

Web Engineering

Mobile Application Development





Where we are?

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- Motivation
- Technical Solution
 - Mobile Web Architectures
 - Bootstrap
 - Trends



Motivation

Why do we want to learn about WE at all?

INNOVATION INSIGHTS

community content

blog

Featured

Mobile

web

The Web Is Not Dead

BY NATHAN MATUSKA 02.13.14 | 1:06 PM | PERMALINK

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Does "mobile first" breathe new life into the web? Have your say below. Image: Marco Arment/Flickr

At the very least, the reports of the web's death have been greatly exaggerated.

In 2010 Wired Magazine published [The Web Is Dead | Long Live The Internet](#), regarding the demise of the PC and the shrinking need for the Web as a digital

- 13 Feb 2014

- "Next Up: Mobile Web Strategy is Key

To succeed in this changing web environment, marketers and web professionals need to have a mobile web strategy".

<http://www.wired.com/2014/02/web-dead/>

- The Mobile market grows rapidly worldwide
- “Almost” 1 mobile device per person
 - <http://singularityhub.com/2014/02/18/there-are-7-billion-mobile-devices-on-earth-almost-one-for-each-person/>
- “By the end of 2018, the number of worldwide mobile users is expected to increase to over 6.2 billion. Roughly 84% of the world population will be using mobile technology by year-end 2018”
 - <http://www.radicati.com/wp/wp-content/uploads/2014/01/Mobile-Statistics-Report-2014-2018-Executive-Summary.pdf>
- Other interesting statistics
 - <http://www.smartinsights.com/mobile-marketing/mobile-marketing-analytics/mobile-marketing-statistics/>

Internet Usage (Mobile vs Personal Computers)

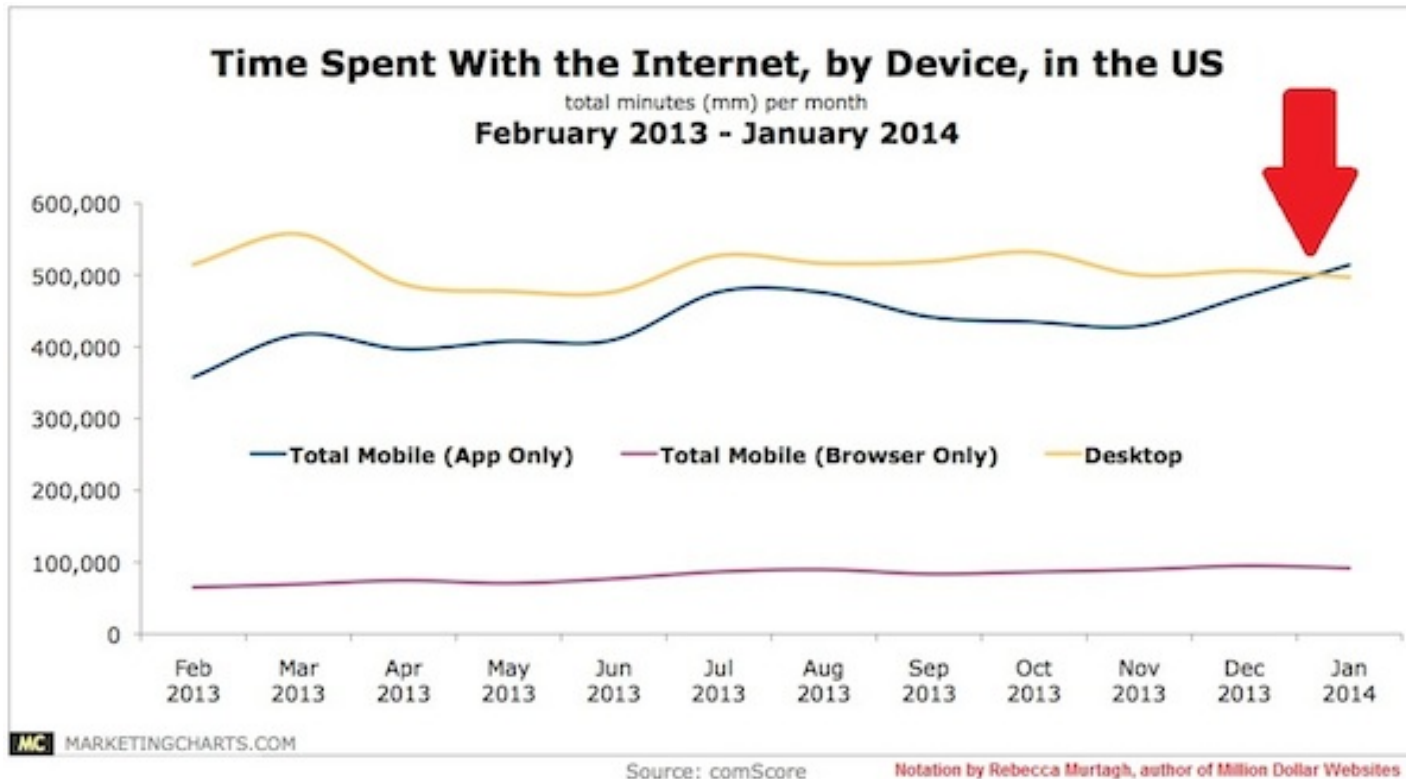


Image taken from:

