Mobile Information Kiosk in Mall using Wi-Fi

by

Mohd Zulfadli bin Roslan

Dissertation submitted in partial fulfillment of
the requirement for the
Bachelor of Technology (Hons)
(Information Communication Technology)

JULY 2007

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CERTIFICATION OF APPROVAL

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Information Communication Technology Programme
Universiti Teknologi PETRONAS
in partial fulfillment of the requirement for the
BACHELOR OF TECHNOLOGY (Hons)
(INFORMATION COMMUNICATION TECHNOLOGY)

Approved by,

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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 expect as specified in the references and acknowledgements and that the originality work contain herein have not been undertaken or done unspecified sources or persons

MOHD ZULFADLI BIN ROSLAN

ABSTRACT

With the introduction of faster wireless networking technology, the emergence of wireless devices and mobile networking has opened up new business opportunity begin with e-commerce and now extends to mobile commerce (m-commerce). Basically, this Final Year Project proposed the development and implementation of the Mobile Information Kiosk in Mall using Wi-Fi – a mobile solution that satisfies shopping mall customer's need and busy working style. This report presents the research and study of the project as well as the outcome of the project that is Mobile Information Kiosk in Mall using Wi-Fi This project will address to the three problem statements which are larger shopping mall brings a larger number of shops, practicality of Web-site provided and last but not least network fees and charges. This followed by the objectives of the system that is to develop a system called " Mobile Information Kiosk in Mall using Wi-Fi" that can successfully aid visitors to find their desired retail stores or facilities or items in the shopping mall as well help visitors saving their time, money ,and effort.

The scopes of the project are divided into two main parts that are to focus on information search and retrieval from system's database and also to focus on information display by providing the graphical mapping. Basically, the whole project will be applying a Waterfall Development Model due to its simplicity and requires linear progress. With this report, the basis for the research of this project will be underlined in detail, including the technologies as well the study of recent researches related to the study and also summarizing the result form the surveys that have been done through out t the whole period given . Finally the result of this project, will be in the mobile web application where user can easily access the system through Wi-Fi technology using their mobile phone or their Personal Digital Assistance (PDA)

ACKNOLEDGEMENT

First and foremost, I would like to recite my greatest gratitude to Allah, the Most Merciful for giving a great opportunity in completing this Final Year Project without much hassle and problem. Without His observance in giving me the chance in finishing this Final Year Project as well as the report, surely I will have to face many challenges and problems

Also my warmest appreciation especially to my dearest Supervisor, Mr Hilmi bin Hasan for his caring and cooperation towards me during the one year period of finishing the Final Year Project. I also would like to thank him for all his willingness to train as well giving the experiences as much as possible to me during the Final Year Project period. I also would like to thank him for his kind effort to equip me with all the facilities and technical expertise that he has in order to make this project runs successfully indeed.

A special thank is also dedicated to:

- Mr Ruslan Idris, Technician of Data Communication for giving all of his advice and opinions about my Final Year Project so that I have a clear vision or view about my Final Year Project throughout the whole one year.
- All Computer and Science Department lecturers for their continuous support to me during finishing the project
- And last but not least to Arina binti A. Ghani and also my beloved family in Melaka and all of my friends for their patience and support that they have always showed to me.

May Allah bless all of you

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ABBREVIATIONS

ASP	: Active Server Page
HTML	: Hyper Text Markup Language
ICSC	: International Council of Shopping Center
PDA	: Personal Digital Assistance
Wi-Fi	: Wireless Fidelity
WLAN	: Wireless Local Area Network
WML	: Wireless Markup Languange
XHTML	: Extensible Hyper Text Markup Language
UTP	: Universiti Teknologi PETRONAS

CHAPTER 1

INTRODUCTION

1.0 BACKGROUND OF STUDY

ASP.NET (Mobile Controls)

ASP.NET is a set of web application development technologies marketed by Microsoft. Basically programmers can use it to build dynamic web sites, web applications and XML web services. It is part of Microsoft's .NET platform and is the successor to Microsoft's Active Server Pages (ASP) technology. By using ASP.NET mobile controls, it extends the power of the .NET Framework and Visual Studio to build mobile Web applications by enabling ASP.NET to deliver markup to a wide variety of mobile devices. It reduces the work required for developers to target a wide variety of browsers by eliminating the need to write and maintain numerous web-applications each targeted to a specific browser. The ASP.NET mobile controls also render the appropriate markup (HTML 3.2, WML 1.1, cHTML. XHTML) while dealing with different screen sizes, orientations and device capabilities. One important thing that differ ASP.NET mobile control with normal ASP.NET is ASP.NET mobile control used web mobile forms to create web application. As with any other Web Forms page, a mobile Web Forms page is a text file with an .aspx file extension. A mobile Web Forms page contains a set of mobile Web Forms controls, which are ASP.NET server controls that can adaptively render to supported mobile devices. By using this web form, we can program mobile pages and controls by using device-independent properties, methods, and events. Moreover, when a supported device requests a mobile Web Forms page, the page and controls automatically produce a rendering suitable for the device.

Wireless Fidelity (Wi-Fi)

Wireless communications is a fast-growing technology that enables people to access networks and services without cables. The aim of the Wi-Fi is to provide wireless connectivity to devices that require quick installation, such as portable computers, PDAs, or generally mobile devices inside a wireless local area network (WLAN). Wi-Fi also is one of the brightest areas of the communications business. The Annual industry revenue in this technology is already exceeds $1 billion and is expected to pass $4 billion by the year 2007.It also has become the preferred technology for wireless local area networking in both business and home environments. Even though it was designed primarily for private applications, WiFi is also being deployed in public places to create so-called hotspots, where WiFi-capable users can obtain broadband Internet access. Moreover, WiFi offers wireless communications using open spectrum (2.4 Ghz and 5 Ghz) at speeds ranging from 11 Mbps to 54 Mbps and therefore this latest wireless technology is being applied in this research project. Below is information on all standards in Wi-Fi

Please view Appendix 1 to view the summary of Wi-Fi technology

Mobile Technologies (PDA and SmartPhone)

Personal Digital Assistants (PDAs) are handheld devices that were originally designed as personal organizers, but with the latest movement of technology, it became much more versatile over the years. PDAs have many uses or functions that are used for calculating, use as a clock and calendar, playing computer games, accessing the Internet, sending and receiving E-mails, use as a radio or stereo, video recording, recording notes, use as an address book, and use as a spreadsheet. Newer PDAs also have both color screens and audio capabilities, enabling them to be used as mobile phones (smartphone), web browsers or media players. Many PDAs can access the Internet, intranets or extranets via Wi-Fi, or Wireless Wide-Area Networks (WWANs). One of the most significant PDA characteristic is the presence of a touch screen. They offer instant on/off capability and synchronization of files with a PC. A PDA may offer WAN support for voice, but these are data-first, voice-second devices. Meanwhile, SmartPhone is an electronic handheld device that integrates the functionality of a mobile phone, personal digital assistant (PDA) or other information appliance. This is often achieved by adding telephone functions to an existing PDA (PDA Phone) or putting "smart" capabilities, such as PDA functions, into a mobile phone. According to Gartner Inc research [1], worldwide shipments of PDAs and smartphones combined totaled 42.1 million units in the first half of 2006, a 57 percent increase from the same period last year. Smartphone shipments bolstered the market growing 75.5 percent to reach 34.7 million units, more than four times the size of the PDA market. PDA shipments increased by 5.7 percent totaling 7.4 million units. Therefore, the usage of PDAs and Smartphone in this project become significant as the total numbers keep increasing and the usage become wider.

1.1 PROBLEM STATEMENT

Problem Identification

i) Larger Shopping Mall Will Create More Shops

According to International Council of Shopping Center (ICSC) [2], with the continuance buoyancy and growth of Malaysian economy, many big developers have come out with numerous plans for shopping centers and later the megamall concept has become popular in this country. The existence of Midvalley Megamall which is about 1.7 million net square feet, followed by Suria KLCC Shopping Centre which is around 880 000 net square feet, Sunway Pyramid Shopping Centre (755 000 net square feet) and latest Berjaya Times Square Megamall which took about 1.96 million of square feet. With a larger retail space provided in the mega mall, it is expected that the number of retail shops will incredibly increased in the year comes. For example, Mid Valley Megamall, a suburban center is opened in November 1999 and was a rapid success. It was the largest shopping center in Malaysia during that time and among the largest in Asia-Pacific region. It is 95% occupied which contain 3 anchor tenants, Carrefour, Jaya Jusco, as well MetroJaya and also has about 450 shop lots to be leased. Now, with that much number of retail stores in such megamall, the problem has arisen where the user or customer especially the new one such as tourist find that there are so many shops contained throughout the mega mall and can you imagine how much time they have to spend in order to cover or visit or maybe find any shop in the shopping center. Although the megamall had provided its customer with the information kiosk or booth, it still not enough as the number provided is very small and sometimes even it is so difficult to find the information kiosk! (*See discussion and result for more information.*) Another situation that might happened is if let say the mall visitors managed to find as well buy the item from their preferred retail store by using the information or directory stand provided and suddenly they want to find another store, what will they do? Of course they will find the information or directory stand again. This surely will waste their time and effort as they have to find the information stand and start searching again. Therefore, this information or directory stand must be converted into the mobile technology as nowadays mobile

technology has become an integral part in our life. Another problem also arises when the customer is very concern with their time especially for the busy people. As time is important for them, shopping in a large area like Midvalley Megamall would require them a quick and easy system that can provide all the information within a short time in every places in the shopping complex

ii) Practicality of Web-site provided

Today's technology is growing in very fast lane. The Internet is being accessed by 1,043,104,886 [3] people from around the world and thus it has made an integral part in today's activity. Many companies have build web-site of their own in order for them to participate in this open type of businesses. Same as Midvalley Megamall, this shopping center also provides all information to its customer with their own web-site. In its own website, http://www.midvalley.com.my/ [4], the customer is provided with a store directory system where they can find their preferred store simply by key in the desired word and the system will provide with all information related to the word searched. But, this technology is only available on the Internet means that the user needs to have an Internet connection plus with a notebook or maybe their Personal Digital Assistance (PDA) if let say they want to access the system in the shopping center itself. If the user chooses to access the system using a notebook, he or she has to find a Wi-Fi hot spot in the shopping center but can we imagine how difficult for the user to access the system while they actually is shopping in the mega mall! Meanwhile, if the user can access the system using a Wi-Fi connection from his or her Personal Digital Assistance (PDA), they still have to pay the fees and charges for the services that they utilized. Therefore it is not practicable for the store directory system to be developed in a Web-based system that requires Internet connection.

Another important issue that arises under this problem statement is the practicality of user interface provided for mobile application. Based on research done, in Malaysia there are currently four shopping centers that provide the same services (Information Directory) on the Web-site [4], [5], [6], [7] and all the sites is basically mean to be viewed by normal PC Desktop or laptop and not built to be integrated with the mobile phone or Personal Digital Assistance (PDA).Usually normal PDA has a 320 x 240 screen resolution compared to normal PC desktop screen resolution which has 1024 x 768 pixels, therefore when mobile users try to browse the sites, they found that the sites cannot fully fit onto their mobile screen as the arrangement of between texts and objects become scattered and improper. Moreover, the sites contain lot of animations that require users to install flash before it can be viewed and this action actually not practical to be performed in the mobile application as users are more likely prefer to have a simple site to be accessed. Therefore, a web application that can satisfy all those problems has to be developed to fulfill the demand and user friendliness of mobile users.

iii) Network Fees and Charges

As stated in above problem statement, if the user need to access the store directory system provided, they need an Internet connection where surely they will be charged by the telecommunication service providers for some amount of services fee. Below are the fees and charges set by local telecommunication service provider:

1. Maxis

	Monthly Subscription	Peak Hours	Off-Peak Hours (12am - 7am)
Pay-Per Use	-	1sen/kB	0.5sen/kB
5MB*	RM25	0.5sen/kB**	0.5sen/kB**
Unlimited*	RM120	-	-

These data packages are applicable to GPRS, EDGE and 3G services.

