CERTIFICATION OF APPROVAL

Applying GIS Concept In Creating Info Kiosk : Medical Centre

By

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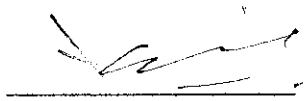
Approved by,



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CERTIFICATION OF ORIGINALITY

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

(Maya Shahida Abd Halim)

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ABSTRACT

This project dissertation report was entitled Applying GIS Concept in Creating Info Kiosk: Medical Centre. The system should be implemented as a server side client method. It consists of graphical representation of informative and knowledge about medical center allocated around Malacca that covered almost major area around the state. The system concludes some of the basic point or base station for mobile interaction among wireless connection through out three different coverage areas. They're also some useful query for finding the best route and few other queries in term of medical information and allocation of places regard to map that was illustrated. This system will help people to make their life become easier in doing their routine job. The system helps people by using devices to guide them to find the way to the location or destination that they want to go. It will be control by the central system that remotely to the map database server and required the combination of various kind of technology like the integrated wireless LAN system, geographical information system (GIS), and satellite positioning technology. The system will respond to instructions verbally so that the people can be easily finding his/her way to the hospital. It keeps track of the user location while giving directions to a destination and may even warn the user against veering off a sidewalk or stepping into a road.

CHAPTER 1
INTRODUCTION

1.0 BACKGROUND OF STUDY

Applying GIS Concept in creating info kiosk: medical centre is a web based system that help people easier to find the nearest hospital when they have health problem or an emergency. These systems required the combination of various kinds of system technology like the integrated wireless LAN system, geographical information system (GIS) and Telemedicine. This system assist people by allowing a central system to guide the user to find the nearest hospital or medical centre by provide them with latest information on verbal instruction. These systems help people to find the best, shortest and safer routes to go to the nearest hospital or medical centre.

These systems control by the central system that remotely to the map database server. The system responds to instructions verbally so that the people can be easily finding his/her way to the hospital. It keeps track of the user location while giving directions to a destination and may even warn the user against veering off a sidewalk or stepping into a road and so on. These systems also provide the detail instruction that able to guide the people on every step they make from their starting point to their destination (Hospital). These system able to detect the location beside find all the information about the routes that are using by the people to find the nearest hospital or medical centre.

In these systems the GIS act as the intelligent map which contain entities and attributes that provide the central system with latest information like finding the nearest location and the types of public transports, finding geographical location for the hospital or medical centre, analyzed the routes whether it safe or not for the user to use it, finding the

current traffic condition and measure the distance from the stand point to the hospital locations. The wireless LAN system had been integrated with the GIS and act as a platform for the people to communicate with the central system in their way to find the hospital or medical centre.

1.1 OBJECTIVE AND SCOPE OF STUDY

The objective of Applying GIS Concept in creating info kiosk: Medical Centre :

i. to help and guide people to the nearest hospital or medical centre when they having health problem or emergency.

ii. to provides people with information including specify types and location of nearest public transport, analyze geographical for location, observe the traffic condition and analyze the distance of the hospital or medical centre from the stand point ,those people will get the latest information by using the system and can easily response through the wireless verbal instruction from the central systems.

iii. to expose the targeted people with knowledge and latest technology toward the better lifestyle so that they will not left far behind from the normal person.

Scope of Study

- **Project Risks**

  Determination and ensured that the "Applying GIS Concept In Creating Info Kiosk: Medical Centre System" for Telemedicine has a commercial and market value by researching the telemedicine industry and the medical based organizations who are intending to increase their efficiency in providing better customer services. There are several project risks become conscious as follows.

  i. ***The similarity of the system function that will be done by other software developer.***

  There are a lot of system developers and programmers works in this country. Usually there are a few systems that offering the same function for the

customers/users. The differentiation of the system is maybe on how the system providers promote the system and the special features that offered by the system. To manage this risk, an efficient marketing strategy and targeted customers/user must be list out to ensure the commercialization of the system done successfully. Other than that, by using of the latest technology to build the system also can help to bring the system to the market place.

ii. Coding plagiarism

Plagiarism is the act of appropriating the literary composition of another, or parts, or passages of his or her writing of ideas, or the language of the same, and passing them off as the product of one's own mind. In this case, the program coding plagiarism is a risk that must be faced by the programmer when the system was hacked by the hackers. For this kind of risk, a complicated and hard security development must be applied to the system so the risk of the system to be hacked will decrease.

iii. System hacked

The risk of the system will be hacked by the hackers is depends on the security that offered by the systems. Once the system has been hacked, all the databases, system functionality and system coding will be spread out among the system developers. The risk management on coding plagiarism also applied to this system hacked risk.

1.1.1 Deliverables

Deliverables	Description
1. Admin module	An organized and computerized module to keep track of the records that is very essential to the staff. This module allows staff's to analyze and keep track of the entire medical centre that is situated around the specific area. Staff also can record new existing medical centre in the databases easily, and view the existing record. This module also allows the staff's to use the spatial data or attribute data that is available. The staff does not need to waste time to duplicate the job.
2. User module	User here is all people because the system is develop to help find the nearest medical centre by using wireless communication such as hand phone. Users just have to call the operator, give the exact location at the moment and wait for reply from the operator.

Table 1 : Deliverable

1.2 PROBLEM STATEMENT

- Hard to find the way to medical centre during emergency.
- Information was limited to spreadsheets.
- Geography matters.

1.3 SOLUTION

The system describing the important of mapping and allocating the suitable location for person to know and to get to their destination fast and easy. From the problem statement before we should know now, why and how important for us to build such kind of system to provide helps mostly targeted to all level of people scoping around Malacca area only. Thus, it would guide them to the location of medical center that situated around Malacca area by using mobile preference and operator services.

1.4 SOLUTION TO PROBLEM STATEMENT

1.4.1 Direct And Locate People

The system consists of web-based GIS application services where it would provide better and easy to use map allocating site for only medical center situated inside Malacca area. The attribute such as direction and location of each places are allocated using Geographical Information System (GIS) with the help of software such as ArcView to manipulate the existing physical map into digital scanned map. The use of GIS is not new to the world and also been use by several state government inside Malaysia. So, by purposing the good allocating location of medical center, it would make it easy for the user to go to the destination places just only by referring to mobile connection integrated with Web-based GIS application. Nevertheless, the system provides online direction driven that notifies user status of predefined travel route. This service could be a helpful system to traveler or user that needs to know in advance of committing to particular route.

1.4.2 Assumption Of Direction And Condition to Locate Medical Centre

Most of the medical centers are situated in specific location and as we know it is hard for disabilities people to allocate this kind of places using non-mobile application. So, the alternative way is to use mobile device to connect them to service operator via wireless LAN. From the system it would help to display the possible assumption in term of the nearest health care center to the allocated request user. In spite of that, the system could display the possible distance between the nearest medical centers to request user. It should also provide some suggestion on how the user could get to their requested destination via any particular public transport such as bus and taxi or with their own transportation.

1.5 SIGNIFICANCE OF THE PROJECT

Web-based application system is indeed an asset for a vast developing era of ICT, whereas the desire of managing information transactions by means of computerized system over the network is gliding.

GIS is computer software that links geographic information (where things are) with descriptive information (what things are). Unlike a flat paper map, where "what you see is what you get," a GIS can present many layers of different information. To use a paper map, all people do is unfolding it. The cities are represented by little dots or circles, the roads by black lines, the mountain peaks by tiny triangles, and the lakes by small blue areas similar to the real lakes.[J3]

A digital map is not much more difficult to use than a paper map. As on the paper map, there are dots or points that represent features on the map such as cities, lines that represent features such as roads, and small areas that represent features such as lakes.

All this information where the point is located, how long the road is, and even how many square miles a lake occupies—is stored as layers in digital format as a pattern of ones and zeros in a computer.[J3]

Think of this geographic data as layers of information underneath the computer screen. Each layer represents a particular theme or feature of the map. One theme could be made up of all the roads in an area. Another theme could represent all the lakes in the same area. Yet another could represent all the cities.

These themes can be laid on top of one another, creating a stack of information about the same geographic area. Each layer can be turned off and on, as if the user were peeling a layer off the stack or placing it back on. The user can control the amount of information about an area that they want to see, at any time, on any specific map.

1.6 PROJECT SCOPE

The system purposely develops to enhance the finding of location among users revolution from traditional allocation to digitize and web-base solution. From the finding and discussion, the system should be narrowed down to some specific scope and boundary. Some of the suggestions to this particular matter are:

- Provide services to any mobile connection
- Provide easy and understandable digital map using GIS application
- Provide simple allocation of medical center situated around Malacca area
- Provide detail and additional function such as map printing as it build using web-based methodology

From all above suggestion, here is an explanation one of the core function of the system that providing services from mobile connection. Thus, it could hopefully be some sort of assistant to the target user such the disabilities person to use the concept of GIS to help

them allocate nearest medical center with the most easy and precise way through the used of mobile/ WLAN connection within the stipulated areas.

CHAPTER 2
ANALYSIS AND RESEARCH

2.0 GEOGRAPHY MATTERS

A transformation is taking place. Businesses and government, schools and hospitals, nonprofit organizations, and others are taking advantage of it. All around the world, people are working more efficiently because of it. Information that was limited to spreadsheets and databases is being unleashed in a new, exciting way all-using geography.

This is not the elementary school's geography. This is using geography, or location of information, to gain new insights and make better, more informed decisions. Linking location to information is a process that applies to many aspects of decision-making in business and the community. Choosing a site, targeting a market segment, planning a distribution network, zoning a neighborhood, allocating resources, and responding to emergencies all these problems involve questions of geography. For anyone trying to evaluate information, the best way to view it is on a map. Not just any map intelligent digital maps made possible by geographic information system (GIS) technology. Everyone, including people who have never used maps to analyze data, is finding that maps make processing information much easier and
more effective.[J5]

2.1 GEOGRAPHIC INFORMATION SYSTEMS AND ITS HISTORY

A GIS-Geographic Information System is an information technology which collects, stores, analyses, retrieves at will, transforms and displays spatial data from the real world for a particular set of purposes. It is actually a technology and is not necessarily limited to the confines of a single, well-defined software system. It is a special case of information system where the database consists of observation on spatially distributed features, activities of events. Data inputs into GIS that available are paper maps, remote sensing images, ground survey and such data are very costly. Use of GIS provides sufficient capability to analyze data and provide better and easier interpretation to understand flood phenomena and characteristics. [S6]

Geographic Information Systems or known as GIS are computer application for mapping/geospatial and analyze something that exists around us. GIS technology combine normal database operation such as 'query' and statistical analysis with some unique images such as maps. With this technology, planning and forecasting of development will be representing in simulation/geospatial. GIS is capable in map creation, data/information manipulation, latest scenario viewing, complex problem solving and other effective useful solutions, that cannot be done with other tools.

A GIS references real-world spatial data elements also known as graphic or features data elements to coordinates system. Examples of spatial data features are latitude, longitude, and state plane, which refer to particular plane on earth. These features can be separated into different layers like maps themes or coverage. Descriptive attributes in tabular form are associated with spatial features. These attributes information is placed in a database separate from the graphics but is link to them. Spatial data and descriptive attributes in the same coordinate system can be layered together for mapping and analysis. GIS lets user to search attribute data and relate it to spatial data. Therefore, GIS can combine geographic and other types of

data to generate maps and report, enabling users to collect, manage, and interpret location based information in a systematic way.

In a constricted sense, a GIS consists of a system for data input in vector form, in raster form and in alphanumeric form, a CPU containing the programs for data processing, data storage and data analysis and of facilities for visualization and hard copy output of the data. The manipulation of data, which are managed by administration, is for purposes of data inventory, data analysis and the presentation for administrative support or for decision support. Next figure gives more clear view about GIS concept.

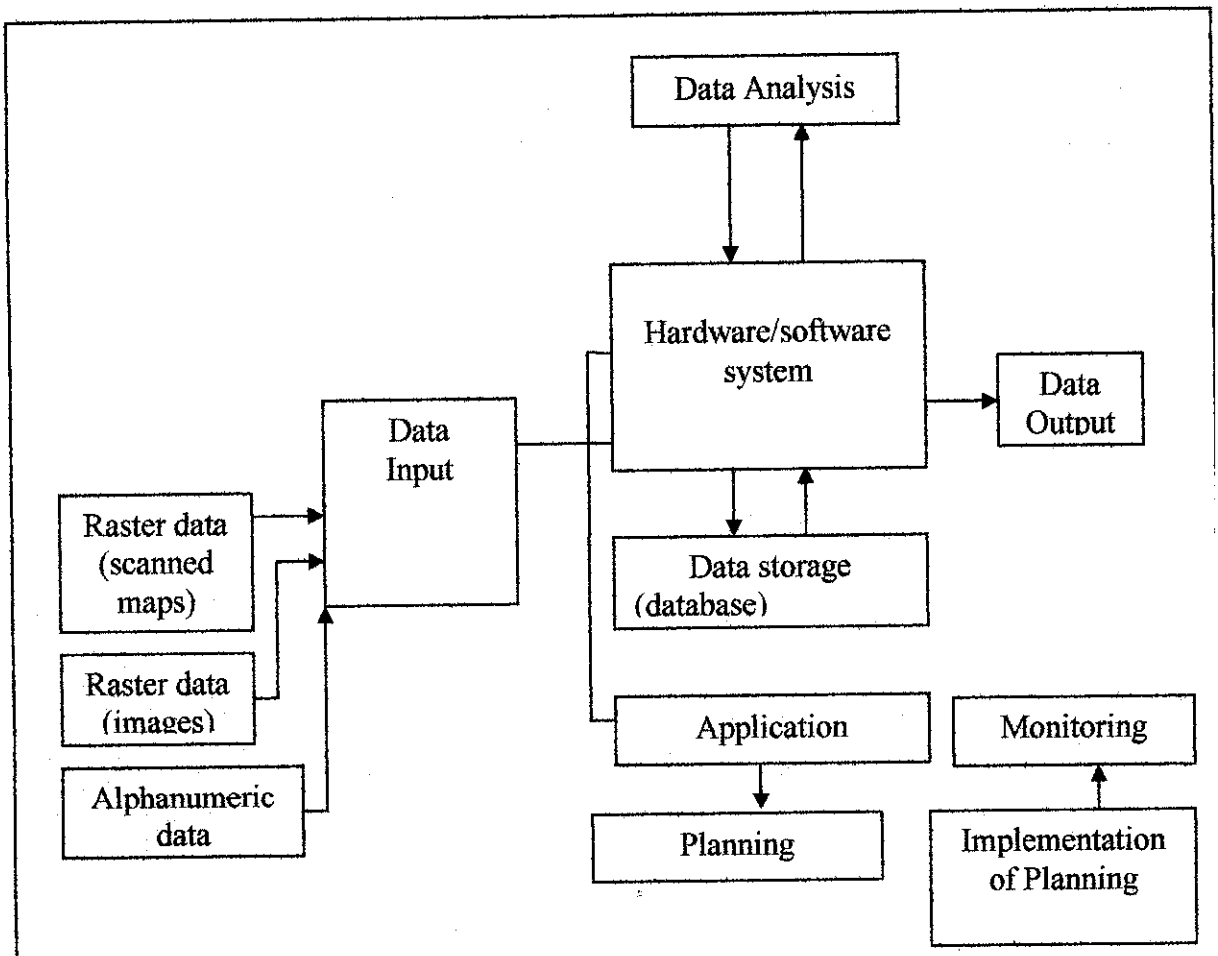


Figure 1 : Concept of GIS

(source : Michael N. Demers. Fundamentals of Geographic Information System, Second Edition, John Wiley & Sons, Inc, 2000)

2.1.1 GIS Data Elements

Single geospatial data can be described as Figure 2 below:

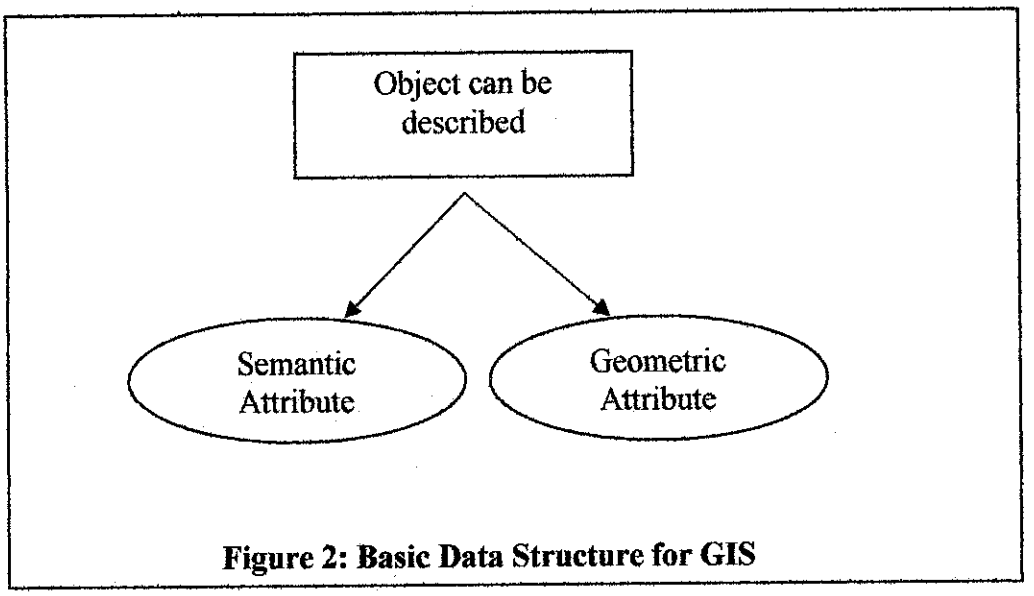


Figure 2: Basic Data Structure for GIS

Data element Geographic data can be classified into 2 main Classes there are spatial data and attribute data. The two most popular types of spatial data are raster and vector. Raster references spatial data according to a grid of cells or pixels, whereas vector data references spatial data to a series of coordinates. Raster data consist of different numerical value assigned to individual pixels. Raster data are more suitable for representing features without discrete boundaries such as forest cover type and precipitation. Vector data, on the other hand, consist of points, lines, or polygons(areas). These features are recorded in series of coordinates. Denoting a point requires assigning one coordinate pairs. Vector data are more suitable for features that have discrete boundaries such as roads and houses.

