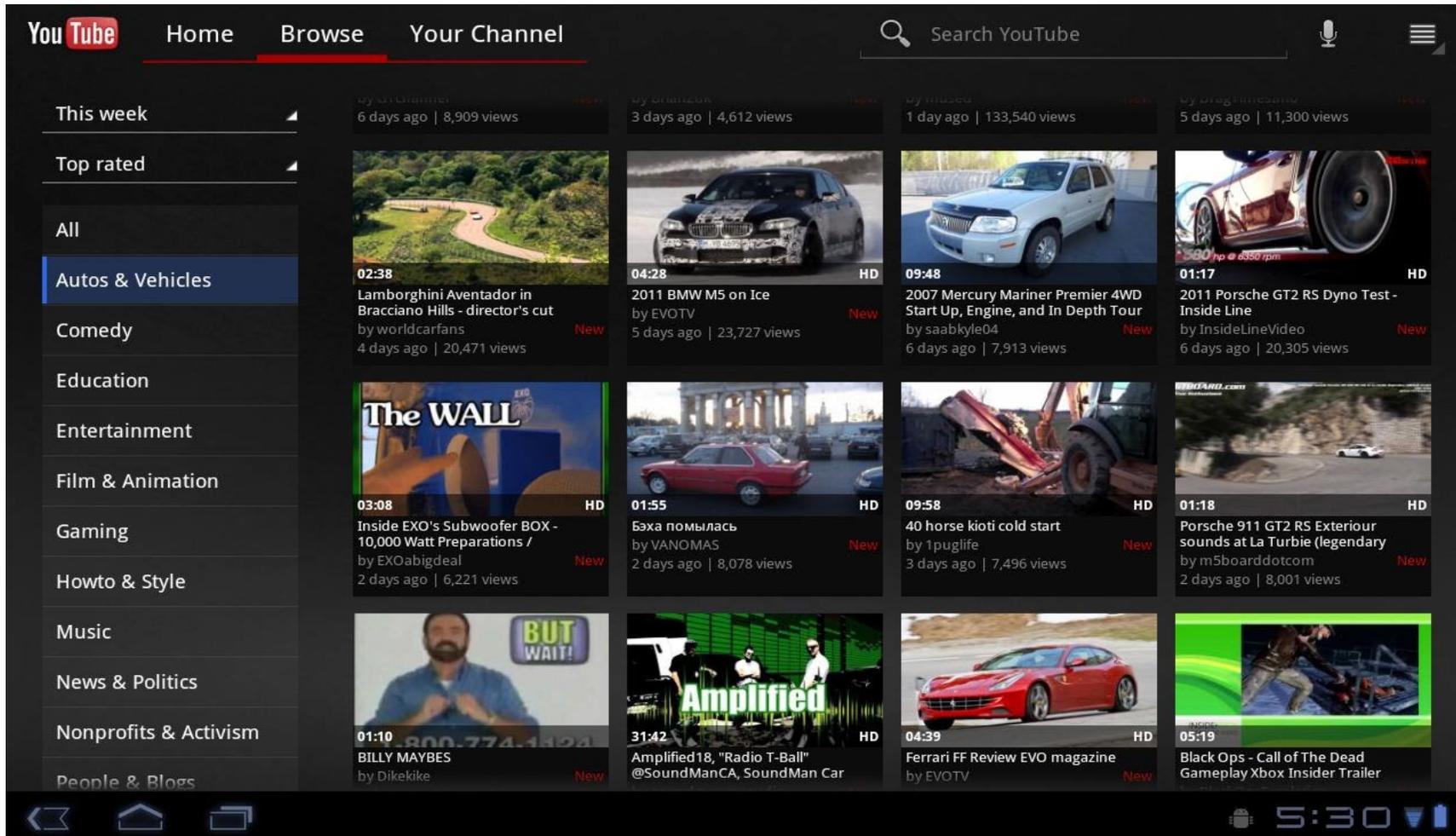
# HTML5 is Everywhere

## Tablets



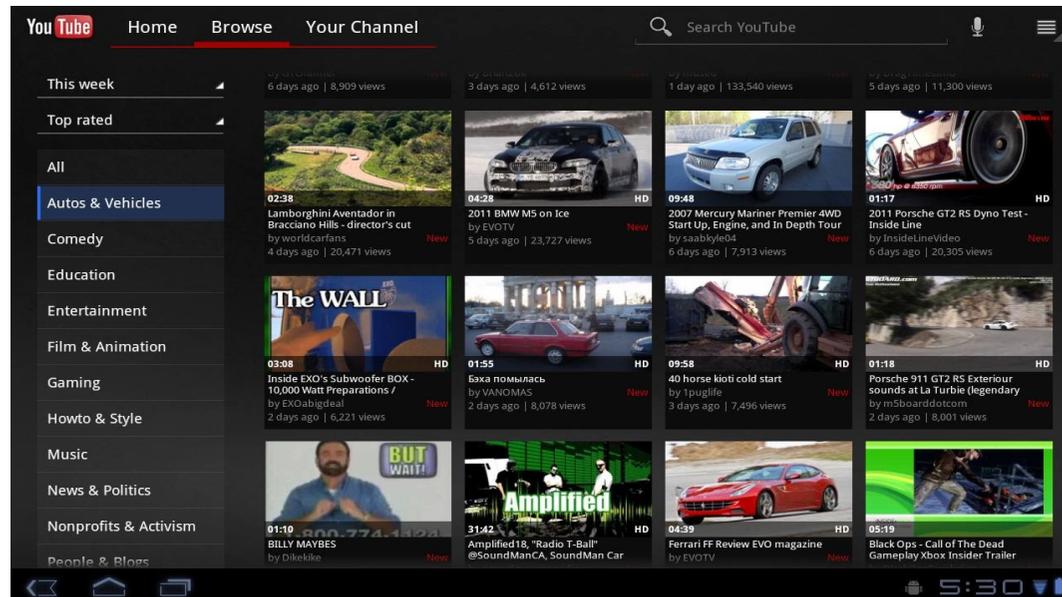
# HTML5 is Everywhere

## TVs



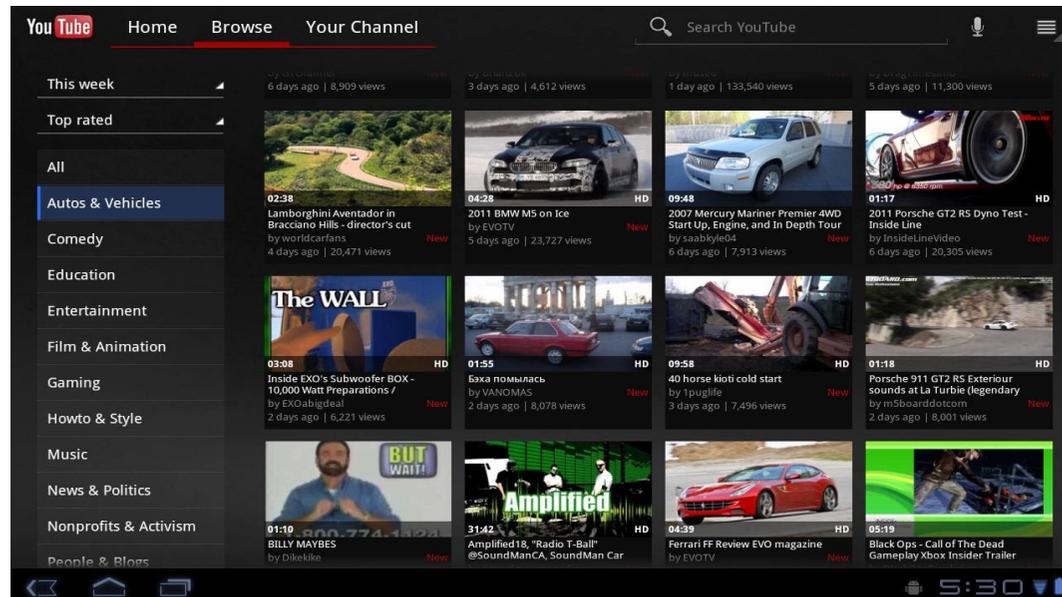
# HTML5 is Everywhere

They all have browsers



# HTML5 is Everywhere

... And embedded web views



# Let me fix that for you ...

<b>Android</b>	Dalvik
<b>iOS</b>	Objective C
<b>Windows Mobile 7</b>	XNA/Silverlight
<b>BlackBerry</b>	Java
<b>WebOS</b>	HTML5

# There, fixed that for you

<b>Android</b>	<b>Dalvik and HTML5</b>
<b>iOS</b>	<b>Objective C and HTML5</b>
<b>Windows Mobile 7</b>	<b>XNA/Silverlight and HTML5</b>
<b>BlackBerry</b>	<b>Java and HTML5</b>
<b>WebOS</b>	<b>Still HTML5!</b>

# HTML



WAIT, one platform? Srsly?

# HTML5 is Flexible

## Separation of Concerns

### **HTML** content

```
<section>hello world!</section>
```

### **JavaScript** logic

```
$("#section").hover(function() {  
  this.innerHTML = "goodbye world!";  
});
```

### **CSS** style

```
section { font-size: 1.5em; color: red; }
```

# HTML5 is Flexible

## Graceful degradation

element not supported

```
<canvas>
```

JavaScript: 1,337 projects

Ruby: 321 projects

```
</canvas>
```

attribute not supported

```
<input type="file" multiple>
```

style not supported

```
article { font-family: Neuton, arial, serif; }
```

# HTML5 is Flexible

CSS: Cascading Style Sheets

## **common.css**

```
body { background: white; }
```

## **mobile.css**

```
body { background: black; }
```

## **android.css**

```
body { background: green; }
```

# HTML5 is Flexible

## Fluid layouts

- Top Stories
    - Leon Panetta
    - Ben Bernanke
    - Synthes
    - Birth certificate
    - Kobe Bryant
    - Dancing with the Stars
    - Prince William and Kate Middleton
    - NATO
    - Syria
    - Muammar al-Gaddafi
  - Starred ☆
  - World
  - News near you
  - U.S.
  - Business
  - Sci/Tech
  - Entertainment
  - Sports
  - Health
  - Spotlight
- All news  
Headlines  
Images

**Top Stories**

Leon Panetta »  
**Petraeus and Panetta said to be up for new posts as part of national security ...**  
Washington Post - Karen DeYoung, Greg Jaffe - 1 hour ago  
President Obama is expected this week to nominate Gen. David H. Petraeus to replace Leon Panetta as CIA director and to name Panetta as secretary of defense, US officials said Wednesday, part of a long-anticipated ...  