2. **Celcom**

i) **GPRS**

- Web and WAP browsing at RM0.10 for 10kb and
- There will be a one-off activation fee of RM5.

ii) **3G**

1. Pay per user package
   - 10sen per 10 kb
2. D99 package
   - Unlimited usage, high end advanced data user with minutes plan
   - Monthly fee is RM 99
3. D120 package
   - Unlimited usage, high end advanced data user (standalone data user)
   - Monthly fee is RM 120

3. **TMnet Hotspot**

Prepaid Package tmnet hotspot		
tmnet hotspot card start-up card	RM 28	30 days unlimited access
tmnet hotspot reload card	RM 28	30 days unlimited access
tmnet prepaid 1515 & ONE	Usage based - charge at 5 sen/min	

As stated above, we clearly see that in order for users or mall visitors to access the site using Internet connection, they have to pay some amount of money. As the current system purpose is to provide the customer with all related information regarding all stores or shops in the megamall, it is not appropriate to liable the customer with all those fees. (*See discussion and result for more detail.)* Therefore, a new system which can be connected around a large area of coverage locally but did not require any Internet connection or in other word a system that only require local area network must be developed in order to solve this issue

Significance of the Project

I. **Larger Shopping Mall brings a Larger Number of Shops**
II. **Practicality of Web-site provided**
III. **Network Fees and Charges**

To cater on all problem stated above, we need to develop a new web application system that utilized quite same functionality with the current application in the Midvalley web-site but with some slight changes had to be made in order for this new system is suitable for the usage in Personal Digital Assistance (PDA) or SmartPhone such as screen resolution and also the Graphical User Interface design. Using a SmartPhone , PDA, or Pocket PC will be more practicable for the user as they can easily access the new system anywhere in the shopping center area and therefore with the utilization of Local Wi-Fi technology (WLAN), the user will have not to worry about the fees charged as the wireless connection is only used to make a connection between users's mobile and system's server within Local Area Network set by the mall management and of course the technology is free of charges

1.2 OBJECTIVE AND SCOPE OF STUDY

The objective of this Final Year Project is mainly to develop a "Mobile Information Kiosk in Mall using Wi-Fi" system that can successfully aids or guides mall visitors to find their desired stores or perhaps to help them finding stores that are selling items that they searched. This system is also can be used to help mall visitors in searching the location of facilities provided by the mall such as Auto Teller Machine (ATM), Prayer Room, or Rest Room in the shopping mall as well. Secondly, the objective on developing this "Mobile Information Kiosk in Mall using Wi-Fi" system is to help users or mall visitor in saving their time, effort, as well as their money. By guiding users to their searched store, facilities or items, this system is provided with an interactive map, where users will find that their visit to the shopping mall will be beneficial as they can directly go to the desired store based on the information given by the interactive map without wasting time, and effort. User also can save their money as the system is installed as wireless and local network and this will not require them to pay for any services of this system provided not like before where they will be charged due to Internet connectivity.

Basically this project has two main scopes. The first one is to focus on information search and retrieval from system's database that help mall visitors to locate the desired retail stores in the shopping mall. Users or mall visitors will have to enter their preferred retailers into the system before the system will automatically display all information that related to the searched retailers based on the database provided by the mall management. Secondly, the scope of the project will be focusing on information display by providing the graphical mapping besides providing all information related to the retail store. In this system, basically it will provide mall visitors with all the detail information about searched retailers. One of the benefit of this system is it can display out the location of searched shops on a graphical interactive map therefore users can easily find the shops by just using their mobile devices.

CHAPTER 2
LITERATURE REVIEW

As discussed earlier in the objective and also in the scope of study, the proposed solution for this research project is the development of a Mobile Information Kiosk using Wi-Fi. But before explaining the basis of this proposed system, a thorough literature review must be done first. Mobile technology is expanding in a great amount. According to The Age [8], "The number of mobile phone subscribers in the world has surpassed the two billion milestones". Meanwhile according to U.S. Device Census Report for Q2 2006 "the mobile Internet is growing, with over 34.6 million mobile users as for June 2006". Another important statement is from Bernard Brenner, director of mobile content at Telephia where he said that "Mobile Web usage has continued to grow over the past year, as Internet content providers continue to extend their reach into the mobile space. Therefore, with such huge number and trend, no wonder mobile technology will become an important part in our life in the near future.

In this report, there are five common applications and implementations that quite related to this research project named Location Aware Shopping Assistance [9] SmartLibrary [10], m-Mall [11], CoolTown [12], and i-Guides [13].Location Aware Shopping Assistance basically gives a shopper directions through any shopping mall according to types of products that the shopper has expressed in, shoppers current location and also the purchases that the shopper has made so far. This technology or research has two main functions that are product location services and also location dependant alerting services. For the first function, the user will have to enter their preferred goods to buy by using their PDA and the system will return the result of shops

that selling the items to users by displaying on a map on users PDA screen. Next the system will instruct the users via the PDA towards the next store that sell the items need by displaying navigation on the PDA itself. The current location and orientation can be determined by using the infrared signal in each of beacons located through out the mall. Although the technology provides guidance to the users but this technology has limited the freedom of users as they will have to follow all the instructions in order to reach the shops that sell the items needed. Another drawback is it is not practical for the users to enter all their item needed before they can start used the system as they maybe want to add another items or goods while navigating the system on half way. Last but not least, infrared is a "line of sight" technology meaning to say that we have to point the infrared directly to the reader as the range must be near in order for the device to be worked

Meanwhile, SmartLibrary, a location-aware mobile library service, which help users to find books and other materials from the library. The help is provided in form of map-based guidance to the target bookshelf on a PDA. The devices can also be positioned, which enables dynamic guidance from user's location to the books. The service is a completely software-based solution, which can be provisioned atop a WLAN installed for wireless Internet access or in other word Wireless connectivity is provided in form of WLAN (IEEE 802.11b)., without any additional hardware. In my opinion, the development of this SmartLibrary project is good for the advancement of library technology as easier system provided can attract more users or customers to the library itself. But the major drawbacks is the Smart Library system can only be accessed on the same floor only meaning to say if the library has multi-floors, hat would give a problem in term of accessing the system. Another drawback is the LibrarySystem can currently being used by PDA devices. Perhaps the development of this system could be implemented into Wi-Fi mobile phones or maybe could be tested on new smart phones equipped with web browser.

Another related concept is m-Mall, a new m-commerce concept that will basically know the location of its users in the mall by using an auxiliary Bluetooth network and later, it will push any information into users handheld regardless of their technology. To be specific, the m-Mall concept offers an advertisement services, notifications, general services, search services, purchase/reservation services and also guidance services. Consequently, Bluetooth seems good alternative to deploy an auxiliary wireless network for the m-Mall system due to higher cost and power consumption of WLAN. But according to John Philips [12], "Bluetooth operates on a relatively small bandwidth of about 721kb, and has a maximum range of roughly 30ft". Therefore to implement this m-Mall using Bluetooth technology is not a good decision as there are quite many alternatives technology available such as WLAN or RDIF

Another significant project that has been developed is CoolTown. Basically CoolTown consist of two applications that are CoolTown Museum and also CoolTown Conference Room. In CoolTown Museum, the visitors will receive Web URLs on their PDA from the wireless beacons where usually the beacons are located near to pictures or sculptures. By using the PDA's Web browsers, visitors can read or hear about the artist or related works and also related art works in the museum itself. Meanwhile for CoolTown Conference Room, it applies the same concept that is users can collect or pull the URLs of the room into their PDA and this will lead to a Web page for the room giving links to room's projector, printer and electronic board as well links to Web-based maps. For example, users can project the corresponding web pages creating a shared web browser. But as this technology is using Bluetooth as medium of connection, it is expected that the drawbacks will be on the range as well in term of security [14] as this system can be shared by everyone that is using the conference room as well those who have Bluetooth connection in their mobile device.

The last implementations that have been done before is i-Guides (Applications for Museum Educator and Visitors Using Wireless Technology). It is a hand - on museum of science, art, and human perception. Here, various configurations of RFID technologies, handheld computers, and network-based applications are being developed to support nomadic inquiry and extend the museum experience for two different audiences that are museum visitors and museum educators. For museum visitors, this project is exploring ways to enable visitors to intentionally capture one's museum experiences for later reflection and investigation of personally relevant science ideas via the Web. For museum educators, this project is designing a wireless handheld Web resource and digital library infrastructure to support educators in making effective uses of exhibits and exhibit-based content for inquiry-based teaching. The implementation of RFID is used when visitors using RFID package such as electronic watch to bookmark the exhibits that they visit, also to capture their photos by activating an RFID sensitive camera or maybe trigger a printer to create a souvenir. But the major concern for this implementation is the use of RFID as the cost is quite expensive especially for the readers and also for the tag. As there are many exhibits in the museum as well other frequencies, it is expected that some collisions of signal will happened especially signal from one reader with another reader.

CHAPTER 3
METHODOLOGY / PROJECT WORK

3.1 METHODOLOGY

In dealing with the system to be developed, methodology plays and important role in determining the success of a project. Some methods work better for specific types of projects, but in the final analysis, the most important factor for the success of a project may be how closely particular plan was followed. Proper design methodology need to be implemented in order to produce a reliable system and meets all objectives mentioned earlier. The design System Development Life Cycle (SDLC) that has been chosen is Waterfall Model.

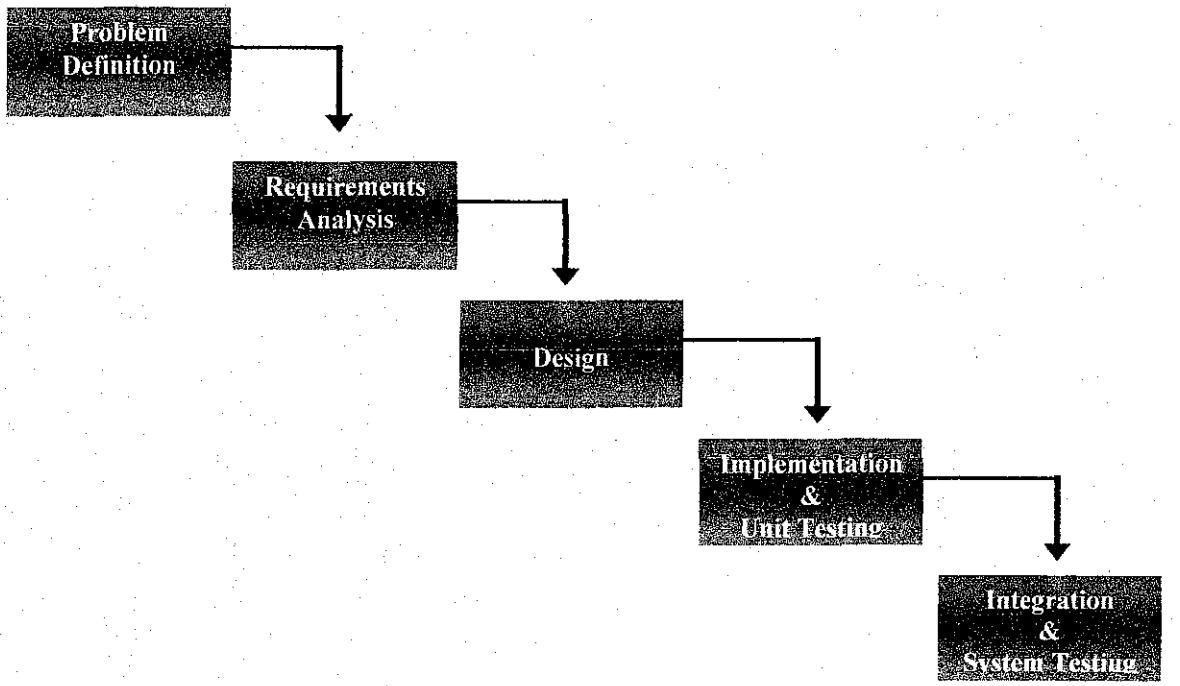


Figure 1 : Waterfall Model

Please view Appendix 2 to view the Gantt chart model for Mobile Information Kiosk in Mall using Wi-Fi system

Problem Definition

- Identifying the current problems faced by target users
- Defining the scope of the system

Requirement Analysis

- Focus on studying the concepts of developing mobile web application using ASP.NET mobile controls
- Focus on researching the Wi-Fi technology and its implementation on current applications
- Collecting necessary information on current Information / Directory Stand provided in shopping mall by doing surveys

Design

- Design the system's work flow
- Design the system's network architecture / infrastructure
- Design the system's database
- Design the system's interface and functionality

Implementation

- Develop the mobile web application
- Develop the system's functionality
- Setup the Local Wi-Fi environment (WLAN)
- Execute the unit testing on mobile web application and Wi-Fi environment independently.

Integration and System Testing

- Integrate the mobile web application with the Wi-Fi environment
- Execute the system testing on both parts to ensure the integration will works as a whole Mobile Information Kiosk in Mall using Wi-Fi system.

3.2 REQUIREMENT SPECIFICATION

Software requirement

- ✓ **Microsoft Visual Studio.NET 2003 (Development Tools)**

Visual Studio .NET 2003 is the comprehensive, multi-language development tool for rapidly building and integrating XML Web services and applications. Visual Studio .NET 2003 offers a highly productive environment in which to develop a broad range of Microsoft .NET—connected applications and technologies. Using the high-performance Microsoft .NET Framework run-time environment, Visual Studio .NET provides you with powerful tools for designing, building, testing, and deploying Web services and applications, as well as sharing best practices and guidelines in a team environment.

- ✓ **Microsoft Access 2003**

In this project, Microsoft Access 2003 is chosen to be the project database as it will integrate better with the Visual Studio.NET 2003 compared to other database system. Furthermore, this system only requires simple database storage and therefore Microsoft Access 2003 is the best database system to be used in this project.

Hardware requirement

- ✓ **Wi-Fi Access Point**

At the basic level, the thing that everyone must have before they can start a wireless networking is an access point. In computer networking, a wireless access point (WAP or AP) is a device that connects wireless communication devices together to form a wireless network. The WAP usually connects to a wired network, and can relay data between wireless devices and wired devices. For this project, the access point devices must be in the 802.11b or 802.11g standard as both the standard are most widely used nowadays.

- ✓ **Repeater**

Another important hardware that must be included in the project is repeater.As the project will cover a wide area of mall with multilevel floors, therefore it is proposed to have repeaters in order to ensure the quality of the Wi-Fi signal is always good so that users can always accessing the web application using their mobile devices. Basically the repeaters will be located in strategic area or in the area where the signal quality is not and the network quality for each location can be known by applying or implementing site survey on the mall.

