

The 3G Mobile Learning Platform's Building Based on AJAX Technology

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Abstract—With the current development of information technology and the popularity of wireless communication devices, mobile learning came into being. 2009, China officially entered the era of 3G, 3G mobile communications technology introduction, certainly for the rapid development of mobile learning, providing a better technical support. The Ajax technology is Web 2.0, and the realization of a new RIA technology with interactive capability, convenient use Ajax technology in building mobile learning has a great advantage. As the modern mobile devices have a powerful browser, and Nokia S60 3rd Edition devices with the introduction of the S60 Web browser support for Ajax. Therefore, this paper introduces and analyzes by Ajax technology, mobile learning platform and then the relevant design and implementation are summarized.

Keywords- AJAX; M-learning; 3G; NOKIA

I. INTRODUCTION

With the development of information technology and the popularization of wireless communication devices, mobile learning (M-Learning) came into being. Mobile learning is a new type of learning, which make full use of wireless technology and mobile computing devices anytime, anywhere access to learning the information, learning resources and learning services as a way of learning [1]. It lets people liberate completely from learning time and space constraints in the complete liberation, will greatly enhance the learning efficiency, to meet the needs of lifelong learning.

China has entered the 3G era, distance learners who are enjoying mobile phone-based mobile communication technology to facilitate, but can also access Internet on the mass data. Integrate the advantages of the two, moving together in online learning and teaching, so that each learner can have anytime, anywhere to enjoy the convenience of information resources and learning.

The world is increasingly mobile. Obviously, a variety of mobile Internet access is the latest innovative Web applications using the main driving force. Web convergence to mobile terminals, however, because Web applications have some problems, the interactivity is relatively weak, unable to achieve a variety of user interface, and its synchronous requests often means blocking the user interface. However, the introduction of Ajax technology to solve these problems, Ajax is a Web 2.0 rich Internet applications and new implementation techniques. Provide users with a wonderful experience and media features.

As the modern mobile terminal has a strong Web browser, Nokia S60 Web browser supports JavaScript and Ajax technology. S60 Web browser is the desktop-based Safari browser, the same used by Webkit open-source engine.

II. AJAX TECHNOLOGY

A. Ajax technology Introduction

Ajax all called Asynchronous JavaScript and XML is to create interactive web applications, web development technologies [2].

Ajax uses client-side scripting to exchange data with the web server. By Ajax, the client can make the application of enriched experience and exchange operators, and users will not feel the process of page to submit or refresh the page do not need to be re-loaded, the application of data exchange have been hidden. So, do not have a full page refresh, you can dynamically update the web page of the local. Use Ajax technology to create richer, more dynamic web application user interface. This makes interactive web applications has been an unprecedented increase, greatly enhanced the practicality and real-time applications.

- Ajax is essentially a combination of the following related technologies.
- Through the HTML / XHTML + CSS used to implement the content display.
- XML and XSLT through the exchange of data and processing.
- Document Object Model DOM (Document Object Model), JavaScript code by handling HTML structure and the server returns the XML data.
- Use XMLHttpRequest to get data through the asynchronous mode.
- Collection of all of the above techniques using JavaScript.

Which, HTML / XHTML is necessary for standardization of presentation, DOM is not to reload the page, under the premise part of the necessary changes, JavaScript is initialized the client and server communication, the operation by the DOM update page necessary. XMLHttpRequest object which is the key to Ajax asynchronous interaction. XMLHttpRequest object is responsible for receiving the call reception, the server sends an asynchronous request, after receiving the server response content dynamically update the page. In addition to these techniques, other techniques for fine-tuning Ajax solution are very useful, but not required.

B. Ajax works

Ajax technology is actually between the client and the server to add a Ajax engine , which makes the browser and the server can be asynchronous interaction between the conduct “Fig. 1”, that is, the client need not wait for the server can continue to return for other operations[3]. In Ajax applications, server-side only with business data, the engine is no longer required to provide links to other resources, so no need to refresh the entire page. Blank window open so you do not wait for the server's response, which can continue to work for other clients. Server response has finished, the results presented to the Ajax engine, the client and server that asynchronous communication, allowing users to feel the client and server communication, making Web program appears to be an immediate response.