<http://searchenginewatch.com/sew/opinion/2353616/mobile-now-exceeds-pc-the-biggest-shift-since-the-internet-began>

Internet access "on the go" provides advantages to many, such as the ability to communicate by email with others and obtain information anywhere, the web, accessed from mobile devices

- Anytime and anywhere access
- Enables people to take advantage of Internet services even though usually they do not access Internet through a PC
- Make Internet access easy and cheap
- Brought new services on mobile phones

- In short: it made Mobile Web real. But how?
- The device it's very well designed and offers new touch screen based ways to navigate the Internet
 - But still this is not really the motivation why Mobile Web become real, the real reason is mostly the new marketing strategy adopted
- Created a Web2.0 market place for applications
 - User can easily search for applications matching their needs, install them and updated them
- Forced mobile providers to provide cheap Internet connection with device
 - Flat rate, 3GB cost around 15 euro per month. Before you could pay more than 100 euro for the same amount of data
- Everyone copied them, not only in term of device capability but also in term of marketing strategy



Mobile application development: the basics



- Less Computing Power
- Need to keep down power consumption
- Connection not 100% available
- Smaller display
- Different means of interactions
- Mobile services (GPS, SMS, ...)
- A multitude of Operating Systems
- Event driven paradigm

- **Types of pages accessible**

- Many sites that can be accessed on a desktop cannot on a mobile device. Many devices cannot access pages with a secured connection, Flash or other similar software, PDFs, or video sites, although recently this has been changing.

- **Broken pages**

- On many devices, a single page as viewed on a desktop is broken into segments, which are each treated as a separate page. Paired with the slow speed, navigation between these pages is slow.



Mobile Applications Architectures

Which mobile architecture is the best for your application?

- Choosing the right application solution is complex → smart phones, tablets, etc...
- The mobile marketplace is characterized by a variety of operating systems and device types that evolve at different rates.
- Mobile applications can be developed in 3 main ways:
 - Native Apps
 - Cross-Platform Apps
 - Mobile Web Apps

Which mobile architecture is the best for your application?

- Native Apps

“Build the application in its native code to run on a specific device and operating system. The app is downloaded from an app store and resides on the device.”

Build the app using native frameworks: iPhone SDK, Android SDK, Windows Phone SDK

Underlying technology: iPhone: Objective C, Android: Java, Windows Phone: .NET

When?

↑ User experience vs Cost

- Apps requiring high-end user experience
- Large user base on one device (e.g. physicians with iPad)
- Offline usage
- Apps requiring extensive device and/or OS functions

- Cross-Platform Apps:

“Build the application once using a cross-platform framework and run it on multiple mobile platforms (after fine-tuning for each platform). It’s also downloaded from an app store and resides on the device”

Build once, deploy on multiple platforms as native apps:

- RhoMobile, Titanium Appcelerator, PhoneGap, Worklight

Underlying technology: RhoMobile:

- Ruby on Rails, Appcelerator: Javascript, HTML, PhoneGap: Javascript, HTML, Worklight: Javascript, HTML

When?

↓ User experience vs Cost

- Simpler apps, offline Usage
- Multiple device types distributed across key users
- Works well for a number of enterprise applications that do not require heavy device functions

- Mobile Web Apps

“Build the application to run over the internet from a central server, from where it can be accessed by any device with a web browser.”

