Aalto University
School of Science
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Kimmo Puputti

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## !Fixme **Add English subtitle** Fixme!

Master's Thesis
Espoo, !FIXME **Add English date** FIXME!

**DRAFT! — Wednesday 11$^{\text{th}}$ January, 2012 — DRAFT!**

Supervisor:      Professor Petri Vuorimaa, Aalto University
Instructor:      Risto Sarvas D.Sc.(Tech.)

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ABSTRACT OF
MASTER'S THESIS

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| **Author:** | Kimmo Puputti | | |
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# Acknowledgements

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    Thank you.

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Kimmo Puputti

# Contents

## 0.1 Thesis Git repository info

Build time: **Wednesday 11<sup>th</sup> January, 2012  14:48**

**Git HEAD:**

```
commit efc80fd9a77d06a5b8f3d6189831590fd8605cf8
Author: Kimmo Puputti <kpuputti@gmail.com>
Date:   Wed Jan 11 13:13:52 2012 +0200

    Add platform skills table and devdays architecture img.
```

**Repository status:**

```
# On branch master
# Changes not staged for commit:
#   (use "git add <file>..." to update what will be committed)
#   (use "git checkout -- <file>..." to discard changes in working directory)
#
# modified:   Makefile
# modified:   images/devdays.graphml
# modified:   images/devdays.png
# modified:   methods.tex
# modified:   thesis.pdf
#
no changes added to commit (use "git add" and/or "git commit -a")
```

| Mobile OS Type | Skill Set Required |
| --- | --- |
| Apple iOS | C, Objective C |
| Google Android | Java (Harmony flavored, Dalvik VM) |
| RIM BlackBerry | Java (J2ME flavored) |
| Symbian | C, C++, Python, HTML/CSS/JS |
| Windows Mobile | .NET |
| Windows 7 Phone | .NET |
| HP Palm webOS | HTML/CSS/JS |
| MeeGo | C, C++, HTML/CSS/JS |
| Samsung bada | C++ |

Table 1.1: Required skill sets for different mobile platforms. [2]

# Chapter 1

# Introduction: Smartphone Market and the Need for Cross-Platform Support

## 1.1    Smartphone Landscape

## 1.2    HTML5

### 1.2.1    History

### 1.2.2    Markup

### 1.2.3    CSS3

### 1.2.4    JavaScript APIs

### 1.2.5    Related APIs

## 1.3    Modern Mobile Web Application Architecture

### 1.3.1    Single-Page applications

#### 1.3.1.1    JavaScript MVC Libraries

### 1.3.2    Responsive Design

### 1.3.3    Progressive Enhancement

### 1.3.4    UI Libraries

#### 1.3.4.1    jQuery Mobile

#### 1.3.4.2    jQTouch

#### 1.3.4.3    Sencha Touch

### 1.3.5    Hybrid Applications

- Use a Content Delivery Network
- Add an Expires Header
- Gzip Components
- Put Stylesheets at the Top
- Put Scripts at the Bottom
- Avoid CSS Expressions
- Make Javascript and CSS External
- Reduce DNS Lookups
- Minify JavaScript
- Avoid Redirects
- Remove Duplicate Scripts
- Configure ETags
- Make Ajax Cacheable
- Splitting the Initial Payload
- Loading Scripts Without Blocking
- Coupling Asynchronous Scripts
- Positioning Inline Scripts
- Writing Efficient JavaScript
- Scaling with Comet
- Going Beyond Gzipping
- Optimizing Images
- Sharding Dominant Domains
- Flushing the Document Early
- Using Iframes Sparingly
- Simplifying CSS Selectors

# Chapter 2

# Research Question: HTML5 - Hype versus Realities?

# Chapter 3

# Methods: Example Application and Library

## 3.1 Qt Developer Days 2011 Conference Schedule Application

The Qt Developer Days[1] is a conference for developers using the Qt cross-platform application and UI (?) framework[2]. We created a mobile web application for conference with contextual and personalized session information and per-day schedule.

### 3.1.1 Application Architecture

The conference schedule[3] is a single-page application (citation needed)with a lightweight backend written in Python using the Django Web Framework[4].

The backend provides the static assets (JavaScript, CSS (?), images, etc.) and an API (?) for persisting session feedback to a MySQL[5] relational database. It also generates the HTML5 AppCache (citation needed)offline cache manifest file based on the device type.

The frontend is a JavaScript application written using the Backbone[6] MVC (?) framework. Other used JavaScript libraries include Underscore[7],

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[1]`http://qt.nokia.com/qtdevdays2011/`
[2]`http://qt.nokia.com/`
[3]`http://m.qtdevdays2011.qt.nokia.com/`
[4]`https://www.djangoproject.com/`
[5]`http://www.mysql.com/`
[6]`http://backbonejs.org/`
[7]`http://underscorejs.org/`

jQuery[8], Handlebars[9], and Modernizr[10]. The HTML5 Mobile Boilerplate[11] was used as an initial markup structure for the application.

