Developing a Mobile Information Service

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ABSTRACT

This paper reports the experience in the development of a Mobile Information Service, namely a mobile GP booking system using WAP technologies. The primary objective of the GP booking system is to allow patient to book an appointment with a doctor using WAP enabled phone such as an Ericsson R380s. This system also provides a real demonstration on database access through WAP covered in most e-commerce and web-wap development papers. The system first allows user to log on, make an appointment, browse his appointment, or delete his appointment. Other features such as notification of appointment through e-mail is still in progress. This paper also describes the software and hardware requirement to build the WAP development site. Testing strategies derived to ensure system functionality is also presented in this paper. And lastly, survey result on the usability with mobile users is presented.

Keywords: WAP, Mobile Information Service, Database

1. INTRODUCTION

Despite the slow adoption of WAP and confusion over the benefit of mobile data technology (Braue, 2001) there are still opportunities to provide simple and reliable business viable solutions to consumer for efficient information access. Several interesting business and location-based services have attracted interest from consumers (www.ericsson.com/mobilityworld/). The problems associated with cost, speed, security and latency obviously had an impact on the development of WAP. But with the introduction of 3G technologies and WAP 2.0 (Sutton, 2001), (WAP 2.0 Technical White Paper), these shortcomings can be overcome in a very near future with enhanced users experience. The purpose of this project is to demonstrate the use of retrieving and uploading data to a remote database through the use of Wireless Application Protocol (WAP) technology. The mobile service developed here is a Medical General Practitioners (GP) booking system, where existing patients are able to book a time slot as well as cancel the appointment using wireless technology. The system requires a WAP gateway and web server that will host both ASP and WML script (Thompson, 2000). Microsoft Access is used as the database to retrieve the information and maintain the doctor's database. A WAP-enabled device is needed to run the application.

2. METHODOLOGY

The survey methodology uses a qualitative approach instead of a quantitative approach. Qualitative approach is a cheaper and effective method and according to Nielsen (http://useit.com/alertbox/20010121.html), a survey with only five users could review almost 85% of the problems. Our survey forms are designed similar to the IBM's psychometric evaluation (http://www.acm.org/-perlman/question.cgi) but with modifications to suit the WAP environment. The survey covers users background, navigation simplicity, actual booking with a WAP phone emulator, structure, content and functionality effectiveness, and competitive costing and user experience. Our target users are current mobile phone subscribers randomly selected from a student population. During the survey, the user will be led to the survey web site. Once the five background questions have been completed, the user will be guided to the GP-online WAP site. A WAP phone will be launched and the user uses the emulator to make a booking. Once the user has completed the booking he will continue to respond and complete the questionnaires.

3. APPLICATION OVERVIEW

The development of the GP Online WAP site uses a full project development methodology - the waterfall methodology. The WAP site contains information on the doctors and times available for the consultations. Using a unique Patient ID, registered Patients will make an appointment based on the allocated time slots available (at intervals of 15 minutes). The information included in the WAP site consists of:

1. Welcome page
2. Patient Login
3. Selecting a Doctor
4. Making Appointments
5. Patient cancelling appointments
6. Selecting a day
7. Selecting the time of day (i.e., AM or PM)
8. Choosing the time
9. Confirmation

Within the nine main categories for the WAP site there will be a number of additional sub categories.

4. WAP DEVELOPMENT ENVIRONMENT

The software used in the development includes Macromedia UltraDev Dreamweaver 4.0 provides the basic WML (Wireless Markup Language) to create the decks and card of the WAP site. It is also