Obama set to name CIA's Leon Panetta as Defense secretary, officials say Los Angeles Times  
Panetta and Petraeus should sail through Senate CBS News  
Reuters - Fox News - New York Times - Wikipedia: Leon Panetta all 1,274 news articles »

NATO »  
**Afghan army pilot kills 9 from NATO in airport shooting**  
MiamiHerald.com - Hashim Shukoor - 27 minutes ago  
An Afghan military pilot opened fire Wednesday on US-led NATO troops at the airport here, killing eight soldiers and a civilian contractor, in the deadliest attack on international forces this month.  
Video: Six NATO Troops Killed at Kabul Airport  
The Associated Press  
Afghan Pilot Kills Foreign Soldiers in Airport Attack Claimed by Taliban Bloomberg  
The Guardian - AFP - Atlanta Journal Constitution - BBC News all 1,339 news articles »

Ben Bernanke »  
**Treasuries Lower Before 5-Yr Auction, FOMC Statement, Bernanke**  
Wall Street Journal - Min Zeng - 23 minutes ago  
NEW YORK (Dow Jones)--A looming five-year notes auction and stronger-than-forecast durable goods report pressured Treasuries Wednesday.  
Video: Bernanke Briefings to Address Transparency



**Recent**

**Markets flat ahead of Fed, Bernanke comments**  
Reuters - Ryan Vlastelica, Kenneth Barry - 13 minutes ago

**Afghan officer shoots, kills 9 Americans**  
USA Today - Musadeq Sadeq - 16 minutes ago

**America's Third War: An Informant's Story**  
Fox News - William La Jeunesse - 32 minutes ago

**News near you** - Edit  
Local news is not available for your location. Change location

**Spotlight**

**Calif. gangster's tattoo of crime scene helps solve murder**  
CBS News - Camille Mann - Apr 22, 2011

**Councilwoman Janice Hahn for Congress**  
Los Angeles Times - Apr 25, 2011

**Seth Rogen: Alzheimer's is 'brutal'**  
CNN - Elizabeth Landau - 4 hours ago

**Austrian Buried Treasure A 'Fairy Tale' Find**  
Huffington Post - George Jahn - Apr 22, 2011

**Disunion: Land Pirate**  
New York Times (blog) - Ted Widmer - 12 hours ago

**The Really Smart Phone**  
Wall Street Journal - Robert Lee Hotz - Apr 22, 2011

- Top Stories
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Gold Futures Resume Rally on Outlook for US Interest Rates BusinessWeek  
CNN - Reuters - MarketWatch - The Canadian Press all 3,222 news articles »



