Research On Mobile Web Applications End to End Technology

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Abstract

As the rapid development of software and hardware platform in the mobile devices and mobile Internet, web application has been moved to a wide range of mobile devices. However, transporting traditional end to end technology of web applications to the mobile environment has encountered some difficulties as the mobile web application network bandwidth is small, network transmission is unstable, the client processing power is low. This paper analyzes the traditional end to end techniques of web applications, proposes the requirement of mobile environment end to end web application technology. And above points has been improved, tested, and achieves good results.

Keywords: web application engine, mobile, embedded, end to end technology, hybrid architecture

1. Introduction

Currently on the market, a large number of mobile web application engine most do not realize the direct communication of mobile terminals and mobile Internet platforms, but only as a web application to run the engine exists in the terminal, needing for the underlying platform to provide data to the engine. In this paper, the research and implementation of web engine end to end technology provides the direct connection of mobile devices and servers, and achieves centralized web application publishing and management, and lays the platform for commercial applications based on the mobile Internet industry to fill in the gaps.

2. The end to end architecture of the traditional Internet

Software system architecture is a high-level abstraction, which describes the software system structure and behavior models, identifies the major system components, interactions between components, as well as inter-related components and connectors between the constraints and configuration. Software architecture is designed to be higher than the programming of the superstructure, the architecture is directly related to success or failure of software systems. At the same time, a suitable architecture is an important means to control software complexity, and improve the quality of software systems to support software development and reusing.

2.1 C/S architecture

C/S structure, well-known as client and server architecture, is based on the unequal nature of resources for the realization of shared and developed, the development of maturity in the eighties and nineties. Through it can take full advantage of the hardware environment at both ends of the advantages of a rational allocation of tasks to the Client side and Server-side to achieve, reducing system overhead.

From a development perspective, C/S model has a powerful data manipulation and transaction processing capabilities, and the development model is simple, easy to be understood and accepted. The system client applications and server components run on different computers respectively, simplifies the expansion and compression. In the C/S structure, each functional component is isolated, the customer application development is focused on the data query browser, but the development of the database server is focused on data management, this is beneficial to the system security. Because the client and the server directly connected, real-time performance is better. Finally customer-interface design targets to meet individual customer's business requirements.

However, C/S structure also has evident shortcomings. First, the development cost is high, the client program design is complicated, user interface style is not reunification, and promoting is difficult. Second, the compatibility is poor, for different development tools, it is difficult to be compatible with each other. Migration to different platforms is almost need to re-build full system, maintenance and upgrading is inconvenient. Thirdly, the existing C/S system, is difficult to apply these new technologies. In addition, the traditional C/S structure is a single
two-tier structure, only opens the develop level, in the specific application in both Client-side or Server-side still require specific software or platform support. Facing to the continuous upgrading of technology and products, C/S structure has been difficult to adapt to the needs of a large-scale open systems.

2.2 B/S architecture

B/S structure, browser and server architecture, is a kind of improved structure which inherits and develops the C/S structure, with the rise of Internet technology. B/S structure mainly uses maturing WWW browser technology, combined with variety of browser scripting language, using a standard Web browser to acheive the powerful function which needed for complex proprietary software previously. In this structure, most of the business logic implementation is on the server side, small amount in the front end (Browser), and users work through the web browser interface, forming the three-tier structure. The advantage of such structure is system installation and maintenance all in the service-side. Users use the system, only needing a browser to run all the modules to really achieve a "zero client" greatly facilitating the system development, deployment and maintenance.

As the double-edged sword, B/S structure has three defects equally. First, there is no database integration with effective processing capabilities, over-reliance on the server end, causing data query, such as responding speed is slower. And data presentation makes a page as a unit generally, so the data dynamic interaction is not strong. Second, it is too open to guarantee the security. Third, the development model is too stereotyped, resulting in weakening of system functions, can not meet the specific business needs of the field of special functions. However, looking from the current level of technology, based on B/S network applications is relatively mature, especially after the adventing of JAVA language which is good at crossing platform, B/S architecture in the enterprise applications is very widely used.

3 Current status of mobile Internet end to end technology

3.1 Web application engine status

At present there are many large companies have introduced a lot of web application engine. Of its most notable are: Yahoo mobile widget, Nokia WRT, Apple's dashboard, China Mobile’s BAE, as well as opera's opera widget. Foreign countries have more and more companies begin to study the web application of the engine, with a few domestic companies, just to stay at the applications level. Foreign companies can only run on high-end machine. In this topic, the web application engine is a lightweight multiple web applications engine, can make some low-level machine up and running, thereby enabling a variety of mobile phone users to have mobile multimedia experience.

3.2 The status of embedded web application engine end to end technology

Currently on the market a large number of mobile web application engine most do not realize the direct communication of mobile terminals and mobile Internet platforms, but only as a web application to run the engine exists in the terminal, needing for the underlying platform to provide data to the engine.

