

**COURSE REGISTRATION INTEGRATED WITH
WIRELESS APPLICATION PROTOCOL**

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the requirements for the
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Course Registration Integrated with Wireless Application Protocol

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Approved by,



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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and the original work contained herein have not been undertaken or done by unspecified sources or person



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ABSTRACT

This project is initiated with the hope to enhance the current Online Tutorial/Lab Registration, integrated with WAP application. The tremendous surge of interest and development in the area of wireless data is to bridge the gap between the mobile world and the Internet, bringing sophisticated solutions to mobile users, independent of the bearer and network. The main objective of this system is to develop an efficient and interactive system to cater to the course registration of lab and tutorial sessions integrated with WAP for the students and lecturers. Usually, students will have to either meet the lecturers at their cubicle which are located far from their block or will have to attend the class in order to register for a lab or tutorial session. Besides that, it consumes a lot of time for the student to go over to the lecturers' office or to even wait in line after class to register for the suitable slot. This is mainly to minimize the hassle and inconvenience that the students and lecturers go through for lab and tutorial registrations. A Linear Sequential Model has been chosen as the methodology in developing this system. Other objectives are to study the underlying concept of WAP and to work in line with the university's goal of e-learning where a paperless environment is encouraged. The scope of this project is only limited to the labs or tutorials registration in UTP.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

At present, students are required to enroll for their laboratory and tutorial sessions by filling up a registration form provided by lecturers or the lab technicians. Although this is easy to implement, this manual process has brought much hassle not only to the students, but also to the lecturers and lab technicians. Since each session has a limited number of slots, some students might not make it in-time to register for their preferred slots due to unfairness of the other students by producing fraud signatures to reserve places for their friends. As for the lecturers and lab technicians, there is less control on the number of students enrolled in a session and they might face the possibility of losing the registration forms. Besides this, this process is time-consuming and unnecessary, as the staffs could make better use of their time. As a result of observation; most students and lecturers prefer a comprehensive and secure online registration system that provides the capabilities and features to counteract the weakness of manual registrations.

With the aid of course registration via Wireless Application Protocol, students can easily register for their preferred session just by following intuitive and easy to follow web instructions. This interactive message is capable of sending automated confirmation messages to mark a successful registration once a submission is accepted. This means that, the system includes registration processing and requirement fulfillment to minimize the hassle and mistakes performed by manual operators. As a result, the system serves to also save staff time and cut costs.

1.2 Problem Statement

1.2.1 Problem Identification

At present, the lab and tutorial sessions' registration are done manually by the student going to either the lecturers cubicle, or at the appropriate laboratory or after class session. This clearly shows how time consuming and inconvenience it is to perform this task not only for the lecturers but for the students as well. The problems are as follow:

- i) The lecturers' cubicles and laboratories are located at a distance from the students' hostel.
- ii) Students who are busy with classes and have a whole day of packed timetable or when the lecturers are not available lose their possibility of getting registered into the lab of their preferred day and also, they would need to make multiple trips merely to register for their lab or tutorial sessions.

1.2.2 Significance of the Project

The proposed system would be interactive with the purposes:

- i. Allow students to choose the suitable time slots for registration.
- ii. Serve as a communication tool between the students and the staffs in cases of any problems.

1.3 Objective

The objectives that must be accomplished by the end of this project are as follow:

- i. To develop an efficient and interactive system to cater to the registration of lab and tutorial sessions via WAP for the students.
- ii. To minimize the hassle and inconvenience that the students and lecturers go through for lab and tutorial registrations as in going over to the lecturers cubicle just to get registered for a lab session or losing the registration paper by misplacing it or perhaps the destruction of the registration paper due to students eagerness towards registering a slot for themselves.
- iii. To study the underlying concept and technicality of Wireless Application Protocol.

1.4 Scope of Study

This project will focus on the following areas:

- i. To apply the online registration system in the modules of all courses offered that requires lab registration.
- ii. Applications will be written in wireless markup language (WML), which is a subset of extensible markup language (XML).
- iii. Using the same model as the Internet, WAP will enable content and application developers to grasp the tag-based WML that will pave the way for services to be written and deployed within an operator's network quickly and easily.

