

Malacca Tourism WAP Portal

by

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(Business Information Systems)

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TABLE OF CONTENTS

CERTIFICATION OF APPROVAL	i
CERTIFICATION OF ORIGINALITY	ii
ABSTRACT	.	.	.	.	.	.	.	.	.	iii
ACKNOWLEDGEMENT	.	.	.	.	.	.	.	.	.	iv
CHAPTER 1:										
INTRODUCTION	.	.	.	.	.	.	.	.	.	1
1.1	Background	.	.	.	.	.	.	.	.	1
1.2	Problem Statement	.	.	.	.	.	.	.	.	2
	1.2.1	Problem Identification	.	.	.	.	.	.	.	2
	1.2.2	Significance of the Project	.	.	.	.	.	.	.	3
1.3	Objectives and Scope of Study	.	.	.	.	.	.	.	.	3
	1.3.1	Objectives	.	.	.	.	.	.	.	3
	1.3.2	Scope of Study	.	.	.	.	.	.	.	3
1.4	The relevancy of Project	.	.	.	.	.	.	.	.	4
CHAPTER 2:										
LITERATURE REVIEW AND/OR THEORY	.	.	.	.	.	.	.	.	.	5
2.1	Geographical Information System (GIS)	.	.	.	.	.	.	.	.	5
	2.1.1	Introduction to GIS	.	.	.	.	.	.	.	5
	2.1.2	GIS in tourism.	.	.	.	.	.	.	.	6
2.2	Wireless Application Protocol (WAP)	.	.	.	.	.	.	.	.	6
	2.2.1	Introduction to WAP	.	.	.	.	.	.	.	6

2.3	WAP-based GIS	7
2.3.1	Introduction to WAP based GIS	7
2.3.2	Implementation of WAP based GIS	8
2.3.3	Criteria of successful WAP based GIS	9
CHAPTER 3:	METHODOLOGY / PROJECT WORK	10
3.1	Procedure Identification	10
3.1.1	Feasibility Study	11
3.1.2	Analysis	11
3.1.3	Design	11
3.1.4	Implementation	12
3.1.5	Testing	13
3.2	Tool Required	13
3.2.1	Software Requirement	13
3.2.2	Hardware Requirement	15
CHAPTER 4:	RESULTS AND DISCUSSIONS	17
4.1	Findings	17
4.1.1	System Flow	17
4.1.2	Data	18
4.1.3	Coding	20
4.1.4	Framework	20
4.1.5	Output	22
4.2	Discussion	28
4.2.1	Building Dynamic WAP Sites	28
4.2.2	Differences between web page and WAP page.	29

CHAPTER 5:	CONCLUSION	.	.	.	.	.	.	30
	5.1 Conclusion	.	.	.	.	.	.	30
	5.2 Recommendation	.	.	.	.	.	.	31
REFERENCES	.	.	.	.	.	.	.	32
APPENDIX	.	.	.	.	.	.	.	34

LIST OF FIGURES

- Figure 3.1 System Development Life Cycle
- Figure 4.1 Print screen of spatial data
- Figure 4.2 Malacca Tourism WAP Portal framework
- Figure 4.3 Welcome page
- Figure 4.4 Select Function Page
- Figure 4.5 Select Place Page
- Figure 4.6 List of places of interest Page
- Figure 4.7 Using Search Place Function
- Figure 4.8 Map and Image Page
- Figure 4.9 Detail Information Page
- Figure 4.10 List of Nearest Hotel Page
- Figure 4.11 Hotel Information Page
- Figure 4.12 Current Location Page
- Figure 4.13 Select Destination Page
- Figure 4.14 Travel Information Page

ABBREVIATIONS

ASP	Active Server Page (file name extension)
CDMA	Code-Division Multiple Access
CSS	Cascading Style Sheet
FTP	File Transfer Protocol
GIS	Geographical Information Systems
GSM	Global System Mobile
GUI	Graphical User Interface
HTML	Hypertext Markup Language
PC	Personal Computer
PDA	Personal Digital Assistant
PHP	Hypertext Preprocessor
PHS	Personal Handyphone System
SQL	Structured Query Language
TCP/IP	Transmission Control Protocol/Internet Protocol
TDMA	Time-Division Multiple Access
URL	Uniform Resource Locator
WAP	Wireless Application Protocol
WCDMA	Wideband Code Division Multiple Access
WML	Wireless Markup Language
XML	Extensible Markup Language

CERTIFICATION OF APPROVAL

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A project dissertation submitted to the
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Approved by,

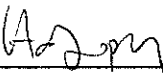


(Mr. Justin Dinesh Devaraj)

UNIVERSITI TEKNOLOGI PETRONAS
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JUNE 2006

CERTIFICATION OF ORIGINALITY

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



ADRINA ZOLKEPLY

ABSTRACT

Tourism sector is a leading revenue generator and an umbrella industry in Malaysia. Malacca has been chosen as the scope of study because tourism industry in Malacca has experienced a rapid and continuous growth. Nowadays, time is considered as valuable as gold. Once time is used sensibly, access to a lot of information is possible. Currently, tourists visiting Malacca having problem to search for information using paper maps. Important information such as available transportation (bus number, taxi phone number, fare), distance from one place to another place are not available in paper maps. This is because paper maps are only able to show limited information mainly determined by the map size. Tourists who want to go sightseeing in different places may need this information to plan their travel. Therefore, Malacca Tourism WAP Portal aims to ease tourists to find information about places of interest and sightseeing in Malacca using hand phone in connection with WAP service. This project covers two main areas which are GIS in tourism and WAP Based GIS. The realization of Malacca Tourism WAP Portal starts when user accesses the application and make request. The request will be processed by the web server and MySQL using WML combined with PHP language. The result will be sent back to user and is displayed on the phone screen. As a conclusion, Malacca Tourism WAP Portal aim to benefit tourists by providing essential information about tourism places in Malacca. Tourists can find information regarding tourism places (address, open hour, etc.), nearest hotel to stay and also travel information which includes available transportation, distance and others. This become as an alternative way to get information and beside that can assist them to make decision during their visit in Malacca.