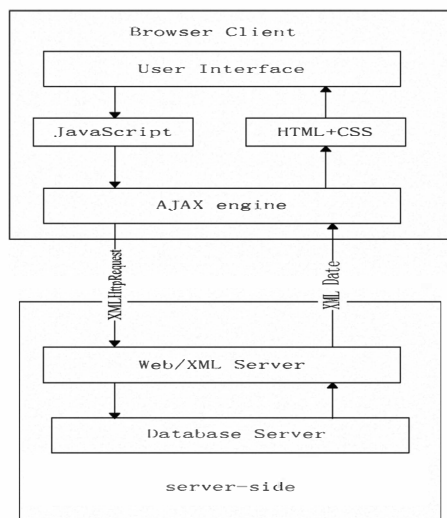


Figure 1. Ajax asynchronous mode.

Ajax Web development techniques as a complement to the program than the traditional web are that it places more emphasis on user experience. This experience is improved by reducing page refreshes, such as reducing unnecessary way to get the page to submit. Ajax uses asynchronous request and response model, and its message passing is the basic process.

- XMLHttpRequest object initialization.
- Send a request to the server.
- Server receives the request.
- Server returns a response message returned to the client.
- Client receives response information.
- DOM amendments update the page.
- The client browser is displayed.

III. WIDGET TECHNICAL

Widget is independent of the browser application running on a number of Web applications. In other words, widget is that some Web pages [5] [6]. Widgets use standard Internet technologies such as HTML, CSS, JavaScript, and Ajax. Widget includes building blocks such as shown in Table. I .

The behavior of Widgets is similar to Web applications. Their web server sends requests and receives responses. Client access to Web services, from services - the consumer's point of view. Because the URL will always be encoded within the widget, allowing the widgets in the Web, consumer services, rather than as a service producer (endpoint) to run. In addition to this difference, widget and other parts of the standard Web services architecture / organization are the same.

TABLE I. WGZ BUILDING BLOCKS TABLE

Document	Description
info.plist	xml document , describes the properties widget
name.html	Html
Icon.png	menu icon
*.js	logical definitions
*.jpg *.png	Image Resources
*.css	style and layout definitions

IV. ANALYSIS AND DESIGN PLATFORM

A. The overall architecture platform

Through the above analysis on the Ajax technology , we developed a Widgets NOKIA S60 application M-learning. Nokia Web widgets run on the Web Run-Time platform (Web Run-Time platform, WRT), the platform provided by the S60 Web browser driven. Web Run-Time platform for widgets can run independent of the Web browser. As the WRT platform supports JavaScript and Ajax technology, we develop a platform in WRT widget application - mobile learning platform.

Mobile learning platform technology architecture adopted by the four components: the presentation layer, network layer, business logic and data layer. One layer is located in the client mobile phone, Network layer is based on the 3G/GPRS and the Internet, business logic and data layers in the server side. Shown in Fig. 2, that layer is displayed on the mobile phone users, Mobile client is based on the Nokia S60 platform client applications running on mobile phones, When the user interface displayed by mobile phone, select the appropriate function within the package through the url to the server through the 3G/GPRS network request procedures. The mobile learning system installed package also features some business logic. Data layer is running on the web server, which encapsulates the whole of the mobile client application sends the request and the associated business logic and database operations. Server to accept client operating instruction, the associated business processes, will handle the results into the client phone can handle the format, the final show on the phone.

B. Implementation Platform

3G M-learning features of the full use of portable phones, to seize any available around the time to learn. Technically, as 3G networks have a substantive breakthrough in transmission and development, video on demand, under the 3G network is not limited by network speed. Therefore,

mobile learning system, will be video on demand is an integral part. This function allows users to achieve not only limited to traditional text display, and avoid the tedious nature of learning. Teacher can explain the animation and video tutorials presented to the user, so that in learning a

better choice. Therefore, the following were on the AJAX technology to communicate with the server-side mobile phones and video-on-demand functions to achieve a concrete description.

