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# AJAX for Mobile Devices

*Using Apache Projects to get the job done*

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ACCU 2009 - Apr., 23rd - Oxford (UK)



# Why is this relevant?

## *“Mobile is the next Desktop!”*

- “The only bright spot in the PC industry is netbooks. Analysts at the Gartner research company said shipments rose to 4.4 million devices in the third quarter of 2008, from 500,000 units in the first quarter of last year. **Analysts say sales could double this year despite a deep worldwide recession.**” - NYT - 26/01/2009
- “According to new research from CompassIntelligence.com, **businesses in the US will spend roughly \$11.6 billion on mobile applications by 2012.** ... <snip> ...The highly mobile Healthcare industry is expected to spend an estimated \$1.1 billion on mobile applications by 2012, although the Government and Services industries are expected to be the top spenders on mobile applications.” - Compass Intelligence - 04/09/2008
- “An iPhone record: **500 million App Store downloads**” - Apple - 16/01/2009
- Internet usage on mobile devices has dramatically increased since 2007. This proliferation is the result of a rapid increase in processor power, improvements in network connectivity and reductions in the costs of mobile computing. Many mobile devices now include the same or similar Web browsing software as desktop computers. **As a consequence, mobile device users expect access to the World Wide Web anytime, anywhere and from any device.** - MobileAjax - 2008

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Developing solutions for the mobile platform will more and more become part of the everyday software engineering challenge!

# This talk ...

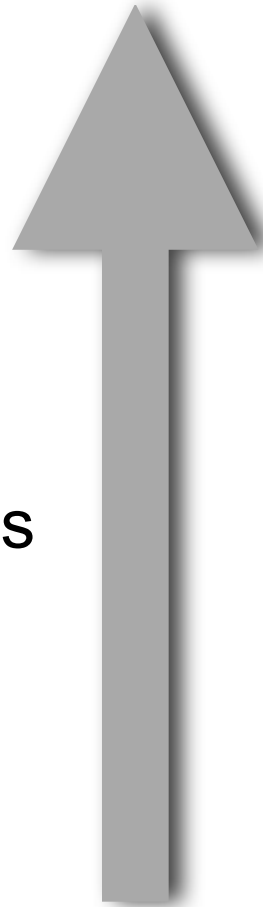
*... is also about money!*

- Build and maintain distributed (mobile) applications/systems and minimize the cost doing it
- A key cost factor are people
  - Ramping up a skill and/or have them use a skill
- You need to A&D systems that are “easy” to build and maintain
  - AST - Architecture, Standard, Tools
  - A&D and Code

# What are the options?

*One way to look at it ... (the “if-you-have-to” approach)*

- Go Native ...
  - iPhone SDK (Objective-C), Windows Mobile (C++), Symbian (C++), Palm (C++), Blackberry (C++), Android (C++)
  - High cost, very good results
- Use Java ...
  - CLDC/MIDP, CDC, AGUI, OSGi, lots of JSRs
  - Medium cost, good results
- Use the Browser (and AJAX :)) ...
  - Internet Explorer, Safari, Firefox, Opera
  - Low cost, maybe “good enough” results



# The Project(s) ...

*... that were driving some of the research!*

- Mobile Health Care Solution
  - To make patient data available to doctors and nurses, while they provide home-care services
  - Cutting costs in the health care system and increase traffic on the mobile network
  
- Mobile Payment Solution
  - Use mobile devices to make “cheque” like payments between businesses and individuals
  - Use a widest possible variety of devices

# Agenda

- Why is this relevant?
- Characteristics of a Mobile-SOA Platform
  - Comparing the available approaches
- Using AJAX to get the job done
  - Introducing AJAX and some relevant Apache Projects
- Summary, Wrap Up and Q&A
  - The “Sensoric” Revolution

# What makes “Mobile” special?

*The client side hardware/the devices!*

- Limited Hardware
  - Limited Screen “Real Estate”
  - Limited CPU, main memory, disk space
- Limited Network Connectivity
  - Limited Bandwidth
  - Unreliable Network Connectivity
- The Application Design
  - Offline vs. Online
  - Request/Response vs. Fire-and-Forget
  - Short- vs. Long-Running