- iv. To utilize the following tools:
 - a. Notepad
 - To write WML and ASP codes
 - b. Microsoft Access
 - Database
 - c. WinWap SmartPhone Emulator
 - To display WAP contents
 - d. Microsoft Internet Info Services
 - To deliver WAP content

CHAPTER 2

THEORY / LITERATURE REVIEW

2.1 Introduction to Wireless Application Protocol (WAP)

The Wireless Application Protocol is a protocol standard that designs the way for a mobile device to communicate to a server installed in a mobile network. For example it gives the framework used when a mobile phone talks to the server installed in the mobile phone network. The Wireless Application Protocol, commonly know as WAP, is an important development in the wireless industry because of its attempt to develop an open standard for wireless protocols, independent of vendor and air link. The WAP Forum was formed after US network operator Omnipoint issued a tender for the supply of mobile information services in early 1997. It received several responses from different suppliers using proprietary techniques for delivering the information such as Smart Messaging from Nokia and HDML from Phone.com (then called Unwired Planet). It was the WAP forum, which developed and deployed the Wireless Application Protocol. Industrial giants like Motorola, Nokia, Ericsson and phone.com are the founder members of the WAP forum. WAP is an attempt to define the standard for how content from the Internet is filtered for mobile communications. Content is now readily available on the Internet and WAP was designed as the overriding (rather than just one among many) way of making it easily available on mobile terminals.

The rapid growth of Web services has led to a situation where companies and individuals rely more and more on material that is available on the Internet and

intranets. An increasing number of people use Web services both at work and at home. The next step is to gain access to Web services for mobile users too. Already before WAP some simple interactive services have been available on mobile phones. These services are based on the GSM short message service (SMS) and include schedules, news, sport results, weather forecasts and so on. Although the available SMS-based services are quite awkward to use, they have become very popular. This indicates a need for additional mobile Web services. Access itself will probably be the killer application for the mobile Internet [1].

Wireless Application Protocol (WAP) together with Wireless Markup Language (WML) constitutes an open architecture for mobile Web services. They make it possible to provide markup-language based services for different mobile devices equipped with WAP browsers. The selection of WAP devices is expected to range from mobile phones to palmtop computers. The international specification work on WAP is still going on (February 2000) in the WAP Forum and several details must still be worked out [2]. The first WAP-compliant devices were introduced to the market during the fall of 1999. The WAP services currently available are not generic but they have been tailored to specific WAP devices.

i) Wireless Application Protocol and Wireless Markup Language

Just as Web developer write HTML; WAP developers write a markup language to create WAP applications. As WAP devices have a specific user interface requirement and restrictions, the use of HTML is not an option. For example WAP devices do not have a pointing devices, keyboard, large screen or real multimedia support.

With all these limitations and restrictions a special language was created for WAP: WML, the wireless markup language. WML is a client-side markup language, and it is used by devices (known as "user agents", or "UA's") to render and display

content, WML content is generally created in two forms: Static files and Dynamic files.

ii) Wireless Application Protocol Gateways

There several approaches for providing WAP enabled content. A common approach is to use WAP gateways and WAP servers. WAP gateways allow content posted in HTML on the Internet to be reformatted and served as WAP over a wireless link. The WAP gateway may incorporate or require a separate remote access server as part of the interface to the wireless carrier. Some gateways are sold as hardware-independent software solutions while others are packaged with hardware and sold as a system.

iii) Wireless Application Protocol Servers

WAP servers work in a similar manner to web servers, natively publishing WML content. Rather than serving HTML onto the Internet, WAP servers broadcast WML over wireless networks. Using WAP servers, data can be directly transferred to and from WAP-enabled appliances. For applications like secure m-commerce, directly generating WML is more efficient and secure using WAP servers.

iv) Wireless Application Protocol Architecture Structure

The WAP (Wireless Application Protocol) Specification defines a set of protocols intended to bring Internet content to mobile devices like cellular phones, pagers, and personal digital assistants (PDAs). It defines both an application environment and transport protocols. It uses existing Internet technologies and many of its

components are based on these. The WAP specification is developed taking in account the limitations of the wireless devices:

- Less powerful CPUs
- Less memory
- Smaller display
- Different input devices
- Low bandwidth network connectivity

The WAP architecture has a layered structure. Every layer depends on the layers beneath it and each of them is accessible by the layers above.

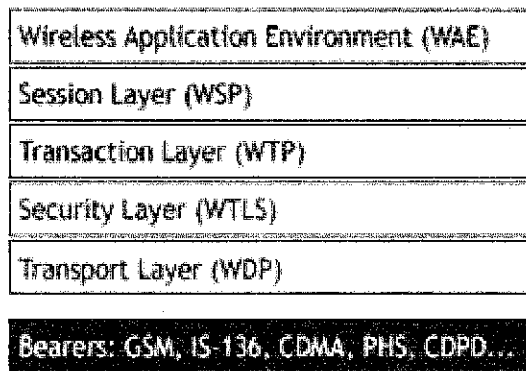


Figure 2.1 WAP Architecture

The WAP Specification defines the following layers:

- Application Layer (Wireless Application Environment)

WML and WMLScript are collectively known as WAE, the Wireless Application Environment

- Session Layer (Wireless Session Protocol)

The Wireless Session Protocol provides the Wireless Application Environment a consistent interface with two services: connection-

oriented service to operate above the Transaction Layer Protocol (WTP) and a connectionless service that operates above either secure or non-secure datagram service (WDP).