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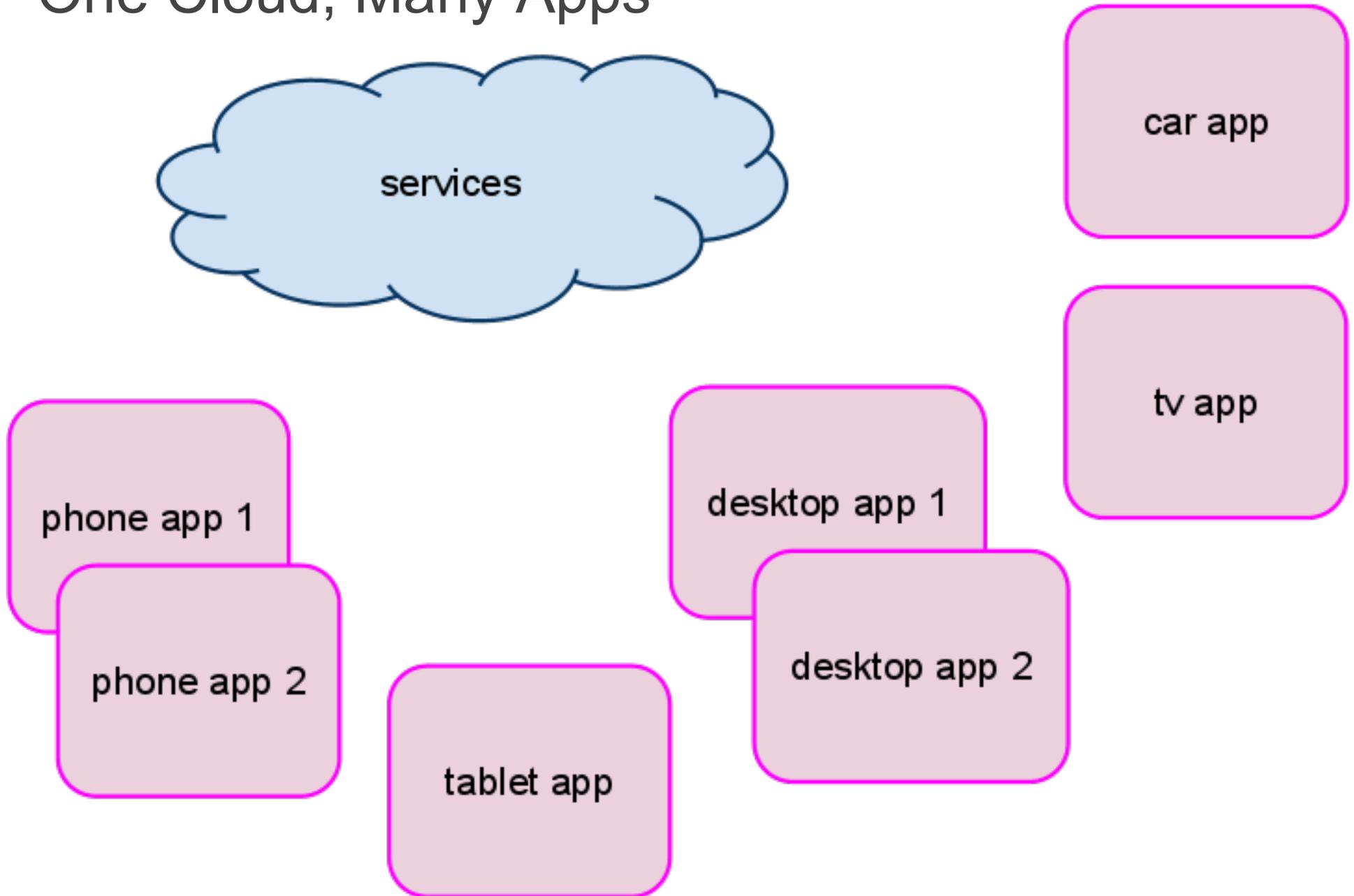
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# One Cloud, Many Apps



# HTML



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Therefore, mobile HTML5 rocks!

# HTML5 is Capable

Input

Output

Networking

Offline

# HTML5 is Capable: Input

## Geolocation

```
navigator.geolocation.getCurrentPosition(function(pos) {  
  function(pos) {  
    pos.coords.latitude;  
    pos.coords.longitude;  
  }  
});
```

<http://goo.gl/TdSeU>

# HTML5 is Capable: Input

## (Multi) Touch

```
button.ontouchstart =
```

```
  function(ev) { ev.touches[n] ... }
```

```
button.ontouchmove = ...
```

```
button.ontouchend = ...
```

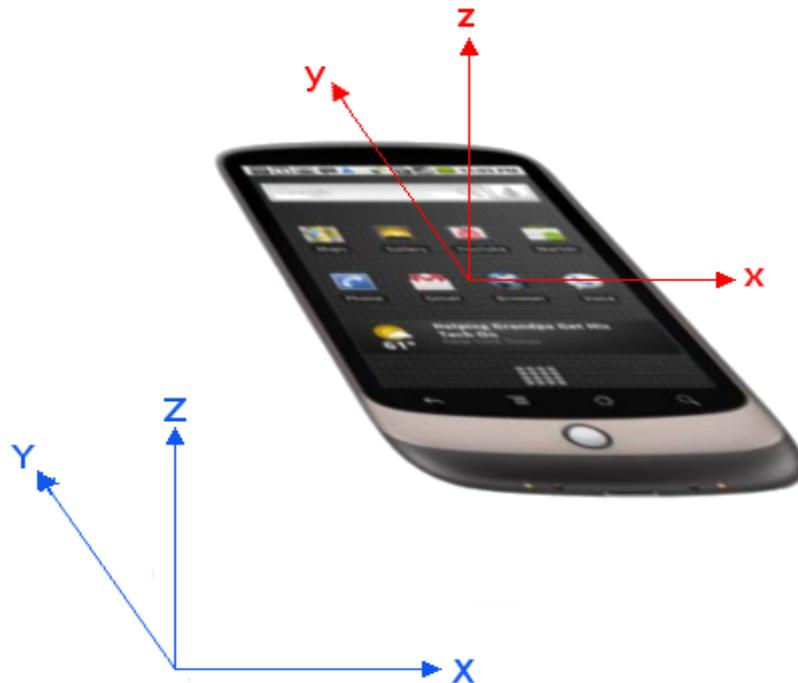
<http://goo.gl/I9AQP>



# HTML5 is Capable: Input

## Device Orientation

```
window.addEventListener("deviceorientation", function(ev) {  
    // ev.alpha, ev.beta, ev.gamma  
});
```