Attributes data are descriptions, measurements and/or classifications of the geographic features. Attribute data can be classified into 4 levels of measurement; nominal, ordinal, interval and ratio. The nominal level is the lowest level of measurement in which the data can only be distinguished qualitatively, such as

vegetation type or soil type. Data at the ordinal level can be ranked into 4 hierarchies, but such differentiation does not show any magnitude of difference. Example of this ordinal data includes stream order and city hierarchies. The interval level of measurement indicates the distance between the ranks of measured elements, but a starting point is arbitrarily assigned. The best example of interval measurement is Celsius temperature, in which 0 degrees Celsius are an arbitrarily value, and 20 degrees Celsius is not twice as hot as 10 degree Celsius. A ratio measurement, the highest level of measurements, includes an absolute starting point. Data of this category include property values and distances.[S1]

Time can also be considered as a data element, since geographic information often changes over time. For instance, a river course may wander over time, or river dimensions may undergo sudden changes due to floods, living pattern of a certain kind of wildlife may change, and land use may change due to agricultural to industrial use.

2.1.2 GIS Subsystem

Mainly there are 4 subsystems of GIS. Next figure explains on the connection of the subsystem and its functions.

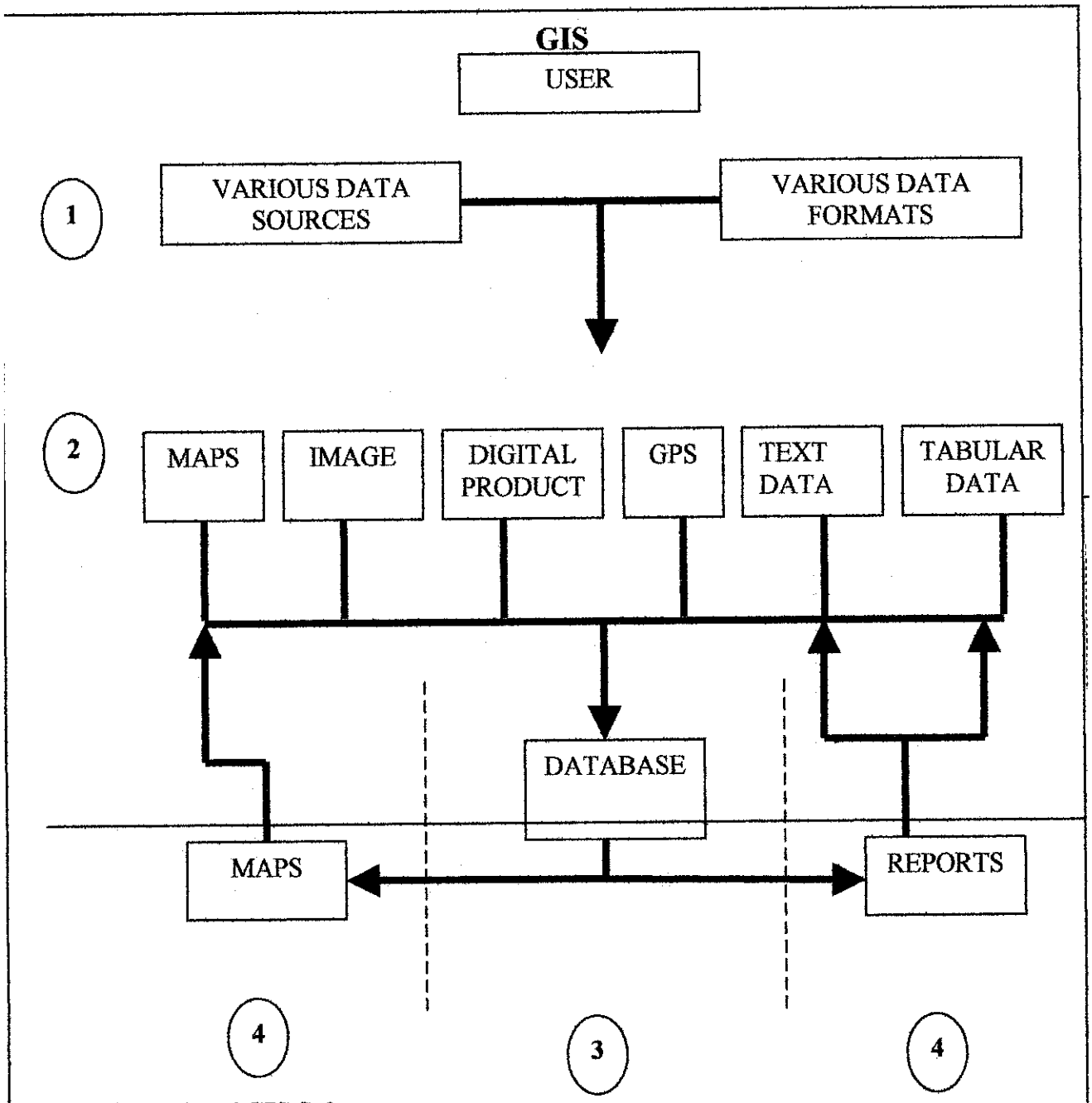


Figure 3: Model of GIS Subsystem

(source: Michael N. Demers. Fundamentals of Geographic Information System.

1. Data acquisition
- Define entry and preliminary processing data
- Digitizer, scanner, survey equipment, etc.

2. Data Management
- Control existence, update, recall and deletion of data
- Database management system

3. Analysis of data
- Generation of information from data achieves
- Spatial data analysis
- Value of GIS depends on the analytical functions it provides

4. Information Output
- Generated information conveyed to the user
- Information managed by computers can be plotted, printed or exported into other systems.

2.1.3 Collection Of Geographic Data

There are a few different approaches in obtaining and inserting data around GIS environmental. One of the common ways to collect spatial geographic data is to perform a physical survey. This includes land, under water, and underground features of the earth.

The approaches such as:

- Aerial photography

Aerial photography/remote sensing is where aerial photographs taken from aircraft. Then these data are measured and interpreted. It is analogous to remote sensing where the data interpreted for physical features and attributes.[1]

- Censuses

Censuses is a method conducted by the U.S Census Bureau to gather a variety of demographic data such as population, age, sex, ratio, race composition and employment rates.[1]

- Statistics

Statistics is where mathematical methods are involved to collect and analyze data. The technique such as collection and study of data at different time intervals and at a fixed location and these include information for yearbooks. Examples are weather stations, water reports, etc. This information usually related to spatial data and thus incorporated into a GIS.[1]

- Tracking

In tracking is a process whereby collecting attribute data on changes that occur at the location over time period. Example is monitoring the change of an ecosystem and real-time monitoring like moving objects such as vehicles. [1]

2.1.4 GIS Components

Five key components of GIS:

- ***Hardware:*** Hardware is the computer on which a GIS operates. There are consisting of computers, computer configuration/network, input devices, printers and storage system. It also can be stand-alone or network configuration.

- ***Software:*** GIS-related software includes GIS program and special application packaged, such as digital terrain modeling and network analysis. The main difference between GIS software programs and desktop mapping programs is the ability of GIS programs to perform spatial analysis. Key software

components are tools for input and manipulation of geographic information, database management system (DBMS) to support geographic query, analysis and visualization and graphic user interface (GUI) for easy access to tools.

- ***Human Resources:*** Used to operate GIS include operational staffs, technical professional staffs and management personnel.

- ***Data:*** Most common component of GIS is the data. Geographic data and related tabular data can be collected in-house or purchased from a commercial data provider. A GIS will integrate spatial data with other resources and even a DBMS, used by most organizations to organize and maintain their data to manage spatial data.

- ***Methods:*** A successful GIS operates according to a well-designed plan and business rules, which are the models and operating practices unique to each organization.

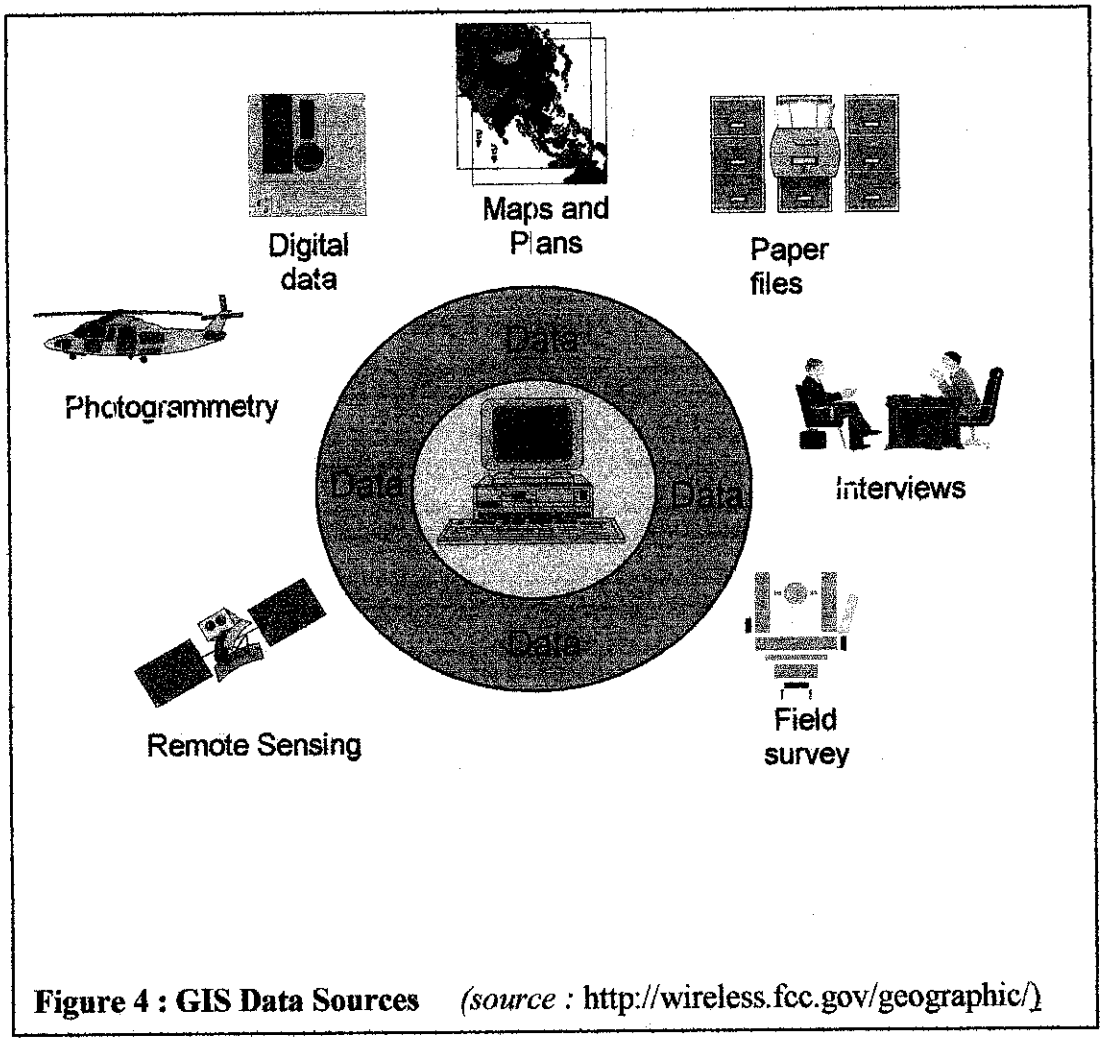


Figure 4 : GIS Data Sources *(source :* http://wireless.fcc.gov/geographic/)

2.1.5 GIS Application

Generalized and specialized GIS systems have been designed for a variety of purposes as below :

- For environmental management and conversation
- For defense and intelligence purposes
- For governmental administration
- For resource management in agriculture and forestry
- For geophysical exploration
- For cadastral management
- For telecommunications

- For utility management
- For business application
- For construction projects

2.1.6 GIS Benefits

By using GIS, there is an advantage in several ways such improves and enhances the effect and studies of physical and environmental growth. It also helps in management of resources and adds new values to services, such as:

- Perform analysis on spatial and non spatial components
- Fast recall of data
- Ability for complex analysis
- Recalling of non spatial data through object location
- Display of information in a different light/view
- Multiple scenarios in planning can be performed easily.

2.1.7 The Future Of GIS

Many disciplines can benefit from GIS technique. An active GIS market has resulted in lower costs and continual improvements in the hardware and software components of GIS. These developments will, in turn, result in a much wider application of the technology throughout government, business and industry. [S2]

Maps have traditionally been used to explore the Earth and to exploit its resources. GIS technology, as an expansion of cartographic science, has enhanced the efficiency and analytic power of traditional mapping. Now, as the scientist community recognizes the environmental consequences of human activity, GIS technology is becoming as essential tool in the effort to understand the process of global change. Various map and satellite information sources can be combined in modes that simulate the interactions of complex natural systems. [S2]

Through a function known as visualization, a GIS can be used to produce images, not just maps, but drawings, animations, and other cartographic products. These images allow researches to vies their subjects in way that literally never been seen before. The images often are equally helpful and conveying the technical concepts of GIS study subjects to non-scientist.

The condition of the Earth's surface, atmosphere, and the subsurface can be examined by feeding satellite data into a GIS. GIS technology gives researches the ability to examine the variations in Earth processes over days, months, and years. For example, the changes in vegetation vigor through the growing season can be animated to determine when drought was most extensive in a particular region. The resulting graphic, known as a normalized vegetation index, represents a rough measure of plant health. Working with two variables over time will allow researchers to detect regional differences in the lag between a decline in rainfall and its effect on vegetation.

Based on the analyses had been made, possible both by GIS technology and by the availability of digital data on regional and global scales. The Advanced Very High Resolution Radiometer or AVHRR produces the satellite sensor output used to generate the vegetation graphic. This sensor system detects the amount of energy reflected from the Earth's surface across various bands of the spectrum for the surfaces areas of about 1 square kilometer. The satellite sensor produces images of a particular location on the Earth twice a day. AVHRR is only one of many sensor systems used for Earth surface analysis. More sensors will follow, generating ever greater amounts of data.[1]

GIS related technology will help greatly in the management and analysis of these large volumes of data, allowing for better understanding of terrestrial processes and better management of human activities to maintain world economic vitality and environmental quality.

2.1.8 The Malacca GIS

The Computerized Planning Information System was developed by the Malacca City of Council in 1994 and upgraded in 1996. This system is being maintained by the Town Planning Department with the assistance of the IT Management Division of Malacca City Council. The objective of this system is to convert all land-related information including building and planning information within the Council Administrative area, into a more efficient and integrated digital format, in line with the national objective of realizing an 'electronic government'. [S9]

A statewide network will provide the system with linkages to all other government department and agencies through which basic data will be shared across the network to facilitate efficient decision-making as well as for taxation and licensing purposes. The map for the entire health care unit in Malacca and map of Malacca town get it from Computerized Planning Information System which is being maintained by the Town Planning Department with the assistance of the IT Management Division of Malacca City Council. [S9]

CHAPTER 3
LITERATURE REVIEW

3.0 IMPAIRED PEOPLE

Visually impaired people do not constitute a homogeneous group. Varying degrees of central vision, peripheral vision, light perception and color perception occur. Many visual impairments have specific effects on the individual and cause a variety of limitations on activities (Machell, 1996).

Visual impairments are also unlikely to be stable, particularly for partially sighted people. Visual impairment is affected by print size, media, color ratios, lighting and by the nature and degree of the visual impairment. This means that a wide range of assistive aids are required and different visual impairments may require specific media. Access to and ease of use of a specific medium, for example Web pages, are often determined by document length, design and structure. For discussions concerning current enabling technology, see Carey (1997), Douglas & Lau (1997), Murnion (1996a; 1996b) and Vanderheiden & Chisholm (1998).