- Transaction Layer (Wireless Transaction Protocol)

The Transport layer protocol in the WAP architecture consists of the Wireless Transaction Protocol (WTP) and the Wireless Datagram Protocol (WDP).

- Security Layer (Wireless Transport Layer Security)

The Security layer protocol in the WAP architecture is called the Wireless Transport Layer Security, WTLS. The WTLS layer operates above the transport protocol layer. The WTLS layer is modular and it depends on the required security level of the given application whether it is used or not. WTLS provides the upper-level layer of WAP with a secure transport service interface that preserves the transport service interface below it. In addition, WTLS provides an interface for managing (e.g., creating and terminating) secure connections.

- Transport Layer (Wireless Datagram Protocol)

The WDP protocol operates above the data capable bearer services supported by multiple network types. As a general datagram service, WDP offers a consistent service to the upper layer protocol (Security, Transaction and Session) of WAP and communicate transparently over one of the available bearer services.

Beneath the transport layer is the bearer. The WAP Architecture is designed to operate over a variety of bearer services. Different bearers offer different quality.

v) WAP Network

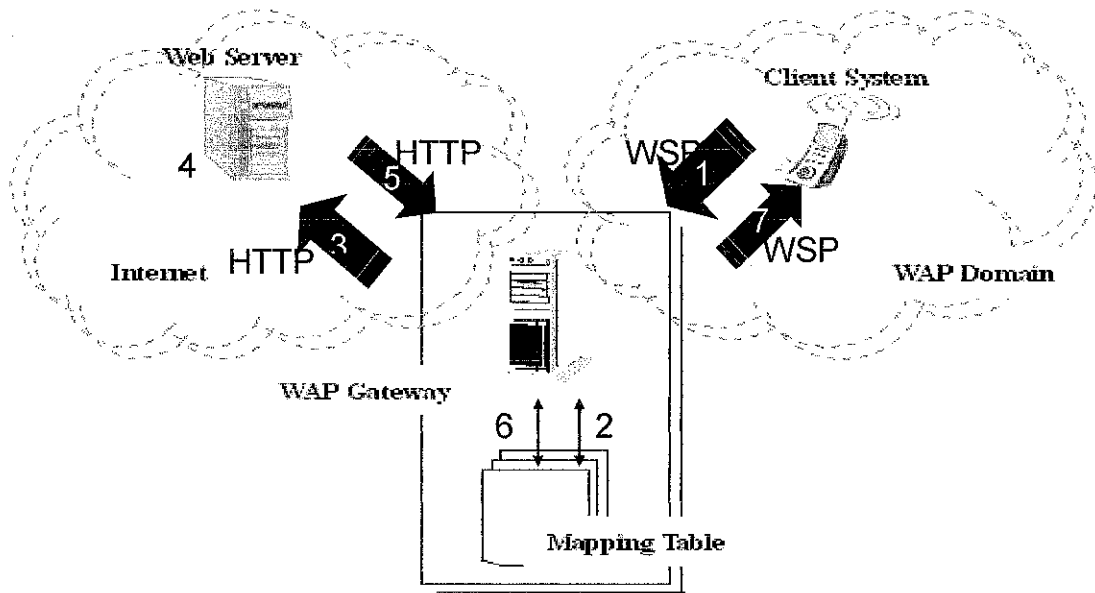


Figure 2.2 WAP Network

- 1) User agent (i.e. client system) sends a URL request to a WAP gateway (i.e. WSP request).
- 2) The WAP gateway decodes the request message and translates the request line and request header (in binary-format) to HTTP format using a mapping table.
- 3) The WAP gateway creates a connection to the web server and sends a HTTP request to it.
- 4) The HTTP request is processed by the web server. If the URL refers to a static file, web server fetches the file to response with a HTTP reply header; if the URL refers to a script application, web server starts the application.
- 5) The web server returns a HTTP reply message, which contains data or result from script application.

- 6) The WAP gateway encodes the received reply message, and translates HTTP well-known-formatted reply line and reply header to WSP binary-format using the mapping table.
- 7) At last, the response is replied to user agent.