# HTML5 is Capable: Input

## Device API and Speech Recognition

```
<input type="file" accept="image/*;capture=camera">  
<input type="file" accept="audio/*;capture=microphone">  
<input type="file" accept="video/*;capture=camcorder">  
<input x-webkit-speech>
```

<http://html5photos.appspot.com>



# HTML5 is Capable: Output

Markup + Styling with semantic tags and CSS3

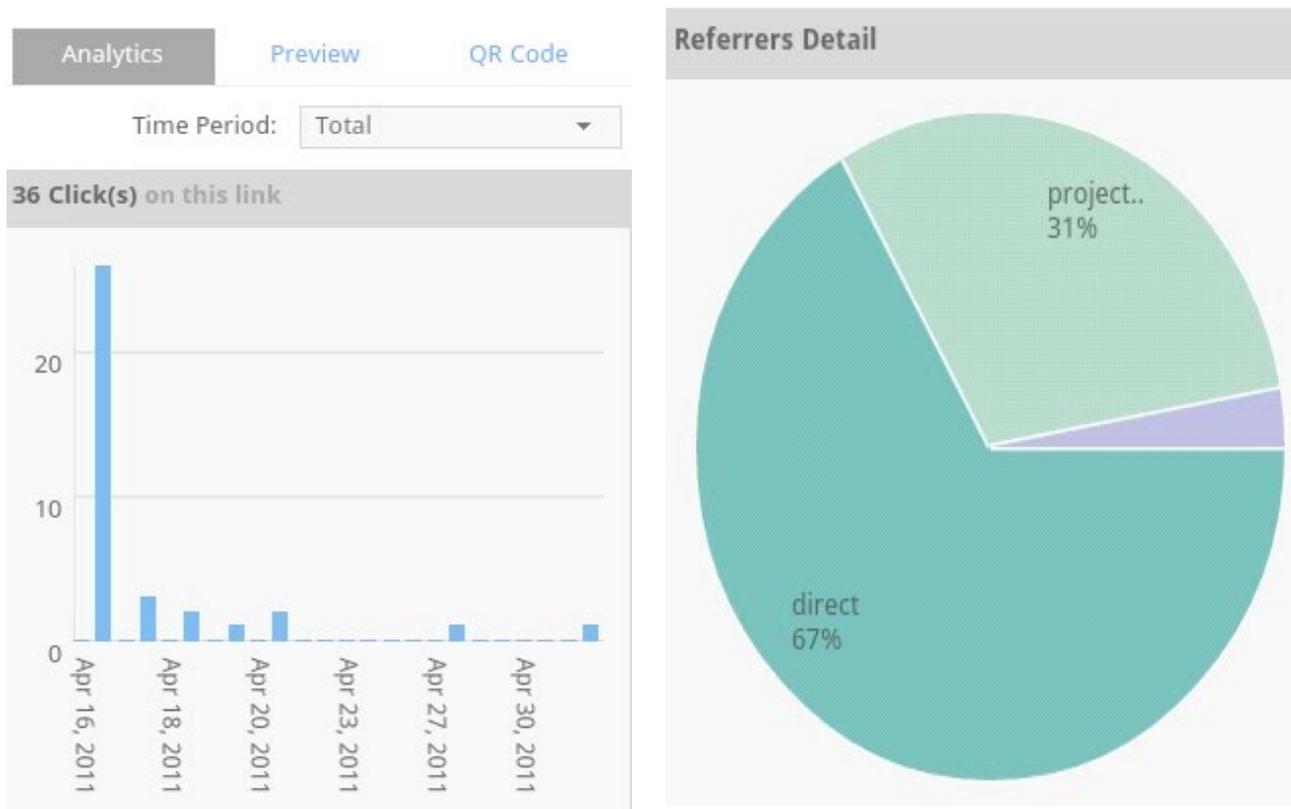
```
<article>  
  <header><h1>...</h1><div>...</div></header>  
  <section>...</section>  
  <section>...</section>  
  <section>...</section>  
</article>
```