The most recent survey of blind and partially sighted adults in the UK was conducted in 1991 (Bruce, McKennell & Walker, 1991). This survey concluded that 1.1 million people were eligible to be registered as visually impaired, but that 1.7 million people found it difficult to read standard print. An earlier survey (Martin, Meltzer & Elliot, 1988) estimated that there were almost two million people in the UK with visual impairments. The number of people who actually experience problems due to visual impairments is generally accepted to be much greater than the official figures. Demographic analysis (Machell, 1996) suggests that the number of visually impaired people will continue to rise, as 66% of those registered

as blind or partially sighted are over 75 and this is the fastest growing section of the population.

Wendy (1996) suggests that there are between 10,000 - 20,000 blind and partially sighted adults in the UK who could access the Web. This number could rise dramatically when the Internet becomes accessible via the medium of digital television, as approximately 90% of blind and partially sighted people 'watch' television. Wendy states that 60% of blind and partially sighted people claim that television 'is one of their most important sources of information' (1996: 28).

Increasingly, equality legislation and standards are beginning to have an impact. The Disability Discrimination Act (1995) came into force in the UK in December 1996. The Act makes it mandatory for 'people and/or organizations providing goods, services and facilities to the public, whether paid for or free' to facilitate access by disabled people, including the blind and partially sighted, to these goods, services and facilities (Disability Policy Division, 1997: 48).

The Act is important as it provides a right of access to goods and services and prohibits discrimination (Wendy, 1996). The Act's code of conduct stipulates that from October 1999 information and service providers must provide an equal right of access to goods and services including access to, and use of, information and communications services such as the Web. This is to be achieved by providing auxiliary aids and services to make electronic Web-based information and services accessible to blind and partially sighted people in an accessible and useful form.

The United Nation's 'Standard Rules for the Equalisation of Opportunities for Disabled People,' adopted in 1993, is a further important statement on this issue. These advocate that members of the United Nations 'increase the opportunities for people with disabilities to enjoy active participation in society' (Wendy, 1996: 8). Rule 5(b) is of particular significance as it states that information should be accessible to people with

disabilities; appropriate technologies should be used to provide access to written information and documentation for visually impaired people; all electronic information and/or service systems available to the public should be made accessible from conception, or be subjected to the relevant adaptations to enable the information and/or service systems to be available to disabled people.

3.1 INTEGRATED DEVELOPMENT

Users should have access to Web-based resources through integrated, rather than isolated development, as this is the best method of exploiting the value of networked resources. This would be beneficial for all as text-only equivalent pages, for example, would help search engines index resources more effectively and allow all Web users to access the Web from the new generation of technology such as mobile phones and pocket computers. Integrated development is particularly necessary for assistive technology if it is to become more widely used. The inclusive nature of this development means that all sections of society might be engaged and plugged into the Information Society. Guidelines explaining how designers can make their Web pages more accessible to visually impaired users also need to be supported and actively promoted by government and industry. [J4]

3.2 INTELLIGENT GIS

Historically, humans have learned to express knowledge and share it through many abstract forms. Abstractions, such as text, hieroglyphics, language, mathematics, music and art, drawings, images, and maps, are used to record and communicate the culture and civilization from generation to generation.

Geography has traditionally provided an important framework and a language for organizing and communicating key concepts about our world. GIS provides a comparatively new mechanism for capturing geographic knowledge in five basic elements. There are maps and globes, geographic data sets, work flow models, data models, and metadata.

These five elements, along with comprehensive GIS software logic, form the building blocks for assembling intelligent geographic information systems. Intelligent GIS makes it possible to digitally encapsulate geographic knowledge. These elements provide a foundation for addressing many challenges using GIS (for example, improvements in efficiency, intelligent and informed decision making, science-based planning, resource accounting, evaluation, and communication). *(An ESRI® White Paper September 2002)*

CHAPTER 4

METHODOLOGY

4.0 PROCEDURE

4.0.1 Access Via Hand Phone

A location service, is one type of service or application that evolve the GIS capabilities, wireless LAN system and information processing to end user via hand phone. User can contact the operator to get all of the information regarding location of the hospital or medical centre, which provides geographical information related to the location. The operator will act as reference or as a medium for the blind people to get the information.

4.0.2 Process Flow

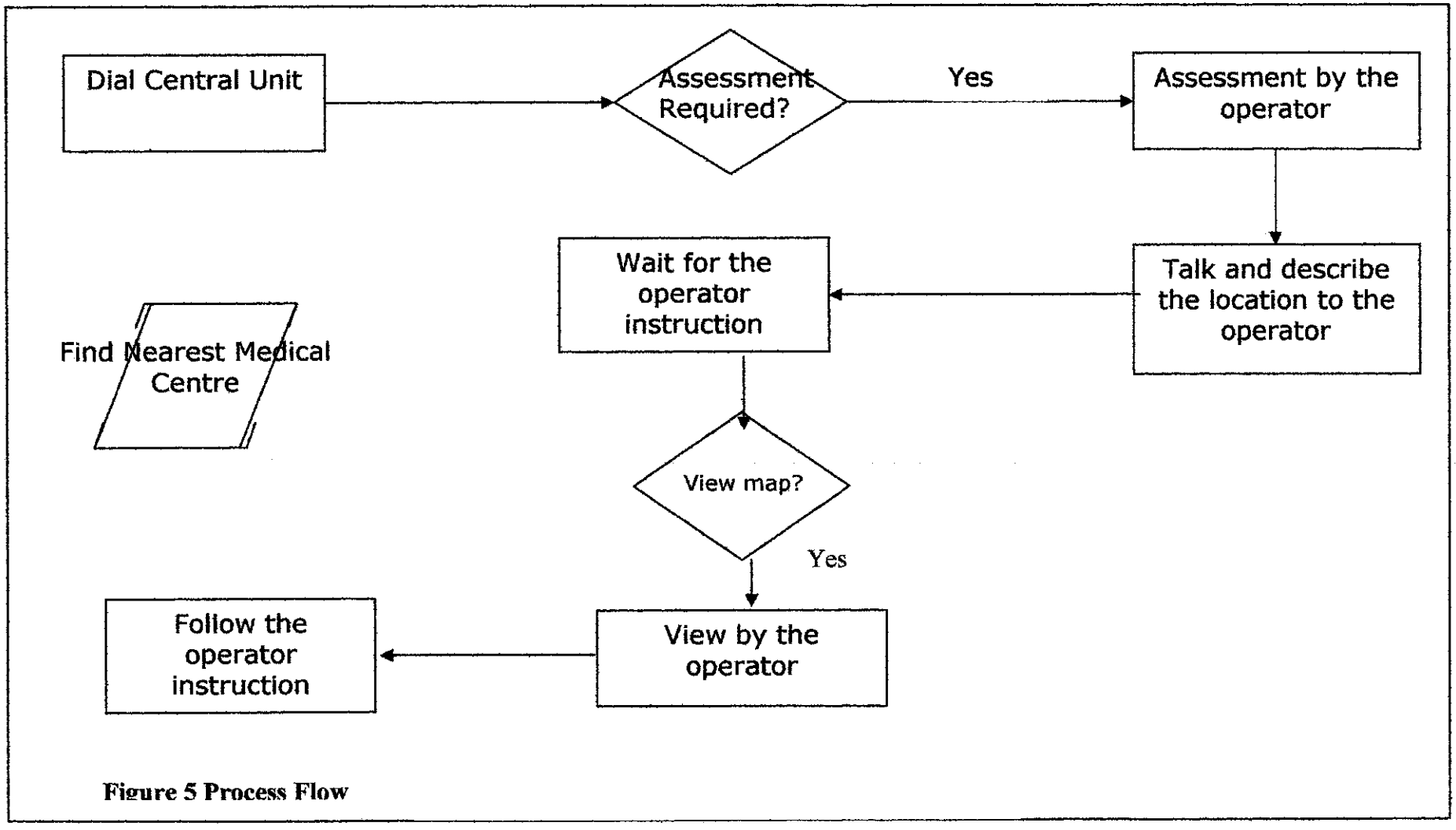


Figure 5 Process Flow

- ***Dial the Central Number***

Users can dial the central number to seek for help from the operator in finding the shortest and safer routes, finding the current traffic conditions and the nearest public transport to go to the hospital or medical centre.

- ***Talk and Describes to the Operator***

Users have to tell the operator his/her location so that the operator will find the exact location of the user and the nearest hospital or medical centre before the operator can provide them with the information to follow.

- ***Wait for the Operator Instruction***

The users have to wait for the operator to check the information given by the users with the system to recognize the exact location of the people and the nearest hospital or medical centre.

- ***Follow the Operator Instructions***

Users have to follow the instruction given by the operator to guide them to the nearest hospital or medical centre safely. All the instructions allow the users to know the latest information about the types or the nearest public transport location, geographical location for the hospital or medical centre, the shortest and safer routes to go to the hospital or medical centre, the current traffic condition and measure the distance from the stand point to the hospital locations.

4.1 WATERFALL MODEL

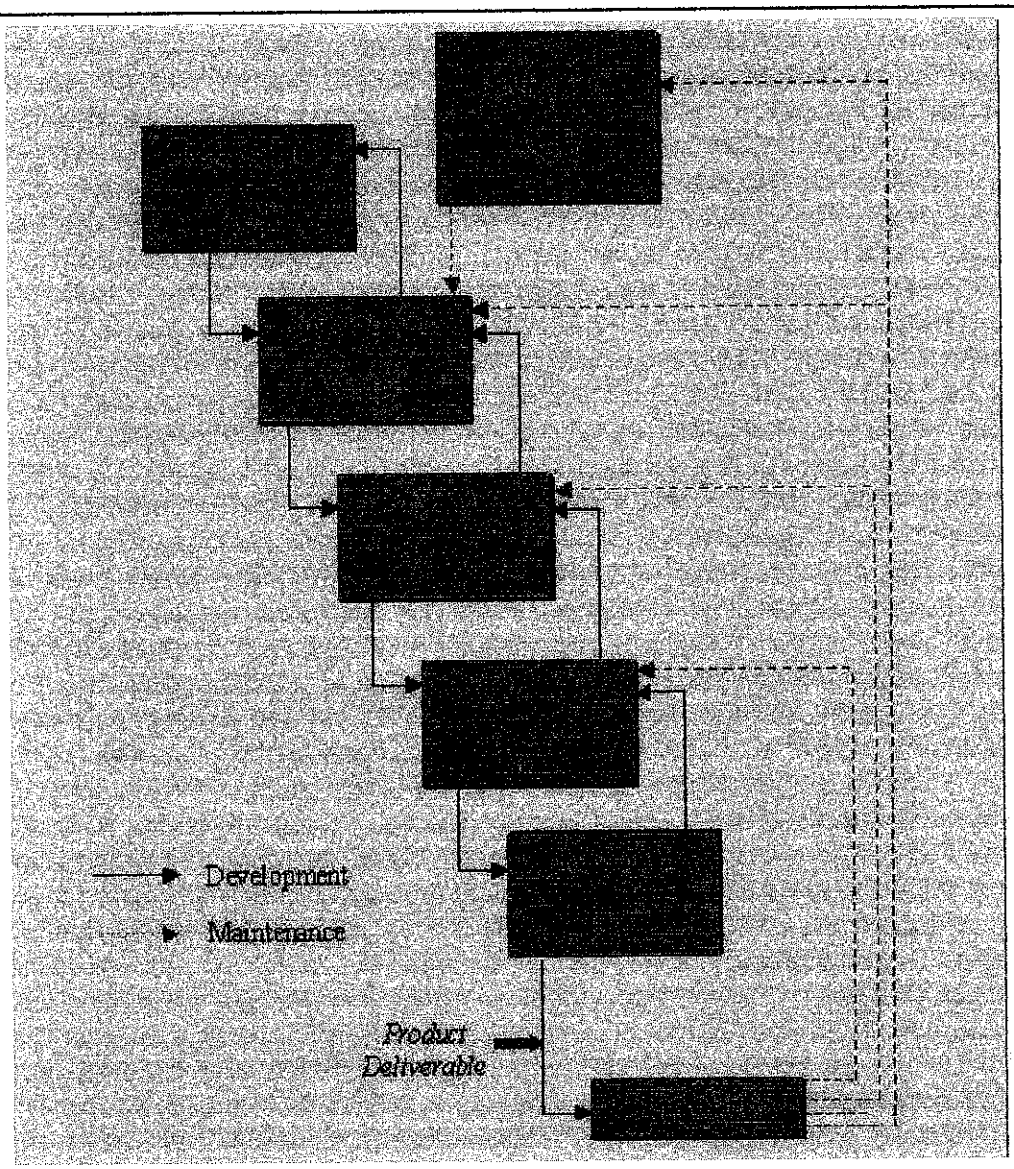


Figure 6 : Waterfall Model

(source : http://scitec.uwichill.edu.bb/cmp/online/waterfall_model.htm)

In order to get a clear picture of what the title about and looked a like, the author surfed through the Internet and find a few samples that are similar to the system. After that only started to design the layout. Overall, the system had been implemented through Waterfall Model method according to System Developments Life Cycle (SDLC).
The model consist of six distinct stages, namely:

1. Requirement analysis phase :
   (a) The problem is specified along with the desired service objectives as well as the goals that want to achieve.
   (b) The constraints are identified here.

2. In the specification phase the system specification is produced from the detailed definitions of above. This document should clearly define the product function.

3. In the system and software design phase, the system specifications are translated into a software representation. The consideration should take place are:
   - Data structure
   - Software architecture
   - Algorithmic detail and
   - Interface representations

   The hardware requirements are also determined at this stage along with a picture of the overall system architecture. By the end of this stage, identify the relationship between the hardware, software and the associated interfaces. Any faults in the specification should ideally not be passed 'down stream'.

4. In the implementation and testing phase stage the designs are translated into the software domain
   - Detailed documentation from the design phase can significantly reduce the coding effort.

- Testing at this stage focuses on making sure that any errors are identified and that the software meets its required specification.

5. In the integration and system-testing phase all the program units are integrated and tested to ensure that the complete system meets the software requirements. After this stage the software is delivered to the customer .

6. The maintenance phase the usually the longest stage of the software life cycle. In this phase the software is updated to:
   - Meet the changing customer needs
   - Adapted to accommodate changes in the external environment
   - Correct errors and oversights previously undetected in the testing phases
   - Enhancing the efficiency of the software

Observe that feed back loops allow for corrections to be incorporated into the model. For example a problem/update in the design phase requires a revisit to the specifications phase.

Advantages

- Testing is inherent to every phase of the waterfall model
- It is an enforced disciplined approach
- It is documentation driven whereby documentation is produced at every stage

Disadvantages

The waterfall model is the oldest and the most widely used paradigm. However, many projects rarely follow its sequential flow due to the inherent problems associated with its rigid format as mention below :

- It only incorporates iteration indirectly, thus changes may cause considerable confusion as the project progresses.
- As the client usually only has a fuzzy idea of exactly what is required from the software product, this model has difficulty accommodating the natural uncertainty that exists at the beginning of the project.
- The customer only sees a working version of the product after it has been coded. This may result in disaster if any undetected problems are precipitated to this stage.