Built using web technologies: HTML5, Sencha, JQuery Mobile

Underlying technology: Javascript, HTML

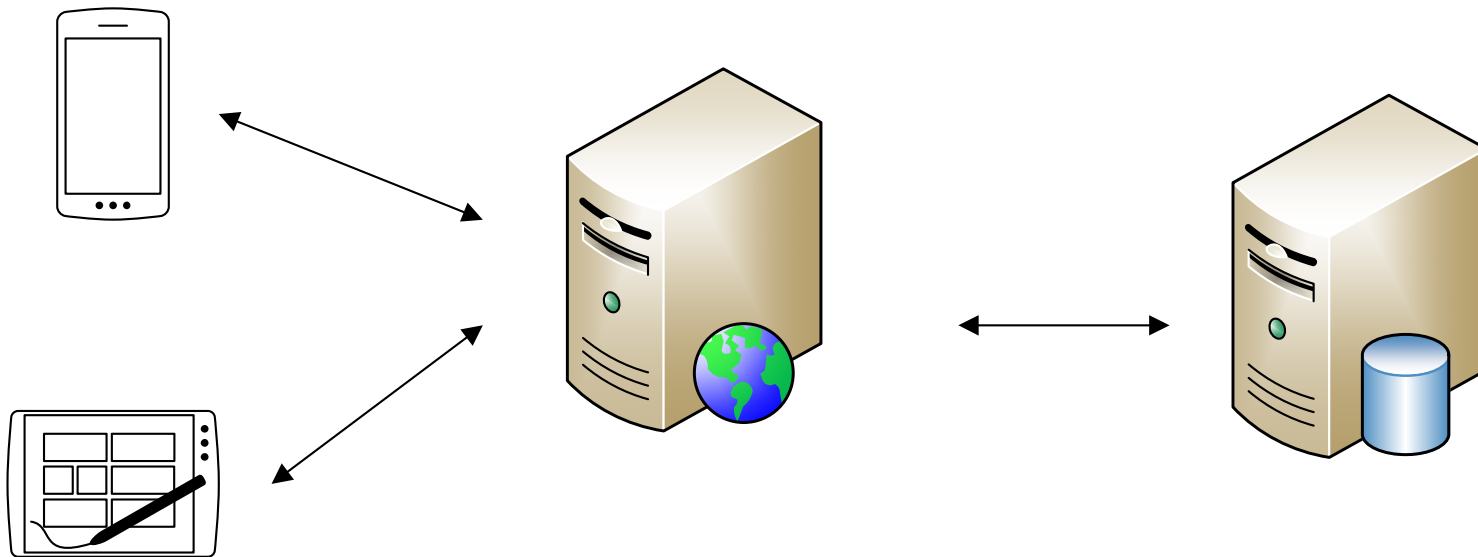
When?

↑ Audience Reach vs
Performance ↓

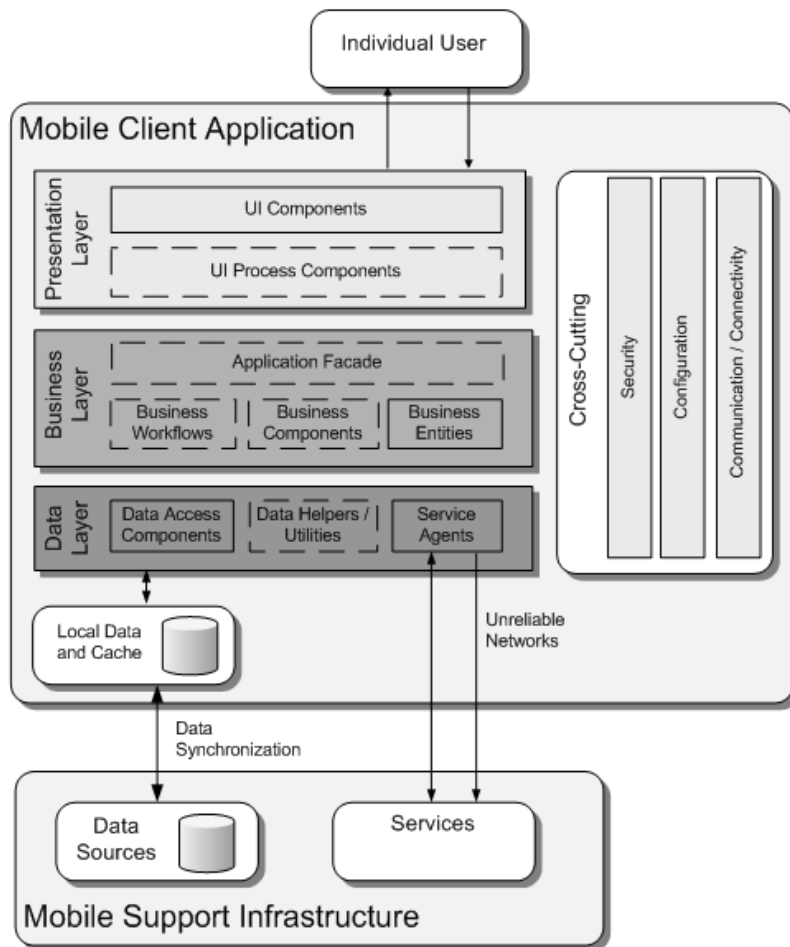
- Generic user experience, performance depends on Internet connection
- User base across smart phone platforms
- Need to maintain single code base
- Moderate amount of device functions