<http://goo.gl/H7wx0>

# HTML5 is Capable: Output

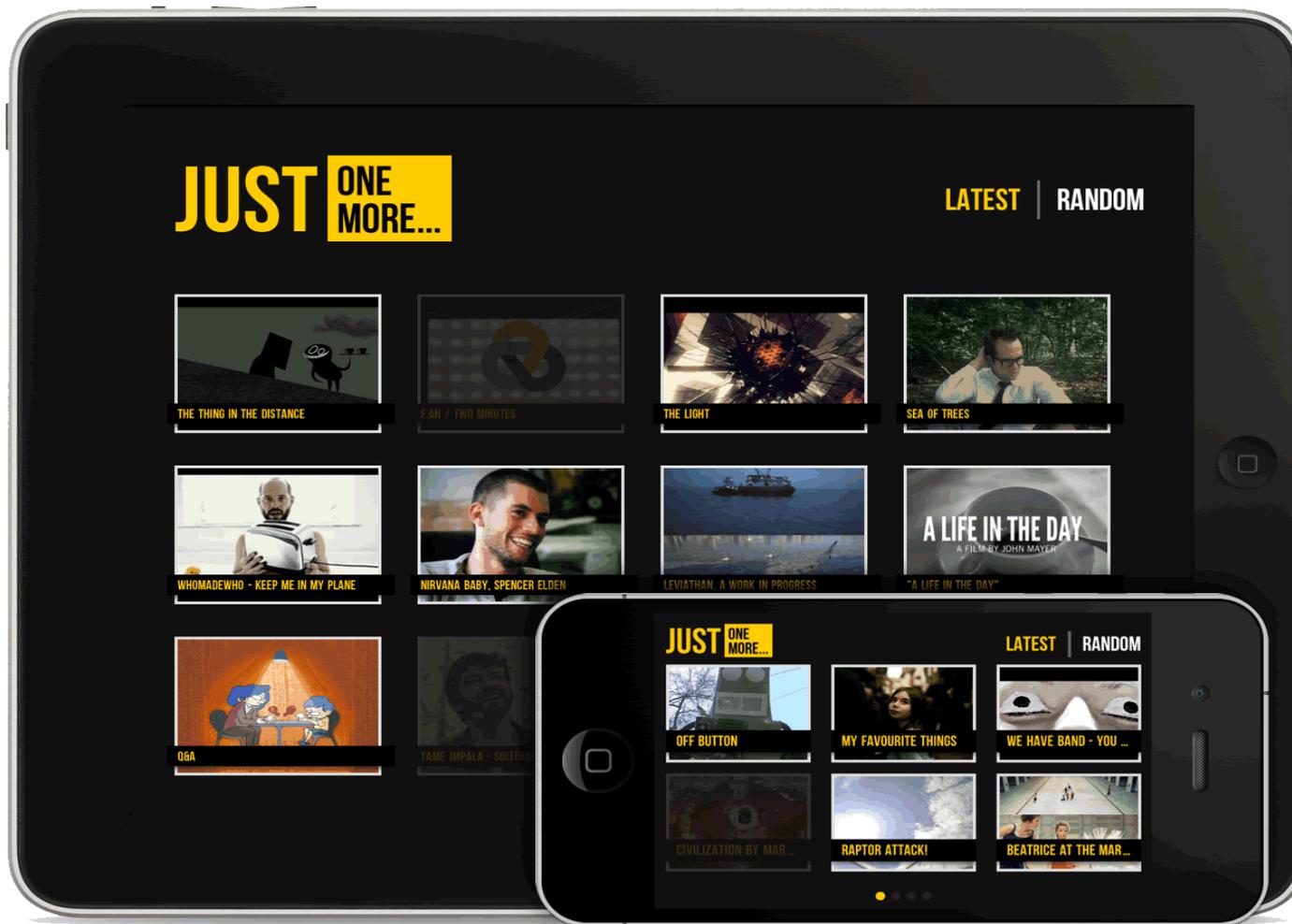
Rich graphics with Canvas

Bit.ly app <http://bit.ly>



# HTML5 is Capable: Video

Example: "Just One More" iPad app



# HTML5 is Capable: Networking

Ajax (XMLHttpRequest)  
Cross-Origin Resource Sharing

WebSocket

<http://rumpetroll.com>



# HTML5 is Capable: Offline

CACHE MANIFEST

# 14

timer.html

timer.css

timer.js

favicon.ico

timer.png

bookmark\_bubble.js

<http://goo.gl/MJOiv>

# HTML5 is Capable: Offline

## **Offline Storage**

Local Storage

```
localStorage.foo = "bar"
```

Web SQL Database Indexed Database FileSystem

<http://goo.gl/MJOiv>

# HTML



HTML5 is mobile.

HTML5 is capable.

**HTML5 is open.**

Therefore, mobile HTML5 rocks!

# HTML5 is Open: Standards

Standards-Based  
Many implementations

Markup + Styling == searchable

# HTML



# HTML5 is Open: Well-Understood Technologies

JavaScript: A Lingua Franca

“We chose to build the iPad app in HTML5 so we could avoid having to learn a new programming language.”

Michael Greer, chief product officer at The Onion,  
[quoted](#) in the New York Times

# HTML5 is well-supported

## Libraries

jQuery, MooTools, YUI, Closure, ....

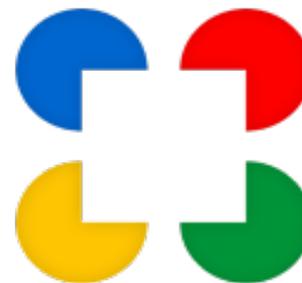
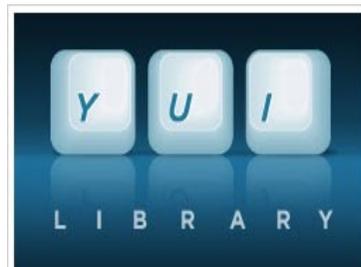
## Debugging tools

Chrome Developer Tools,  
Firebug, Page Speed  
Mobile Bookmarklets ...

## Community

Blogs, Forums, Books, Tutorials, ...