(source : http://scitec.uwichill.edu.bb/cmp/online/cs22l/waterfall_model.htm)

4.2 SYSTEM ARCHITECTURE

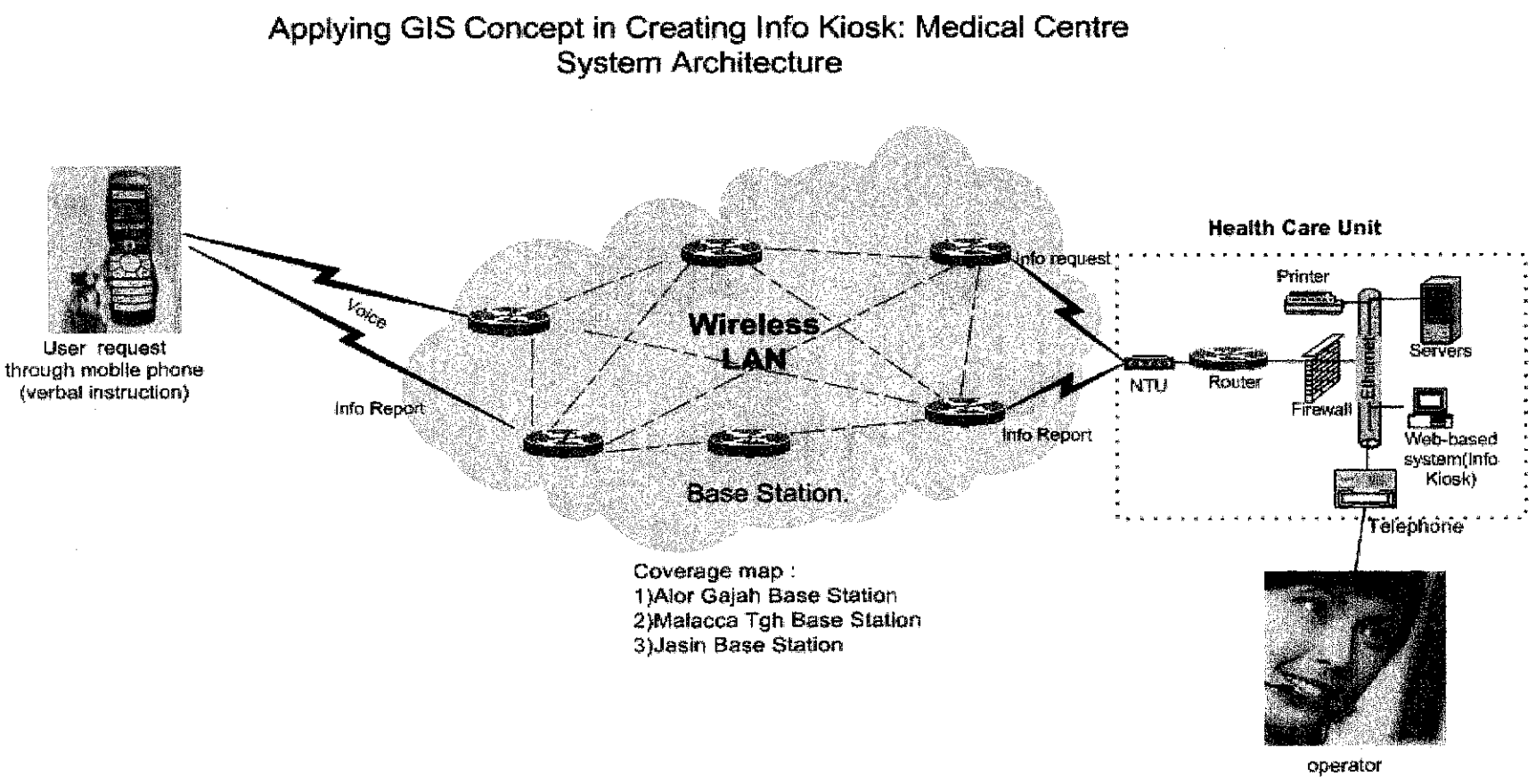


Figure 7 :System Architecture

4.3 PROCESS MODELING

4.3.1 Context Diagram

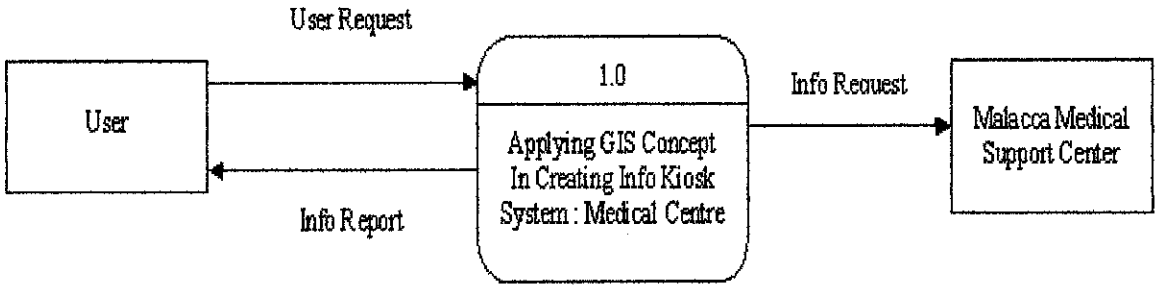


Figure 8: Context Diagram

For the web-based GIS is focusing only in Malacca by list down all possible government hospital, government clinics, private hospitals and private clinics all around Malacca for the three base station coverage map for the time being. For this, the existing exchange for Maxis, Celcom and Digi will be use. When the person contacted the operator, the signal will first go through this exchange before reach the health care unit. Then the blind person will receive the information that he/she wants by voice.

There will have the client (patient) and server (operator of the health care unit) side. The website that have been developed will be used by the health care unit. So that, when the blind person tell the operator in charge where the exact location he/she is at, the operator will give the direction to the blind person where the nearest hospital or clinic that he/she can go.

4.3.2 Data Flow Diagram (DFD) Level 0

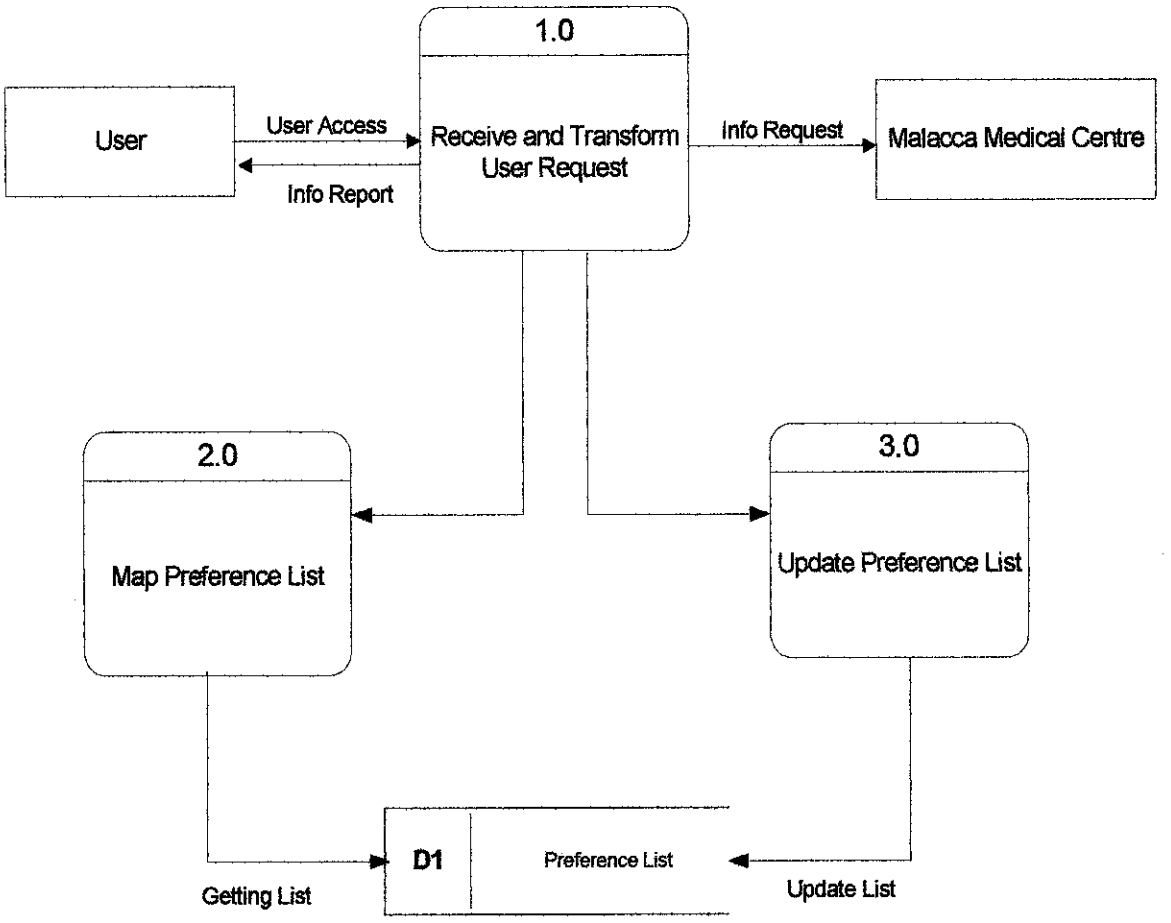


Figure 9: Data Flow Diagram (DFD) Level 0

4.3.3 Entity Relationship Diagram (ERD)

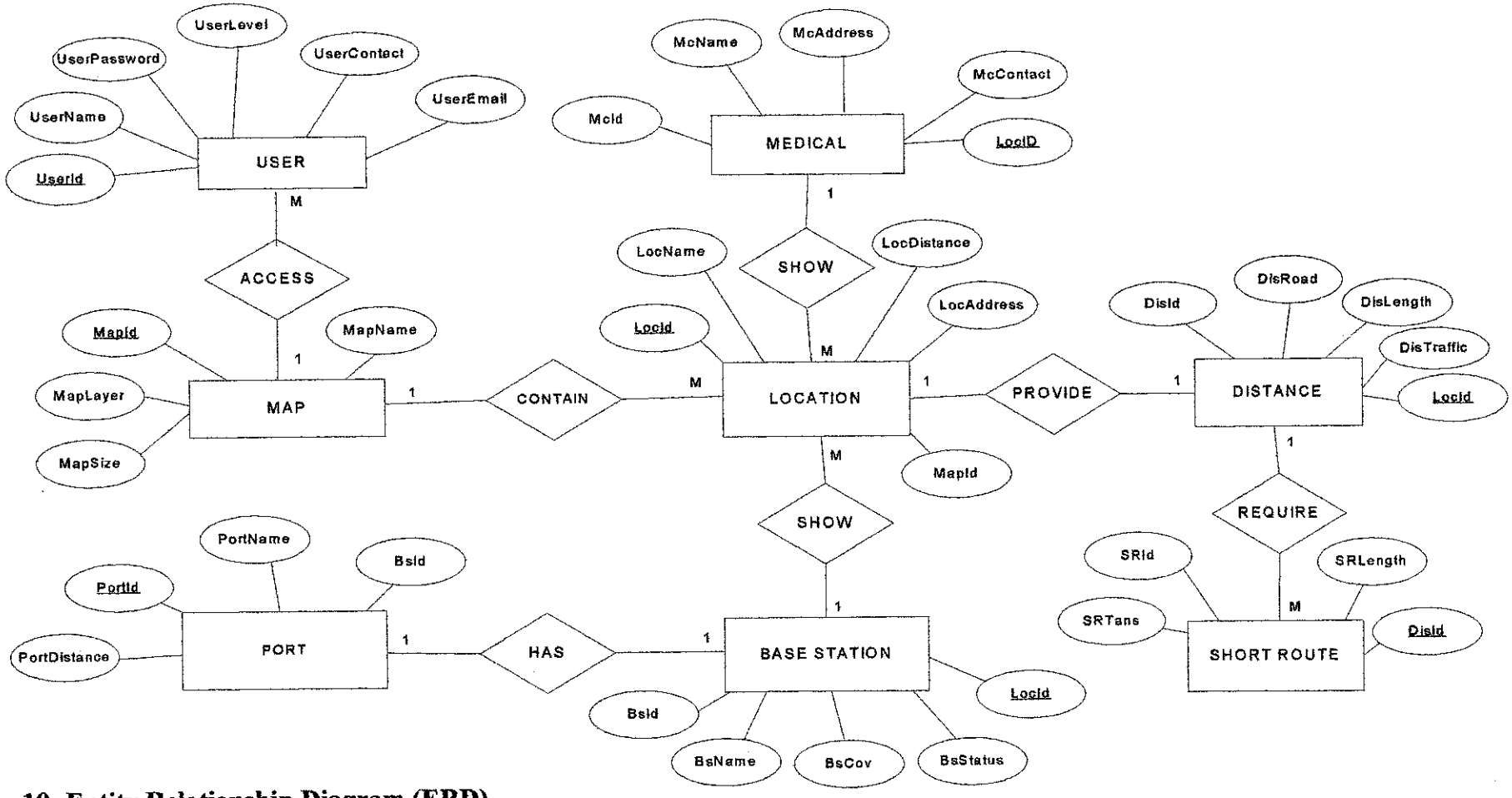
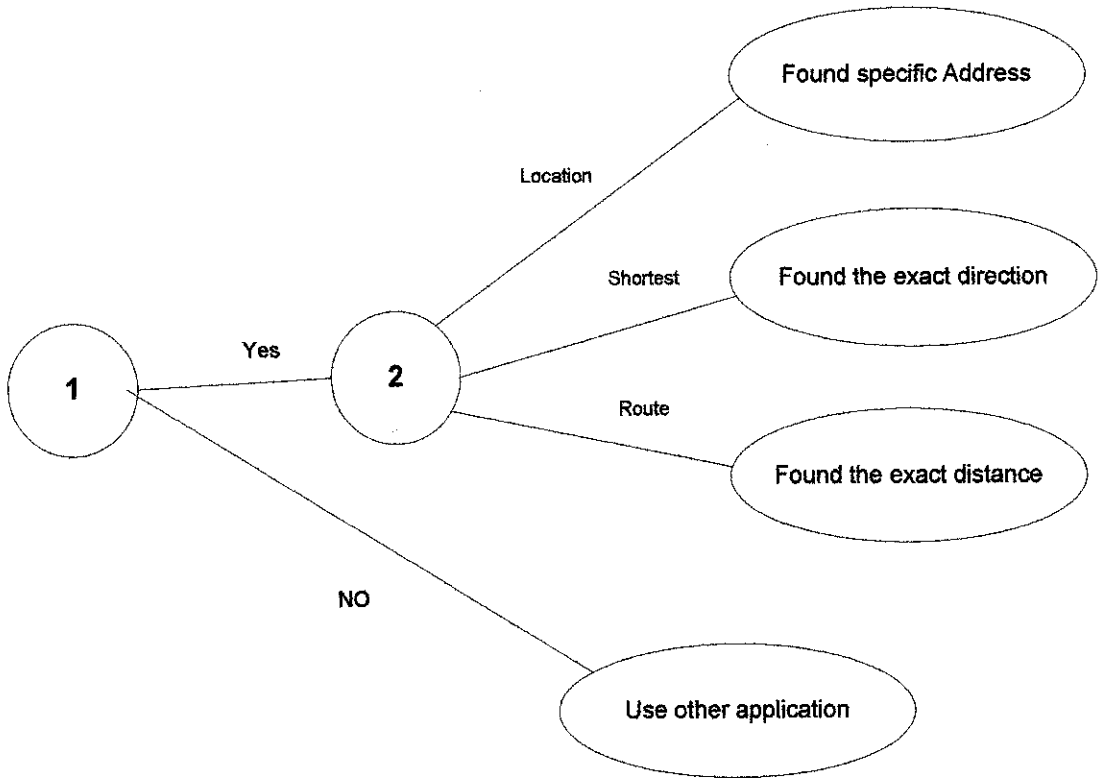


Figure 10: Entity Relationship Diagram (ERD)

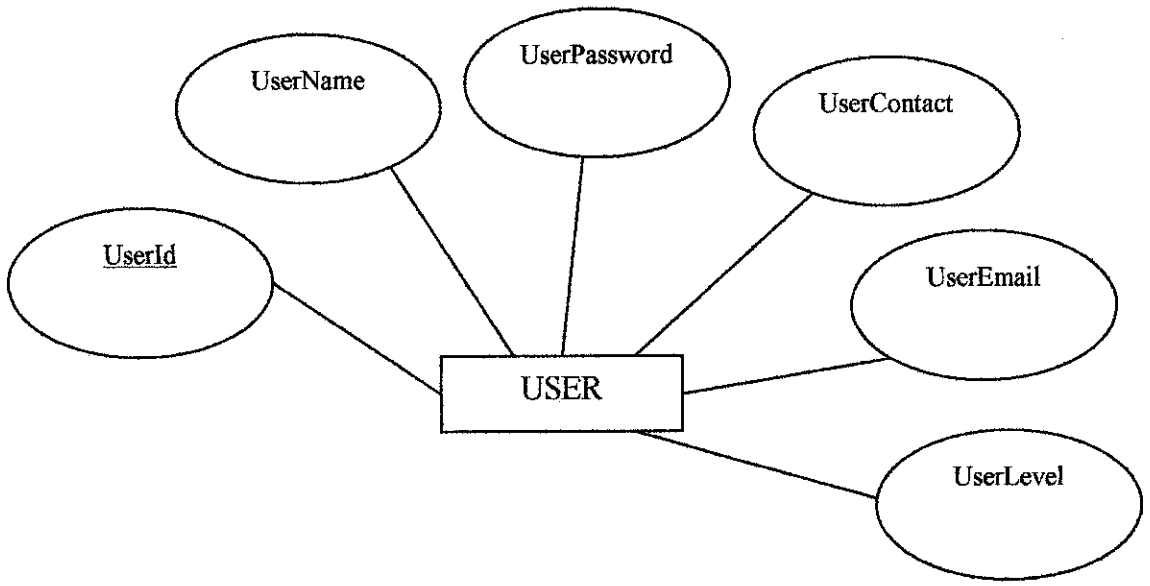
4.3.4 Graph Decision Tree



Legend :
1) Do you want to use GIS Integrated Wireless LAN for Telemedicine :E-blind System?
2) Where your location?