ACKNOWLEDGEMENT

First and foremost, Thanks to Allah SWT that is above all giving me the strength, motivation and guidance to successfully complete my final year project.

Generally I would like to thank everybody who are directly or indirectly involved in the completion of my project. To be honest, the process to get the project done was tough and difficult, but in the same time it was also fun and interesting. Therefore I would like to take an opportunity here to give appreciations to them for all the supports that have been given to me.

Highest gratitude goes to my supervisor, Mr. Justin Dinesh Devaraj for supervising me and for all the time he spent to facilitate me. Without him, I don't think that the project will be successful as it is. Thank you for being patient, motivating and helpful in completing my project. I also would like to dedicate this acknowledgement to all FYP coordinators and UTP lecturers for their cooperation and advices. Thank you for all the knowledge that has been given to me until I can come up with this project for my FYP. Greatest appreciation goes to my family who always been there when I need them the most, I could never repay you. Last but not least, to all my friends who are always encouraging and very helpful, thank you and I will always remember you guys. I wish lifetime happiness for you all. The corporations given by all of you are much appreciated.

Thank you very much.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

It is a well-established fact that Malacca is a city of tourism. The tourism industry in Malacca has experienced a rapid and continuous growth. Given this background, the continuous development of modern tourism application is an important issue.

When tourists visit a new place, they need to orient themselves and this is why any kind of orientation guidance is welcome. Tourists usually stay in areas that are unfamiliar to them and for this purpose maps are used. Tourists are using maps to navigate during their travels and for preparing their routes. These maps often include representations of points and areas that might be of interest for example historical buildings, amusement parks and others. Paper maps such as these are useful for gaining an overview of a place and for finding places that are of interest to tourists.

Why using WAP enabled hand phone? Why not using PDA or laptop instead? They are mobile gadgets too. Well, the reasons are not many people own a PDA and laptop is bulky. The number of hand phone user is increasing day by day and most of the hand phones support WAP. Why need to spent money to buy PDA when you have already own a mobile phone? Why need to carry a bulky laptop wherever you go when mobile phone can be easily slipped inside your pocket?

Malacca Tourism WAP Portal is developed specifically to overcome the limitations of paper maps and to ease tourists visiting the Malacca state. The selected target platform

was WAP enabled hand phone in, meaning that mobile phone made by Nokia, Sony, Motorola, Siemens and others would be able to run the application. The targeted users are generally neither familiar with the topic nor with the use of a GIS. Thus, simple and intuitive user interfaces are required for such services.

1.2 Problem Statement

1.2.1 Problem Identification

- i. It is slightly difficult to get information and locating tourism places in Malacca on map
- ii. Existing paper maps are only able to show a limited amount of detail determined mainly by the size of the map as well as the volume of data that is available for representation in the map
- iii. Information such as available transportation (bus number, taxi phone number, fare), distance from one place to another place are not available in paper maps.
- iv. Tourists are not sitting in front of the PC. They are always on the move.
- v. Tourists need to bring paper map which is big and very inconvenience. Using hand phone it can be easily slipped inside the pocket.
- vi. Without information aggregation, tourists will have to browse through different websites to gather different information. Consider a scenario where a tourist have to search for tourism spots destination, search for another website on the transportation methods available and search for accommodation in that destination and etc. As the list goes longer, the tourist may not be able to keep track of every detail information he had gathered.

1.2.2 Significance of the Project

The final product of this project will be able to assist tourists to find the interesting tourism places in Malacca wirelessly. Besides that, the project will also help tourists to reduce time to locate position on static map which is very cumbersome. This project also will be able to help tourists to prepare their routes thus can save time and money. One of the distinguishing characteristics of mobile device is interactivity. By implementing this project, user can navigate map wirelessly instead of making phone calls or sending messages only.

1.3 Objectives and Scope of Study

1.3.1 Objectives

The objectives of this project are:

- i. To serve as a medium to help tourists to find interesting tourism places in Malacca.
- ii. To show extra features such as available transportation (bus number, taxi phone number, fare), distance from one place to another place and others
- iii. To build WML applications using PHP
- iv. To study the underlying concept of GIS and WAP

1.3.2 Scope of Study

The scope of study for this project includes the study of GIS and WAP-based GIS such as the power of GIS in visualizing spatial data and integrating WAP service with GIS data. This application is focusing on tourism places in Malacca only. This is because it is

a well-established fact that Malacca is a city of tourism and tourism industry in Malacca has experienced a rapid and continuous growth from day to day.