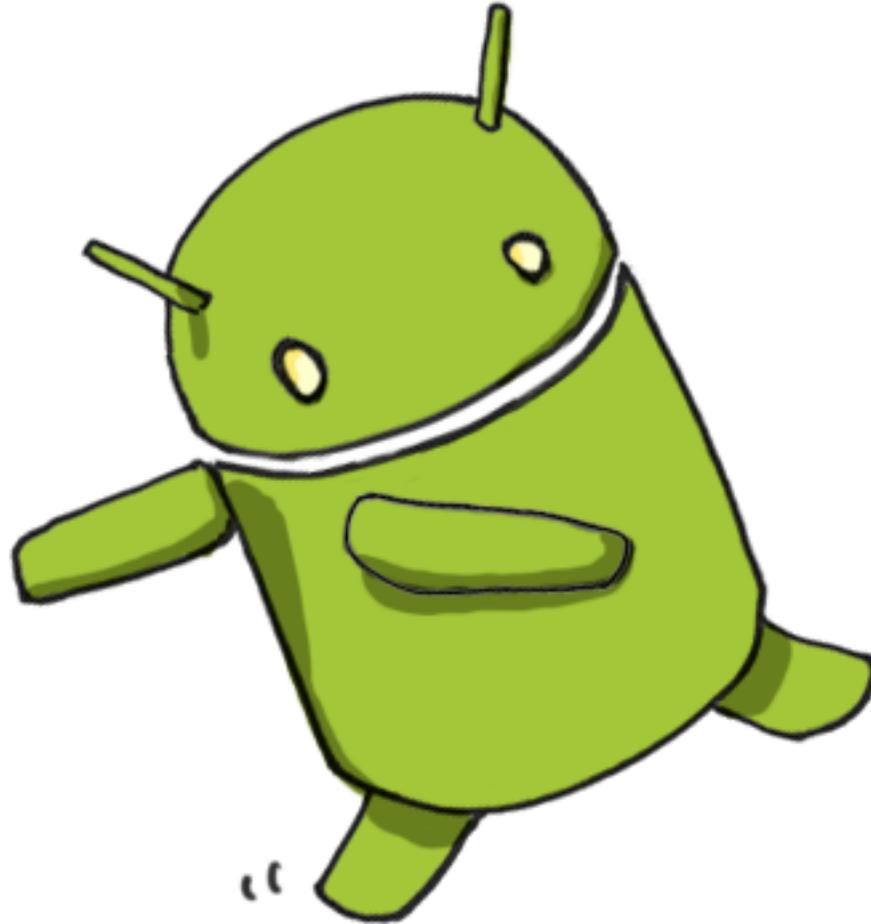
# HTML



# The Case for Native



# What Do We Mean by Native?



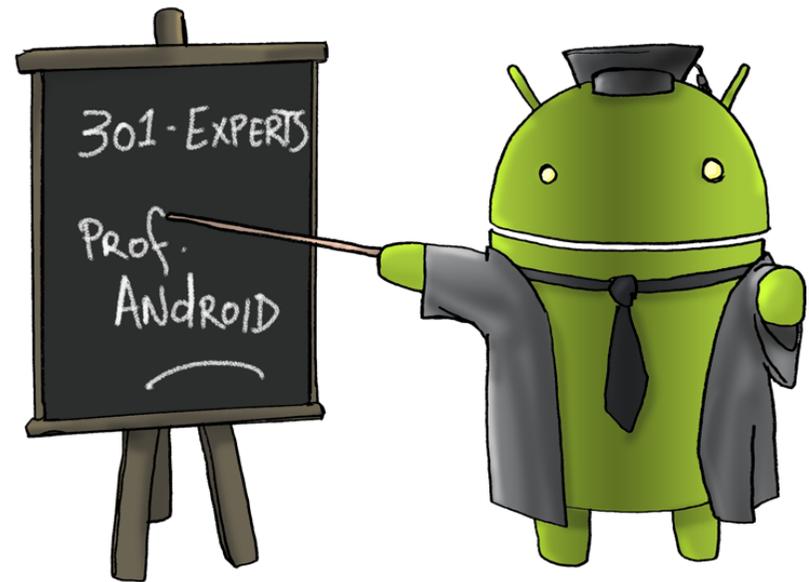
# What Could We Mean By Native?

- Software Development Kit for Dalvik using Java Syntax
- Native Development Kit using C/C++
- Renderscript using C99
- Android Scripting Layer using Python etc.



# Mobile App Development: Like a Boss

- Broader access to device hardware
- Closer integration with system features
- Ability to integrate with other apps
- More discoverable (widgets, search, and notifications)
- Faster, smoother, and more attractive



# Why Develop a Native App?

- Speed
- Power
- Control
- Integration

If you can't think of a way to improve your web app using Android SDK features...

If you can't think of a way to improve  
your web app using Android SDK  
features...

...you're doing it *wrong*.

# Mobile Development Innovation

- New hardware innovation
  - New sensors
  - 3D cameras and displays
  - Multiple cameras and displays
- New software innovation
  - Animations
  - Background Services
  - Hardware acceleration
  - Fragments and loaders
  - Widgets
- A standardized user experience

# Standards Always Trail Innovation

- 2007: Multi-touch, accelerometers, microphone
- 2008: Video, compass, background apps
- 2009: Bluetooth, multiple screen sizes
- 2010: Gyroscopes, front facing cameras
- 2011: Barometer, NFC, tablets, USB accessories
- 2012: ???

# Mobile Innovation Leverages Hardware

- Location-based services - Google Maps
- Audio input - Shazam
- Video input - Google Goggles
- Touch screens - Angry Birds
- Accelerometers, gyroscopes, barometers ...

# Leverage the Hardware on New Platforms

- Smartphones
- Tablets
- Televisions
- Cars? Picture Frames? Fridges? Washing Machines?

# Hardware APIs Available Today on Native

- Smartphones, Tablets, and Televisions
- Audio input
- Video input from front or rear facing cameras
- Sensors (orientation, light, temperature, ...)
- 10 finger multi-touch input
- Telephony, WiFi, SIP, USB, and Bluetooth

# Each App is Part of an Ecosystem

- Listen for system events
- Communicate with other apps
- Leverage functionality from other apps
- Offer functionality for use by other apps
- All native apps can be replaced or augmented

# True Background Apps

- Cloud to Device Messaging for server-based events
- Set alarms that can be triggered at set time or interval
- Set alarms that can be triggered by system events
- Alarms can be triggered even when an app isn't running
- Application events triggered by system broadcasts
- Concurrent apps

# Full Offline Support

- Your app can run without ever being online
- Search functions are still available
- Actions (send, delete, move) can all be cached and executed when connectivity changes

# Apps are More than a Shortcut

- Widgets and Live Wallpapers
- Quick Search Box
- Rich Notifications
- Apps can build on top of each other

# Universal Native APIs

- Geo services
- Sensors
- Interprocess communications (Intents!)
- Background, scheduled, and concurrent apps
- Home screen widgets and quick search box
- Rich multimedia
- Native (C/C++) development
- Full database / SQLite support
- Camera and microphone access
- Deep system integration / replacement

# HTML



OR



# Two Great Tastes that Taste Great Together

- Web Apps

- Mobile: Near-universal coverage
- Capable: Advanced UI and beyond
- Open: Standards-based and well-understood

- Native Apps

- Integrated: Deep hardware/platform integration
- Current: Supports latest hardware innovations
- User Experience: Native look and feel

"Great, now what can I do about it?"