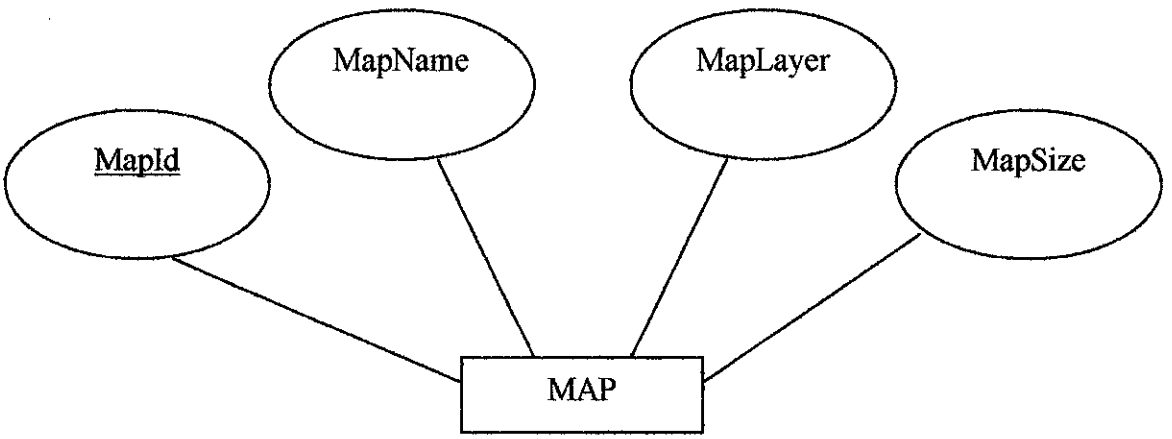
Figure 11 : Decision Tree

4.3.5 Table Design



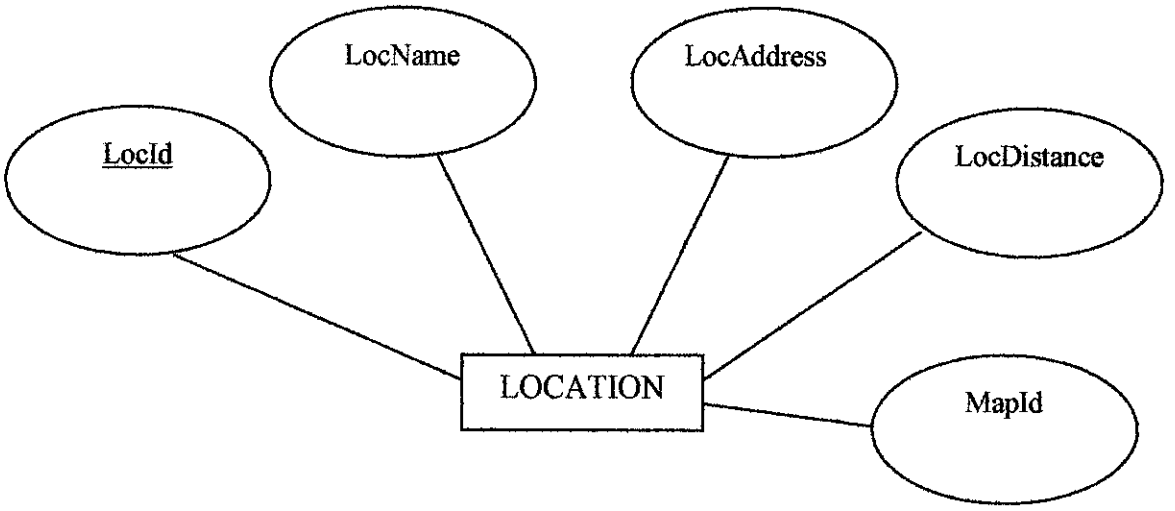
KEY	FIELD NAME	TYPE	LENGTH	DESCRIPTION
P	UserId	int	10	User id
	UserName	Varchar	10	User name
	UserPassword	Varchar	10	User password
	UserLevel	int	10	User level
	UserContact	Varchar	12	User contact
	UserEmail	Varchar	30	User email

Table 2: User Table



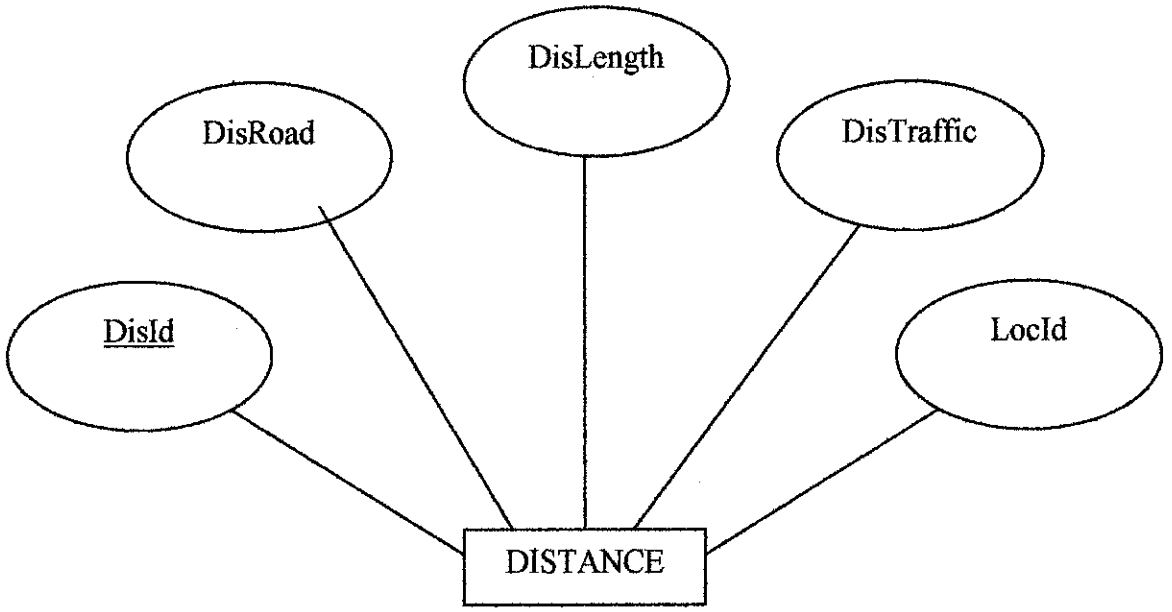
KEY	FIELD NAME	TYPE	LENGTH	DESCRIPTION
P	MapId	int	10	Map Id
	MapName	Varchar	20	Map name
	MapLayer	Varchar	10	Map layer
	MapSize	Varchar	10	Map size

Table 3 : Map Table



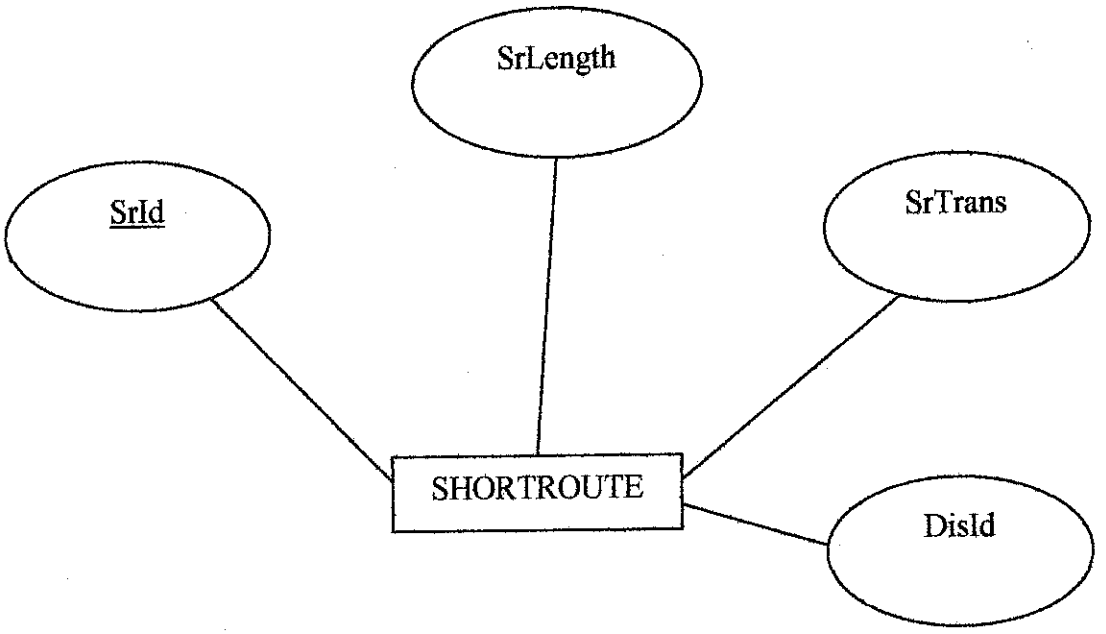
KEY	FIELD NAME	TYPE	LENGTH	DESCRIPTION
P	LocId	Int	10	Location Id
	LocName	Varchar	25	Location name
	LocAddress	Varchar	50	Location address
	LocDistance	Varchar	10	Location distance
F	MapId	Varchar	10	Map Id

Table 4 : Location Table



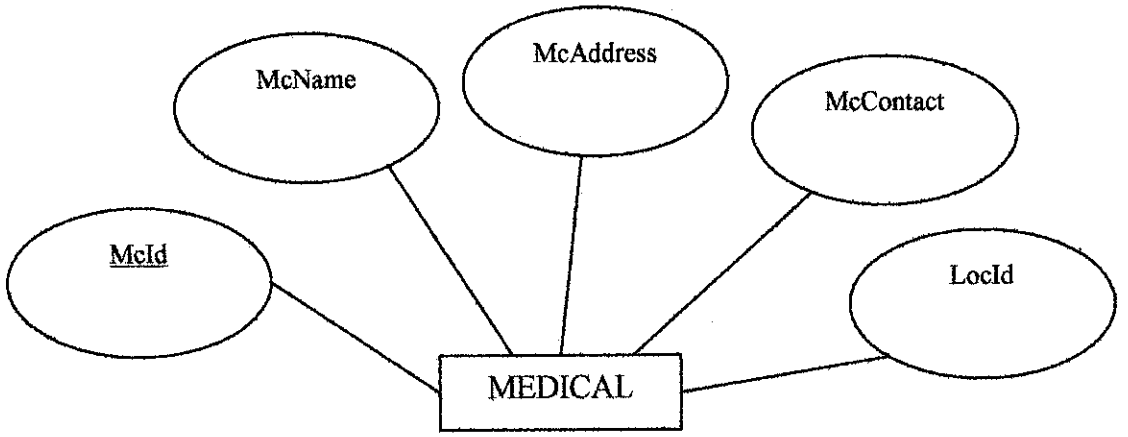
KEY	FIELD NAME	TYPE	LENGTH	DESCRIPTION
P	DisId	Int	10	Distance ID
	DisRoad	Varchar	30	Distance road
	DisLength	Varchar	10	Distance length
	DisTraffic	Varchar	10	Distance traffic
F	LocId	Varchar	10	Location ID

Table 5: Distance Table



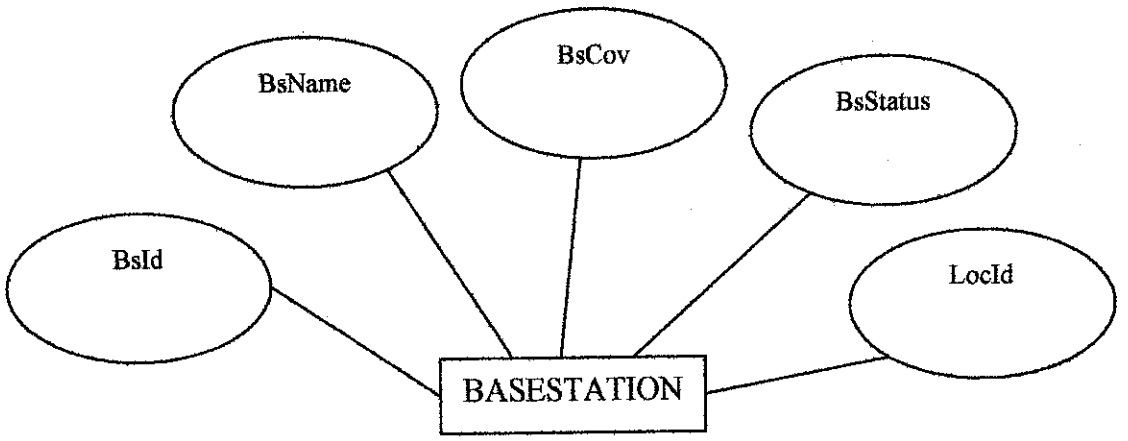
KEY	FIELD NAME	TYPE	LENGTH	DESCRIPTION
P	SrId	Int	10	ShortRoute ID
	SrLength	Varchar	10	ShortRoute length
	SrTrans	Varchar	15	ShortRoute transportation
F	DisId	Varchar	10	Distance ID

Table 6: Short Route Table



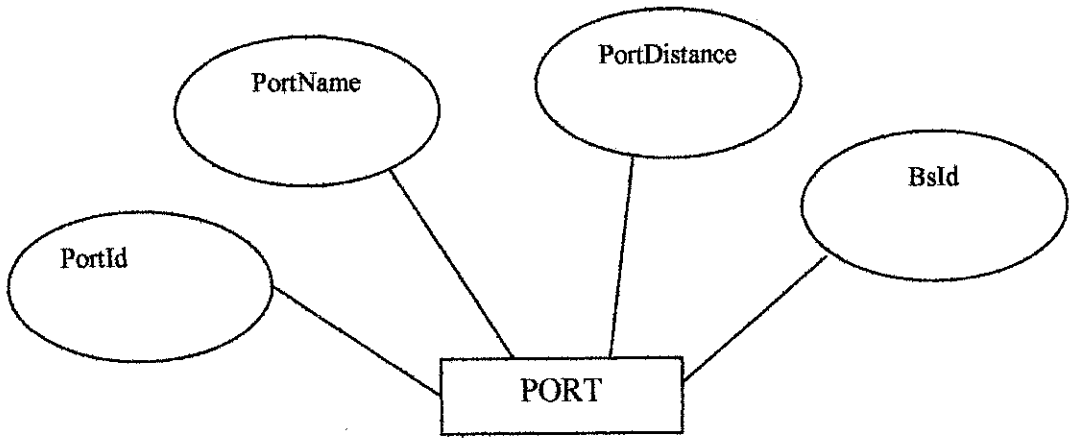
KEY	FIELD NAME	TYPE	LENGTH	DESCRIPTION
P	McId	Int	10	Medical Id
	McName	Varchar	25	Medical name
	McAddress	Varchar	50	Medical address
	McContact	Varchar	25	Medical contact
F	LocId	Varchar	10	Location Id

Table 7: Medical Centre Table



KEY	FIELD NAME	TYPE	LENGTH	DESCRIPTION
P	BsId	Int	10	BaseStation Id
	BsName	Varchar	30	BaseStation name
	BsCov	Varchar	10	BaseStation coverage
	BsStatus	Varchar	20	BaseStation status
F	LocId	Varchar	10	Location id

Table 8: Base Station Table



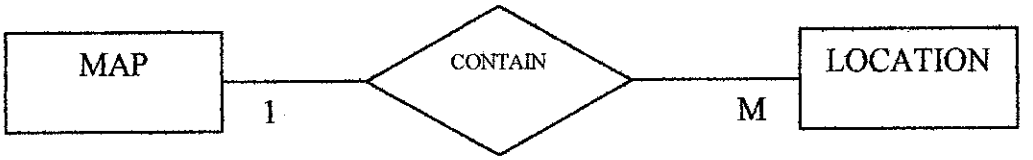
KEY	FIELD NAME	TYPE	LENGTH	DESCRIPTION
P	PortId	Int	10	Port Id
	PortName	Varchar	20	Port Name
	PortDistance	Varchar	10	Port Distance
F	BsId	Varchar	10	Base Id

Table 9: Port Table

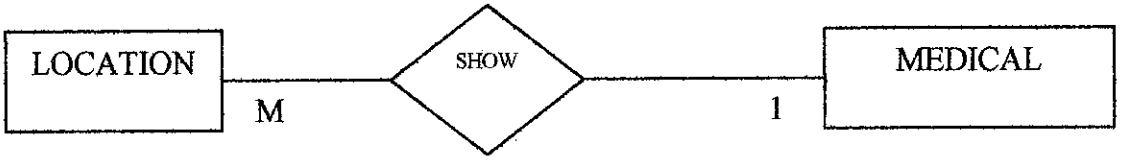
4.4 CONCEPTUAL DATA MODELLING

4.4.1 Business Rule Implemented Inside (ERD)

Business Rule 1: Many users can access 1 map



Business Rule 2: One map contain many location



Business Rule 3: Many location show only one medical center

4.5 TOOLS

4.5.1 Software Specification

Software	Minimum Requirement
Operating System	Window XP
Supporting Software	Apache 1.3.26 (Server API) Macromedia Dreamweaver MX 2004 Macromedia Fireworks MX 2004 Macromedia Flash MX Macromedia Paint XP MySQL 3.23.3a(Client API)/ MySQL-Front 2.5/SQLyog 4.03
Scripting Language	PHPdev5 / PHPMyAdmin / PHP 4.2.2 JavaScript

Table 10 :Server side

Software	Minimum Requirement
Operating System	Microsoft Window 98 and above
Supporting Software	Internet Explorer 5.5 / Netscape Communicator 6
Scripting Language	Not applicable

Table 11: Client Side

4.5.2 Software Tools Fundamental

The author has to weigh the pros and cons of the software before choosing the most suitable development tools to implement the project. Below, Table 12 and Table 13 are the requirements that need to be considered in order to develop and implement the system. It consists both terms; computer hardware and software.