1.4 The Relevancy of Project

Nowadays, WAP is increasing in popularity with mobile device used to send and receive information. This technology is still new in Malaysia, thus the implementation of this project is relevant to WAP-based GIS. This study aims to implement Mobile GIS using WAP technology. The final product is a prototype of WAP-based GIS which design to provide tourists with the essential information needed when they visit Malacca. The system is very useful for tourists who are not familiar with Malacca as they can get information by few clicks only. The rationale of this project is to emphasize the benefits of using WAP in our life which provide much convenience. This project introduces a new dimension of mobile phone usage which can benefit mobile user.

CHAPTER 2

LITERATURE REVIEW AND/OR THEORY

2.1 Geographical Information System (GIS)

2.1.1 Introduction to GIS

The dictionary definitions for each word in GIS are as follows:

- *Geographical* - Geography is the study of locational and spatial variation in natural and human phenomena on the Earth.
- *Information* - Data that has been processed to add or create meaning and hopefully knowledge for the person who receives it. Information is the output of information systems
- *System* - A group of interacting, interrelated, or interdependent elements forming a complex whole.

There are countless definitions for Geographical Information Systems (GIS), each based on the type of user and application domain [4]. A broadly accepted definition of GIS is the one provided by the National Centre of Geographic Information and Analysis (1990). GIS is a system of hardware, software and procedures to facilitate the management, manipulation, analysis, modelling, representation and display of georeferenced data to solve complex problems regarding planning and management of resources [5]. It is a system for creating and managing spatial data and associated attributes. Spatial data is information about the location and shape of, and relationships among geographic features that are usually either in points, lines or polygons. Attribute

data describes characteristics of the spatial features. Attribute data is often referred to as tabular data.

2.1.2 GIS in tourism

There has been a huge development in information technology recently. In addition, GIS has been commonly used in different fields such as tourism activities enabling people from different countries and cultures to interact with each other [6]. GIS is a rapidly expanding field enabling the development of applications that manage and use geographic information in combination with other media. This technology offers great opportunities for the development of modern tourism applications using maps to present information in an effective way [3]. Maps are a natural means of indexing and presenting tourism related information. Travelers are using maps to navigate during their travels and for preparing their routes. Nowadays, time is considered as valuable as gold. Once time is used sensibly, access to a lot of information is possible. People who want to go sightseeing in different places as tourists may need to have some information about those places. Thus, GIS technologies provide us with these possibilities.

2.2 Wireless Application Protocol (WAP)

2.2.1 Introduction to WAP

The WAP can be described as a set of protocols that has inherited their characteristics and functionalities from the Internet standards as well as from standards developed for wireless services by some of the world's leading companies in the business of wireless telecommunications [2]. The WAP protocol is the leading standard for information services on wireless terminals like digital mobile phones.

The dictionary definitions for the words “wireless”, ”application” and ”protocol” are as follows:

- *Wireless* – lacking or not requiring a wire or wires pertaining to radio transmission
- *Application* – a computer programming piece of computer software that is designed to do specific tasks
- *Protocol* – a set of technical rules about how information should be transmitted and received using computers

WAP is a bear-independent international standard protocol that has optimized for mobile devices with limited display and small keyboards of mobile handsets and low bandwidths of wireless networks, and permits applications and services to operate over all existing and foreseeable wireless networks such as GSM, CDMA, PHS, TDMA and WCDMA [8]. WAP is used to access services and information and enabling us to create web applications for mobile devices. Wireless web sites are written in WML, which is different than HTML.

2.3 WAP-based GIS

2.3.1 Introduction to WAP-based GIS

WAP-based Mobile Geographical Information System (Mobile GIS) can be described as mobile users can perform the almost same functionality as of Internet GIS but in a mobile environment at any time, any place and without the limitation of operating system and wired link [1]. Mobile GIS offers another new perspective for the use of GIS and further extends the GIS works in mobile environment. Tourism information mostly is geographically related information and therefore, a multimedia presentation of

tourism information in spatial context on different digital platforms will offer the opportunity for a comprehensive information service. Based on the rapid developments of the telecommunication industry, several handheld devices are available allows realizing a mobile information system including location aware services [7]. WAP-based GIS has richer information presentation, friendlier GUI, more system functions and more application fields. Moreover, it can work on a wide range of mobile devices with a WAP microbrowser only, from Personal Digital Assistants (PDAs), mobile phones, and in-car computers to other small mobile devices.

2.3.2 Implementation of WAP-based GIS

WAP and WML will allow us to deliver web applications to mobile phones. Because of the obvious limitations of low bandwidth and small screens, it is important to give fast and easy access to the data and to offer a useful and applicable data information service [9]. In many cases, especially when searching for tourist objects, this can be reached when using the location information of the user to retrieve relevant information such as zoo, museum or the nearest hotel with vacant rooms. The cellular phone acts as a navigation help for the nearest objects, which fulfill the search criterions. Working with WAP architecture is very similar to working with traditional web applications architectures. WAP client applications make requests very similar in concept to the URL concept in use on the Web. A WAP gateway acts as an interface between the TCP/IP world and the mobile phone, translating information into a wireless protocol, and passing it to and from the phone. WAP allowing mobile phones to access simple text and form based web applications. Using a WAP enabled mobile phone, we can send information to and from a web server including information typed in by a user.