"Which" is the wrong question

# HTML



AND



# Embedded Web Views

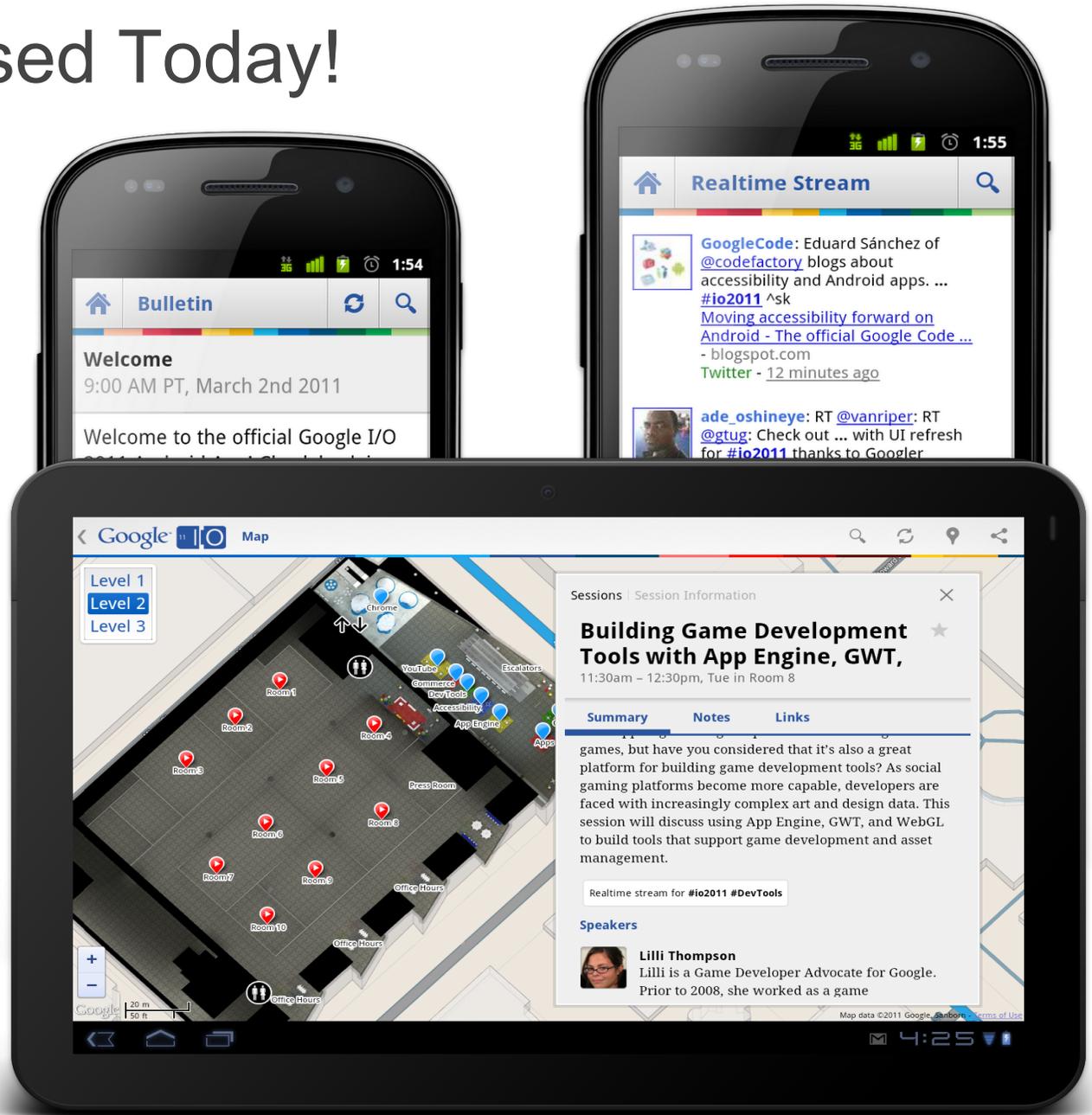
1. Make a native app
2. Use Web Views to render content
3. Bridge to native functionality with Javascript shims



# Here's One You Used Today!

IO 2011 Android App

Maps  
Stream  
Bulletin



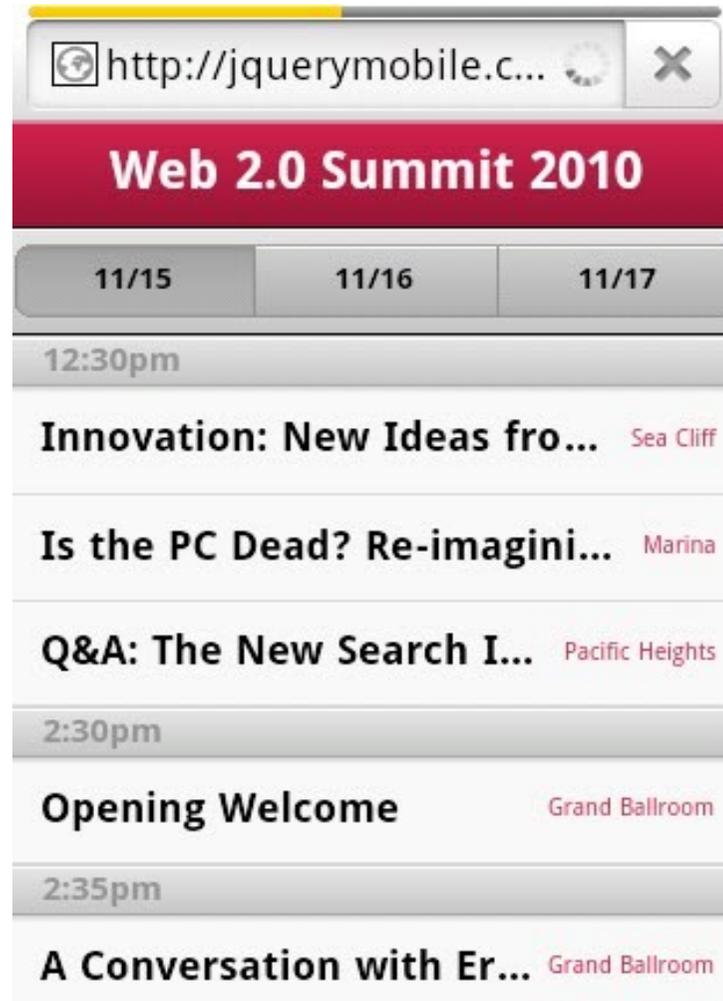
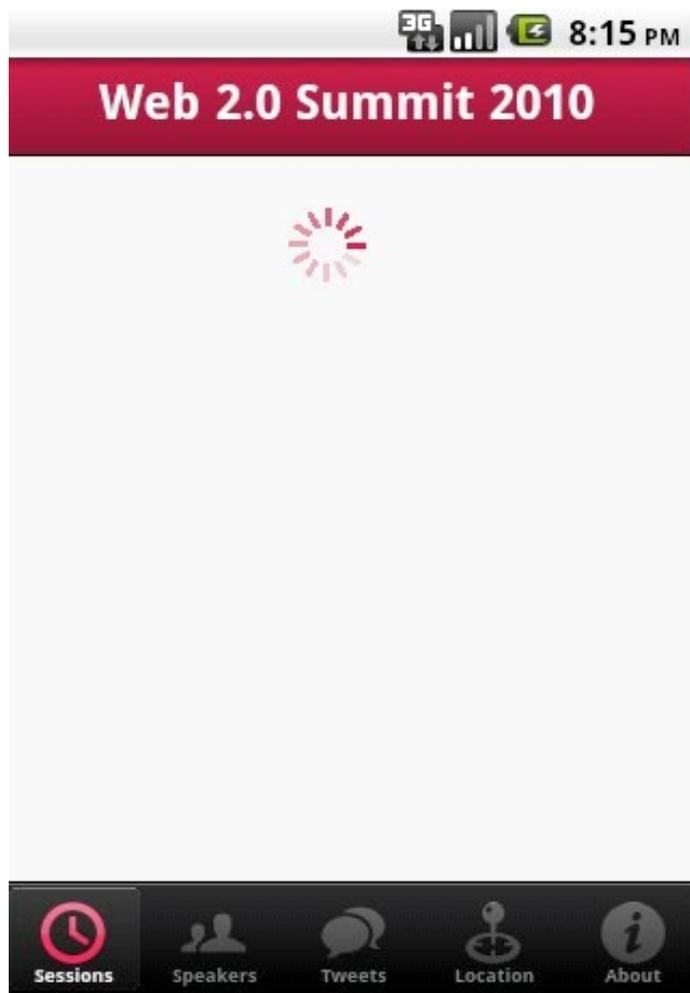
A few tips ...