2.2 Technical Analysis of Wireless Application Protocol

Phone.com created a version of the standard Hyper Text Markup Language (HTML) internet protocols designed specifically for effective and cost effective information transfer across mobile networks. Wireless terminals incorporated a Handheld Device Markup Language (HDML) microbrowser, and Phone.com's Handheld Device Transport Protocol (HDTP) then linked the terminal to the UP.Link Server Suite which connected to the Internet or intranet where the information being requested resides. The Internet site content was tagged with HDML. Wireless Application Protocol embraced and extends the previously conceived and developed wireless data protocols. The Wireless Application Protocol has WMLS, WTP and WSP to take care of the above. WAP uses a built in microbrowser to do various following services. A Request is passed to a WAP Gateway that then retrieves the information from an Internet server either in standard HTML format or directly prepared for wireless terminals using WML. The suite is designed to make it possible to access Internet resources from hand held wireless devices (mobile phones or personal digital assistants PDA) in an efficient manner.

2.3 Wireless Application Protocol development in the university environment

Wireless technologies represent a rapidly emerging area of growth and importance for providing ubiquitous access to the network for the campus community. Students, faculty and staff increasingly want untethered network access from general-purpose

classrooms, meeting rooms, auditoriums, and even the hallways of campus buildings. Recently, industry has made significant progress in resolving some constraints that have affected the widespread adoption of wireless technologies. Some of the constraints have included disparate standards, low bandwidth, and high infrastructure and service cost.

Wireless technologies can both support the institutional mission and provide cost-effective solutions. Wireless is being adopted for many new applications: to connect computers, to allow remote monitoring and data acquisition, to provide access control and security, and to provide a solution for environments where wires may not be the best implementation.

New technologies rapidly find acceptance in the university environment. To determine the appropriate application of wireless communication, the campus community will be fully engaged to ensure that this developing technology will be used to enhance the teaching, learning, and research environment.

CHAPTER 3

METHODOLOGY AND PROCEDURE

3.1 Procedure Identification: Linear Sequential Model

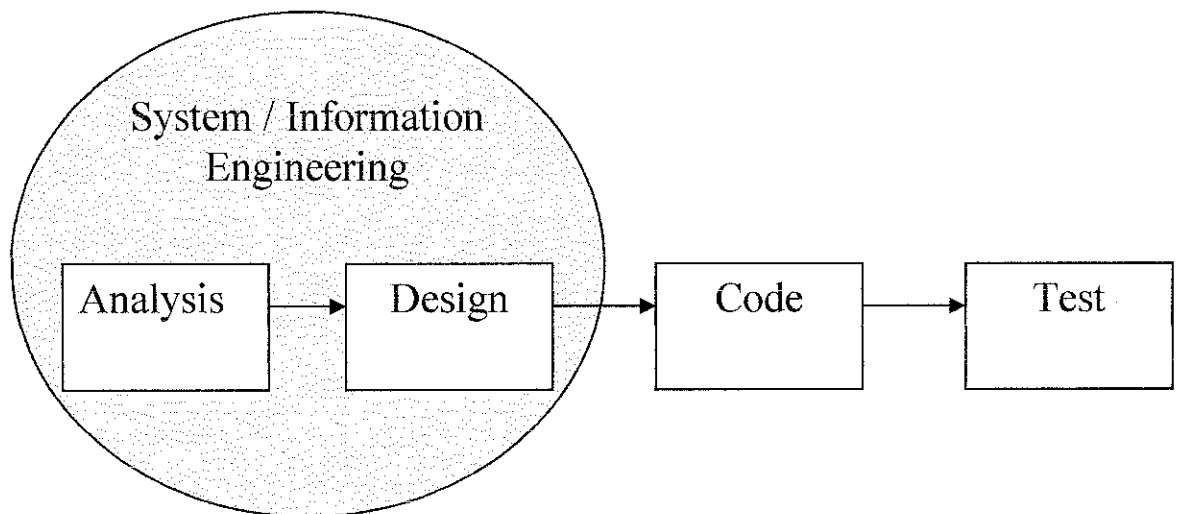


Figure 3.1 Linear Sequential Model

Analysis

Complete and detailed requirements for the system are identified through constant interaction and data collection with the users. Identification of the proper development tools to be utilized, as well as the focus of the main functions of the system finalized.

Design

To begin the designing of the system as of the interface and the WML decks to be used according to the amount of information gathered. Making sure the navigation of the system would be user friendly and easy to be used by new users.

Code

The codes that would be used are purely WML codes and also ASP codes for the system. Along the way of this coding process, the system is tested many times for its functionality and usability.

Test

Thorough detailed verification and validation of the system. Ensures every component and interface are completely tested and verified to be error free.