Hardware	Model	Reason of usage
Processor	Intel Pentium 4 or above	Compatible and stable
Main Memory	128Megabytes(MB) or above	To support the Operating System and to improve server's performance

Table 12 : Hardware Requirement

Software	Reason of Usage
Microsoft Windows XP Professional	Most stable Windows series with performance and security enhancements through service pack
Apache 1.3.26 - WIN 32	Freeware. The Apache Project is a collaborative software development effort aimed at creating a robust, commercial-grade, feature, and freely-available source code implementation of an HTTP (Web) server. It must remain a platform upon which individuals and institutions can build reliable systems, both for experimental purposes and for mission-critical purposes.
PHP 4.2.2 - WIN 32	Open source and highly compatible with Apache. It is a good language for building

	dynamic web sites such as the system.
MySQL 3.23.39 –WIN 32	Open source, good performance, independent storage engines, full-text indexing and searching, and mostly used with PHP. The unique separation of the core server from the storage engine makes it possible to run with strict transaction control. It can be used in a wide range of platforms, including Microsoft Windows. Version 4.0 of the server includes a new query cache, which can significantly increase the performance of commonly issued queries.

Table 13: Software Requirement

Microsoft Windows XP Professional

First of all, the system uses Microsoft Windows XP Professional as the operating system. Although it is costly compared to Linux distribution, it is user-friendly and is the most stable Windows series ever with the release of its fist service pack. Due to the unpopularity of the Linux operating systems in the campus, the author decided not to use it to avoid system incompatibility in case the system needs to be installed in the campus.

PHP Hypertext Preprocessor (PHP)

Since the system is a web-based system, thus it is developed using a server-side script language, that is, PHP (PHP: Hypertext Preprocessor). Choosing PHP because of the reliability and functionality of the software. It is an established server-side scripting language for creating dynamic Web pages. As a language that has been designed expressly for the Web, it brings many features such as exceptionally short learning curve, quick development time and very high performance.

In addition, PHP supports all major platforms (UNIX, Windows and even mainframes), and features native support for most popular databases. All these factors make it a very good choice for Web development: non-programmers can also use PHP in producing usable code within days. Programmers familiar with languages such as C, C++ or Java frequently find that they can begin programming in PHP within a few hours. Besides, PHP is open source software, which means it is available free of charge. There are also no costs or restrictions related to distributing PHP scripts we create, whether the scripts are for development or commercial use.

One of the most important features of PHP is the ability to work with a number of different databases, including MySQL, Oracle and Sybase. PHP pages can be used to access a database and then make the information stored in the database available to users who visit the Web site. Using databases to store information and PHP code to access the information is an efficient method of displaying up-to-date information in a Web site. PHP can also allow users to manipulate the data in a database. For example, a PHP page can be used to add, delete or edit records in a database depending on a user's request.

Therefore, PHP is a well-established tool with functions allowing rapid application development. As the software is free of charge, the users do not need to pay extra charges for this software if they utilize the system. In addition, it can connect to and manipulate data with reduced complexity and also opens the access to a variety of data sources. We can also display results of operations and accept user input from the PHP Web site with both bound and unbound controls.

Apache HTTP Server

In order to implement PHP, the system use Apache as server for the reason that Apache can support many Operating Systems such as UNIX, MacOS, and Windows. The advantages of Apache included the ability to implement the latest protocols, its modular architecture allows users to build a server that is easy to handle. One can control the server from command line, which makes remote administration very convenient. A lot of effort has been put into optimizing the Apache's C code for performance. As a result, it runs faster and consumes less systems resources than many other servers. Apache server and API source code are open to public. When any bugs are found, they are often quickly communicated, and rapidly fixed. Updates are made and announced thereafter. This has resulted in Apache becoming more and more stable, and hence reliable, server over the time.

MySQL Database

An important feature of server-side scripts is the ability to access the database. For the database, MySQL, which is the most popular Open Source SQL database. Below are some of the explanations of MySQL and the reasons why the system use this software to create the database. MySQL is a database management system, which is a database that structured collection of data, to add, access, and process data stored in a computer database, a database management system such as MySQL Server is needed.

In addition, MySQL is a relational database management system. A relational database stores data in separate tables rather than putting all the data in one big storeroom. This adds speed and flexibility. Defining the relations and combining data from several tables on request link the tables.

The most important point is MySQL software is Open Source. Open Source means that it is possible for anyone to use and modify without paying anything. We can also study the source code and change it to fit our needs. The MySQL software uses the GPL (GNU General Public License), to define what user may and may not do with the software in different situations.

The MySQL database server is very fast, reliable, and easy to use. MySQL Server was originally developed to handle large databases much faster than existing solutions and has been successfully used in highly demanding production environments for several years. Its connectivity, speed, and security make MySQL Server highly suited for accessing databases on the Internet. MySQL database software is a client/server system that consists of a multi-threaded SQL server that supports different back ends, several different client programs and libraries, administrative tools, and a wide range of programming interfaces (APIs). The main reason we selected MySQL database as one of our software tools is because it is open source software. Besides, MySQL database is also compatible with PHP and HTML plus it is user friendly. It provides a perfect feature of maintaining both data accuracy and data consistency. The software is also widely used and easily obtained. The database created in MySQL is a relational one, being the most powerful way to present data. Our system allows user to select search criteria from Web sites and show data that matches their parameters. MySQL can automatically identify relationships in unstructured data and reorganize it into a relational database.

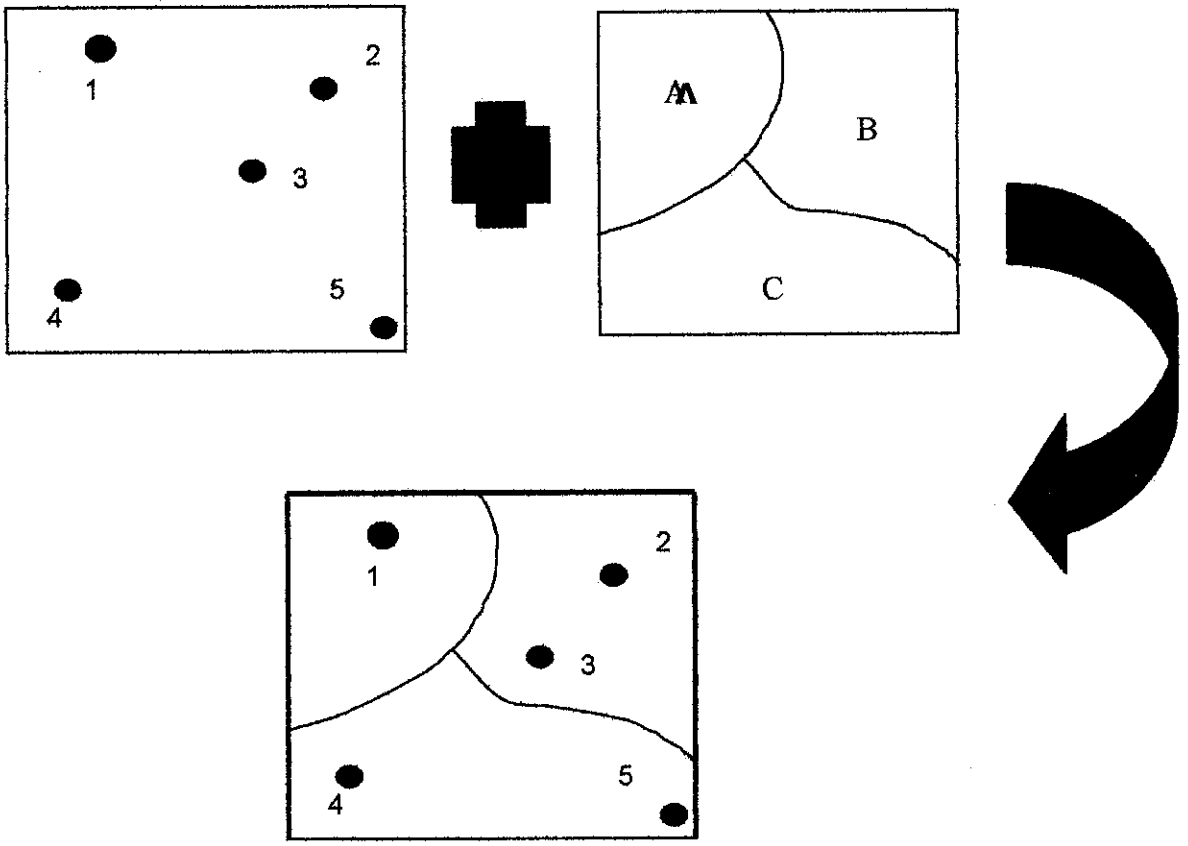
CHAPTER 5
RESULT AND DISCUSSION

5.1 SYSTEM FUNCTIONALITY

5.1.1 Malacca's Layer Map

This part of the system shows how GIS concept was applied through the basis of topological overlay, which is a process of merging overlay and updating the relational database for each layer from the point to polygon. Topology is a GIS data that have intelligent connection with other features. People can easily find and trace a route on a map. Besides that people can easily identify features on each side of the road or building along the way. But computer lack of this ability thus, it need special programming that have these abilities and recognize relationship that human do intuitively for much faster and better. Here is the illustration of how topology work as solution for geography matters in the system:

5.1.1.1 Point In Polygon



Point Object is overlain onto Area Objects. Each layer will obtain new attributes for point objects. That is how each layer merger as follow :

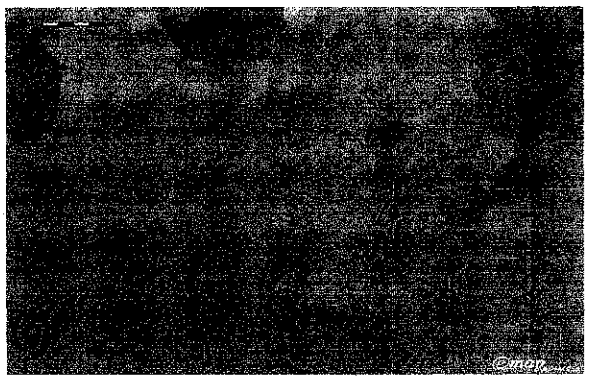


Figure 14 : Base Layer

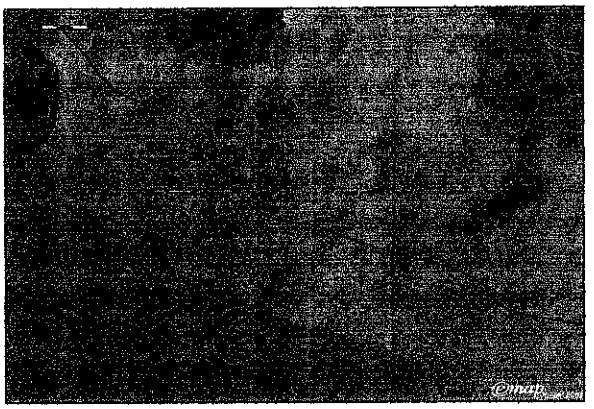


Figure 15: Layer 2

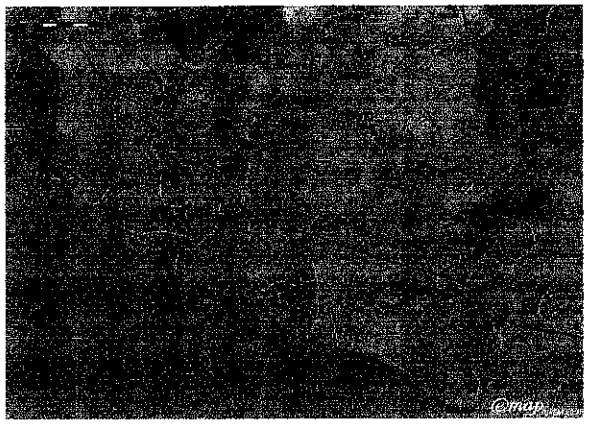


Figure 16: Layer 3

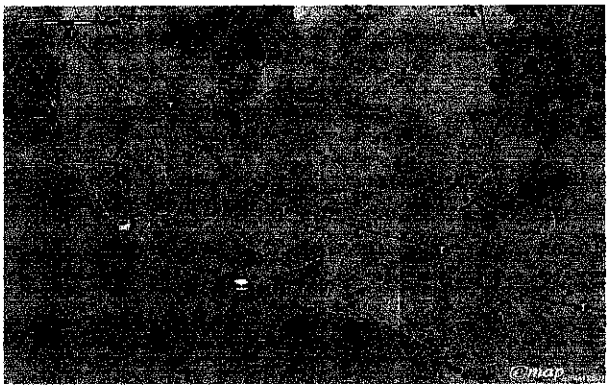


Figure 17: Layer 4

5.1.2 Attribute Map

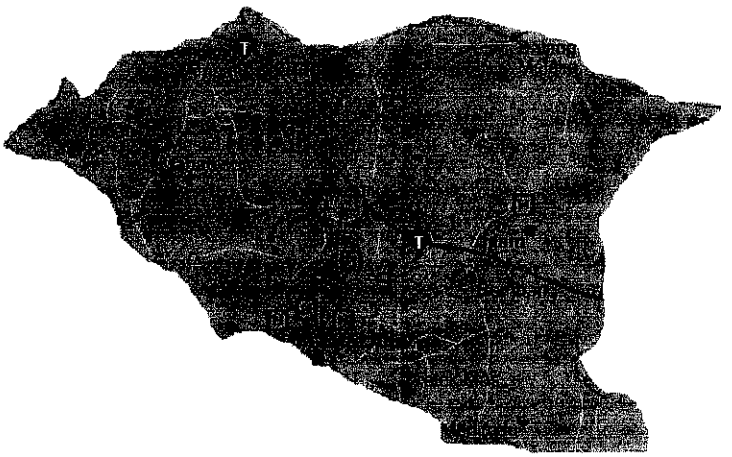


Figure 18: Attribute Map

Attribute map have been placed with the medical centre allocation and attributes database driven to allocate nearest medical centre around the three-coverage area(Alor Gajah, Jasin and Melaka Tengah).

5.1.3 Coverage Map

5.1.3.1 Base Station

Mobile phone base stations are radio transmitters with antennas mounted on either free-standing masts or on buildings. Radio signals are fed through cables to the antennas and then launched as radio waves into the area, or cell, around the base station. A typical larger base station installation would consist of a plant room containing the electronic equipment as well as the mast with the antennas.

Several types of antennas are used for the transmissions; panel-shaped sector antennas or pole-shaped omni antennas are used to communicate with

mobile phones. Dish antennas form terminals for point to point microwave links that communicate with other base stations and link the network together. Sometimes the base stations are connected together with buried cables instead of microwave links. Depending on the location of the base station and the level of mobile phone usage to be handled, base stations may be anything from only a few hundred meters apart in major cities, to several kilometers apart in the countryside.