- The most appropriate choice really depends on your end goals.
 - Mobile web app: Mobile web presence
 - App: Specific purpose
- Advantages of Mobile web applications: broader accessibility, compatibility and cost-effectiveness.
 - Immediacy – Mobile Websites Are Instantly Available
 - Compatibility – Mobile Websites are Compatible Across Devices
 - Upgradability – Mobile Websites Can Be Updated Instantly
 - Findability – Mobile Websites Can be Found Easily
 - Shareability – Mobile Websites Can be Shared Easily by Publishers, and Between Users
 - Reach – Mobile Websites Have Broader Reach
 - LifeCycle – Mobile Websites Can't be Deleted
 - A Mobile Website Can be an App!
 - Time and Cost - Mobile Websites are Easier and Less Expensive
 - Support and Sustainability

- Specialization of a three tier architecture



Reference Architecture for Mobile Web Applications



- 3 Layer architecture (logic)
- Some parts of data (data sources) and some parts of logic (services) are accessed via remote connection

<http://apparchguide.codeplex.com/>

- The presentation layer is responsible for all interactions with the user
- Common ways to present data to mobile users:
 - HTML
 - Native UI

- The business-logic layer is responsible for implementing the basic rules of the system according to the operating rules of the business
- This layer is in charge of accessing the data tier and for processing the data retrieved and sent to the presentation layer

- The main function of the data layer is to provide fast, reliable access to data needed to run a system
- Additionally, the data layer is responsible for maintaining information about the relationships between data

- Authentication vs. Authorization
 - How to simplify Mobile User access to Web APIs and Services
- Speed Traps
 - How to avoid excessive number of request that may saturate the available bandwidth to the device (and cause higher connection prices)
- Large Data Set Handling
 - How to handle large data set so as to reduce response time and bandwidth consumption
- User Interaction
 - How to deal with constraints posed by mobile devices displays, connections to provide and effective interaction to users

- Definitions
 - Authentication is any process by which a system verifies the identity of a user who wishes to access it [<http://mtechit.com/concepts/authentication.html>]
 - Authorization is the process of giving someone permission to do or have something [<http://hitachi-id.com/concepts/authorization.html>]
- Security is an important concern over mobile connections where devices are used in more open environments
- Usual desktop solutions for authentication and authorization that requires complex interaction with remote services may constitute a complex overhead to mobile users
- Thus we need to adopt principles to simply, but still retain security of access to remote services through mobile devices
 - Authentication from the API provider based on API Key stored on the devices can avoid user to provide their authorization details.

- Connection in mobile environments is subject to different quality in different contexts
 - Connection could be on wifi, 3G or 1G based signal and bandwidth
- Connection is a scarce resource
 - Connection may not be always available
- Thus we need to adapt to connection quality and availability by
 - Segmenting functionality and/or calls to prevent bandwidth issues
 - Adopting polling techniques that adapts to the available bandwidth and connection
 - Create subset of calls and functionality when on slower bandwidth
 - Use notifications if possible
 - Modify polling interval based on need
 - Recovering from intermittent or lost connections

- Data transmission is a costly resource
 - In term of performances, bandwidth and a service cost
- Transmission of large chunk of data is more error prone than small chunk of data
 - Quality of connection is not constant in a mobile environment
- Thus we need to minimize large data sets, by employing techniques such as:
 - Ask for only those elements that you require (Filtering)
 - Ask for only those items that you require (Paging)
 - Cache what you can locally instead of requesting the same data (Caching)

- Besides issues related to connection aspects, adoption of mobile devices poses challenges for the User Interaction
 - Asking for new information using synchronous call, due to bandwidth limitations may totally block user interactions with the application
 - Re-requesting already accessed information may end up in making slower the interaction
- Thus we need to employ techniques that hides the limitations of mobile devices and mobile connections by
 - Caching of information for future retrieval and navigation
 - Execute web service parsing and display in background when possible to prevent UI blocking
 - Use JIT and Information on Demand to maximize small layouts and minimize web service calls



Mobile Web App Frameworks

Bootstrap

- Free & open-source collection of tools for creating websites and web applications.
- Contains HTML, CSS, and JavaScript framework for developing responsive, mobile-first web sites.
- “Responsive web design is about creating web sites which automatically adjust themselves to look good on all devices, from small phones to large desktops”