3.2 Framework

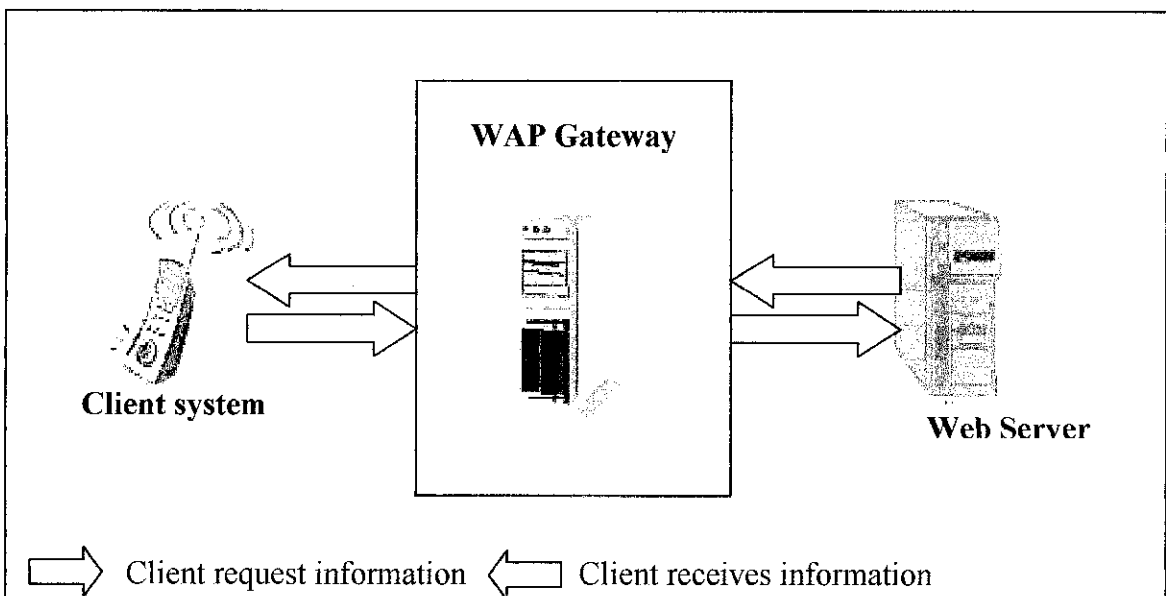


Figure 3.2 WAP framework

- 1) The user agent (i.e. client system) sends a URL request to a WAP gateway
- 2) The WAP gateway decides the request message and translates the request line and the request to the Web.
- 3) The WAP gateway creates a connection to the web server and sends the request to it
- 4) The request is processed by the web server.
- 5) The web server returns a reply message, which contains data or result from script application.
- 6) The WAP gateway encodes the received reply message.
- 7) At last, the response is replied to user agent.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 Results

Findings and results related to the author research and development of the system are shown in this section. The findings are about comparing the WEB to WAP.