As far as concern, through analysis and research the system is useless if developer fail to take as above considerations, which are stipulated territory base station areas to ensure coverage for mobile connection in order to make a call to the health care unit. Below are the coverage map that cover three targeted user location for the system :

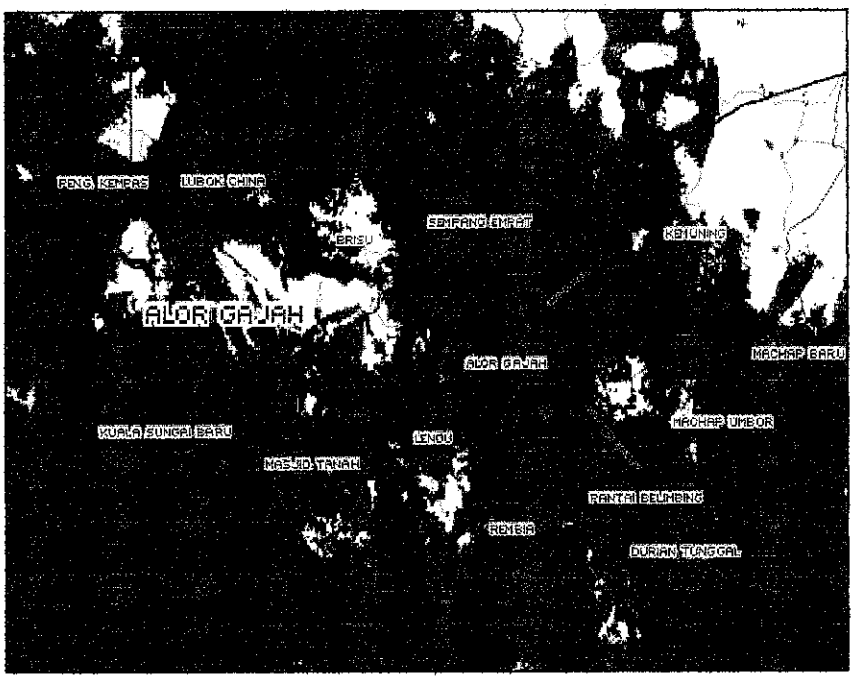


Figure 19: Alor Gajah Base Station

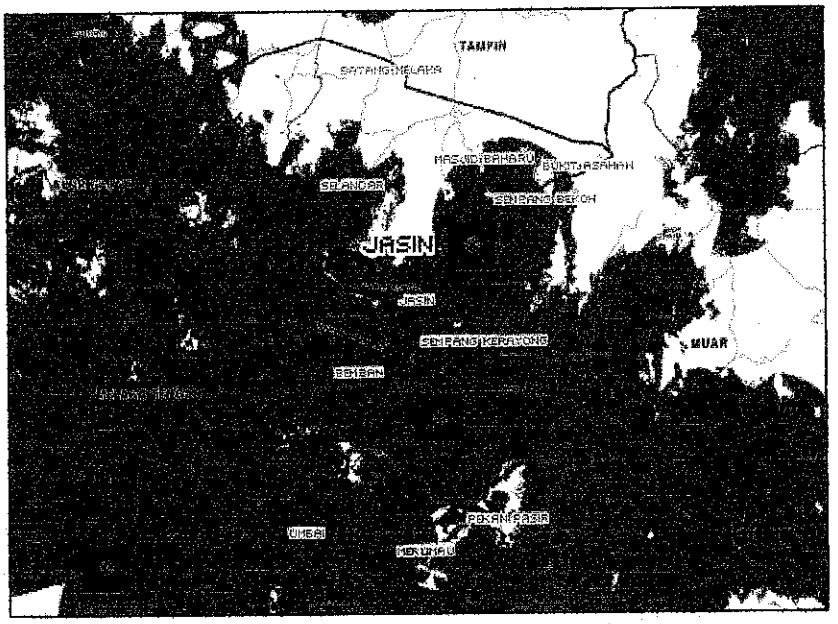


Figure 20: Jasin Base Station

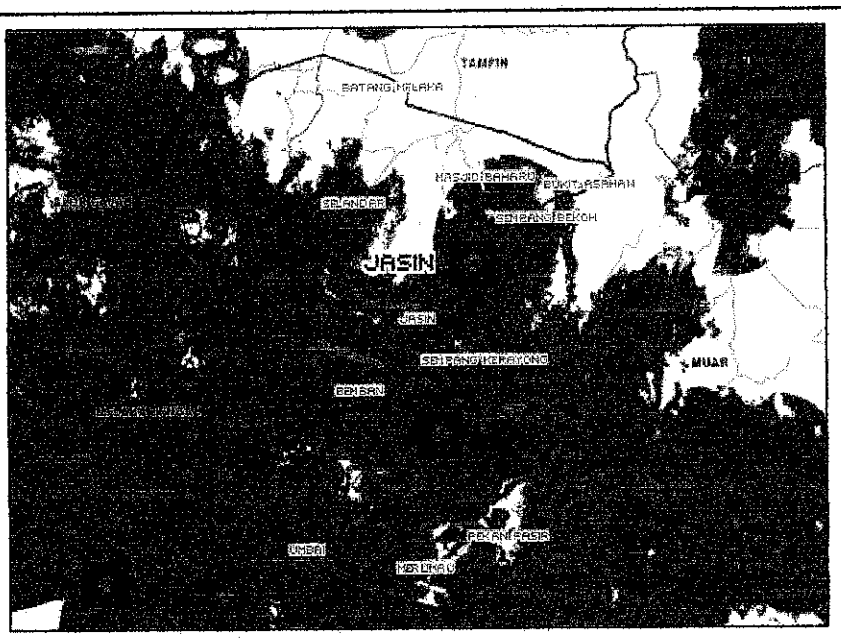


Figure 21: Melaka Tengah Base Station

5.2 TESTING

Critical element in maintaining software quality and assurance is software testing. It represents the overall review specification on the software designed code generation. These parts of reports focus on the checking process, which are required to ensure that software, meet the specification and the user requirement. Normally, verification and validation is the generic name given to checking process which ensure that software conforms to its specification and validation involves scrutiny that the program implemented meets the users needs. It is difficult to manage the testing of a large system, considering the numerous test cases, problems report and fixed.

The planning activities let to do the strategic thinking on what types of tests should be executed within time constraints and budget. The mistake most testers is fail to plan test scheduled upfront. They fail to relocate time to test the product and product regression testing. Often, even if the entire project schedule slips, the due date still remains unchanged. Since the test phase is the last step before the product are use, the time allocated for testing is usually reduced; thus the effect of this action will reduce the quality of the software. Apart from that, through test plan, the advantage is what we are able to get feedback from related users and it aids us for future enhancement.

All major releases must have a test plan. The following steps will give some guidance during the testing process:

- Depending on the features of the systems, determine the tests need to perform
- After identifying the types of tests needed to test the system, plan how each of these tests will be performed
- When the contents of the test plan are finalized, conduct a review for completeness of the test plan.
- Follow the test plan to ensure that everyone on the test team uses the process outlined in the test plan.

The focus here is to design tests that systematically uncover different classes of errors and to do so with a minimum of time and effort. We can assume that through testing, it demonstrates how software functions according to specification of behavioral and performance. So we can know that the requirements have been met. Nevertheless, data collected as testing is conducted provide a good indication of software reliability and some indication of software quality as a whole.

5.2.1 Testing Process

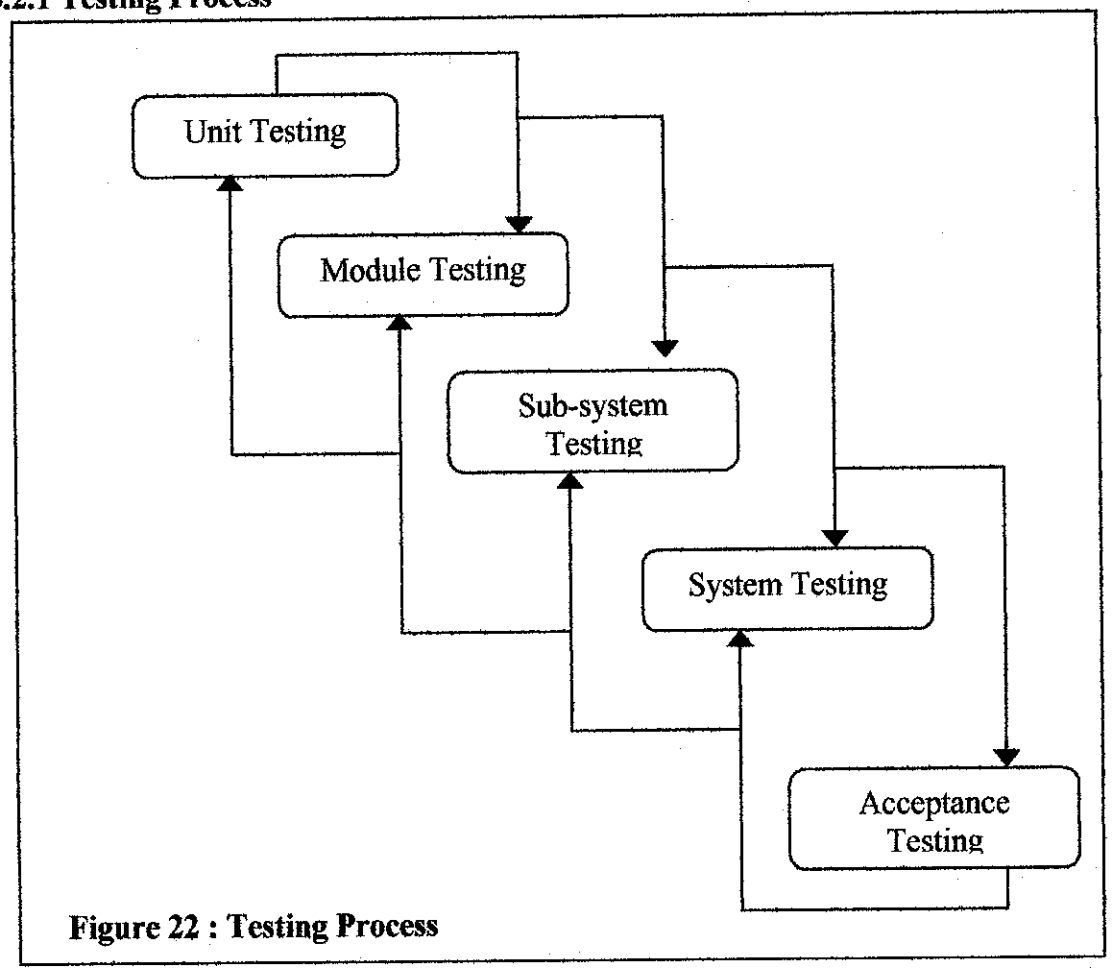


Figure 22 : Testing Process

- Stage 1: Unit testing

Separate individual component of system are tested to ensure that they are operate correctly. Each component is tested independently, without other system components.

- Stage 2: Module Testing

A module encapsulates related to system components so that can be tested without other system modules.

- Stage 3: Sub-system Testing

This phase involves testing collection of different functions of the systems, that had been integrated to the main function.

- Stage 4: System Testing

This testing procedure is concerned with finding errors, which result from unexpected situation.

- Stage 5: Acceptance Testing

The final stage of testing process is testing with some other data obtained rather than the sample data.

5.2.2 Testing Result

Testing can serve as metrics. It is heavily used as a tool in the Validation and Verification process. Testers can make claims based on interpretations of the testing results, which either the product works under certain situations, or it does not work.

Basically, quality has three sets of factors functionality, engineering, and adaptability. These three sets of factors can be thought of as dimensions in the software quality space. Each dimension may be broken down into its component factors and considerations at successively lower levels of detail. System testing as Table 14 illustrates the most frequently cited quality considerations.

Functionality (exterior quality)	**Engineering (interior quality)**	**Adaptability (future quality)**
Correctness	Efficiency	Flexibility
Reliability	Testability	Reusability
Usability	Documentation	Maintainability
Integrity	Structure	

Table 14 :Testing Software Quality Factors

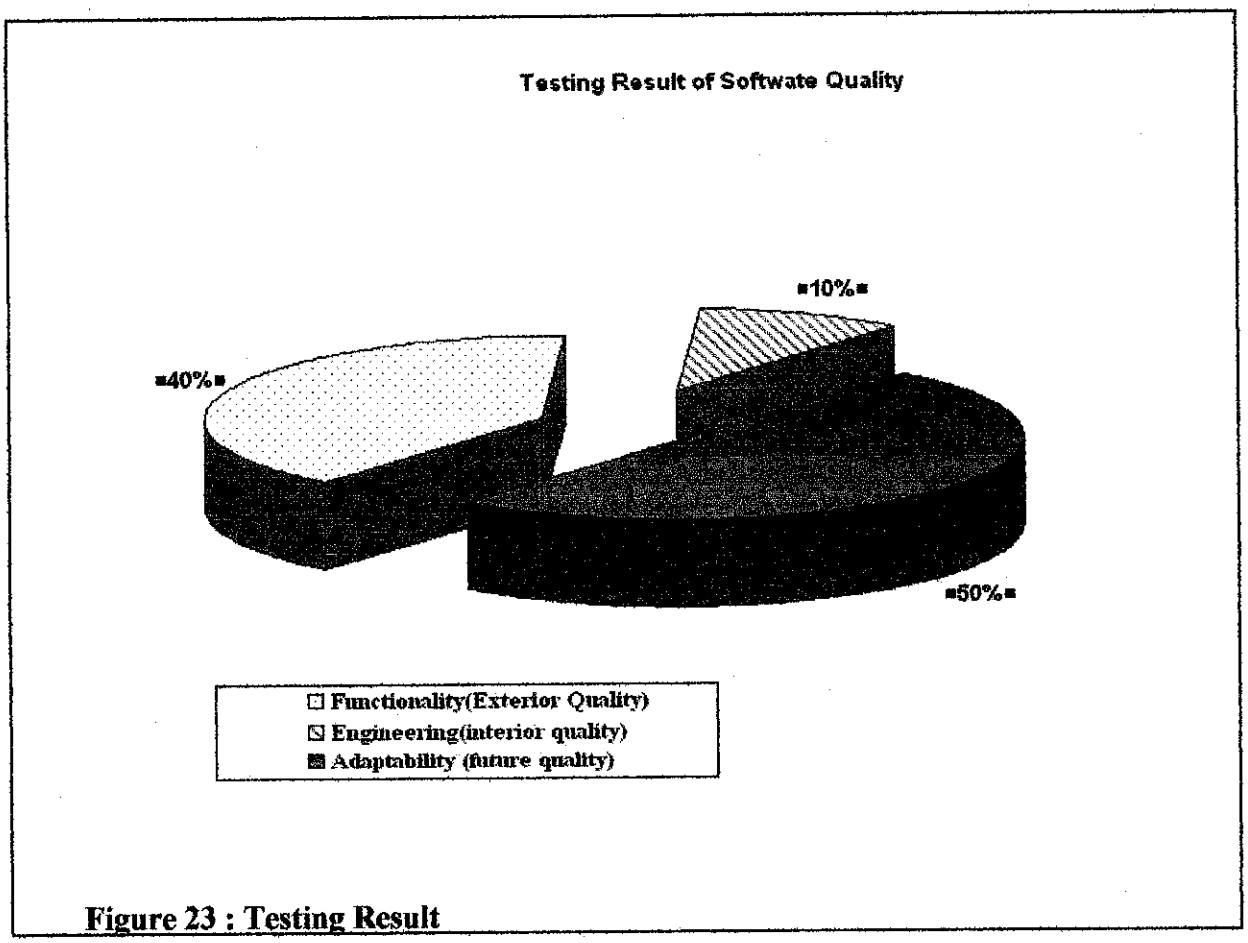


Figure 23 : Testing Result

Testing is potentially endless. We cannot test till all the defects are unearthed and removed it is simply impossible. Realistically, testing is a trade-off between budget, time and quality.

From the result, it shows that the system functionality almost fulfill the user requirement in term of correctness, usability, reliability and integrity. This will usually require the use of reliability models to evaluate and predict reliability of the software under test. Besides that, this system has future quality due to its adaptability for future enhancement and easy to manage. The system should be implemented as a server side client method and user should do site management first if they want to edit the system correctly. the installation of phpdev 5 is originally easy and fast and as are already install all the necessary item,they should now be able to use the system just by copying the GISPROJECT folder into WWW folder and copy the GIS from database folder into data folder inside mysql folder situated inside phpdev5 folder. Meanwhile, due to lack of expertise among tester that majority are students that love to test the system from the front-end side rather than back-end side. Thus, result for interior quality quite lower because of that factor. Each evaluation requires repeated running of the following cycle, failure data gathering, modeling and prediction. This method does not fit well for ultra-dependable systems, however, because the real field failure data will take too long to accumulate. A testable design is a design that can be easily validated, falsified and maintained. Because testing is a rigorous effort and requires significant time and cost, design for testability is also an important design rule for software development.

CHAPTER 6
USER INTERFACE DESIGN

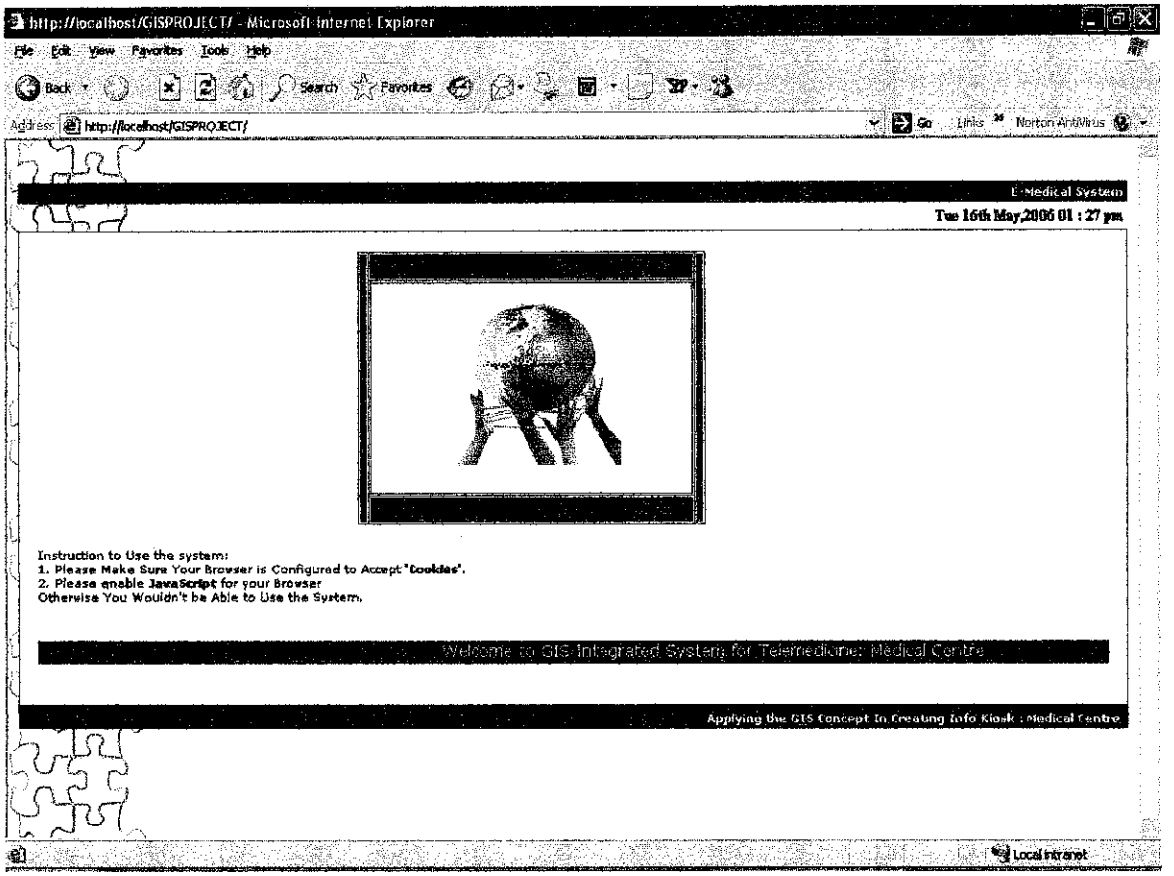
Computer system design encompasses a spectrum of activities from software design to user interface design. The user interface of a system is often the benchmark by which that system is judged. A user interface, which is difficult to use, normally refer as not user friendly might result in a high level of user error. At worst, it will cause the system to be discarded, irrespective of its functionality.