- ✓ **PC Server**

To develop a mobile web application system, one must have a server where all the web application pages will be compiled and run here before it can be viewed. This PC server will be connected to the Access Point and after some configurations made, the mobile web application can be accessed by using a Wi-Fi handheld devices such as PDA or SmartPhone.

✓ **Personal Digital Assistant (PDA) or SmartPhone**

As this system's objective is to help mall visitors by providing a location-based services system using their mobile devices, therefore wireless notebook is not suitable in this project. But all mobile devices that contain Wi-Fi connectivity can be used. For example, Cellular Phone with wireless web access, Palm PDA / Palm Smartphone or PDA with wireless modem, and last but not least Pocket PC / Pocket PC with wireless modem.

CHAPTER 4

RESULT AND DISCUSSION

4.1 RESEARCH AND FINDING

In order for the student to get better knowledge and more understanding on his current research on Mobile Information Kiosk using Wi-Fi, the student has decided to conduct several information gathering sessions that are:

- A survey on Information / Directory stand located in Jaya Jusco Ipoh Shopping Center
- A survey on Information / Directory stand located in Midvalley Megamall, Suria KLCC, Sunway Pyramid, Berjaya Times Square as well One Utama Shopping Center by using e-mail
- A survey on Universiti Teknologi PETRONAS (UTP) students about their opinion on factors that could be much related in implementing Mobile Information Kiosk in Mall using Wi-Fi

i. A survey on Information / Directory stands located in Jaya Jusco Ipoh Shopping Center

To get a better view of the usage or utilization of Information / Directory stands in a mall, the student has decided to conduct a survey in Jaya Jusco (Ipoh) Shopping Center on 7th October 2006. Basically the objective of the survey is to get know how much the number of Information / Directory stands that are being provided by the mall management and also to get to know the range of the nearest Information / Directory stands between both of them. Besides, the purpose of the survey is to observe the frequent of usage of Information / Directory stands by mall visitors based on the observation around 30minutes in the affected area.

Result

Figure 2 : Example of Information / Directory Stand

Based on the observation and research done by the student, there are approximately 4 Information / Directory stands that are being provided by the management of Jaya Jusco (Ipoh) Shopping Center. One stand is available in front of SmartShop tenant, meanwhile another one stand was located in front of Reject Shop tenant. Both are located in the 1st level of the shopping center. In the Ground level, the student also spotted two Information / Directory stands each one is located in front of the Jusco Supermarket and the other one is near to England Optical retail. Therefore, the total number of Information / Directory stands in the shopping mall is only four. The student also found that there about 4 Information / Directory boards that are located beside the mall's elevator or lift specifically one board for one floor of the 2 levels shopping center in both places. The student also found that in 30 minutes of his observation, there only two persons used the service. Next, based on the student observation also, the range for each the range of the nearest Information / Directory stands between both of them is approximately around 500 meters and last but not least the total number of tenants existed in the mall is around 114 in numbers. As a conclusion, the student concludes that the number of Information / Directory stand provided in the mall is average as compared to size of the mall itself. He also conclude that usually the local people did not prefer to use the service provided pertaining they are quite used with the mall location and environment compared to people who are quite new with the mall. As the number of tenants in the mall is quite a lot that are around 114, therefore with the implementation of Mobile Kiosk Information, the student hope he can help most of the people in finding their preferred shops.

ii. **A survey on Information / Directory stand located in Midvalley Megamall, Suria KLCC, Sunway Pyramid, Berjaya Times Square as well One Utama Shopping Center by using e-mail**

The purpose of this survey is to know the actual number of Information / Directory stands that are being provided in respective mega mall. The student has an opinion that the Mobile Information Kiosk will be more suitable to be used in those mega malls as the number of tenants is quite a lot due to very large size of coverage area. Therefore, the student has sent email to the entire related mega mall and after certain of time he only managed to get reply from one of the mega mall that are Midvalley Megamall. Presently, the management of Midvalley Megamall provides 10 directory boards strategically located at every retail floors and directory stands at every public lifts corridors. They also maintained three Information Counters on the Ground Floor, namely on the North, South and Centre Court for the convenience of their shoppers. The student concludes that with the Midvalley Megamall size which is about 1.7 million net square feet and also there are around 450 shop lots inside the mall, perhaps the visitor will find quite difficult to search for their preferred tenants or maybe preferred goods to buy. Therefore, it is suitable to implement an application like Mobile Information Kiosk using Wi-Fi in the mega mall like Midvalley

ii. **A survey on Universiti Teknologi PETRONAS (UTP) students about their opinion on factors that could be much related in implementing Mobile Information Kiosk in Mall using Wi-Fi**

To get more understanding and opinion from target user about the Mobile Information Kiosk in Mall using Wi-Fi, the student has conducted a survey which contains about 11 questions that basically asked users about their opinion on factors that could be much related in implementing the system. A group of 40 students of UTP involved in the survey where basically the questionnaires were sent through MIRC (medium of communication of UTP students) and the affected students will answer all the questions before they will sent back the questionnaires to the sender.

Result

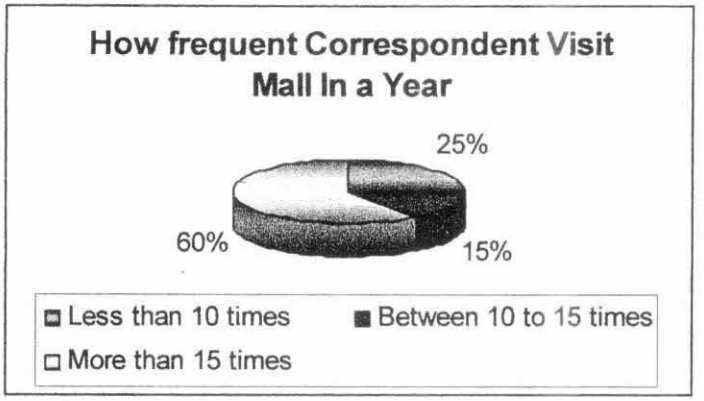


Figure 3: How Frequent Correspondent Visit Mall in a Year

For this Question No 1 as showed in Figure 3, basically the student would like to know how many times that correspondent or UTP students went for their shopping in a year so that the practicality of Mobile Information Kiosk in Mall using Wi-Fi could be evaluated. Let say based on the survey done, 60% from the correspondents visit more than 15 times in a year and therefore the probability of they will use the technology is high compared to 25% of correspondents who only visit mall in less than 10 times in a year.

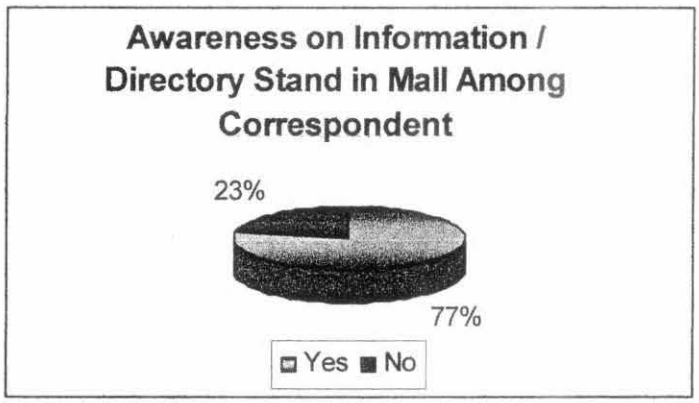


Figure 4: Awareness on Information / Directory Stand in Mall among Correspondents

In Question No 2, the purpose of this question is to test the awareness of Information / Directory Stand that are being provided by mall management among correspondents. From the survey, about 77% of correspondents are aware of the Information / Directory Stand but only 23% are not aware of its existence during their visit to mall.

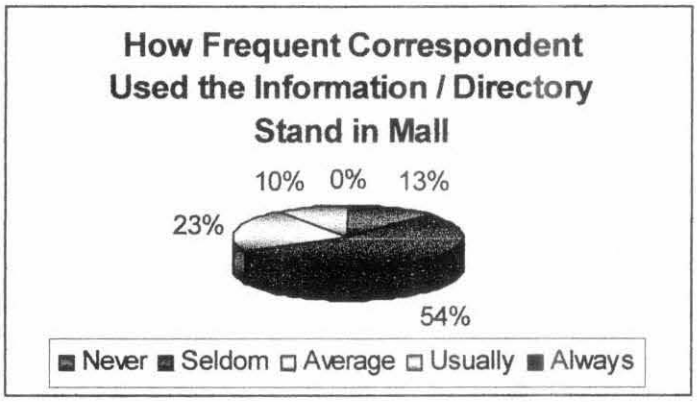


Figure 5: How Frequent Correspondent Used the Information / Directory Stand in Mall

Meanwhile from out of 77% or 30 correspondents who aware of its existence, there are only 10% who usually used the Information / Directory Stand compared to the majority that is about 54% of correspondent who seldom used the provided services. With the majority are only using the service seldom, perhaps the current service provided are not really much helped the visitors.

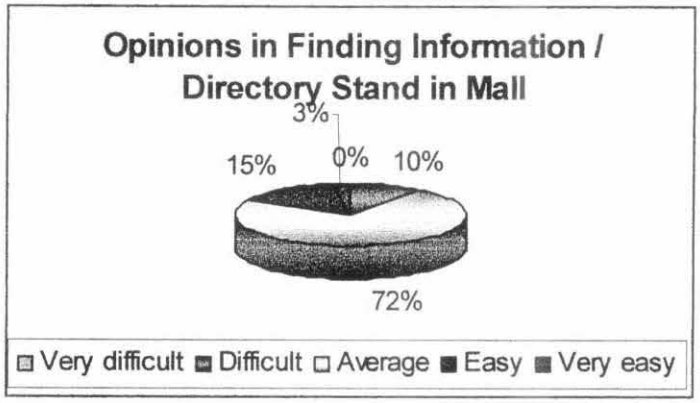


Figure 6: Opinions in Finding Information / Directory Stand in Mall

Meanwhile in Figure 6, 72 % of the aware correspondents thought that it is not so difficult to find Information / Directory Stand in mall and also not so easy to find them. But, 10% of the correspondents agree that it is difficult for them to find the service provided in the mall although 15% has an opinion that it is easy to find the Information / Directory stands. The result shows there are still many mall visitors feel that it is not easy to find the service especially in large shopping center or mega mall.

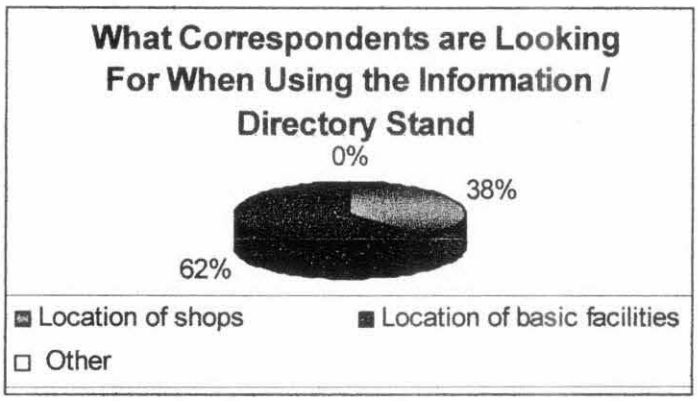


Figure 7: What Correspondent are Looking for When Using the Information / Directory Stand

From result of the survey, it is clearly shows that most the of correspondent or 62% from them basically are using the Information / Directory stands to find basic facilities such as ATM machines, Prayers Rooms, or maybe Toilets while there rest used the service to search the location of shops or tenants in the mall.

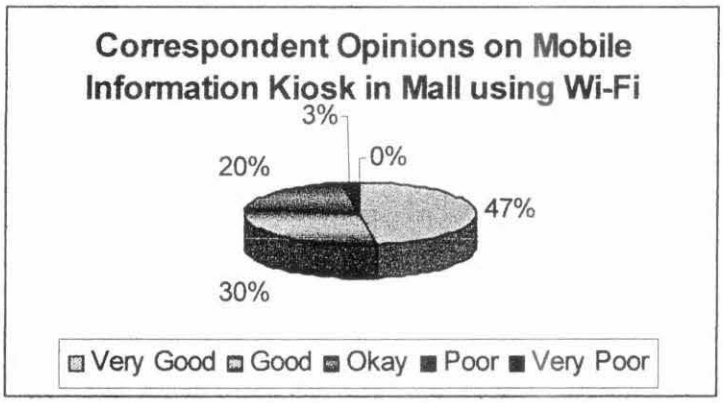


Figure 8: Correspondent Opinions on Mobile Information Kiosk in Mall using Wi-Fi

For this type of question, 47% of the correspondents thought that the technology that will be developed is very good while 30% are agreeing that the technology is good. Only 3 % thought the technology is not practical to be implemented while the rest thought it is okay to implement it in the mall. From the result, it shows that most of the mall visitors would like to try this new technology as well hoping that the system will help them much while they shopping in the mall.