4.1.1 Differences between WEB and WAP

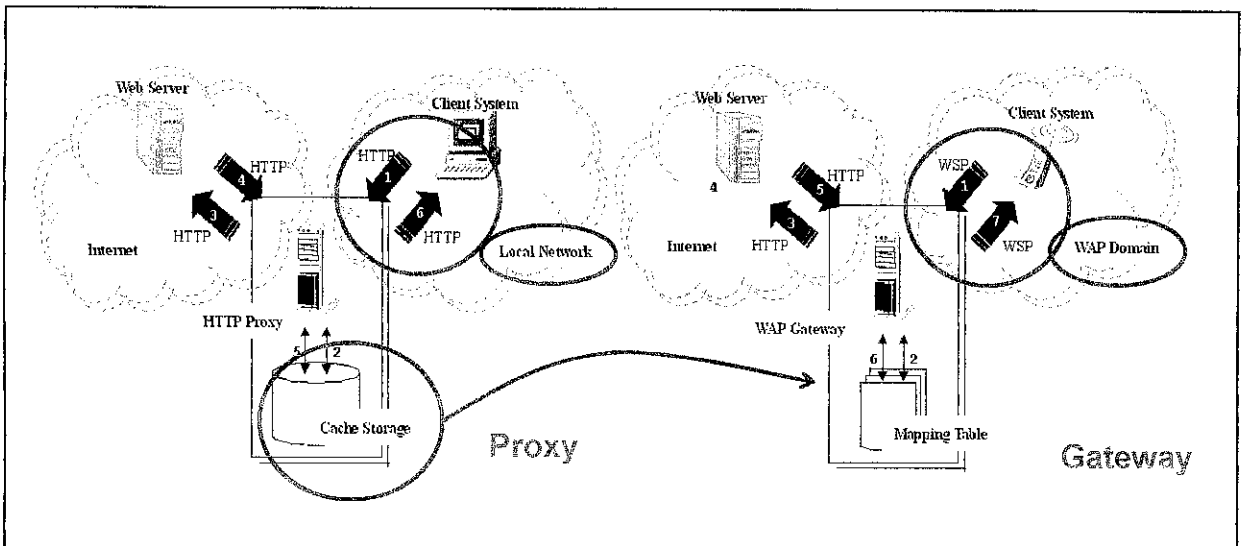


Figure 4.1 Differences between WEB and WAP

i) WEB

- 1) User agent (i.e. client system) sends a request to the HTTP proxy, and asks for a particular resource (e.g. a page).
- 2) After receiving and interpreting the request, proxy checks if the resource had been cached in the disk. It's called a *Hit* when the resource is found and fresh enough, then proxy sends a response to user agent. This effect of a cache is that the request/response chain is shortened. Otherwise, a *Miss* situation occurs, and the sequences continue to next step.
- 3) Proxy rewrites all or part of the request, and forwards the reformatted message toward the origin server.
- 4) The web server receives the request, and replies a suitable response.
- 5) After receiving the response sent by origin server, proxy would cache the message if it is a cacheable message.
- 6) At last, the response is replied to user agent.

ii WEB

- 1) User agent (i.e. client system) sends a URL request to a WAP gateway (i.e. WSP request).
- 2) The WAP gateway decodes the request message and translates the request line and request header (in binary-format) to HTTP format using a mapping table.

- 3) The WAP gateway creates a connection to the web server and sends a HTTP request to it.
- 4) The HTTP request is processed by the web server. If the URL refers to a static file, web server fetches the file to response with a HTTP reply header; if the URL refers to a script application, web server starts the application.
- 5) The web server returns a HTTP reply message, which contains data or result from script application.
- 6) The WAP gateway encodes the received reply message, and translates HTTP well-known-formatted reply line and reply header to WSP binary-format using the mapping table.
- 7) At last, the response is replied to user agent.

4.2 Discussion

4.2.1 Comparison of using WEB and WAP registration

WAP uses the Wireless Markup Language (WML) for application contents in the same way what Hyper Text Mark-up Language (HTML) is used in WEB. In the Internet model there is a client and a server. The Internet is used for transmission. The WEB client sends a request to the WEB server and the server sends a response for that request. The Internet is used as the transmission medium. In the WAP model, the same client server model is used but there is a Proxy/Gateway between the server and the client to allow protocol conversion and encoding plus encoding of WML. WMLScript makes it possible to add procedural logic and computational functions to WAP based services like Javascript in HTML.

To compare with the Course Registration system using WAP or using the WEB, wireless devices have slow connection speeds and small screen sizes. In small terminals, power consumption is very important and these terminals can't provide microprocessor resources like in a PC. Wireless networks have high latency compared to wired networks. WAP is optimized to fulfill these requirements. WAP uses the same addressing model as the one used in the Internet (URL). WAP also can use URIs(Uniform Resource identifiers) for addressing resources that are not necessarily accessed using well-known protocols. WAP allows Wireless Telephony Applications that are not available in the WEB.

Whereas, the Web-based applications probably execute as quickly, if not quicker than standard desktop applications, but their response is noticeably slower. In other words, clicking on a button or link doesn't result in an instantaneous reaction by the program. This is simply because of the time lag that it takes for data to travel via Internet connection from your computer to the application host computer and back. Delays can be anywhere from a second to ten seconds, or more depending on the speed of your Internet connection (e.g. cable modem vs. analog modem) and the amount of other people simultaneously using the Web application.

ii) Advantages of WAP

Using WAP, which is a global and open standard, has the following advantages:

- Portability: A WAP application on one network should be easily portable to a different environment with little or no change.
- Narrow bandwidth connection.
- Devices with small screens, limited battery use without recharging, limited memory, and limited processing power.

- Cost and Application Development Time Reduction: New services can be added quickly and at a lower cost using WAP. This is made possible by the easy availability of standardized WAP tools and platforms such as WAP software development tool kits, WAP gateways, and WAP devices.

iii) Disadvantages of WAP

WAP's disadvantages stem mainly from client limitations. It has a thin client architecture. That is one of the reasons why normal web technology cannot be used in the WAP client. Now WAP clients are handheld wireless devices like mobile phones or personal digital assistants (PDAs). These devices are in no way powerful compared to a stationary computer. So technically speaking all the disadvantages of these clients become constraints for WAP to deal with.