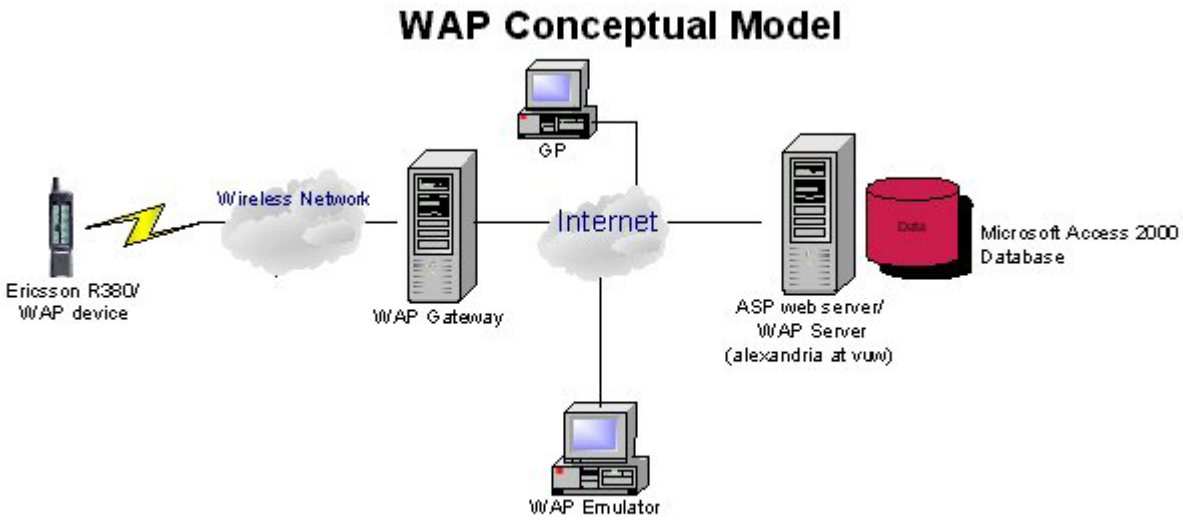


Figure 1 WAP Development Model

Splash Page	
	1. Main page to introduce users to the site 2. Designed with in-built timer loading the next 'card' 3. Developed using WML-based coding

Figure 2: A welcome page for GP booking system

Patient Login	
	1. Registered patients log onto the WAP site 2. Session variables identify the patient that logs on 3. ASP coding integrated with WML used for development 4. Login information is read from the Microsoft Access database 5. Successful login allows user to access next page

Figure 3: Patient login page

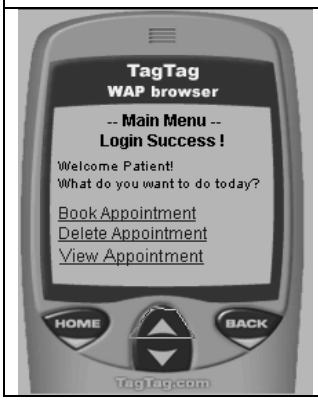
Main Menu	
	1. Users are given the above four options (links) using WML 2. This is a static WAP card using only WML 3. Due to the size, there are limited links to accelerate downloading time

Figure 4: The main menu after successful login

used to create ASP pages, dynamic WML pages and also to code the DSN-less database connection. Macromedia Fireworks 4.0 was used to create WBMP images (e.g 'Cross' image on the splash page). TagTag WAP Emulator (www.tagtag.com) is an online emulator used to simulate the workings of a mobile WAP device. The URL of the WAP site is typed in, in which a WAP page is returned on an HTTP browser, through the use of Java applets. Ericsson WAP Integrated Development Environment Ericsson WapIDE (www.ericsson.com, 2001) is a Software Development Kit (SDK) containing an Ericsson WAP emulator, supporting an Ericsson R380s. However, a variety of errors were encountered when testing the WAP site using this emulator especially with the database connection. As a result, the WapIDE is basically used to develop and test static WML cards. Microsoft Access Database 2000 is used to create the database where information is retrieved, submitted and modified through ASP scripts. Internet Information Server (IIS) and WAP-enabled micro browser mobile device are the main hardware required.

The main Programming Language used is VB Script used in active server page. Other technology such as ColdFusion (Schmidt, 2001) can also provides application server similar to ASP but was not deployed here. VB script is used as the foundation for the generation of SQL queries to create dynamic ASP/WML pages (Lee).

5. SYSTEM MODEL

The entire working and test model is shown in Figure 1. Patients use the WAP device to submit a booking through a WAP gateway via Internet WEB/ WAP server. The requested information is stored in a database. For the GP, a normal PC is used for Internet access and views all the appointments. The WAP emulator is used to perform testing and development. We used more extensively the Internet WAP browser instead of the WAPIDE as it has intermittent error connecting to the web server. The WAP Internet emulator from Tag-Tag works well and is fast compare to actual WAP phone.