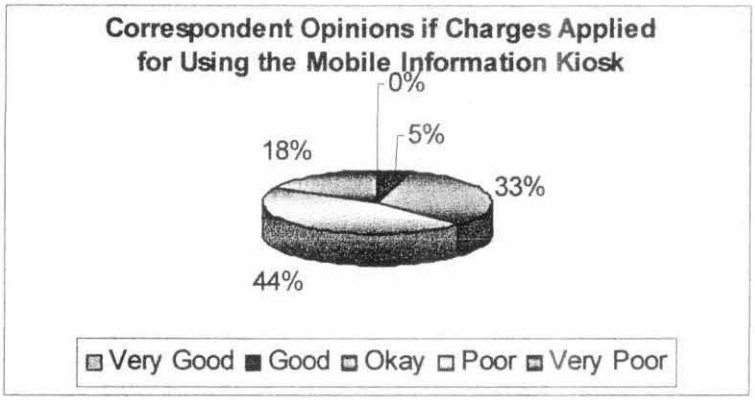


Figure 9: Correspondent Opinions if Charges Applied for Using the Mobile Information Kiosk

For this question, correspondent opinions are asked if the mall management put some charges for their customers in order to access the system and form the result, 44% out of the correspondent thought that it was a poor idea to set certain amount of charges to the customers while 18 % of them thought the idea was very poor. Although 33 % thought that the idea was okay, but the majority thought the technology to be developed must be put in free as they thought the mall management must consider the Mobile Information Kiosk in Mall using Wi-Fi is one of their services to their loyal customers.

The result of the survey clearly shows that correspondent would like to have or try this new technology that is Mobile Information Kiosk in Mall using Wi-Fi and they think that the mall management should provide the service with free of charge as this is considered as one of the services that they must provided to each customers. Basically, the users or mall visitors thought that this new technology to be developed will be beneficial in helping them to find basic facility such as ATM machine, prayers room and toilets as they also thought that sometimes is easy and also hard for them to find any information stand that being provided in the mall.

4.2 USE CASE DIAGRAM

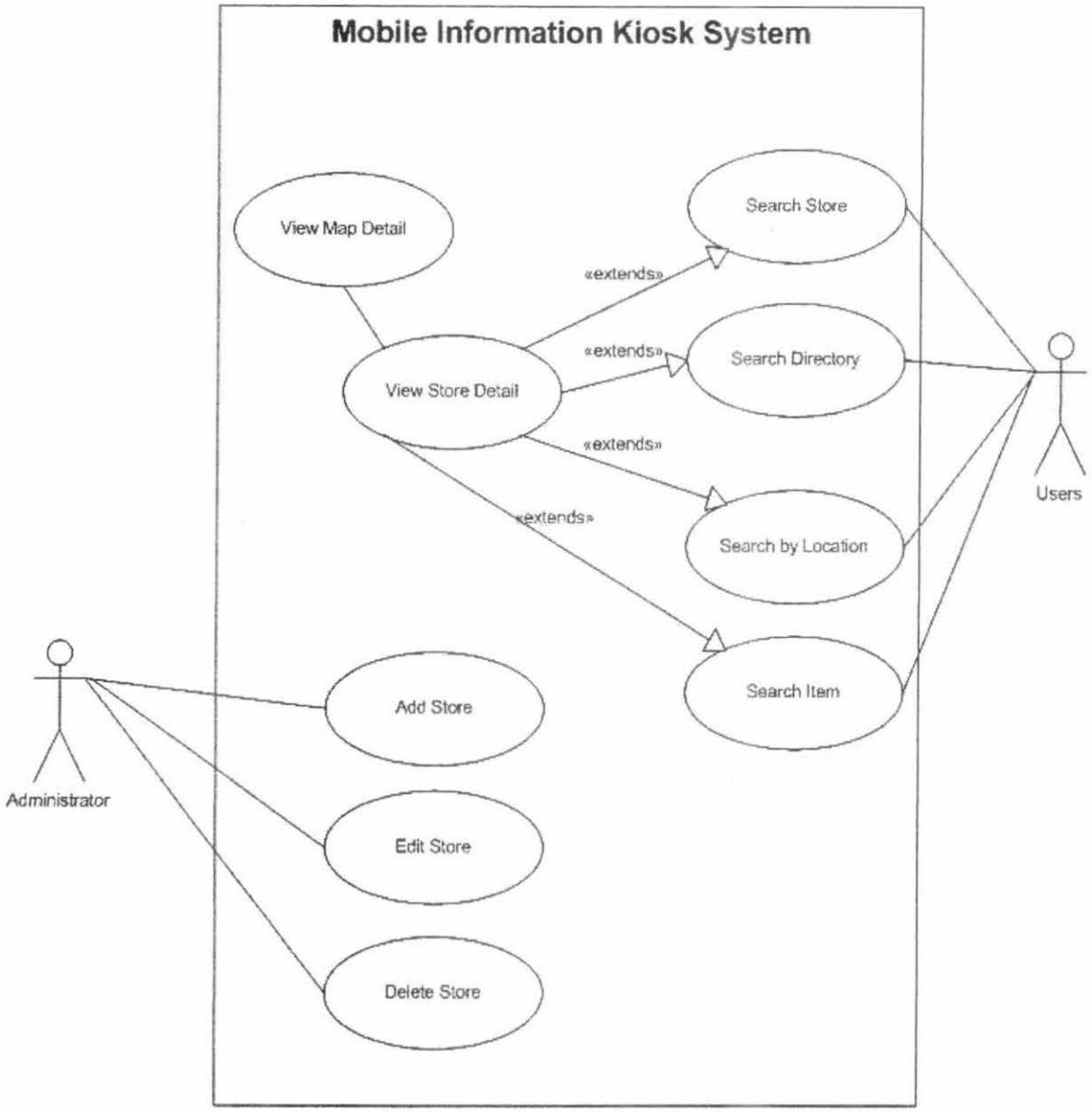


Figure 10: System Use Case Diagram

Use case diagram is used to model the activity to be done from a user perspective. In Figure 10, basically this system has two main groups of user; Administrator and Users. Administrator has the authority to add, edit and delete store in the shopping mall while users has more functions that can be done such as Search Store, Search Directory, Search by Location and also Search by Item. As an extend, users can view the detail of each store as well as viewing the location of searched store based on interactive map provided.

4.3 NETWORK ARCHITECTURE

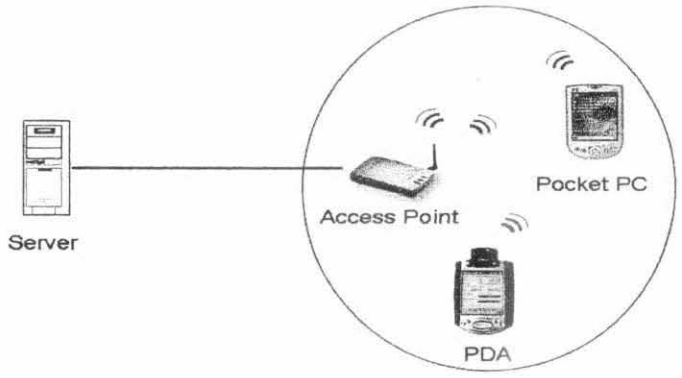


Figure 11 : Proposed WLAN Infrastructure

As stated in the figure, basically the infrastructure can be divided into 3 main parts that are PC server, access point as well the PDA or Pocket PC itself. The PC server will act as a system's database and also used to run the mobile web application. Then, the wireless environment can be configured simply by connecting the PC Server to the Access Point. Lastly, PDA and Pocket PC are important for the mobility of the developed web application.

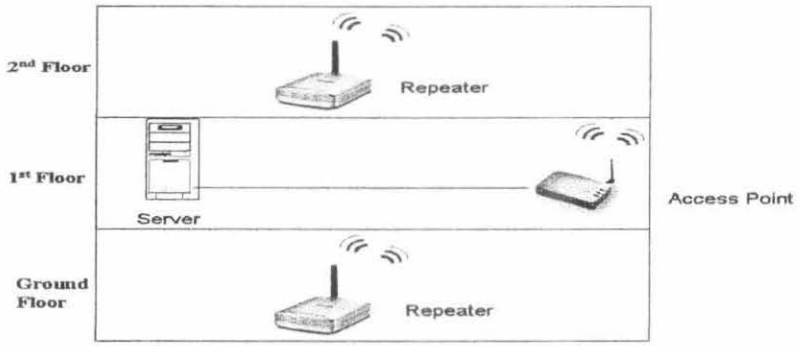


Figure 12: Proposed network infrastructure in Mall

Figure 12 shows the proposed of WLAN infrastructure implementation in the mall. Assuming after the network engineer has done a site survey in the 3 levels mall; the main WLAN infrastructure should be put on the 1st floor or in the middle of the building so that the coverage area will be balanced. The purpose of having repeaters in Ground Floor and 2nd Floor is to ensure the quality of wireless signal received by users will not be interrupted and also to ensure the availability of the system to the mall visitors.

4.4 PROJECT DEVELOPMENT

Basically this project is tentatively to be developed during FYP Part B that is on January 2007 academic session. Below are the progresses that have been made until the end of the Final Year Project Part B.

1. Installing project development tools

Firstly, the student installed Microsoft Visual Studio 2003 as it will be the main developer tool to this project. Then it is followed by the installation of Microsoft Device Emulator Manager as this software will provide the student with virtual PDA and Smartphone. Later on, the student can test whether all the project development done can be run in the real PDA or Smartphone devices by using this emulator. Next, the student also has successfully installed Microsoft Access Database 2003 to be used as the project main database as the project require it to save any retail store information together with related information as well. Finally, in order for the student to complete the installation process of this project, the student has to installed Microsoft Active Sync as it will synchronize the virtual PDA and Smartphone with the student PC Desktop therefore the student can successfully view his Mobile Information Kiosk project by using the virtual PDA or Smartphone

2. Creating project web pages

In creating the web pages for this Mobile Information Kiosk, the student has decided to use ASP.Net Mobile Web Form format as per stated in project Interim Report during the FYP Part A (Research Part). Since this format is quite new to the student, therefore it takes some times for him to initiate the interface of the project by using the Mobile Web Form. Basically, all the mobile web pages created will be based on proposed system's flow. Here, the student keep the simplicity of the web pages as the web pages will be viewed in the PDA or Smartphone environment and therefore there is no need to create a complex interface for this kind of environment.

3. Creating project database

In this Mobile Information Kiosk, basically Microsoft Access is chosen to be the project database as it can be easily integrated with Microsoft Visual Studio.Net 2003. Furthermore, the database also not requires large storage and therefore Microsoft Access is looked as suitable database based on the storage requirement and utilization. In order to integrate the database with the developer tool (Microsoft Visual Studio.Net 2003), OleDbDataAdapter control is applied where basically all of them can be found in Microsoft Visual Studio.Net 2003 itself. In order to create a connection between web pages with the database and as well retrieve or manipulate the data, we need 3 main elements that are OleDbDataAdapter, OleDbConnection and last but not least Dataset. OleDbDataAdapter is used to query the data according to developer requirement hence only data that fulfill the requirement will be displayed on the web page. Meanwhile, Ole DbConnection is basically used to make a direct connection between the database itself and Microsoft Visual Studio.Net 2003. Lastly, Dataset is purposely to generate or retrieve the information from the database before it can be displayed out on the web pages. Below is the example of all the elements in this Mobile Information Kiosk project.

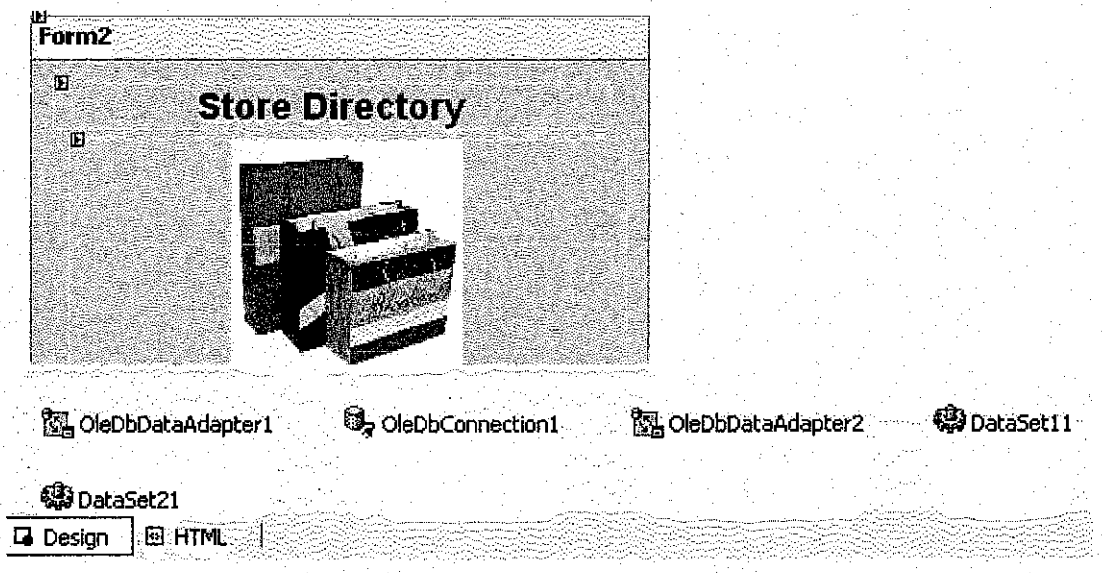


Figure 13 : 3 main elements of project database

4. Creating Wi-Fi (LAN) environment

After completing the Mobile Information Kiosk system, now it is time to create the wireless environment. For this system, it is agreed that the Wi-Fi environment is configured locally, Wireless LAN (WLAN) so that only user in the shopping mall can get the signal and therefore only them are allowed to use the system. To setup a WLAN in shopping mall environment, the only thing need is a PC Server, a Wi-Fi router (Access Point), and also Repeater. In order to create wireless environment, the PC Server must be connected with the Wi-Fi router and later on the DHCP of the router will automatically assigned IP address to the PC Server as well as to all users that are connected with the router. Here, in order to ensure smoothness for the user while connecting to the system, therefore there is no need for them to authenticate to the system. Moreover, as this system is implemented in the public place like mall, therefore it is not suitable if password is enabled for every user. Next, once connected, the user can simply access the Mobile Information Kiosk system by using the Personal Digital Assistance (PDA) or Smartphone.