- WAP application interfaces (like menu labels and navigation items) need to be more user friendly. Because of the misguided use of design principles from traditional Web design, the usability of the current WAP services is reduced considerably.
- Some of the WAP designs that use more screens to display information could have been displayed in a lesser number of screens. This kind of design may work on the Web if users have a big-screen PC, but on a small-screen device, designers must cut short each service down to its essence and show much less information

iv) Advantages of the Web

- Interoperability, Web services typically work outside of private networks, offering developers a non-proprietary route to their solutions. Since it can be used with many different technologies, web service does not easily become obsolete.
- Developing them is thus more cost-effective than developing individual technology-based solutions. Web services also allow developers to use various programming languages, such as: Java, C++, VBScript, JavaScript, or Perl (to name a few). In addition, thanks to the use of standards-based communications methods, Web services are virtually platform-independent.
- Web services allow the business logic of many different systems to be exposed over the Web. This gives your applications the freedom to use the Web services that they need.
- Allows you to develop services and/or client-side code using the languages and tools of your choice.
- Web services are deployed over standard Internet technologies. This enables Web services to be deployed even over a firewall. Also due to the use of existing standards, underlying security (such as SSL) is already built-in.
- Policy-driven services can be assigned delivery assurances and be configured so that communication with such a service is guaranteed to be reliable regardless of software component, system or network failures.

v) Disadvantages of the Web

- Control and security. Many people just aren't comfortable having critical data sitting on someone else's computer, no matter what kind of security policy the company swears by. Some fear malicious hackers looking to steal valuable information, others are paranoid about the Web application company misusing their data for marketing or other purposes, and still others simply like having their data in their possession at all times.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

In this paper, the course registration via WAP application is implemented so that students would be able to register anywhere and anytime. This system is relevant to the objective of the project. This project is carried out with the hope that the Enhanced Registration System Integrated with WAP would benefit both lecturers and students tremendously due to its systems efficiency and widespread availability. Besides this, this project provides the ability to identify which lab or tutorial slots are currently available and unavailable. The development of this registration via WAP

The proposed system is engineered to process the following abilities and features:

1. Lab/ Tutorial Registration system via WAP access in the university.
2. All tutorial/ lab slots and sessions may be successfully registered without the need to fill up any manual registration forms (paperless system).
3. A list of registered students for each tutorial/lab slot is available for lecturers to print or view.

Recommendations

As for the recommendation, to be able to apply the registration system via WAP in the modules of all courses offered that requires lab registration or maybe even in course registration as an option rather than just doing it online. To be able to design a better user interface for this lab/tutorial content.

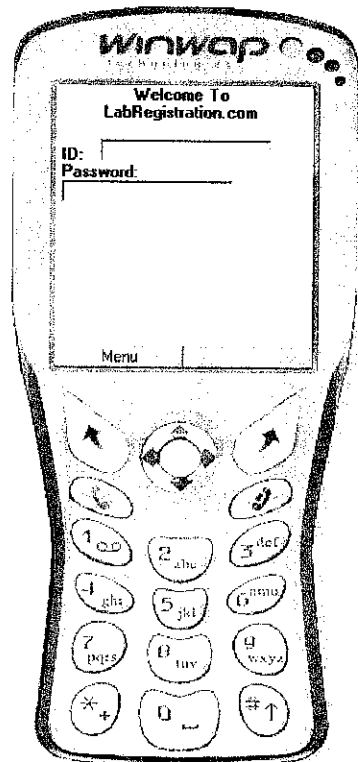
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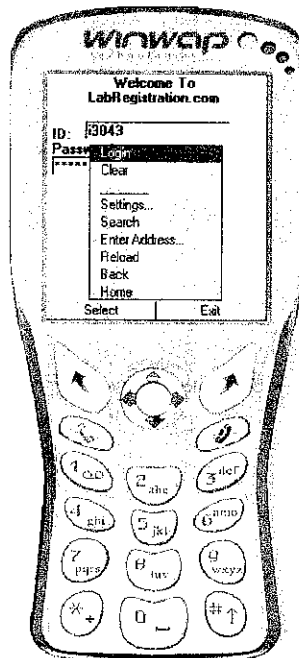
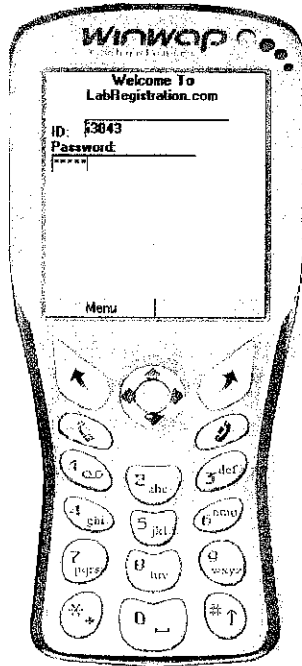
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- [16] WAP Forum: The Specifications of WAP version 1.0 , 13.4.1999 [viitattu 14.3.99] <<http://www.wapforum.org/docs/technical.htm#Approved>>