6. APPLICATION INTERFACE

In Figures 2, 3 and 4 are some of the user interface when a user is accessing the WAP GP booking system.

7. TESTING STRATEGY

Testing is a very critical step for WAP system. This is typically true for WAP application as users might have different handsets that are incomparable. The WAP system must also able to perform under load conditions such as network failure or multiple users access condition. Testing is done after each finished phase or key milestones have been approached. The major testing activity is conducted after the WAP system has been fully developed. There are three major types of testing that being done consecutively and repeatedly over the course of the project.

7.1 TECHNICAL AND SPECIFICATION TESTING

The test plan for this part involves checking the integrity of the data, syntax checking the WML and ASP codes, networks connectivity testing, and lastly, performance & stress testing. Content is tested for accuracy, regular updating and retrieving, use of graphics and links. A specific test for booking an appointment application is included here. To do the specific test, a database containing simulated test data is used. Performance & stress testing is use to test the application for prolonged access, response to network failure, and response times under stressful loads. The test is conducted using the emulator.

7.2 GRAPHICAL USER INTERFACE AND OVERALL DESIGN TESTING

The test for this part comes into two series. The first series involves producing a number of design alternatives for the GUI onto paper. These designs will be surveyed to possible end-users. After the first series of test is done, the second part, which is after the Design phase, we test the overall look and feel of the design. This test is done after the chosen design is uploaded to the phone or to the emulator.

7.3 END-USER USABILITY TESTING

The usability testing involves ease of use testing including all interfaces, navigation, menu consistency, text wrapping, customisation, and set-up. The team also test for interoperability. This test is used to highlight any interoperability problems that the application will have when displayed on specific WAP handsets, between the database and the WAP handsets, and any other software interoperability difficulties. The test is also done on end-users.

8. SURVEY SUMMARY

A user survey was conducted to evaluate the GP WAP booking application. We have used an online survey facility, www.zoomerang.com to build and compile the survey. Five general areas have been identified.

8.1 DEMOGRAPHIC AND GENERAL UNDERSTANDING OF WAP

The objective of the survey was to evaluate the interface design and usability of the WAP GP site. 17 people responded to the design survey. The average respondent to the survey was between the ages of 16-25. The survey respondent was 53% male and 47% female. This means we had an almost equal number of both genders. 65% of respondents said they know the meaning and the usage of WAP, but 59 % of them have never used WAP before. In the 59% respondents that never have used WAP, they said they would not use WAP to make a doctor appointment.

8.2 DESIGN EVALUATION

For the navigation tools and interface of the site, majority of the survey respondents thought that the navigation names and links were not implicit; these were 35% and 59% of the survey respondents respectively. However many respondents thought that it was easy to navigate between the sites, this was 53% of the total respondents. Overall, 35-41% agreed that the WAP site is well structured. The overall responses to the contents and functionalities survey section indicated to us that the content of the site gave a clear meaning and understanding to the users and have served the right purpose and functionalities. Users were able to test the functionalities of the application, for example View Appointment. A total of 35% has performed the operation. 35% respondents viewed that customising the site would be useful. 47% agreed that the site gave the users the right and clear feedback.

8.3 WAP COST

The average cost that users would be willing to pay to use the WAP service is 20 cents. This is the same cost as using the text messaging service (SMS).

8.4 USER EXPERIENCE

41% of respondents were quite satisfactory when using and viewing the WAP site on a limited screen. This indicates that users will be comfortable accessing the site via wireless devices. 65% would visit the WAP site again. This is quite encouraging. The other 35% would not visit because they hardly use mobile phones, and most importantly at this stage it is expensive to use WAP.

8.5 USERS RECOMMENDATIONS

A change that users would like to see is less scrolling when navigating within the page. One respondent thought that adding another functionality, which is viewing the doctors' timetable would be an advantage.

9. CONCLUSION

We have demonstrated the development of a mobile information service namely a WAP GP booking system. The implementation also integrated a WAP development environment, which consists of WEB development tools, WAPIDE, WAP emulators, WAP Gateway, Web server and database. The application is further tested and users survey is conducted to identify the application usability and adoptability. The overall results were encouraging but improvement is definitely needed.

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