2.3.3 Criteria of successful WAP-based GIS

WAP users are not sitting in front of a PC. They are on the move, on their way to a meeting, or in a crowded train. Sometimes they're under pressure. Building usable WAP systems is not straightforward, and goal when doing so should be to make it as simple to use as possible. Usability refers to the ease with which users of an application can perform the operations and complete the tasks that the application is supposed to help them achieve [10]. Usability is a term that indicates the degree of user-friendliness of a system [10]. A usable system is one that lets its users to complete tasks in a reasonably easy way. If users perceive your application as being easy to use, straightforward, and forgiving, then you have a usable application. WML delivers content and user interfaces across very different kinds of devices. The various browser implementations render WML in different ways, and this will affect the usability of WAP applications. A usable WAP application should never confuse users, in that users should ideally be able to find information by just few clicks.

Existing WAP sites such as Transport for London –Live Tube and Bus Information (<http://wap.tfl.gov.uk/>) and Kizoom Train Info (<http://mobile.nationalrail.co.uk/>) displays too many words in 1 page and user need to do a lot of clicking before they can get the desired information. Using Malacca Tourism WAP Portal, user can get the requested information by just few clicks. Furthermore, the displayed result is clearer to fit the small size of hand phone screen.

CHAPTER 3

METHODOLOGY / PROJECT WORK

3.1 Procedure Identification

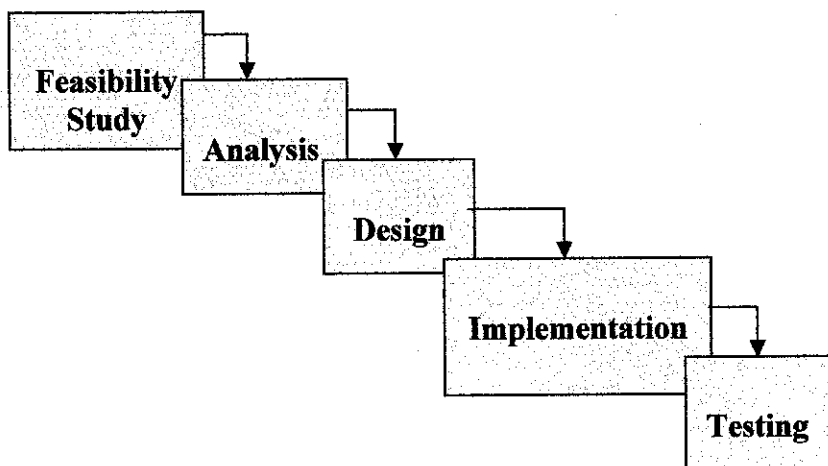


Figure 3.1: System Development Life Cycle (SDLC)

Figure 3.1 show the step by step procedure in System Development Life Cycle. SDLC provides an orderly sequence of development steps and helps ensure the adequacy of documentation and design reviews to ensure the quality, reliability, and maintainability of the developed system. It is a linear progression of project activities and sequence of stages in which the output of each stage becomes the input for the next stages. The final output is the product for delivery to the customer. These stages can be characterized and divided up in 5 different ways, including the following:

3.1.1 Feasibility Study

The feasibility study is basically the test of the proposed system in the sense of its workability, meeting user's requirements and effective use of resources. The main goal of feasibility study is to achieve the scope of study. It establishes a high-level view of the proposed project and determines its goals. The feasibility study is used to determine whether the project should be continued or not. To describe the system study phase more analytically, the author had analyzed several problem related to this project and did some study on background of the project. The author had conducted a wide research regarding WAP-based GIS using journals, white papers, article and relevant websites.

3.1.2 Analysis

Analysis involved a detailed study of the current related application, leading to specifications of a new application. Analysis refines project goals into defined functions and operation of the intended application. Analysis is a detailed study of various functions performed by an application and their relationships within and outside the system. By keeping in view the problems and new requirements and workout the pros and cons including new areas of the application it becomes easy to draw the exact boundary of the new application. This stage requires the author to identify the hardware and software needed in order to implement this project. Besides that, the author needs to carefully plan the time so that the project can be completed in the time frame given.

3.1.3 Design

Design stage is where the details on how the system will work are produced. Design stages focuses on high level design like (what programs are needed and how are they going to interact), low-level design (how the individual programs are going to work),

interface design (what are the interfaces going to look like) and data design (what data will be required). Design stage describes desired features and operations in detail including architecture (hardware and software), screen layouts and pseudocode are all part of the deliverables of a design phase. Analysis and Design are very crucial in the whole development cycle. Any problem in the design phase could be very expensive to solve in the later stage of the application development. Much care is taken during this phase.

In this stage, the author had come out with the project framework and application flow that provides initial views on how the system going to be implemented. In addition, data gathering was done in this stage. For spatial data, the author managed to get Malacca digitized map from her supervisor in shape file (.shp) and database file (.dbf) form. For attribute data, the author needs to find it in the internet. The files can be viewed using ESRI ArcView 3.2. The author also has designed the user interface of the application. In the screen designing process, the author needs to consider several factors such as user friendliness and also small size of hand phone screen.

3.1.4 Implementation

Implementation is the stage of a project during which the whole system is required to be converted into computer understanding language. The real code is written here. With respect to the type of application, the right programming language is chosen. The author used HAPedit to write the coding and using PHP language. This is the longest phase of the system development life cycle.