4.5 SYSTEM'S FLOW

1) Scan Local Network

Firstly, mall visitors must enable the Wi-Fi connectivity on their PDA or Smartphone in order to using the system. This system will only works for PDA or Smartphone that contain Wi-Fi connectivity whether built-in Wi-Fi or using Wi-Fi netword card.

2) User Connecting

Next, after enabling the Wi-Fi option, then the PDA or Smartphone device will automatically scan all wireless network that are currently available within the range of the Wi-Fi connectivity. For this system, user will found that the network name is "Mobile Information Kiosk" where users can immediately make a connection to the system without providing any username and password.

3) View the Default Page

In order for the users to navigate the system, first they must open any web browser that contain in their PDA or Smartphone such as IE, Opera and many more. Then, users have to key in the address for this system, that is http://192.168.0.111/fyp2007/mik2007.aspx before they will view the default page of the system. Basically, the developer of this system is concerned with the long web address for the system and currently the developer is doing research on that problem. One of the solutions is to make the web browser to automatically open the default page of the system instead having the users to type in all the address.

Figure 14: Default page

In Figure 14, basically all users of this Mobile Information Kiosk will see this interface as default page on their PDA or Smartphone Device. As this system consists of 5 main sections, therefore the developer has divided this system into 5 parts that are Store Directory, Search Store, Search Item, Search by Location and Administration. Here, the developer try to maintain this web page simplicity as the target user is for PDA user. Hence, the developer has developed only a few interfaces on the page as the developer thought that mobile web page must be in simple but compact with useful information. Another reason why the developer only use few interface is for user friendliness as this system will be used in PDA and therefore user control and navigation of the system must also suitable for this type of device.

3) Store Directory

Let say if the users want to use this first function. In Figure 15 below, after user has selected Store Directory menu on the default page, this page will automatically display all type of stores that available in the shopping mall according to their category. Then, from the displayed list, user can search all stores that related to each of the type. For example, if user clicked Food and Beverage link, then this system will display out all stores that are related or within Food and Beverage category such as KFC, McDonalds, Coffee Bean and many more stores. Users also can view detail about each store that they chose which will be covered later in Store Detail category. This page is one of the four searching method that have been introduced in this Mobile Information Kiosk.

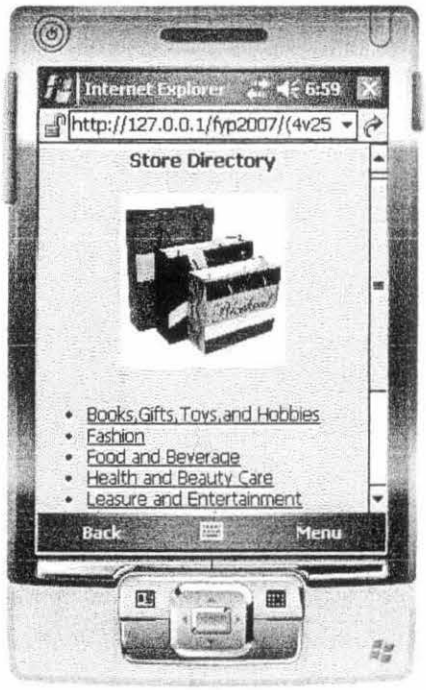


Figure 15: Store Directory

4) Search Store

Figure 16 : Search Store

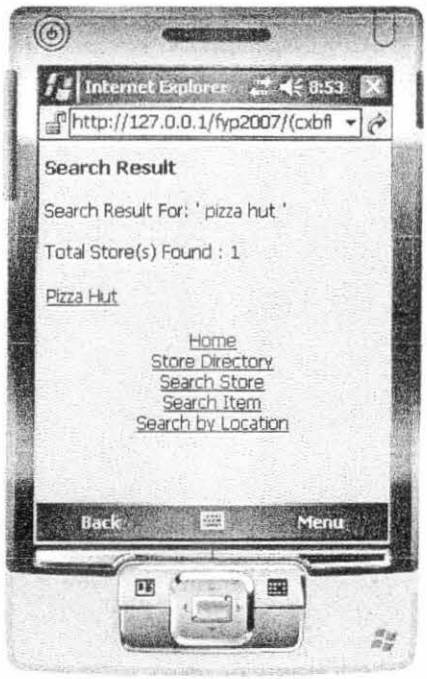


Figure 17 : Search Result

As showed in Figure 16 above, the second method of searching in this Mobile Information Kiosk system is by using Search Store page. Basically, user can find the location of their preferred store, for example Kentucky Fried Chicken or England Optical by key in those stores into the text box before they hit the Search button. Next, the system will display out the query of searched store in a form of list like in Figure 17 before user can navigate or get more information as well as location of the store later in the Store Detail section.

5) Search Item

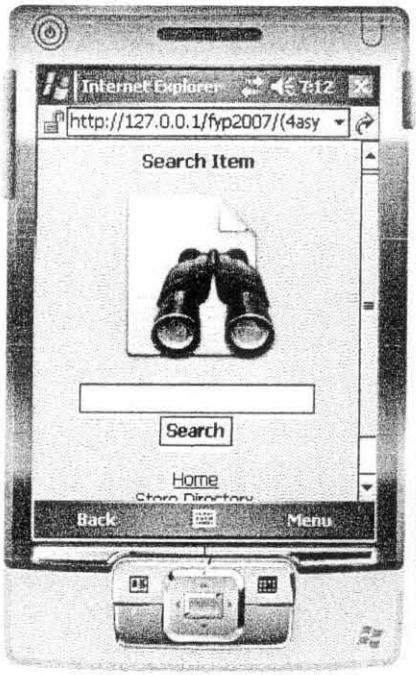


Figure 18 : Search Item

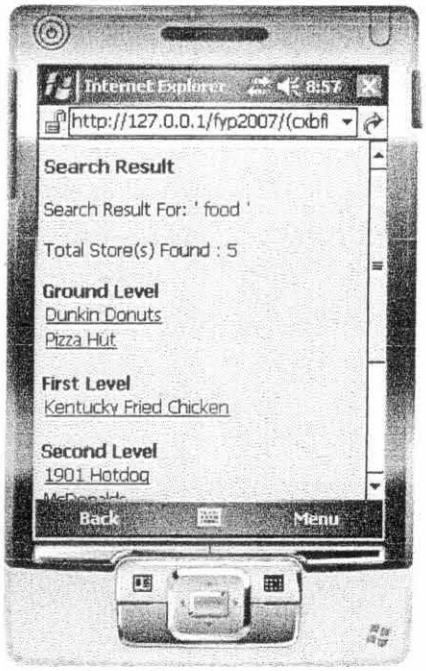


Figure 19 : Search Result

Same as the previous page, this Figure 18 present the third searching method of this system that is Search Item. Basically, what user needs to do is to enter any item that he or she want to search, then the system will display out all stores that are selling the searched item same as Figure 19 above. More over, in order to help mall visitor in making decision, all stores displayed will be sort alphabetically and also according to each level, Ground Level, First Level, Second Level, ad Third Level.

6) Search by Location

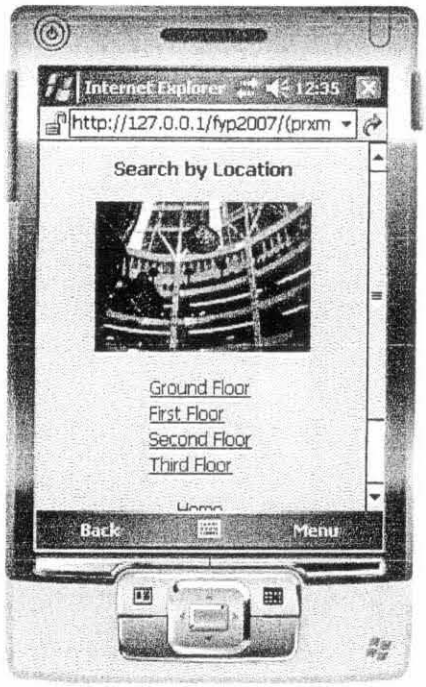
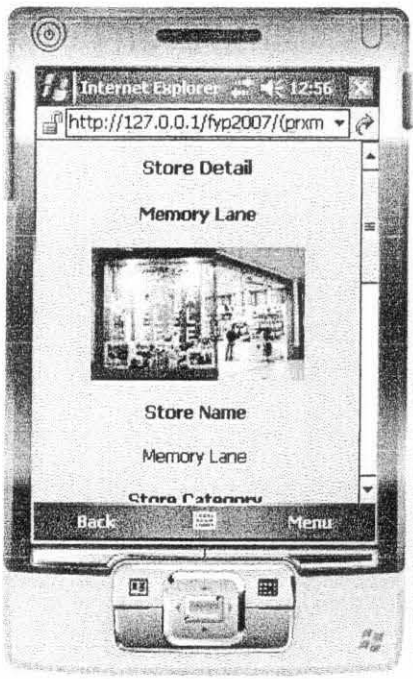


Figure 20 : Search by Location

In Figure 20, the fourth searching method of this system, Search by Location is purposely made to order all stores that available in the shopping mall according to their location. By doing that, it ensures user will not having trouble while searching stores as all the stores will be sort according to Ground Level, First Level, Second Level, and Third Level. For example, if user selects the Ground Floor, then the system shall display out all stores that are located in the shopping mall's Ground Level and this will goes the same if users select other level of the mall.

7) Store Detail



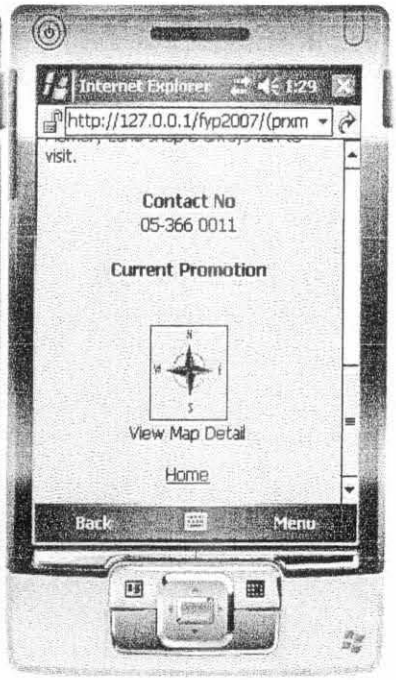
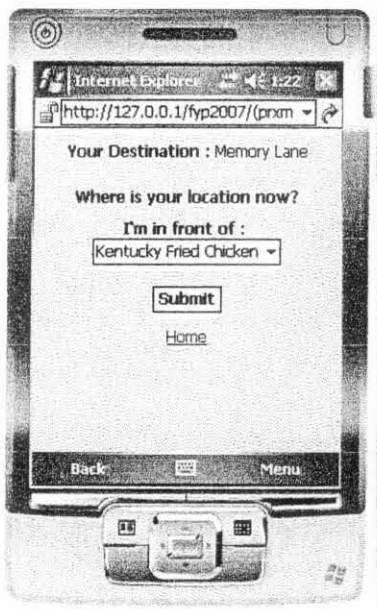


Figure 21 : Store Detail **Figure 22 : View Map**

As showed in Figure 21, after user has selected their preferred store from one of the four functionality explained above, he or she can actually view the details about the selected store. There, all information such as Store Name, Store Category, Store Location, Store Information, Contact Number, Promotion are provided and most importantly user can view the location of the store using the interactive map provided like in Figure 22 that will be discussed later.

8) Interactive Map



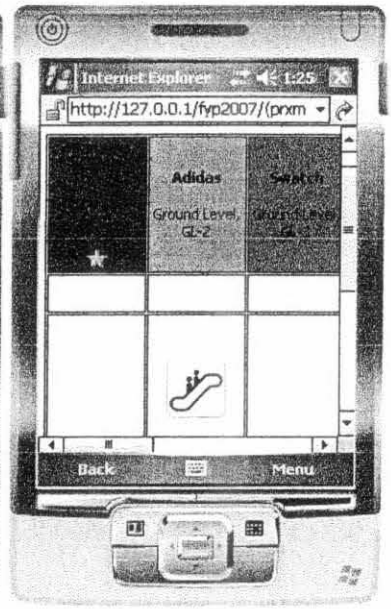


Figure 23 : Select Origin **Figure 24: Interactive Map**

After mall visitors hit the View Map Detail button on the Store Detail page, next, as showed in Figure 23 the system will ask the point of origin of the user or in other word, where is user's current location now so that when users hit the Submit button, the system will be able to display out the location of the user as well as the location of the store searched by them dynamically like in Figure 24. In the map, a star image displayed can be known as the searched store or the destination of the user meanwhile the down arrow displayed in the map is to show user's current location based on information provided on Select Origin section. By providing user with interactive and dynamic map, perhaps user can save a lot of time in order to find the store besides helping user from getting lost while searching the store.