<http://getbootstrap.com/>

Bootstrap

- Bootstrap was developed by Mark Otto and Jacob Thornton at Twitter, and released as an open source product in August 2011 on GitHub.
- Bootstrap 3 is designed to be responsive to mobile devices

Advantages:

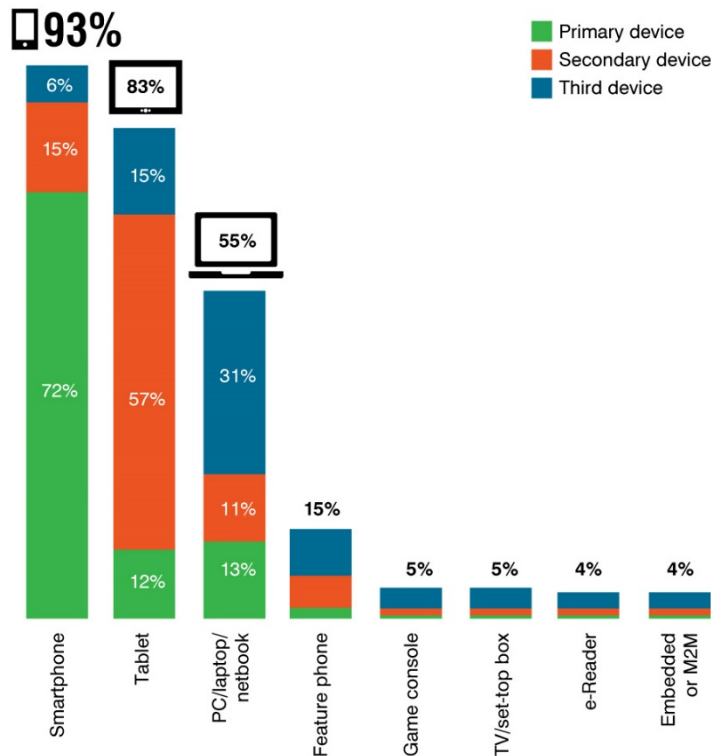
- **Easy to use** → knowledge of HTML and CSS
- **Responsive features** → adjusts to phones, tablets, and desktops
- **Mobile-first approach** → mobile-first styles are part of the core framework (Bootstrap 3)
- **Browser compatibility** → Bootstrap is compatible with all modern browsers

Bootstrap

- Why to use Bootstrap?
 - <http://www.sitepoint.com/11-reasons-to-use-twitter-bootstrap/>
- Tutorial
 - <http://www.w3schools.com/bootstrap/default.asp>
 - Example:
 - http://www.w3schools.com/bootstrap/tryit.asp?filename=trybs_default&stacked=h
- <http://getbootstrap.com/>
- GitHub:
 - <https://github.com/twbs/bootstrap>

CONNECTED DEVICE MINDSHARE, Q1 2014

% of developers developing for each device (n=5,774)



- “The global app economy was worth \$68 billion in 2013 and is projected to grow to \$143 billion in 2016”
- “Tablets attract 83% of app developers but just 12% of developers target tablets as their primary development screen”
- “Information from: Developer Economics Q1 2014: State of the Developer Nation”

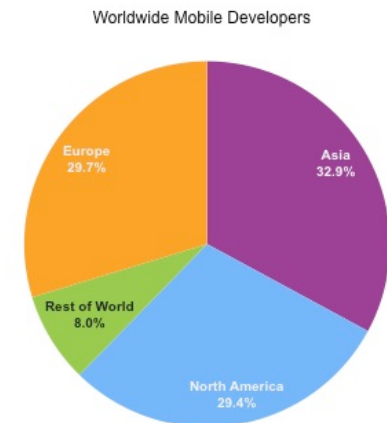


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Source: Developer Economics Q1 2014 | www.DeveloperEconomics.com/go

Source: <http://www.visionmobile.com/product/developer-economics-q1-2014-state-developer-nation/>

- “Android continues to dominate Developer Mindshare with 71% of developers that target mobile platforms, developing for Android”
- “Apple's iOS comes as a distant second at 55% of global app Developer Mindshare. iOS is strong in Europe and North America, but takes third position behind HTML5 in South Asia, South America and Middle East & Africa”
- “HTML5 is both an app deployment platform (on-browser) and a technology for creating native apps (off-browser). 37% of mobile developers use HTML5 as a platform, i.e. to develop mobile websites, or web-apps”
- “iOS is the preferred platform for developers in North America and Western Europe while Android wins in every other region”



Source: <http://www.visionmobile.com/product/developer-economics-q1-2014-state-developer-nation/>
<https://blog.newrelic.com/2014/06/13/mobile-app-development-trends-worldwide-need-know/>

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Questions?