3.1.5 Testing

In this phase the application is tested. Different testing methodologies are available to unravel the bugs that were committed during the previous phases. During testing, the implementation is tested against the requirements to make sure that the product is actually solving the needs gathered during the analysis phase. Unit tests and system tests are done during this phase. Unit tests run on a specific component of the system, while system tests run on the system as a whole. In order to test the application, the author used Openwave SDK 6.2.2 Simulator. The application is tested to ensure that interfaces between modules work (integration testing), the application works on the intended platform and with the expected volume of data (volume testing) and that the application does fulfill the requirement (acceptance/beta testing).

3.2 Tool Required

3.2.1 Software Requirement

i. MySQL

MySQL is an open source RDBMS that relies on SQL for processing the data in the database. MySQL provides APIs for the languages C, C++, Eiffel, Java, Perl, PHP and Python. In addition, OLE DB and ODBC providers exist for MySQL data connection in the Microsoft environment. MySQL is most commonly used for Web applications and for embedded applications and has become a popular alternative to proprietary database systems because of its speed and reliability. MySQL can run on UNIX, Windows and Mac OS.

ii. Apache Web Server

It is often referred to as simply Apache which is a public-domain open source Web server developed by a loosely-knit group of programmers. However, because the source code is freely available, anyone can adapt the server for specific needs, and there is a large public library of Apache add-ons. In many respects, development of Apache is similar to development of the Linux operating system. The original version of Apache was written for UNIX, but there are now versions that run under OS/2, Windows and other platforms. A web server is a computer that delivers (serves up) Web pages. Every Web server has an IP address and possibly a domain name. For example, if we enter the URL `http://www.google.com/index.html` in our browser, this sends a request to the server whose domain name is `google.com`. The server then fetches the page named `index.html` and sends it to our browser.

iii. Openwave SDK 6.2.2 Simulator

Openwave Phone Simulator is a free software development kit that makes creating innovative mobile applications even easier. This flexible and powerful programming tool features the latest versions of the Openwave Mobile Browser and Openwave Mobile Messaging Client, as well as documentation and sample code for authoring wireless applications using XHTML/CSS and MMS-SMIL. Openwave Phone Simulator Version 6.2.2 offers enhanced debugging and an improved user interface for configuring device and server settings. It also supports HTTP connections, so no WAP gateway is required.

iv. HAPedit

HAPedit is an acronym for HTML, ASP and PHP editor; a win32 text-mode editor useful for all developers of dynamic web pages. It is a freeware. Its main features are

syntax highlighting for html/php, html/asp, html, JavaScript, CSS and SQL, page preview in browser, project manager, php code "compilation", edit html tags, code completion, preview images; SQL console; FTP Manager; Code Explorer and many more.

3.2.2 Hardware Requirement

i. WAP Enabled Mobile Phone

The selected target platform is WAP enabled hand phone, meaning that mobile phone made by Nokia, Sony, Motorola, Siemens and others would be able to run the application. For this project I use Nokia 6101 phone.

ii. Hardware for application development

Processor	: Intel Centrino 1.73GHz
Memory	: 512MB RAM
Hard Disk Drive	: 40GB
Media Drive	: Combo Drive (DVD + CDRW)
Operating System	: Windows XP Professional Version 2002 with Service Pack

iii) Scanner

I use HP PSC 1200 All-in-One Series to scan the paper map.

Scanning specifications

- Scanning resolution: 600 dpi (dots per inch) optical and up to 19200 dpi with digital enhancement. The maximum scan dpi may be limited by available computer memory, disk space and other system factors.
- Up to 36-bit color depth hardware scanning; 24-bit color depth output without purchasing separate software.
- Up to 8-bit grayscale (256 levels of gray).
- TWAIN scanning compliant.
- Scanning area: A4-size/US Letter maximum.
- HP Photo and Imaging software.
- ReadIris Pro optical character recognition (OCR) software.
- Scan Preview Speed - 28 seconds.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Findings

4.1.1 System Flow

WAP services are very important to enrich existing Internet information systems with the aspect of mobility and to attract a new customer layer. Because of the obvious limitations of low bandwidth and small screens, it is important to give fast and easy access to the data and to offer a useful and applicable data information service. The realization of Malacca Tourism WAP Portal requires three steps of work:

- i. WAP Connection and User Request
- ii. Processing Request
- iii. Result presentation on the WAP phone

WAP Connection and User Request

In order to use this application, user needs to have a WAP enabled Mobile phone and need to activate the WAP services first. User can access this application by key in the URL and can start sending request.

Processing Request

All users' requests will be processed here. The processed involved in this stage is explained in detailed in the proposed framework.

Presentation on the WAP phone

The result of the request will be displayed on the phone screen. The result consists of the map together with detail information of the query. Nowadays the representation of data on current WAP enabled hand phone is still restricted because of small memory and small black & white displays with a resolution of 96 x 65 pixels for Nokia 7110 cellular phone.

4.1.2 Data

The data collected for this project can be divided into 2 categories which are spatial data and attribute data.

i. Spatial Data

For spatial data, I need to scan the paper map and save it in the web server.