Wireless networks can be unreliable in conference settings, so offline support was also added using several different JavaScript techniques and HTML5 APIs.

The application was designed for touch screens on various platforms and screen sizes. The layout adjusts to the available space and provides rich interactive components. Integration to social networking services was also added to the application.

## 3.2   JSONCache JavaScript Library

JSONCache is a lightweight JavaScript library for fetching JSON (?) data in flaky networks. The library was designed especially to handle flaky mobile networks with connection problems and short interruptions. The goal is to avoid networking as long as possible and failing gracefully if network connections are not stable.

JSONCache provides two main functionalities: data caching and attempting to fetch the data multiple times.

The caching layer uses the client side localStorage (citation needed)cache of HTML5 (?). Data requests can be done using the JSONCache API (?) which always checks the local cache first before opening any network connections. If the data is already in the cache, the cached data is checked for validity and if the data has not been expired, it is returned immediately. If the data is not in the cache or it has been expired, a new network request is made and the received data is cached and returned to the requestor. The expiration time of a data item can be configured in the library settings.

JSONCache also tries to fetch the data multiple times to handle small interruptions in network connection. !FIXME **add example and explain that it is very common** FIXME!. If a data fetch fails, a new fetch is issued after a timeout (defined in the configuration). On subsequent attempts the timeout is increased, and after a defined number of attempts the fetch error is issued to the requestor.

Figure 3.2 shows an interactive demo of the JSONCache library. The demo[12] simulates the caching and fetching functionality of the library by

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[8]http://jquery.com/
[9]http://handlebarsjs.com/
[10]http://www.modernizr.com/
[11]http://html5boilerplate.com/mobile
[12]http://kpuputti.github.com/JSONCache/demo/index.html

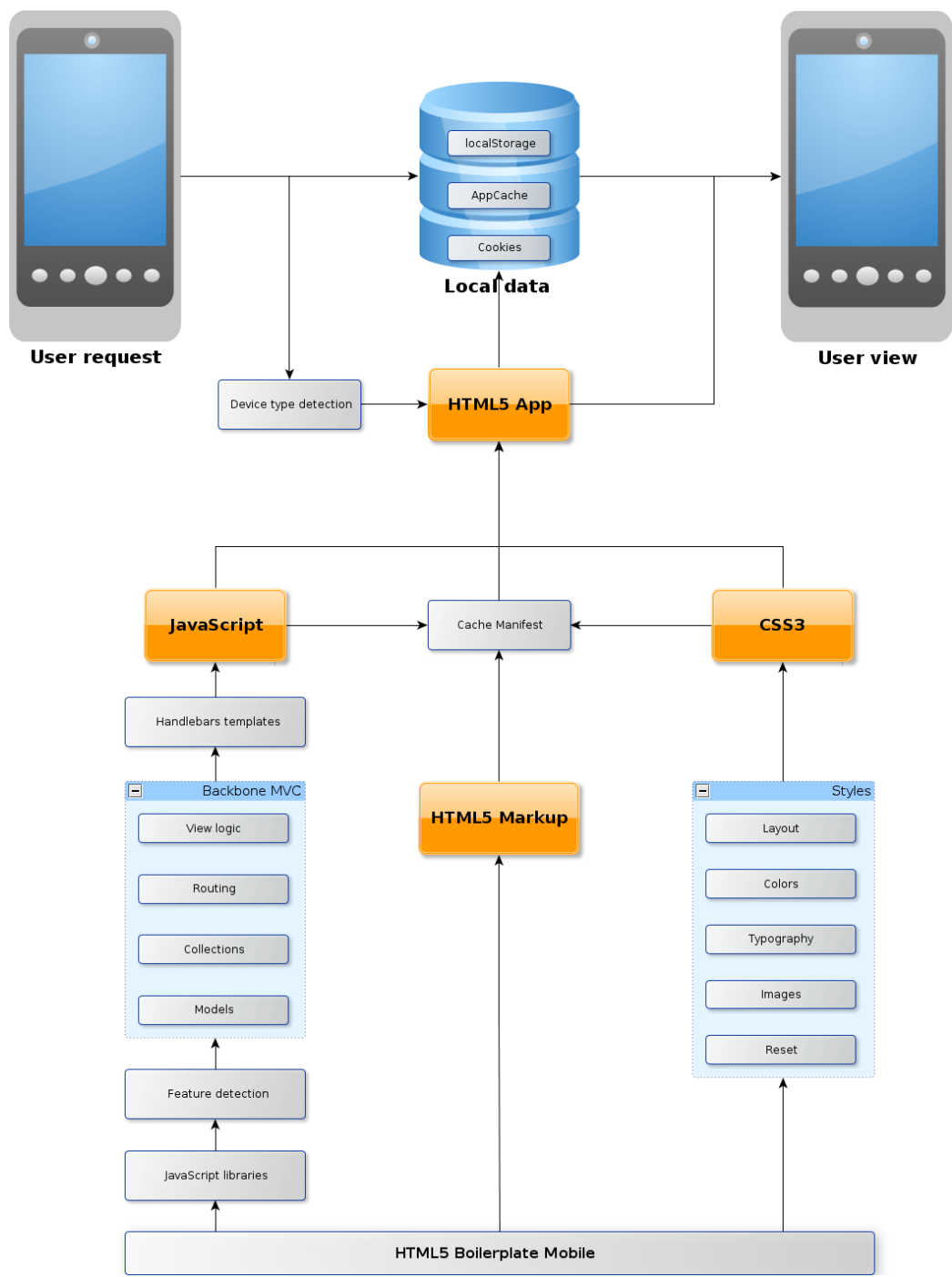simulating a flaky network according to the configuration.