APPENDIXES

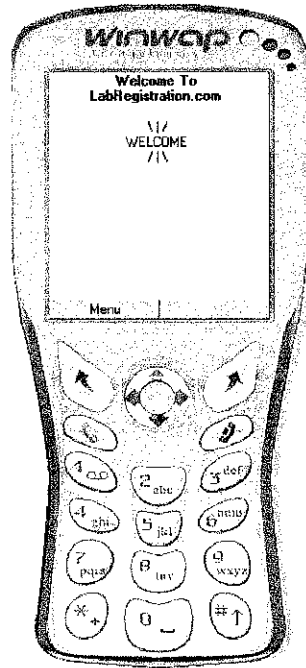
- 1) The main page to begin the registration process



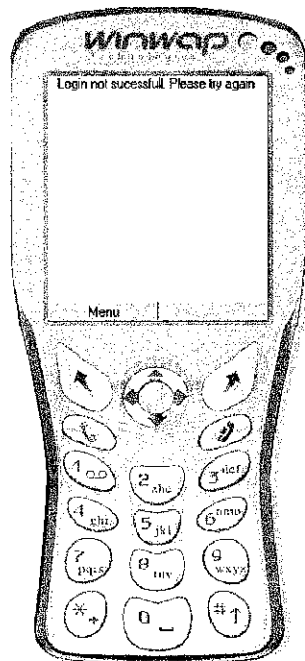
2) Student needs to login with their student ID and given password



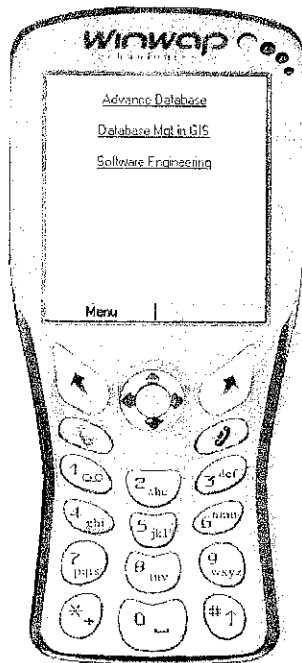
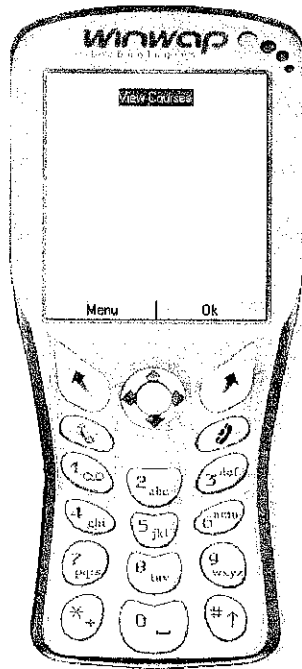
- 3) The starting page after login is successful

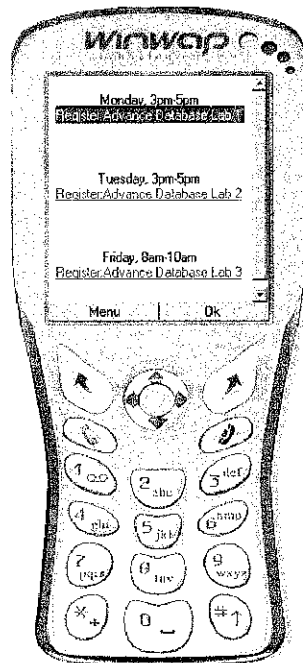
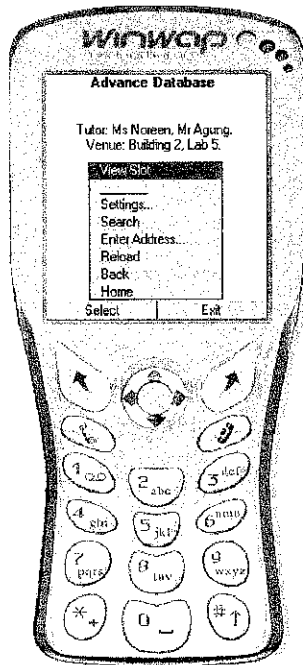


- 4) If login is not successful, the student will be prompted and will need to try again



- 5) Once login is successful, students will be able to view the courses and slots for them to register in





6) Students are required to fill in their name, programme and student number