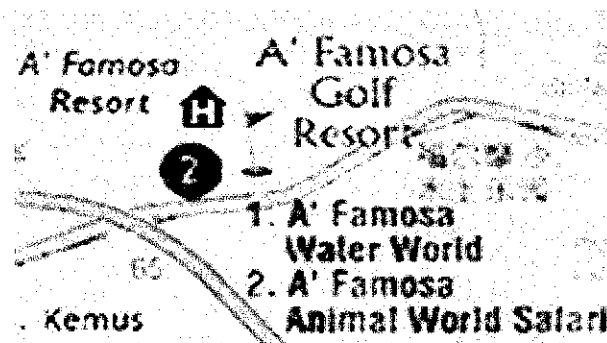


Figure 4.1: Print screen of spatial data

ii. Attribute Data

After doing research, the author found there are about 48 places of interests in Malacca. But for this project, I will highlight 20 places only. Examples of the place include:

a. A' Famosa

Address: Bandar Hilir Malacca, 75000 Malaysia
Neighborhood: Bandar Hilir
District: Melaka Tengah
Overview: It is a part of a fortress of the A'Famosa, built by the Portuguese in 1511.
Fare: Free

b. Crocodile Farm

Address: Jalan Ayer Keroh, Malacca, 75450 Malaysia
Open Hours: 9am-6pm
Neighborhood: Ayer Keroh
District: Melaka Tengah
Overview: Landscaped to create a natural environment conducive for the reptile.
Fare: Adults-RM5; Children-RM3

The attribute data are stored in mySQL database. There are 3 table used to store the information which include

- i) Location – to store place of interests information (name, address, neighborhood, fare, introduction, open hour)
- ii) Hotel – to store hotel information (name, address, price, type, phone number)
- iii) Travel – to store travel information (current location, destination, transportation, taxi phone number, route, distance, duration)

4.1.3 Coding

The author searches for WML coding in the internet. The author writes the code in HAPedit and save it as .php file. See appendix for sample coding.

4.1.4 Framework

Figure 3 shows Malacca Tourism WAP Portal Framework. When a client makes a request, the WAP request is routed through a WAP gateway which acts as an intermediary between the “bearer” used by the client like GSM, CDMA, TDMA and others and the computing network that the WAP gateway resides on which is TCP/IP in most cases. WAP Gateway acts as a proxy server, receives the request, translates it and sends it to the appropriate web server. The server responds by sending the requested document. This document is formatted as WML, a markup language based directly on XML. This project also uses PHP language for database connection. Once the WML has been prepared (known as a deck), the gateway then sends the completed request back (in binary form due to bandwidth restrictions) to the client for display and/or processing. The client retrieves the first card off of the deck and displays it on the monitor. Deck is a WML document and card consists of one user interaction, providing the WML Browser with a small, self-contained document for browsing.

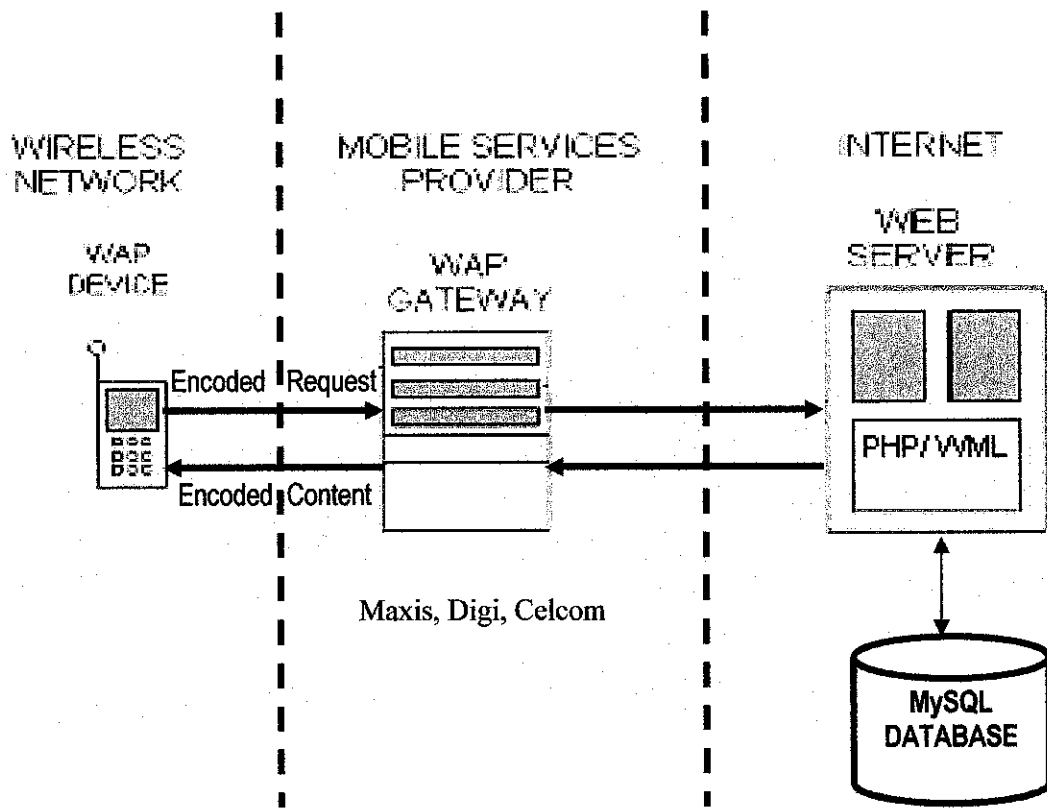


Figure 4.2: Malacca Tourism WAP Portal Framework

4.1.5 Output

Below are the screen shots of the Malacca Tourism WAP portal using Openwave SDK 6.2.2.