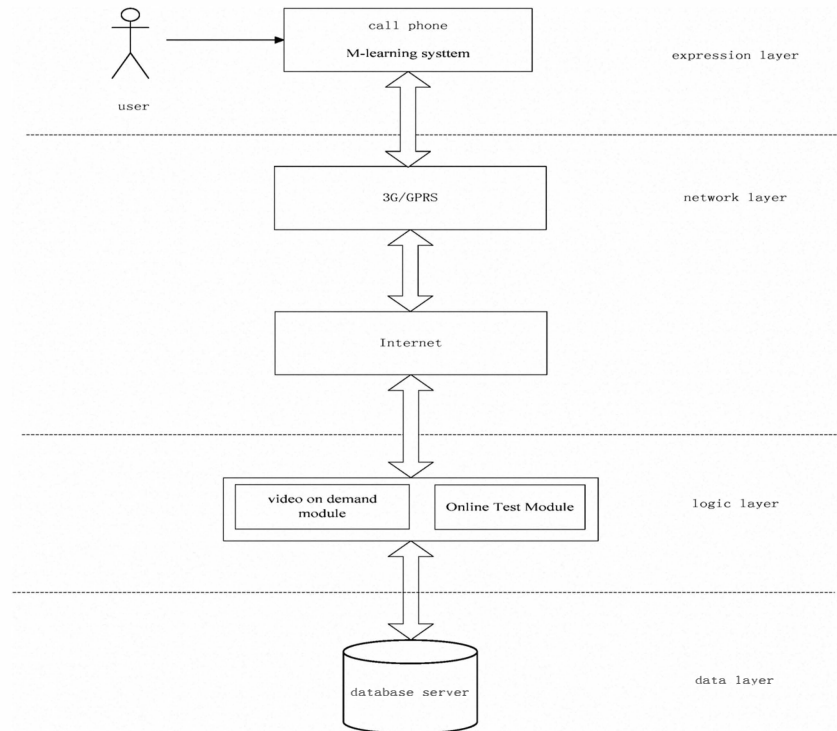


Figure 2. 3G M-learning platform architecture.

1) Mobile communication with the server-side implementation

M-learning platform for the realization of the functions of the asynchronous approach mainly interact with the server-side technology that is introduced in front of Ajax technology [4]. Fig. 3 shows the implementation principle.

- When the user through the mobile phone to access or request a page with Ajax functionality, the website will request information to the JavaScript processing.

- When you need to provide new information, through the XMLHttpRequest sends a request to the server, from server side to accept the data requestor to deal with specific XMLHttpRequest.
- Requested access to the database or XML file, and JavaScript client data return process for further processing.

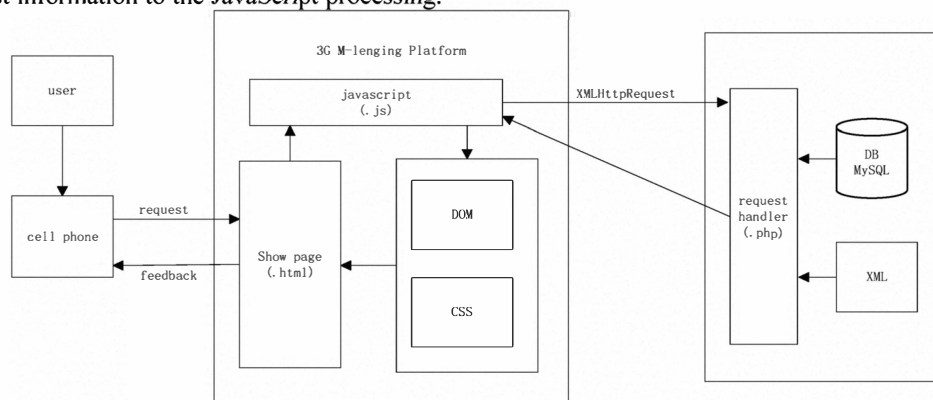


Figure 3. read data flowchart.

2) Implementation of video on demand feature

As in NOKIA S60 platform, can only 3GP format video file for playback. So we 3GP format for playing video files. Fig. 4 shows the functional business process diagrams.

- Through the main interface, select the video on demand. Server-side processing will find all the videos in the database directory name, the data will be returned to the client, and presents it.
- Directory and then select the video options set to the corresponding server-side processing in the database to find the directory and returns all the video files to the user.
- User selection of a video file, will play the video function is called video on demand.

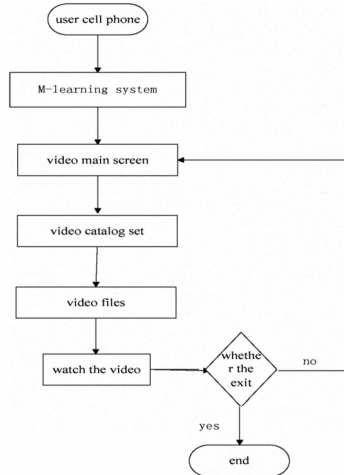


Figure 4. video on demand function flowchart.

V. SUMMARY

This paper proposed by the above Ajax technology in Nokia S60 platform, built 3G mobile learning platforms, Ajax technology to help overcome the mobile browser to certain restrictions, while improving the user experience. Use Ajax to avoid page refreshes. Because only the transmission part of the page, the data using Ajax to load faster and also reduce the amount of data of air transport.

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