Development of the Server-side Web Browser for Mobile Phone based on the Imaging Technology “GT-Browser”

Kentaro WATANABE*, Takashi MIYAMOTO*, Tetsuya SAWANO*, Arito ASAI*, and Norihisa HANEDA**

Abstract

We have been developing enterprise solutions for mobile phones based on the imaging technology. Compared with an e-mail system, websites in the intranet have not been utilized in the mobile environment because of the poor performance of mobile phones. In this report, we introduce “GT-Browser”, that is a mobile web-browsing system based on the imaging technology for PC-based websites.

1. Introduction

For many years, the Internet Business Development Division in FUJIFILM Corporation has been developing solutions for mobile phones based on the leading imaging technology. Recently, we have been mainly developing solutions for corporations. One of the representative technologies is “GT-Document” that provides a means to convert documents to images and distribute them to a document viewer. This technology has been deployed mainly for making internal documents of a company available for browsing while an employee is outside company premises.

Meanwhile, an internal business resource which is no less important than document is the intranet business web system. Typical web systems which employees often want to access outside company premises include attendance records, groupware, sales force automation (SFA) system, and settlement and approval systems. If these systems could be accessed anytime from mobile phones, work efficiency would be increased. However, it is difficult to browse a web system designed for a PC directly from mobile phones due to their limitations. Though installing a mobile website additionally is a common alternative means, the cost of introducing and running such a website is a problem.

To overcome this problem, we developed “GT-Browser” technology which enables the browse of a PC website directly from mobile phones. We applied this technology to the commercial service “Keitai Remote Intra-Access”, which makes it possible to use internal company websites outside company premises through mobile phones (Fig. 1). In this report, we present an overview and describe distinctive features of GT-Browser.

Fig. 1 Keitai Remote INTRA-Access based on the GT-Browser technology.

2. Concept of the Technology

GT-Browser is a server-side web browser that renders web pages in the server and enables users to browse and operate PC websites by mobile phones.

In general, web browsers on mobile phones receive web page data directly and render the page. However, users who browse PC websites by a mobile web browser often encounter problems such as incorrectly rendered web pages and inoperable user interfaces because of the lack of performance and functions of mobile phones. Moreover, when highly-confidential information in company intranet websites can be accessed from the outside of an office, the browsing history of a web browser may become a source of information leak.

To solve these problems, we adopted a server-side rendering technique to GT-Browser. This technique is to render web pages to be displayed in an intermediate server which is placed between a mobile phone and a web server. We thereby achieved the rendering capability equivalent to that of web browsers on PCs. Another important point
is that GT-Browser is a “thin client” type browser. Since GT-Browser does not receive and store data of websites directly in mobile phones, the risk of information leak from mobile phones is extremely low.

3. System Configuration and Operation Flow

GT-Browser consists of a mobile phone for browsing websites and the GT-Browser server that converts websites to a form to be displayed on mobile phones. Fig. 2 shows an example of the GT-Browser system configuration and operation flow. This configuration is for accessing a web server located in a data center of a customer via the data center operated by FUJIFILM Corporation. The following are detailed explanations of the operation flow in Fig. 2.

(1) Obtain data of a website
To browse a PC website, the GT-Browser server retrieves data of the website such as HTML files, JavaScript files and style sheets according to the request from a mobile phone.

(2) Render the website and extract user interface data
Based on the data of the website, the GT-Browser server renders web pages. Then, the rendered web pages are converted into images suitable for mobile phones. In addition, user interface data of the web pages are extracted for the operation of them on a mobile phone.

(3) Send images and user interface data and display them on mobile phones
The images and interface data of the rendered website are sent to the mobile phone from the GT-Browser server. They are displayed on the mobile phone by a preinstalled application. A screen image of this application is shown in Fig. 3. As can be seen, GT-Browser can display web pages on a mobile phone equivalently as web browsers on PCs. This application displays common GUIs (Graphical User Interface) such as anchor links, text boxes, radio buttons, and select boxes based on the extracted interface data. Users can browser websites by operating these GUIs (Fig. 4).

(4) Apply operations of mobile phones to the GT-Browser server
The user’s operations upon interfaces of the mobile phone are sent to the GT-Browser server, and are applied as actual commands to the website. After the web page is updated in response to the commands, its image and interface data are sent and displayed on the application of the mobile phone again.

4. Technical Features

The following are the main features of the GT-Browser technology:

(1) Operability equivalent to that of PCs
Users of GT-Browser can browse PC websites on a mobile phone using a cursor as they operate a web browser on PCs. Therefore, it is not necessary to develop websites for mobile phones and spend any cost for introducing and running them. In addition, several operation modes besides using a cursor are prepared in GT-Browser.

(2) Smooth zoom and efficient data transaction
Since web pages displayed on mobile phones are preliminarily rendered images, it is possible to expand or shrink them smoothly on mobile phones (Fig. 5). For the reduction of communication traffic and quick display, the size of images is limited to the minimum for displaying on a mobile phone. When users zoom in a website image more than a certain level, an expanded image of the web page is requested to the GT-Browser server to display the image with good quality.
(3) **High level of security**

GT-Browser is a thin client type browser that displays only images of websites generated by a server on a mobile phone. Therefore, confidential information in the website such as phone numbers and addresses of employees or customers is not sent directly to a mobile phone. In addition, since retrieved images are deleted when the application is closed, there is no risk of information leak from the usage history kept in the mobile phone. Website data in the GT-Browser server for web browsing are managed separately per users, and they are deleted when sessions are terminated. Hence, GT-Browser users can access to websites which contain confidential information securely.

(4) **Browse of documents on websites**

GT-Browser provides a function to browse documents on websites in conjunction with GT-Document that converts documents to images in a server. This function enables users to read documents attached to websites.

5. **Conclusion**

In this report, we explained the GT-Browser technology, which provides a means to browse and operate PC websites from mobile phones based on imaging technology. This technology is expected to make internal PC websites of companies more accessible from the outside of company premises and to contribute to enhancing the efficiency of business operations and the security control of confidential information. In the future, we will make every effort to improve the functions and performance of this technology, and explore other applicable markets and products of this technology.

---

**Reference**


(In this paper, “JavaScript” is a registered trademark of Sun Microsystems Incorporated. “Keitai Remote” is a registered trademark of FUJIFILM Corporation. Applications for trademark registration of “GT-Browser” and “GT-Document” have been made by FUJIFILM Corporation.)