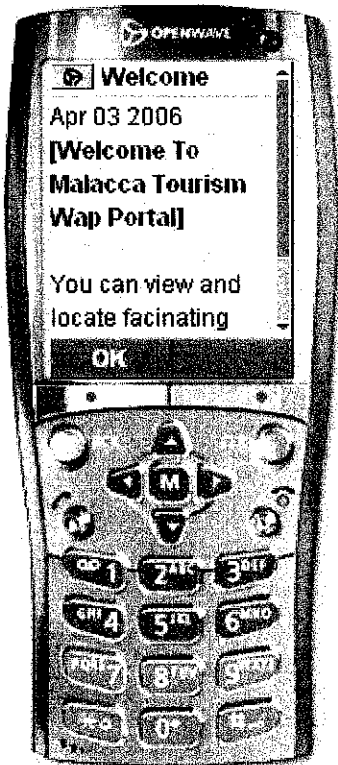


Figure 4.3: Welcome page

This is the main page that is displayed when user launch the application

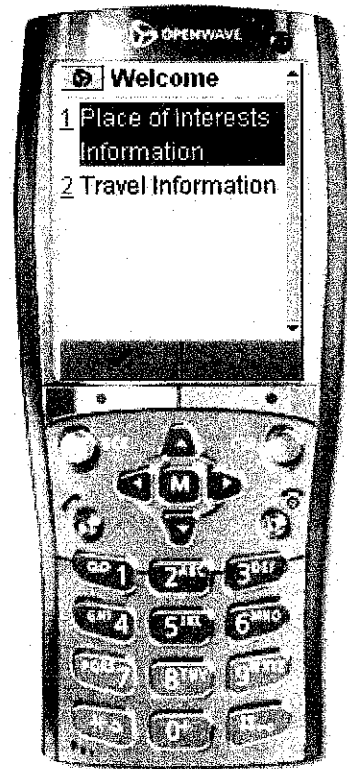


Figure 4.4: Select Function Page

This application consists of 2 major functions which are place of interests detail information and also travel information.

Place of Interests Detail Information

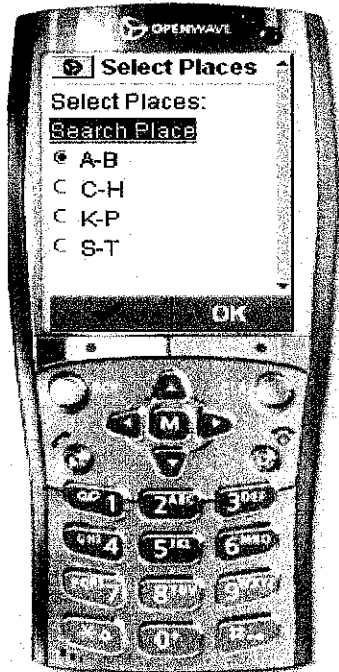


Figure 4.5: Select Place Page

User can select place by choosing from the option list or from the search place function.

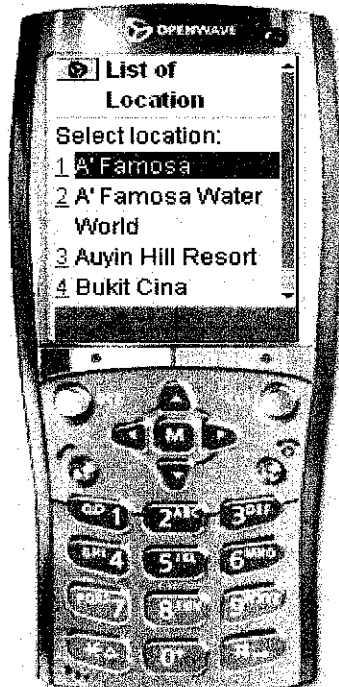


Figure 4.6: List of places of interest Page (Using option list)

This page display all the places of interest based on the user's selection

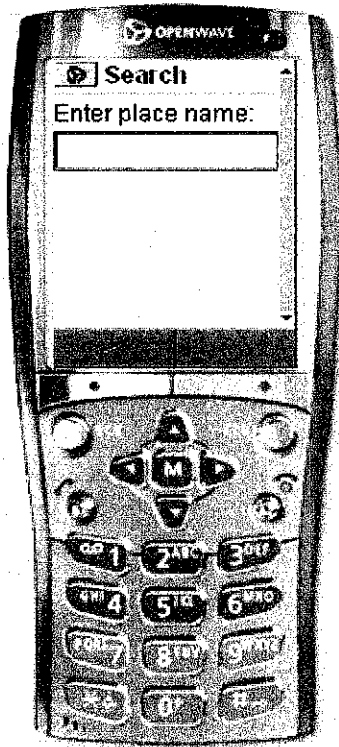


Figure 4.7: Using Search Place Function

User needs to key in the place name

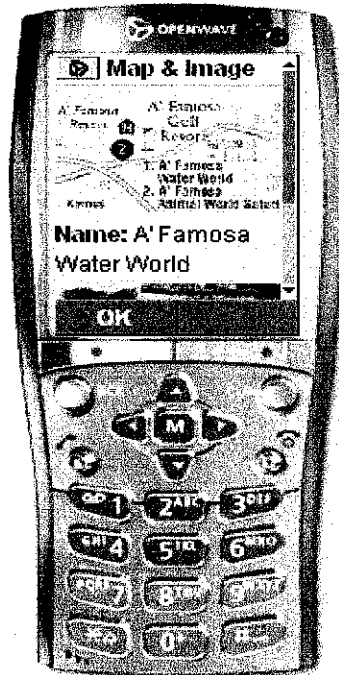


Figure 4.8: Map and Image Page

This page display the map that show the location and also the image of the place selected



Figure 4.9: Detail Information Page

This page contains detail information of the place



Figure 4.10: List of Nearest Hotel Page

This page display the nearest hotels with the place



Figure 4.11 Hotel Information Page

This page shows the hotel information

Travel Information



Figure 4.12: Select Current Location Page

Here, user needs to select their current location



Figure 4.13: Select Destination Page

Next, user needs to select their desired destination



Figure 4.14: Travel Information Page

This page displays travel information which includes the transportation available (bus number, taxi phone number, fare), the route, distance and others.