# “Mobile” A&D requirements

- Design for maximum battery life
  - No constant looping/heavy CPU usage
  - No polling
  - DOM/XML parsing is expensive
    - consider JSON
- Design for minimum data traffic
  - Both for performance and cost
  - “Chunk” the data/interactions to ensure “responsive” user experience
- Design for maximum device portability
  - Testing is key

# Consider the application

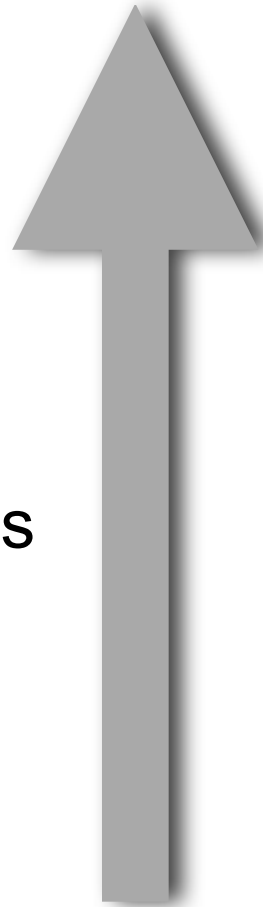
*Categories, behavior, ...*

- “On Device” Mobile Application
  - e.g. Game - lots of computing, not a lot of web access/traffic
- “True” Mobile Web Application - less computing, but lots of interactions with lots of services
  - EMail, Twitter, ..., Online Banking - large number TXs, but (hopefully) small size of TX
- Behavior ...
  - short interrupt driven, expect fast reaction, “explore” (desktop) vs. “focused” (mobile)

# What are the options (revisited)?

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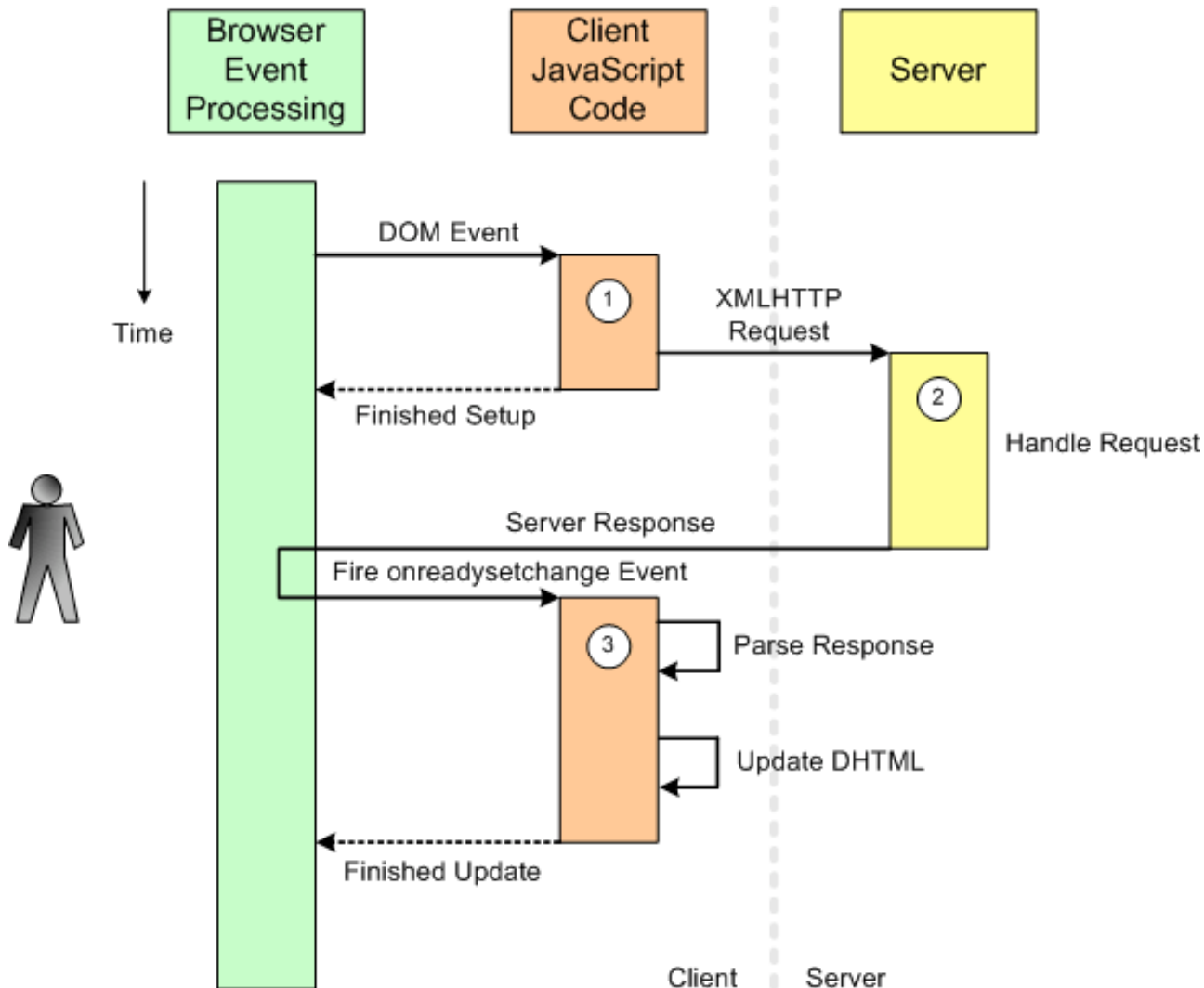
# The “1-Slide” AJAX Tutorial :)