8) Administrator Site

Figure 25 : Administrator Login

Figure 26: Main Page of Administrator Site

Another main function of this Mobile Information Kiosk is to provide Administrator Role where basically all information about the stores in this system will be kept under this function. But first thing first, to ensure only authorized user can used the administrator site, the person need to login to the system like in Figure 25. If successful, user will be directed to main page of the administrator site as showed in Figure 26 which basically contain 3 main functions of administrator role that is add, edit, and delete stores. In Figure 27, the administrator basically can perform add new store functions as perhaps in the future the mall get new retailers. Meanwhile in Figure 28 below, the administrator can also perform the Edit function where basically all information about each store in the shopping mall can be modified based on the current situation on that time. For example, if one store wants to inform user about certain promotions that are currently run in the store, the administrator can update all those information so that user can view all latest information or promotion about the store. Last but not least, the administrator also can perform the Delete function like in the Figure 29, where perhaps in the future one store has decided to no longer operating in the shopping mall. Therefore, the administrator can simply delete the all information about the store from the database permanently.

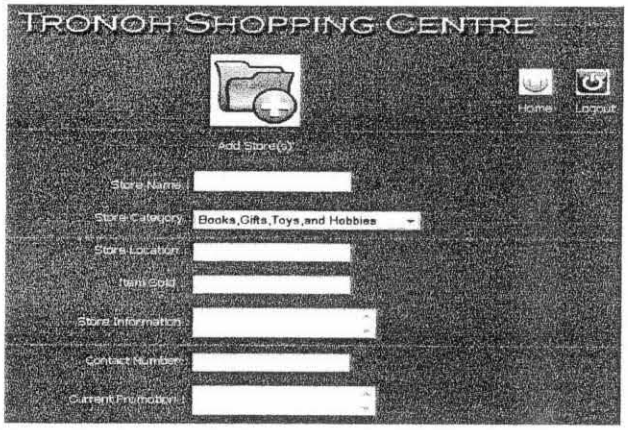


Figure 27 : Add Store

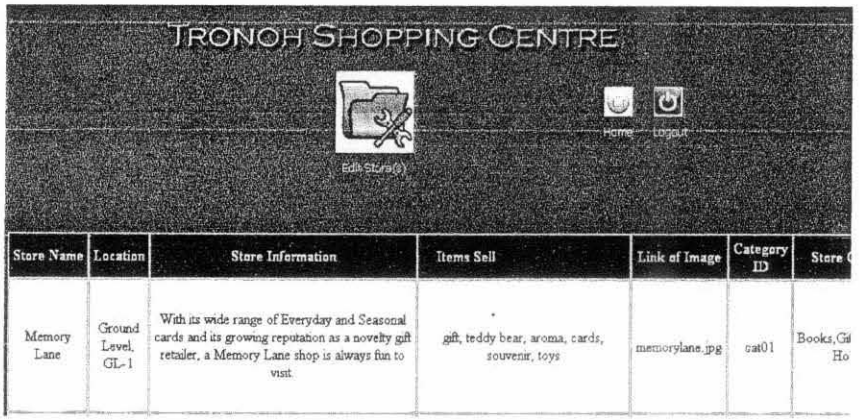


Figure 28 : Edit Store

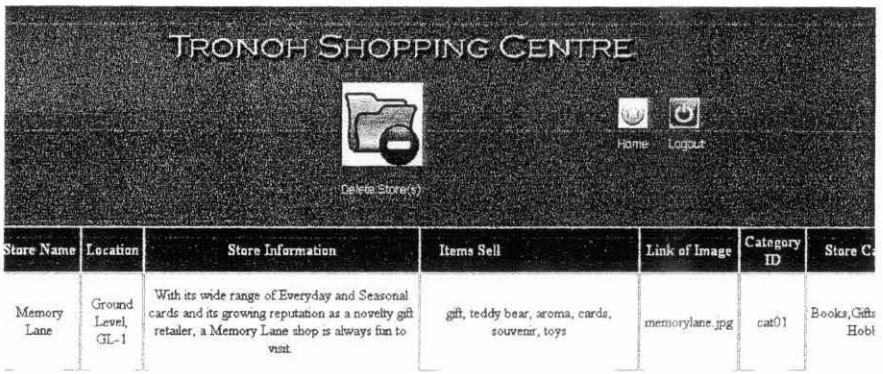


Figure 29 : Delete Store

Please view Appendix 2 to view overall process flow for Mobile Information Kiosk in Mall using Wi-Fi system

4.6 PROJECT TESTING

Type of User: Administrator and Mall Visitors (users)

Testing Device: Microsoft Windows Mobile 5.0 Virtual

- ✓ **Feature Testing**
  - To perform test on every functions provided in the system
  - To ensure whether the functions provided conform to user and system requirements
  - To identify any flaws in the functions and design correction for each of the flaws
- ✓ **Integration Testing**
  - To test the integration between one functions and another functions
  - To test how well the integration between Mobile Web Based and Wi-Fi environment together.
  - To identify the flaws existed if any, and design suitable correction for the flaws
- ✓ **System Testing**
  - To test whether the system can work as a whole system that covers all aspects of function of the system

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

In a nutshell, towards the end of this one year Final Year Project which consist Part A and Part B, the student found that all those research that made earlier in the FYP Part A really beneficial as with enough information the student is managed to complete the Mobile Information Kiosk in Mall using Wi-Fi project within the time frame. The student also found that by following the Waterfall Methodology that mentioned earlier, the development of the project could be done successfully without any delay as all elements or criteria that needed have been analyzed during the FYP Part A research duration. In order to implement this project or system, it requires a lot of new skills especially in the mobile area as the programming language used in the related area is definitely differ from normal programming language. But after all when the system development is complete, it is a satisfaction to the student as he manages to develop the system on his own. With the completion of the system, it is hope that this system will help very much on services provided by any shopping mall to their own customers. Perhaps, with the interactive map display out by the system, the user can easily find any store that they want to search for as the map actually guided each of the users by displaying the current of location of user as well as the location of searched store. By doing that, user can easily find the store based on the information given by the interactive map.

5.2 LIMITATION

As this Mobile Information Kiosk in Mall using Wi-Fi system is purposely to be used by Personal Digital Assistance (PDA) or Smartphone users, thus the student has concern on the practicality of the system developed. This is because, in Malaysia the number of user that owns a PDA or Smartphone is not many or in other word, the usage of those mobile devices is not wide yet. But, the student believed that in the coming years as technologies coming in and grows; it is not possible for Malaysia to have many PDA and Smartphone owner as the price of the devices will be reasonable to be bought by Malaysian.

5.3 FUTURE ENHANCEMENT

As explained earlier, this system provides a dynamic and interactive mapping that can detect user's current location manually and also tells the location of the searched based on the information from the database. Perhaps, due to time, knowledge and budget constrain, in the future or as an enhancement of the system, the mapping system could be developed by using a more advanced system like Global Positioning System (GPS) that can accurately detect the location of users and continuously update their location so that user can always be guided while they are using the Mobile Information Kiosk in Mall using Wi-Fi system.

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[5] http://www.1utama.com.my/welcome.aspx

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Appendix 1 : Summary of Wi-Fi technology

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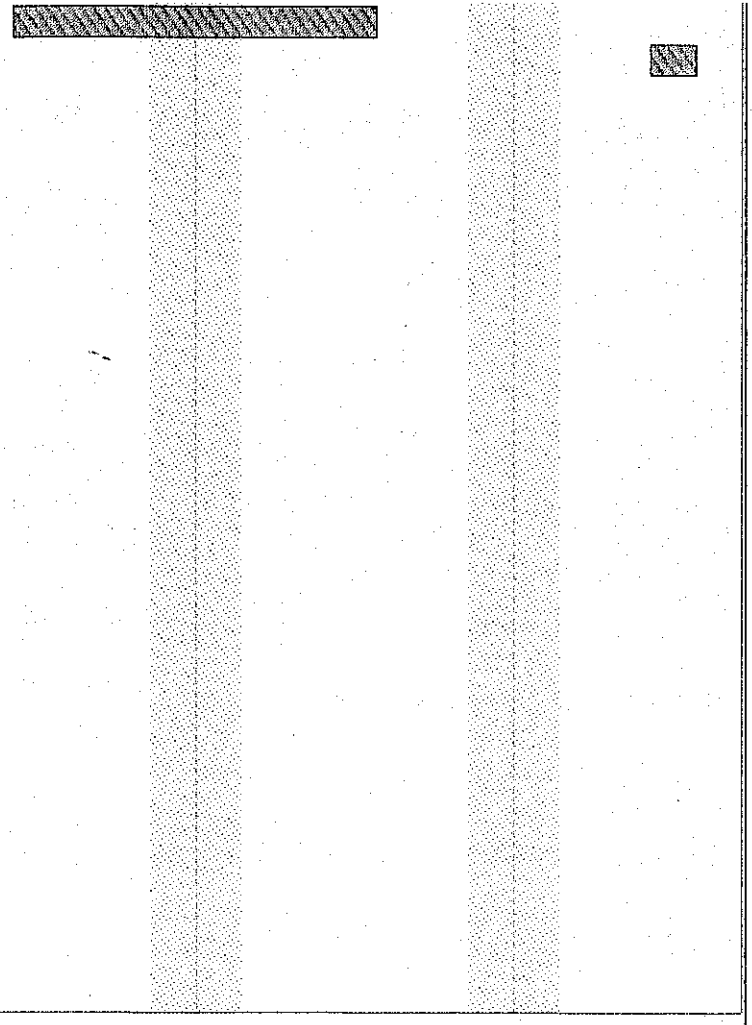
Protocol	Release Date	Op. Frequency	Data Rate (Typ)	Data Rate (Max)	Range (Indoor)
Legacy	1997	2.4 -2.5 GHz	1 Mbit/s	2 Mbit/s	?
802.11a	1999	5.15-5.35/5.47-5.725/5.725-5.875 GHz	25 Mbit/s	54 Mbit/s	~30 meters (~100 feet)
802.11b	1999	2.4-2.5 GHz	6.5 Mbit/s	11 Mbit/s	~50 meters (~150 feet)
802.11g	2003	2.4-2.5 GHz	25 Mbit/s	54 Mbit/s	~30 meters (~100 feet)
802.11n	2007 (projected)	2.4 GHz or 5 GHz bands	200 Mbit/s	540 Mbit/s	~50 meters (~160 ft)

Appendix 1 : Summary of Wi-Fi technology

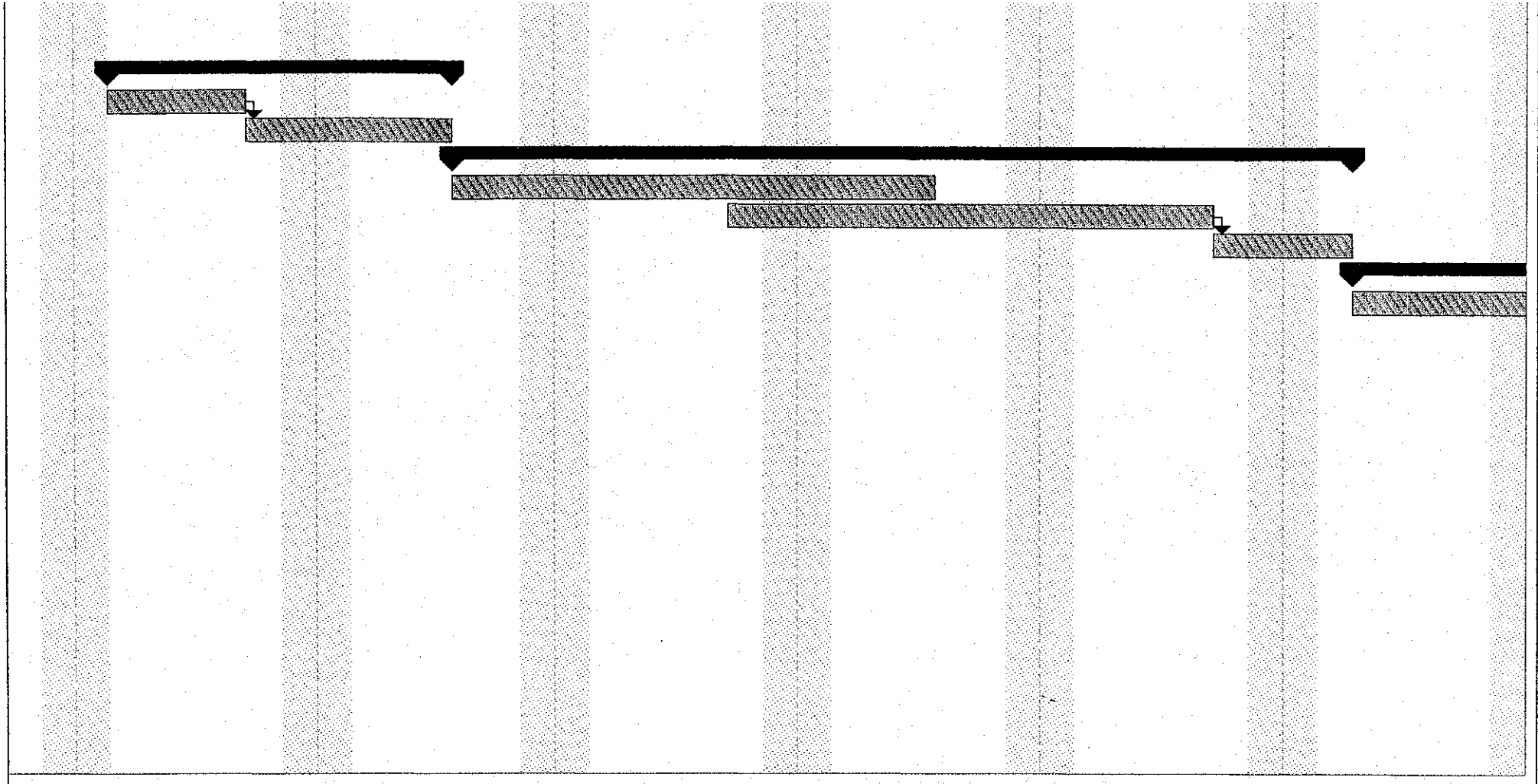
Appendix 2 : Gantt chart model for Mobile Information Kiosk in Mall using Wi-Fi system