Figure 3.1: Conference schedule application architecture.
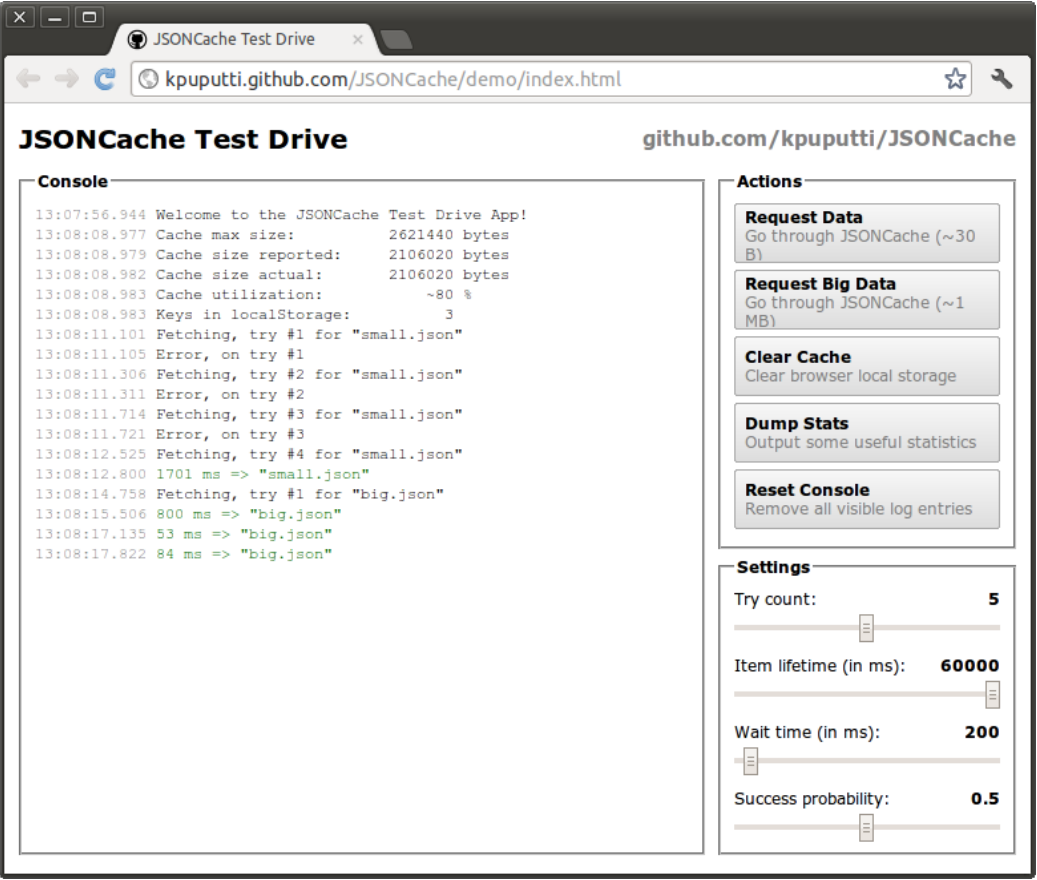
Figure 3.2: Interactive JSONCache demo.

# Chapter 4

# Results: What Was Good and Where Were the Compromises

## 4.1 Targeting Different Platforms

### 4.1.1 Device Detection

### 4.1.2 Feature Detection

## 4.2 Targeting Different Screens

## 4.3 Handling Mobile Networks

### 4.3.1 Minimizing Data Transfer

### 4.3.2 Caching

### 4.3.3 Preloading

### 4.3.4 Offline Support

### 4.3.5 Handling Interruptions

## 4.4 Graphics and Animations

## 4.5 Performance Analysis

### 4.5.1 YSlow

### 4.5.2 PageSpeed

# Chapter 5

# Discussion: Bright Future Ahead for HTML5

# Chapter 6

# LaTeXtest

## 6.1  Citing

- Berners-Lee [1]

- Mikkonen & Taivalsaari [5]

- Taivalsaari & Mikkonen [8]

- Pilgrim [6]

- Crockford [3]

- Souders [7]

- Garrett [4]

- Zakas [9]

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