## *Background and Concepts ...*

- Asynchronous JavaScript and XML (AJAX)
  - Coined by James Garret [2005]
- Based on ...
  - JavaScript, DOM (HTML/XML) and XMLHttpRequest
- Allows for interactive, partial, req/resp-style updates/refreshes of web-pages/content
- Famous use-cases ...
  - Google-Suggestions
  - DART-Tracker (at least for me :))

# The "1-Slide" AJAX Tutorial :)

... a sequence diagram ...



# The “1-Slide” AJAX Tutorial :)

*... and some source code :).*

```
<a onClick="onClickSayHi()">Say Hi!</a>
```

```
---
```

```
function onClickSayHi() {  
    var xmlhttpRequest = GetXmlHttpRequestObject();  
    // setup anonymous callback function to deal with response  
    xmlhttp.onreadystatechange = function() {  
        if(xmlhttp.readyState != 4) return;  
        // LOTS of unmarshaling code goes here  
    }  
    // LOTS of marshaling code goes here  
    xmlhttp.open("GET", url, true);  
    xmlhttp.send(null);  
}
```

# The browser “maze” ...

*... and how to navigate it.*

- Opera Mini - Presto
- (Apple/iPhone) Safari - Webkit
- (Google) Android - Webkit
- Nokia (s60) - Webkit
- Access Netfront - Netfront
- (RIM) Blackberry - Mango
- (Palm) Blazer - Netfront
  
- (MS-Windows Mobile) Internet Explorer



# Mobile AJAX “challenges” ...

*... and how to overcome them.*

- Hidden server interaction creates a risk for the user experience
  - Ensure UI behavior is in sync with network behavior
- DOM/XML marshaling must be managed
  - To manage CPU and battery
- Services wrapping required
  - for Technologies - e.g. CORBA to HTTP/XML
  - for Semantics - Distributed to Mobile
- Limited access to device features
  - No solution - consider JAVA, Native

# Using Apache Projects to get the job done

- Server-side SOA platform
  - Apache ServiceMix, ActiveMQ, CXF
- Server-side service wrapping is required
- But what to do about the client side ... ?



# Using Apache CXF to access the Mobile SOA

- Java-Script generation capabilities
  - wsdl2js, ...?js URL extension
  - supports SOAP, XML, JSON
- Very simple API
  - onSuccess(), onError(), ...
- “Eliminates” marshaling code
- No “installation” needed
- Source Code/Podcast
  - [www.tritsch.org](http://www.tritsch.org) - Podcast



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# Resources to consider ...

*... in case you want to learn more.*

- <http://www.apache.org> - SMX, AMQ, CXF
- <http://www.openajax.org> - Mobile AJAX TF
- <http://www.youtube.com> - Demystify AJAX
- <http://www.w3schools.com> - AJAX, DOM

# Summary/Conclusions

- Given the right requirements, using AJAX is a viable approach to build mobile applications/solutions
- You still need to wrap the services :)
- Apache open source projects can help you to build a/the Mobile SOA platform

# Questions

**Thank You!**





***PROGRESS***  
***S O F T W A R E***