2		1.1 Propose Topic	6 days	Wed 7/26/06	Wed 8/2/06
3		1.2 Topic assigned to student	1 day	Wed 8/9/06	Wed 8/9/06
4		**2. Problem Definition**	**8 days**	**Mon 8/14/06**	**Wed 8/23/06**
5		2.1 Identifying the current problems fac	4 days	Mon 8/14/06	Thu 8/17/06
6		2.2 Defining the scope of the system	4 days	Fri 8/18/06	Wed 8/23/06
7		**3. Requirement Analysis**	**18 days**	**Thu 8/24/06**	**Mon 9/18/06**
8		3.1 Studying the concepts of mobile pro	10 days	Thu 8/24/06	Wed 9/6/06
9		3.2 Focus on Wi-Fi research	10 days	Fri 9/1/06	Thu 9/14/06
10		3.3 Conduct survey on to be developed	2 days	Fri 9/15/06	Mon 9/18/06
11		**4. Design**	**23 days**	**Tue 9/19/06**	**Thu 10/19/06**
12		4.1 Design system's workflow	6 days	Tue 9/19/06	Tue 9/26/06
13		4.2 Design system's network architectu	6 days	Wed 9/27/06	Wed 10/4/06
14		4.3 Design system's database	5 days	Thu 10/5/06	Wed 10/11/06
15		4.4 Design system's interface and funct	6 days	Thu 10/12/06	Thu 10/19/06
16		**5. Implementation and Unit Testing**	**59 days**	**Fri 12/15/06**	**Wed 3/7/07**
17		5.1 Develop the mobile web application	45 days	Fri 12/15/06	Thu 2/15/07
18		5.2 Develop system's functionality	45 days	Fri 12/15/06	Thu 2/15/07
19		5.3 Configure the Local Wi-Fi environm	10 days	Thu 2/15/07	Wed 2/28/07
20		5.4 Execute unit testing on each functio	5 days	Thu 3/1/07	Wed 3/7/07
21		**6. Integration and System Testing**	**12 days**	**Mon 3/12/07**	**Tue 3/27/07**
22		6.1 Integrate the Mobile Application with	5 days	Mon 3/12/07	Fri 3/16/07
23		6.2 Execute system testing for both con	7 days	Mon 3/19/07	Tue 3/27/07
24					
25		**7 FYP Part A Research Evaluation**	**4 days**	**Fri 4/6/07**	**Wed 4/11/07**
26		**8 Seminar**	**5 days**	**Fri 4/6/07**	**Thu 4/12/07**
27		**9 Pre-EDX**	**1 day**	**Fri 4/6/07**	**Fri 4/6/07**
28		**10 Oral Presentation (External Examiners**	**2 days**	**Mon 4/23/07**	**Tue 4/24/07**



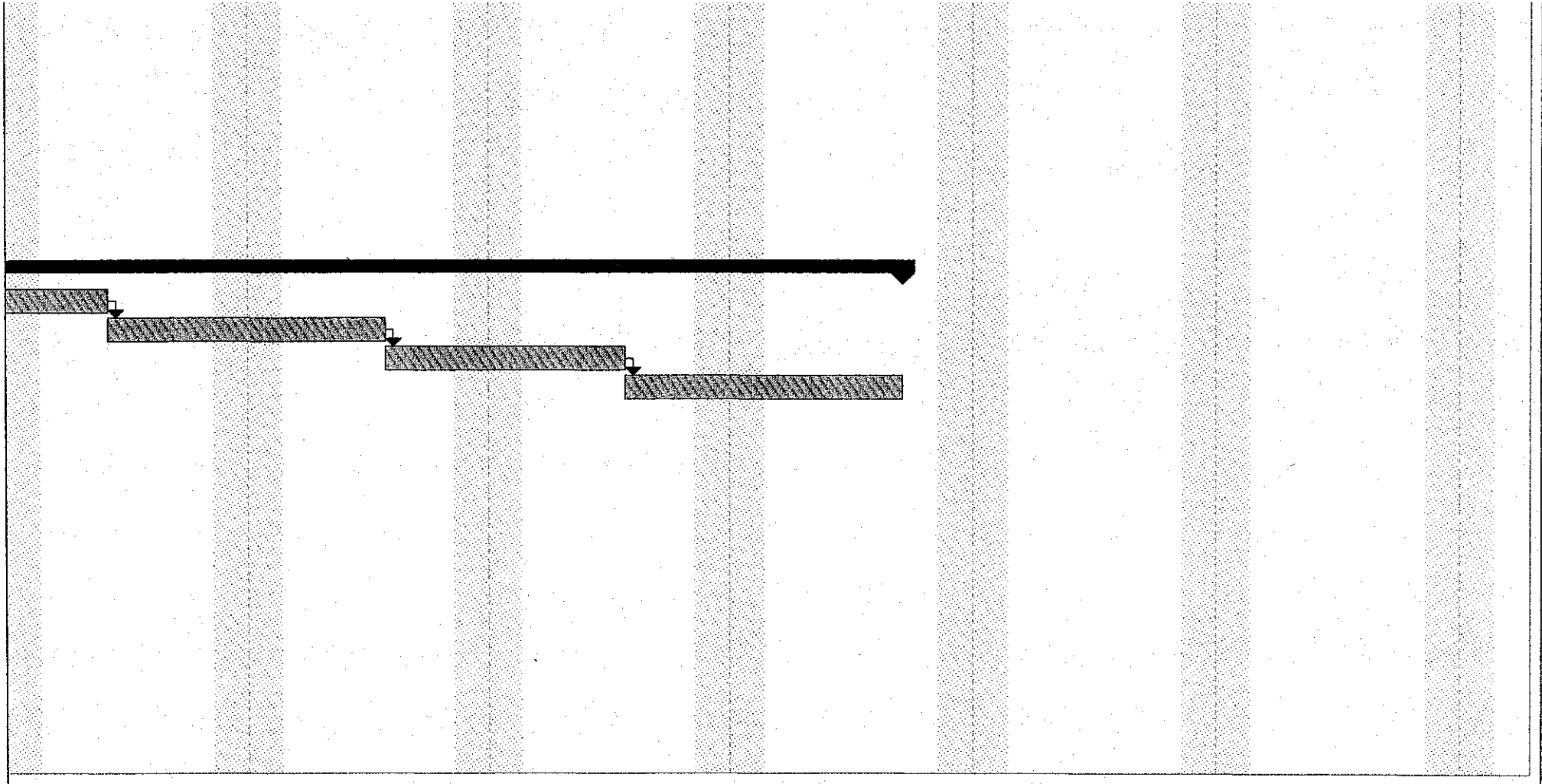
Project: ganchart_MIK2007
Date: Sun 4/29/07

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline



Project: ganchart_MIK2007
Date: Sun 4/29/07

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	



Project: ganchart_MIK2007
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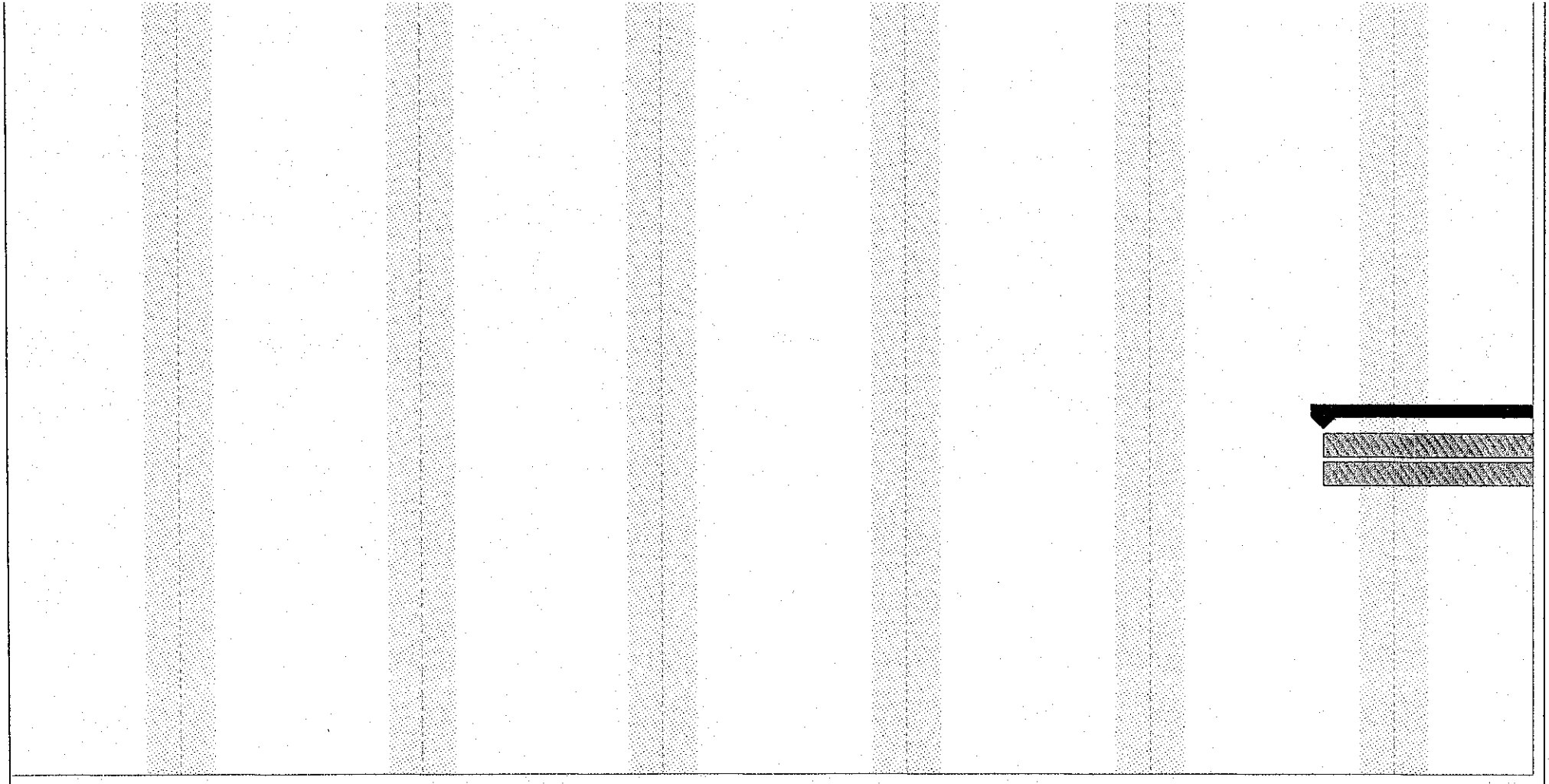
Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	