4.2 Discussion

Based on the findings, several issues are taken into account. The issues are discussed in the following section.

4.2.1 Building Dynamic WAP Sites

Cellular phones supporting WAP are constantly spreading. Therefore, in order to build a dynamic WML sites, it requires few basic steps which include:

- i. Correctly installed PHP and MySQL, and have some experience in programming with both languages. Database needs to be properly installed as well.
- ii. Have some knowledge of SQL
- iii. Running Apache or IIS web server
- iv. Have some experience with WML
- v. Have complete WAP application development tool (server, emulator etc.)

In addition, there are five rules for displaying WAP/WML Content

- i. Keep it simple. WAP browsers are significantly limited compared with regular HTML browsers, so we cannot expect WAP site look like regular Web site.
- ii. Always include alt text. If the user's browser doesn't display images, or the images get corrupted because of communications errors (far more common than on the wired Internet), then the alt text prevents the WML page from being useless.
- iii. Keep WML pages small. The bigger WML pages are, the longer they will take to download.
- iv. Make sure the images are small and display well at low resolution.

4.2.2 Differences between web page and WAP page

There are several differences between a web page and WAP page. The differences include:

i. Image display limitations

Standard HTML documents are generally designed for large displays, such as 800 x 600 resolutions, but for mobile phone for example, Nokia Series 20 phone screens are 84 pixels wide by 48 pixels tall, while the later Series 60 phones have 176-pixel by 208-pixel screen resolution. Therefore, we cannot expect to make a WAP site look like a regular Web site.

ii. Formatting

Most mobile devices don't support the vast array of text formatting available to web browsers. For example, earlier versions of certain mobile browsers do not support underlining while others do not support italic or bold text. Tables are especially problematic due to their width.

iii. Mobile device memory

Device memory is also a problem. Most mobile browsers only support pages (decks) a few kilobytes in size, requiring the content to be broken down into bite-sized chunks and displayed across several cards, if not several decks. The bigger WML pages are the higher the memory consumption.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

People who want to go sightseeing in different places as tourists may need to have some information about those places. In this study, planning for sightseeing, obtaining the visual and detailed information about the geographical data was carried out. Malacca Tourism WAP Portal suits for mobile phone aiming to benefit the mobile users navigating tourism places around Malacca state. Mobile phone together with WAP enables new forms of user adaptive applications. This study was carried out Malacca state, where there are a lot of historical and tourism places. By developing this project, tourist could be able to find interesting tourism places in Malacca, to know the details of each place such as address, open hours and neighborhood and can plan their travel well. Throughout this paper, the author explained the characteristic to build a usable WAP application.

Tourism is a highly complex activity, and thus requires tools that aid in effective decision making. Applications of GIS in tourism illustrate that GIS is a strong and effective tool that can aid in tourism planning and decision-making. In the future, importance of GIS will continue increasingly.

5.2 Recommendation

This project can be expanded into various way, depends on the interest of the person that want to take the product a step further than today. Some of the recommendations include:

i. Integrate with real WAP mobile phone

In implementing this project, the author having problem to find free WAP hosting that can support her application. The standard free WAP hosting only support static WAP page which means page does not connected to any database while WAP hosting that support mySQL is very expensive. It is very good if this project can be integrated with the real WAP mobile phone as it will be very valuable for tourists.

ii. Map panning and zooming

As been mentioned earlier, mobile phone has image display limitation. In this project, the author cannot display the map very well. Therefore, it is recommended that the map can be zoomed and panned so that tourist can view the map clearly and can track the exact location of the place by looking at the map.

iii. Include more place of interests

It is recommended to include more places of interests in Malacca because in this project, the author only highlights 20 places. There is about 48 places of interests in Malacca.

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APPENDIX

```
<?php
// send wml headers
header("Content-type: text/vnd.wap.wml");
?>

<wml>
  <card id = "card1" title="Welcome">

    <do type="accept">
      <go href="#card2"/>
    </do>

    <p>
    <?php
      // format and output date
      $the_date = date("M d Y");
      print $the_date;
      print "<br/><b>[Welcome To Malacca Wap Portal]</b><br/><br/> ";
    ?>
    You can view and locate facinating destination in Malacca. <br/>
    Press accept.
    </p>
  </card>

<card title="Select Places" id="card2">

<p>

  <do ="accept">
    <go href="map2.php" method="post">
      <postfield name="district" value="$district"/>
    </go>
  </do>

Select Places:
<select name="district">
  <option value="1">A-B</option>
  <option value="2">C-H</option>
  <option value="3">K-P</option>
  <option value="4">S-T</option>
</select>

</p>

</card>
</wml>
```