"Embedded Ajax – Web 2.0 Optimized for Mobile Devices"

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The document represents the concept and design principles of an Ajax implementation optimized for mobile devices which was introduced as "Embedded Ajax" by ACCESS.

1 Introduction

Web 2.0 applications that use Ajax will also soon become popular throughout the mobile world. However, since there are still constraints and limitations in mobile device hardware and wireless networks, it will be difficult to deliver a PC-like Web 2.0 experience without some considered adjustments. In order to fully leverage the potential of Web 2.0 on mobile devices, it will be necessary to take the PC service model and end-user experience and adapt it for the mobile world while also overcoming the following issues inherent in mobile devices:

- Limited memory capacity
- Low-power CPUs (to reduce power consumption)
- Narrow bandwidth and low-speed networks (compared to PC networks)
- Limited key input

1.1 Performance

Although Ajax offers a method for the asynchronous retrieval of data required to dynamically run a Web application, the most important functionality is actually the JavaScript bindings with XHTML, CSS and DOM, which perform dynamical display changes and interactions. That is, Ajax requires optimized performance for running complicated JavaScript code on mobile devices. In order to realize this higher level of performance, a mobile device will need not only a highly efficient JavaScript engine, but also a smart framework to run the JavaScript code relevant to Ajax applications such as prototype.js [5] at the highest possible speed.

1.2 Memory Consumption

Memory consumption is another important issue that needs to be carefully considered. Memory management quality has a significant influence on the response and stability of a Web application. For example, on NetFront for mobile devices, the standard version of Google Maps acquires over 100Kbytes of content, and in order to display a map, it requires memory consumption at over 10Mbytes. As you can easily imagine, these requirements are not realistic for the majority of mobile devices currently available. Certainly, downsizing the image itself can

reduce the memory consumption required to display an image. However, the potential vulnerabilities of memory leaking by operating DOM via JavaScript must also be considered.

1.3 Limited Key Input

Many mobile devices have limited key inputs (4-way navigation, enter, cancel, several soft keys, no mouse pointer) relative to desktop PCs. These hardware differences/restrictions create significant difficulties when developing rich Web applications for mobile devices.
For example, when Web browsers are implemented on mobile devices, the Right/Left key is assigned to the history operation, so these keys cannot be used to interact with a Web application. This inability to use the Right/Left keys creates a barrier to sharing the same user-interface for a Web application on a PC relative to a mobile device. A different event system needs to be developed to overcome the interface restrictions on mobile devices.

2 Design Goals

In order to overcome the performance, memory, and input restrictions on mobile devices, ACCESS want to introduced Embedded Ajax, a new technology for mobile devices based on Ajax, that provides enhanced performance and usability for Web 2.0 applications that use Ajax. Embedded Ajax incorporates:

- Optimized extra-DOM operations for Ajax applications
- Explicit Garbage collecting functionalities for JavaScript
- Alternative virtual key event handling for mobile devices

Embedded Ajax embeds and provides extended functionalities for accessing a JavaScript object smarter introduced by many Ajax utilities including Prototype.js. Embedded Ajax also provides three particular functionalities, in order to achieve high performance and usability for Web 2.0 applications that use Ajax technology on mobile devices

(1) Highly sophisticated garbage collecting system.

(2) A function that can invoke garbage collection when a content creator requires

(3) Virtual key event to facilitate the development of Web application for mobile devices.

3 Summary

In this paper, we described the concept and design of Embedded Ajax, and also discussed the issues surrounding the introduction of Web 2.0 applications that use Ajax on mobile devices. Then, we presented how Embedded Ajax and NetFront Browser v3.5 can resolve these issues. Embedded Ajax can deliver a fast, flexible, and seamless end-user experience for Web 2.0 applications accessed via mobile devices. ACCESS believes that Embedded Ajax will become the standard, optimized Ajax technology for all mobile devices.