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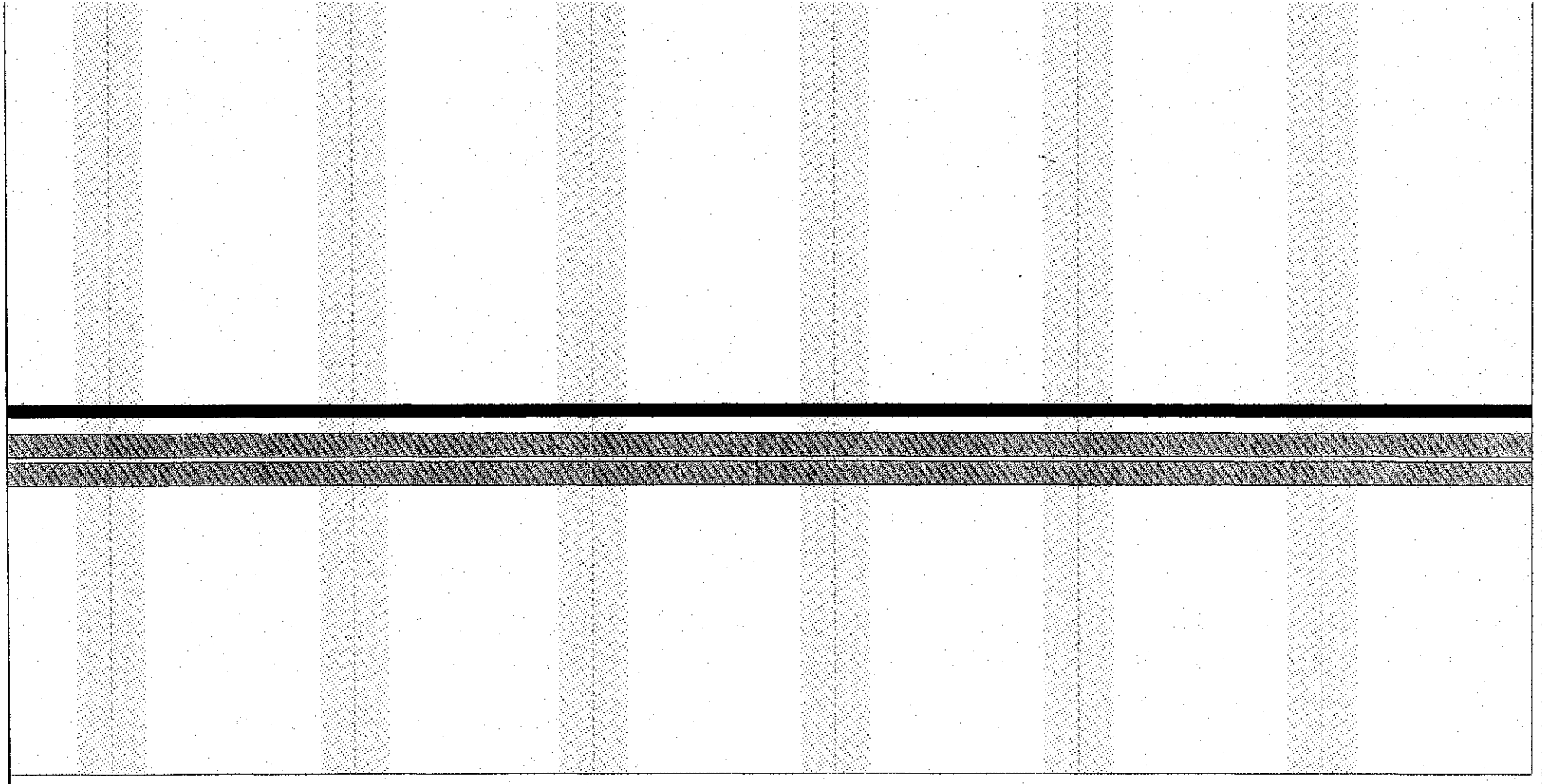
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	



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Task		Milestone		External Tasks	
Split		Summary		External Milestone	
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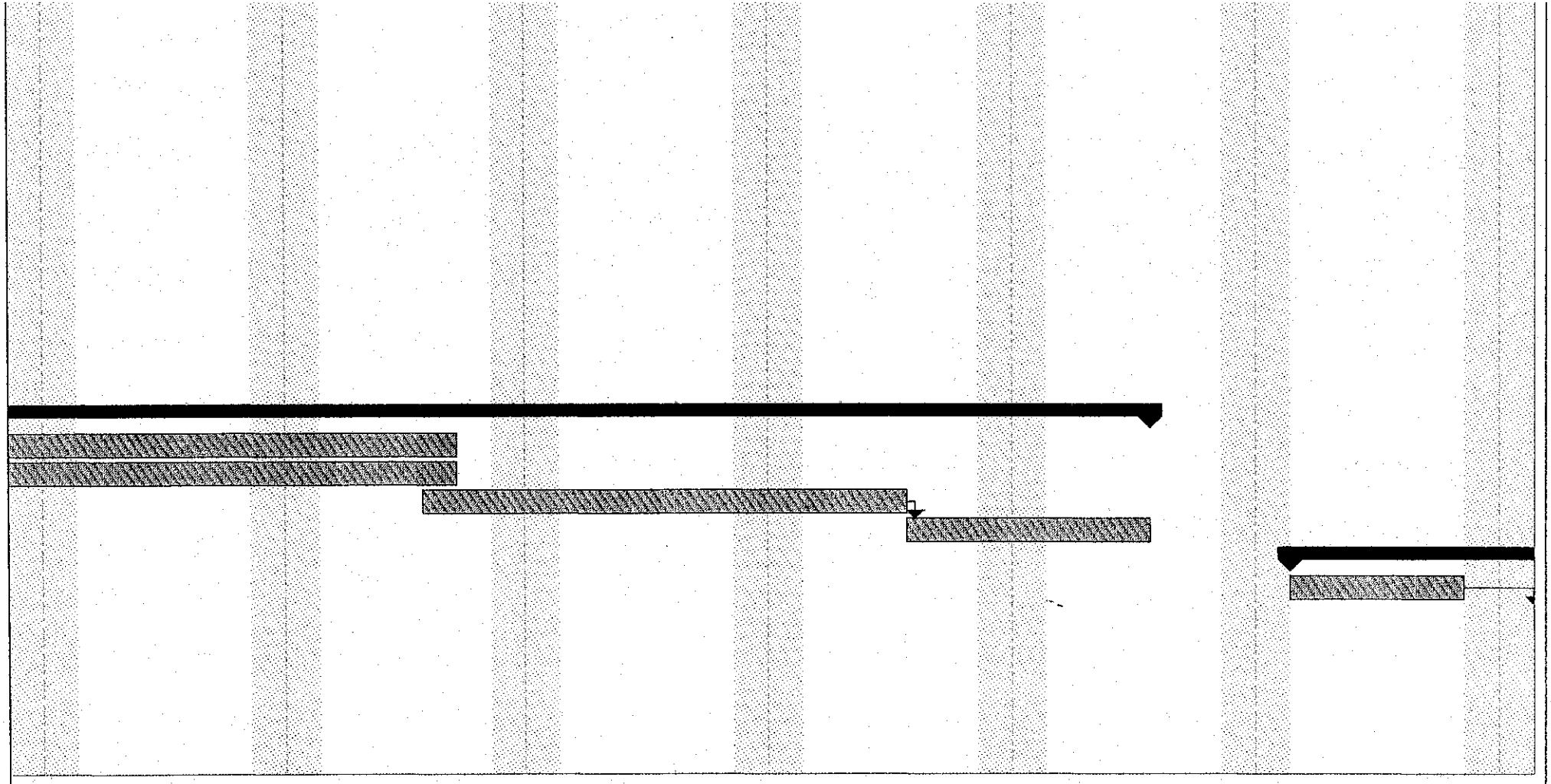

Project: ganchart_MIK2007
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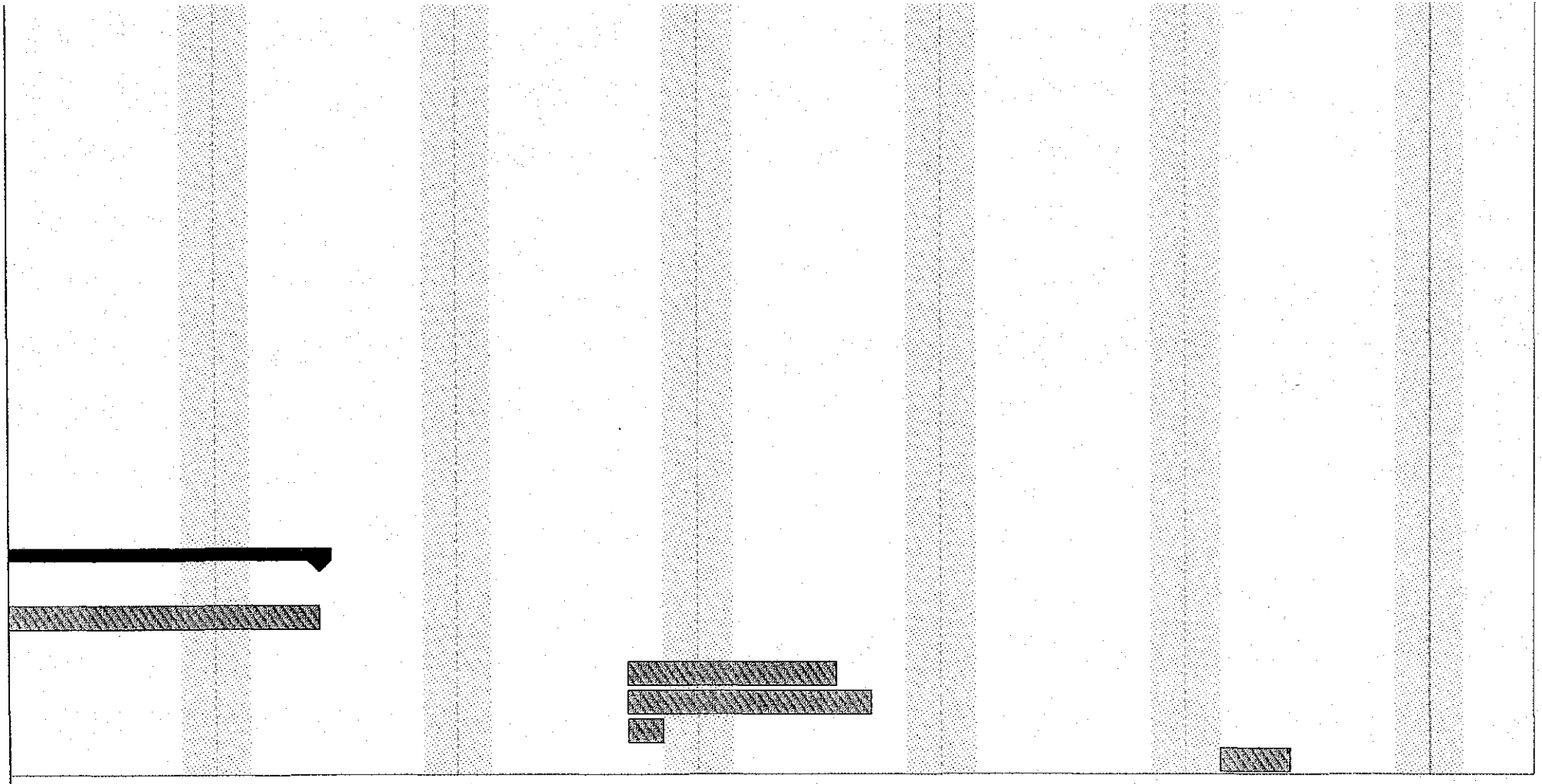
Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	



Project: ganchart_MIK2007
Date: Sun 4/29/07

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

Appendix 3 : Overall System Process Flow

Appendix 4 : Example Survey Form

Survey Form (FYP Part A)

The questions below are prepared in order to give opinion about the effectiveness of having Information Kiosk in mega mall / shopping center.

Figure 1: Example of Information Kiosk/Stand

Please mark '**X**' on each of your answer.

1. How many times in a year you went for shopping?

   ☐ Less than 10 times

   ☐ Between 10 to 15 times

   ☐ More than 15 times

2. Which one is your most preferred mall or shopping center around Ipoh?

   ☐ Green Town Mall

   ☐ Jaya Jusco Shopping Center

   ☐ Ipoh Parade

   ☐ Yik Foong Complex

   ☐ Other:_____ (please specify if have)

3. Are you aware with the existence of such Information Kiosk/Stand in any mall or shopping center that you visited?

Yes	No

4. How difficult for you to find any Information Kiosk/Stand provided in the mall or shopping complex?

☐ Very difficult

☐ Difficult

☐ Average

☐ Easy

☐ Very easy

5. How frequent did you use the Information Kiosk/Stand provided in the mall or shopping complex?

☐ Never

☐ Seldom

☐ Average

☐ Usually

☐ Always

6. When using the Information Kiosk/Stand, what type of information did you search for? (you may choose more than one)

- ☐ Location of shops
- ☐ Location of basic facilities (ATM machine, toilet, prayer room)
- ☐ Other:_____(Please specify if have)

7. Which type of handheld devices that you bring during your shopping (you may choose more than one)

- ☐ Mobile Phone
- ☐ Personal Digital Assistance (PDA)
- ☐ Pocket PC
- ☐ Smart Phone (PDA + Mobile Phone)
- ☐ Other:_____(Please specify if have)

8. How frequent did you use the Hotspot (to access Internet or browse email wirelessly) that are provided in (Mall, Restaurant, Office, or others)?

- ☐ Never
- ☐ Seldom
- ☐ Average
- ☐ Usually
- ☐ Always

9. What do you think if the mall provides you with a Wireless Mobile Information Kiosk system where you can find the location of any shops in the mall and immediately views the result in a graphical map by just using your handheld device?

- ☐ Very Good
- ☐ Good
- ☐ Okay
- ☐ Poor
- ☐ Very Poor

10. What do you think if the Internet service provider (TM NET) charged you with some amount of money for accessing the Mobile Information Kiosk provided by the mall?

- ☐ Very Good
- ☐ Good
- ☐ Okay
- ☐ Poor
- ☐ Very Poor

11. If you have any comment or suggestion regarding Mobile Information Kiosk system, please do state in the field below

Kindly, please return this survey form to ***vadder85*** and make sure you rename the file first. Tq very much for your participation!!!