# Use Mobile HTML5 Frameworks and Libraries

- Sproutcore <http://goo.gl/A4Rf>
- Sencha Touch <http://goo.gl/6OwlX>
- jQuery Mobile <http://goo.gl/7F7Oz>
- Jo <http://joapp.com/>
- iUI <http://goo.gl/gjbN>
- Zepto.js <http://zeptojs.com/>

Also use general-purpose libraries

# Example: Sencha Touch



# Example: Sproutcore

iPad 20:15 96%  
Npr  
touch.sproutcore.com/ Google  
Instapaper: Read Later iPhone bo... & HTML Share Book...tter.com Mobile Per...okmarklet Developer Dashboard

**news**

- Jailed Diplomat In ... Fuels Anger**  
Hundreds of Pakistanis are gathering at the site where a jailed U.S. diplomat allegedly...
- Jailed American's Case Stokes Fury In Pakistan**  
U.S. officials say the American accused of murder is a diplomat who is being held illegally.
- Ecuador's Hurting Families Find Hope With JUCONI**  
The JUCONI Foundation, an organization that aims to help struggling families
- The U.S. Owes China \$1.2 Trillion**  
Japan holds nearly \$900 billion in U.S. government debt. In all, U.S. debt held abroad totals some...

**arts & life**

- ...e Cups Of Tea' or In Hot Water Alleged ications**
- Miso: An Ancient Solution For Modern Meals**
- Dark Miso Soup With Sweet Potato**
- DIANA VREELAND**

**music**

- 'Anna Nicole' Brings Sex And Drugs To The Opera**
- South By Southwest: 2,000 Bands In Five Days**
- SXSW: Beyond Street, A Local**

**Listen** Playlist Programs Stations Support provided by

# Example: jQuery Mobile

The image displays three overlapping iPad screenshots illustrating the jQuery Mobile framework. The top-left screenshot shows the 'jQuery Mobile: Demos and Documentation' page. The middle screenshot shows the 'Search inputs' documentation page, which includes a table of contents with sections like Overview, Intro to jQuery Mobile, Features, Accessibility, Supported platforms, API, Configuring defaults, Events, Methods & Utilities, Responsive Layout, Theme framework, Components, Pages & dialogs, Toolbars, Buttons, Content formatting, and Form elements. The bottom-right screenshot shows the 'jQuery Mobile Framework - Static Containers, States' page, featuring a 'Default Header' section with a content switcher and a 'Default Theme Content Header' section with an input slider and cache settings. Below these are sections for 'Lists & Buttons' and 'Form elements'.

# Progressive Enhancement

## Semantic Markup, Semantic Events

```
<html>  
  <section>  
    <a href="index.html">...</a>  
  </section>  
</html>
```

```
$("#a").click(function() { ... });
```

# Progressive Enhancement

## Fallbacks

```
<video id="game">  
  <source src="movie.ogg" type="video/ogg">  
  <source src="movie.webm" type="video/webm">  
  <object>....</object>  
  <a href="...">please download</a>  
</video>
```

# Feature Detection

Can't make apps for every device.  
Browser detection is fallible.  
Therefore, detect features.

```
function hasCanvas() {  
    return !!document.createElement("canvas")  
        .getContext;  
}
```

*source: Dive Into HTML5*

```
if (hasCanvas())  
    showChart();  
else  
    showTable();
```

# Feature Detection (continued)

## Library Support

### **Modernizr.canvas ?**

```
showChart() : showTable();
```

```
YepNope( {  
  test: Modernizr.canvas,  
  yep: ["chart.js", "chart.css"],  
  nope: ["table.js", "table.css"]  
});
```

# Polyfills

aka "Regressive Enhancement", Shims/Shivs

Browser doesn't have a feature? Fake it!

For Example ...

- canvg: SVG using canvas
- storage: Storage using cookies
- geolocation: Geolocation using Google Geo

<http://goo.gl/8yTAn>

# JavaScript Bridge

Communication between Native and JavaScript

Native calls HTML5:

```
loadURL("javascript: updateScore("+score+");");
```

HTML5 calls Native:

```
WebView.addJavaScriptInterface  
(new BarometerReader(), "barometer")
```

# Resources

<http://www.html5rocks.com/mobile>

<http://www.modernizr.com/>

<http://developer.android.com>



Feedback: <http://goo.gl/AoHur>

# Image Credits

<http://flickr.com/photos/robnas/4938941632/>

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[http://www.flickr.com/photos/adewale\\_oshineye/5384179309/](http://www.flickr.com/photos/adewale_oshineye/5384179309/)

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<http://flickr.com/photos/stevecadman/134974908/>

<http://flickr.com/photos/vegetando/5366523061/>

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