4 Characteristics and needs of Mobile web application end to end technology

4.1 Web application has the following advantages:

1. Based on HTML, CSS, JavaScript and other Web technology development, so it's easy to develop and deploy;
2. With single practical function, every web application has its own theme functions, so the implementation has high efficiency, and occupies less system resources;
3. Flexible and lightweight, rich in content, can realize a high degree of personalized desktop;
4. To develop the application using open APIs to meet low cost, and be easy and efficient integration of existing applications to develop new applications;
5. The form of achieving is between Web-pages and the client software, easy to promotional as B/S architecture, another easy of administration as C/S architecture;
6. Function achieving is completed on web application engine, and low coupling with the operating system, and facilitates the application to transplant across platforms.
7. As the mobile terminal's screen is small, the content show has some limitations, the hardware resource capacity lead to information processing capacity limited, the diversity of operating system, a high degree of personalization and other features, makes the web application technology particularly suitable for applications in mobile terminals.

4.2 Mobile web application features:
1. The current 3G networks is not mature, the majority of cell phones rely on GPRS or EDGE technology involving in the Internet, which requires mobile web applications, end to end system has a higher transmission efficiency.

2. The mobile terminal devices with limited computing power, also called for transferring data as concisely as possible.

5 Optimization and improvement of Mobile web application end to end technology

As the embedded web applications using the traditional web development technologies, easily developing, low coupling with the operating system and functional integrity features, web applications are between the BS and the CS framework, combined with the advantages of both.

Web applications can be summarized as the following Expression styles:

1. The user interface has HTML, CSS, images, sound and other documents as the components of resources, and these resources are stored locally through downloading and installation, do not need loading remotely.

2. Interaction Logic is implemented by ECMAScript which is the web application's soul.

3. In order to dynamically obtain the resources from the server, the applications support the Ajax asynchronous loading.

4. The communication data format can be JSON or XML, and operate the DOM through ECMAScript to update the page to display the content.

5.1 Software architecture research

Through the above analysis, we know that the traditional C/S system structure is not completely useless, while new B/S architecture is not perfect, can they combine the complementary advantages? The answer is yes, that is C/S and B/S hybrid software architecture. C/S and B/S hybrid software architecture is a typical heterogeneous architecture. C/S and B/S hybrid architecture is characterized by large system of different sub-applications to adopt advantages of different architectures, it is more suitable domain-specific software architecture style. In the large-scale heterogeneous systems, the characteristics of different sub-modules, operational features and performance requirements are not exactly the same. For some core modules, which need highly on security and system performance can use C/S structure; while some common features like browsing check and remote access can use B/S structure, for improved openness, versatility and simplicity. In this architecture, the system actually does not exist within the true zero-client, but a large number of thin clients can be configured. From Table 1, you can compare a single C/S or B/S structure and the characteristics of hybrid software architecture, we believe that in specific business applications appropriate circumstances, C/S and B/S hybrid architecture can be expressed in a relatively good actual performance.

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<th>C/S</th>
<th>B/S</th>
<th>Mixed</th>
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<tr>
<td>Data manipulation and transaction capabilities</td>
<td>good</td>
<td>good</td>
<td>good</td>
</tr>
<tr>
<td>Business performance</td>
<td>good</td>
<td>common</td>
<td>good</td>
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<td>Flexibility</td>
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<td>good</td>
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<tr>
<td>Extensibility</td>
<td>good</td>
<td>poor</td>
<td>good</td>
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<td>System open</td>
<td>poor</td>
<td>excellent</td>
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<td>System efficiency</td>
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<td>good</td>
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<tr>
<td>Reusability</td>
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<td>Development costs</td>
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Figure 1: Current end to end technology and system architecture design
5.2 Transfer Protocol Research

Researching on mobile web applications end to end technology, we adopted a lightweight combination of BS and CS architecture. Internet users, access the server through IE using the BS model, mobile end users access the server through the web application engine using CS mode. At this point, the CS model based on mobile Internet transport protocols have been streamlined and optimized. Reflected as follows:

1. The transmission between client and server uses HTTP protocol directly, the input parameters uses GET or POST request method, to provide remote call url address, such as: http://www.abc.com/getInfo.do?Code = sh000001. Data is usually json string format to return (except for binary data file type), json format is a structure similar with xml, according to development of application on web application engine, the processing is more efficient. String unified to use utf-8 character set encoding

2. In return data, if there exists image file, choose the PNG format

3. When the data transmitted from the server to the client, if there is large amount of data, we can compress it before transmission, using the GZIP compression algorithm as standard specifications.

4. When client requests server-side compression and transmission, it is needed that adding Accept-Encoding header in the HTTP_HEADER of the request, and setting the value: gzip, deflate. The server returns the response needing to set Content-Encoding: gzip The HTTP headers tell the client returns the current compressed data.

Figure 2: Normal mode json

4, the client HTTP header file contains the parameters are:
Mid: sim card only corresponds userid
UA : phone model descriptions
engine-version: web application engine version

5, Server only returns the current page of data according to the terminal screen size and paging processing.

Figure 3: Compression and Transmission

4, the client HTTP header file contains the parameters are:
Mid: sim card only corresponds userid
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6 Conclusion

This paper analyzes the status of mobile Internet end to end technology, and compares the characteristics of traditional Internet end to end technology, proposes the needs of mobile web end to end technology, and gives part of the solution. Of course, in the mobile Internet end to end technology research, there are many technical points worthy of excavation. In this paper, improvement proposed of architecture and transport protocols establishes the basis for follow-up study.

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