Graphic user interface (GUI) should be quite similar to most of the personal computer users. Our system is design based on GUI because of certain reasons as below:

- GUI is easy for user to learn and use. Beginners can easily learn to use the system due to its simplicity and user friendliness.
- Fast, fill screen interaction is possible with immediate access to anywhere on the screen.

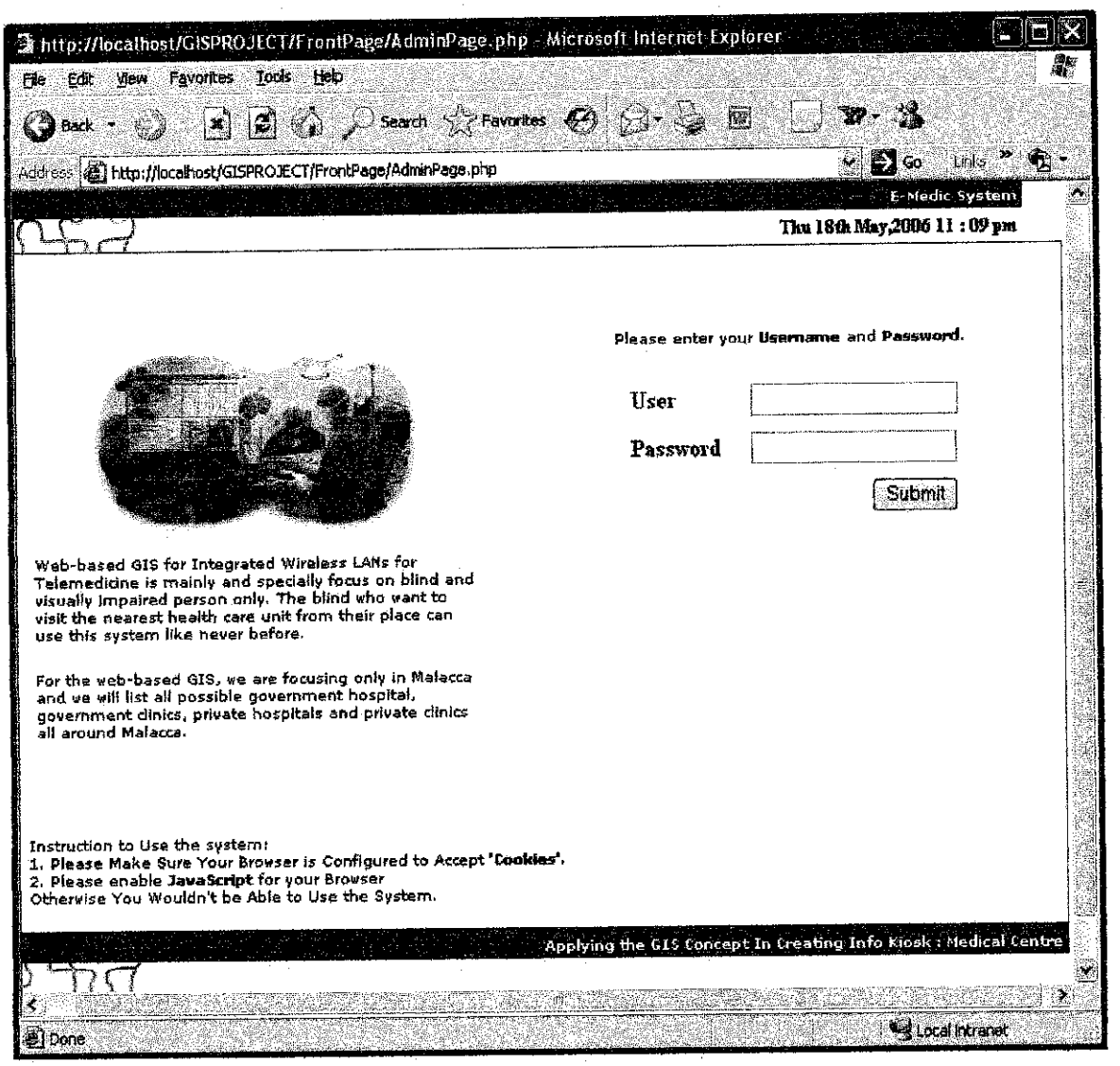
6.1 SCREEN DESIGN

6.1.1 Main Screen



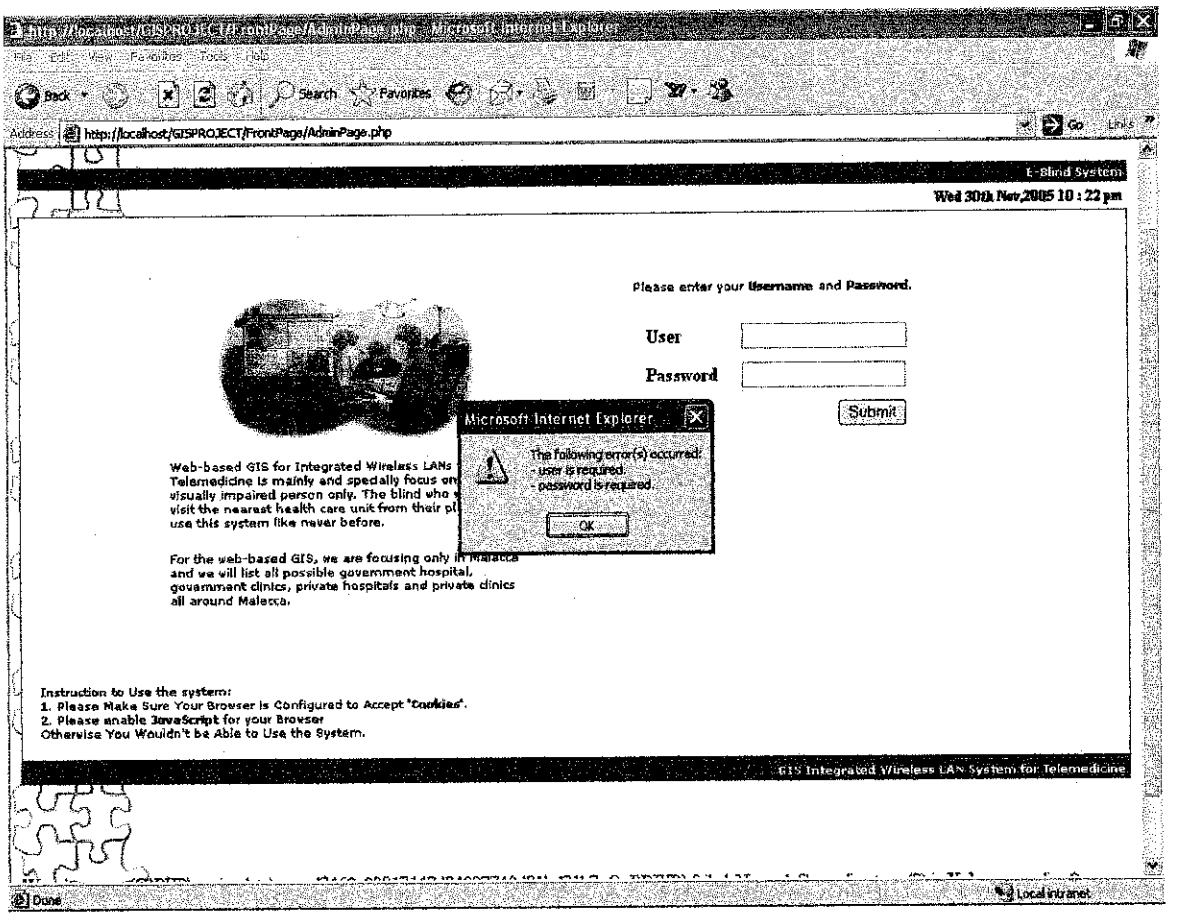
1) Here is the main screen for the system. The system would go to log in page if you click on rollover picture in the middle of the screen.

6.1.2 Login Page



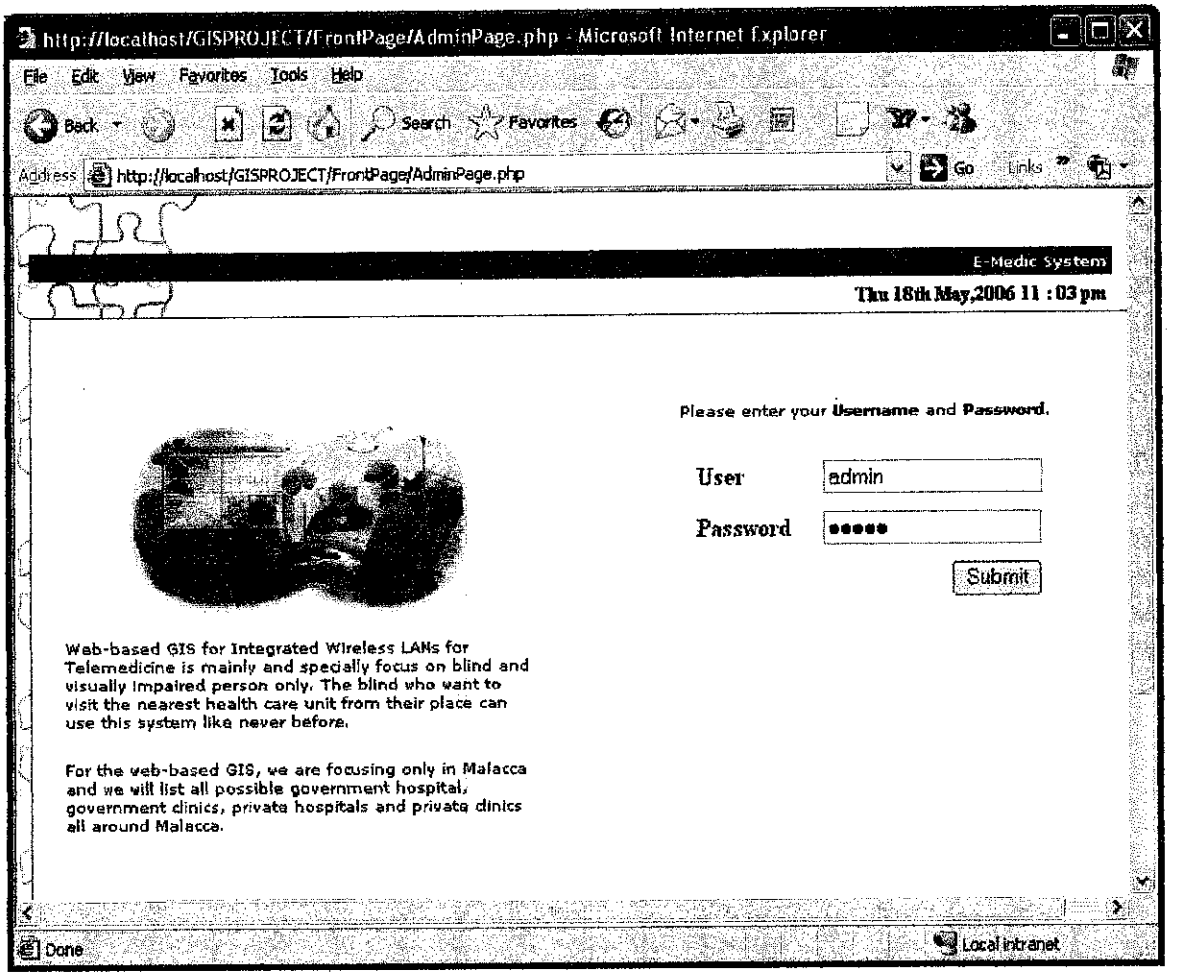
2) Here is the log in page that authenticate user according to their username and password used.

6.1.3 Error Pop-up



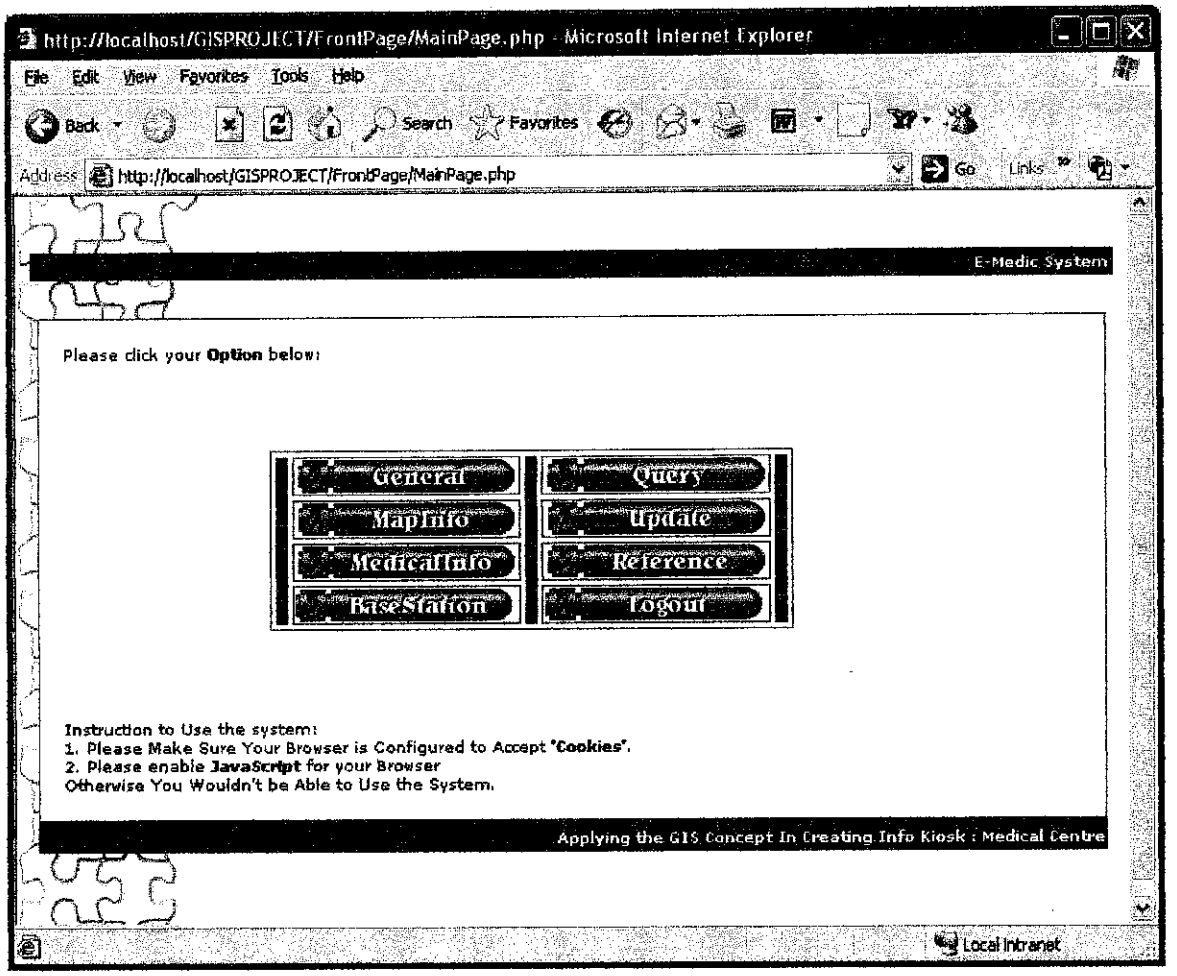
3) Here shown that the log in page need a valid user name and password as registered and provide from system administrator, thus if is not be key in correctly a pop-up message would appeared to show that you need to assign following value or input before go in to the system.

6.1.4 Assigning Log input



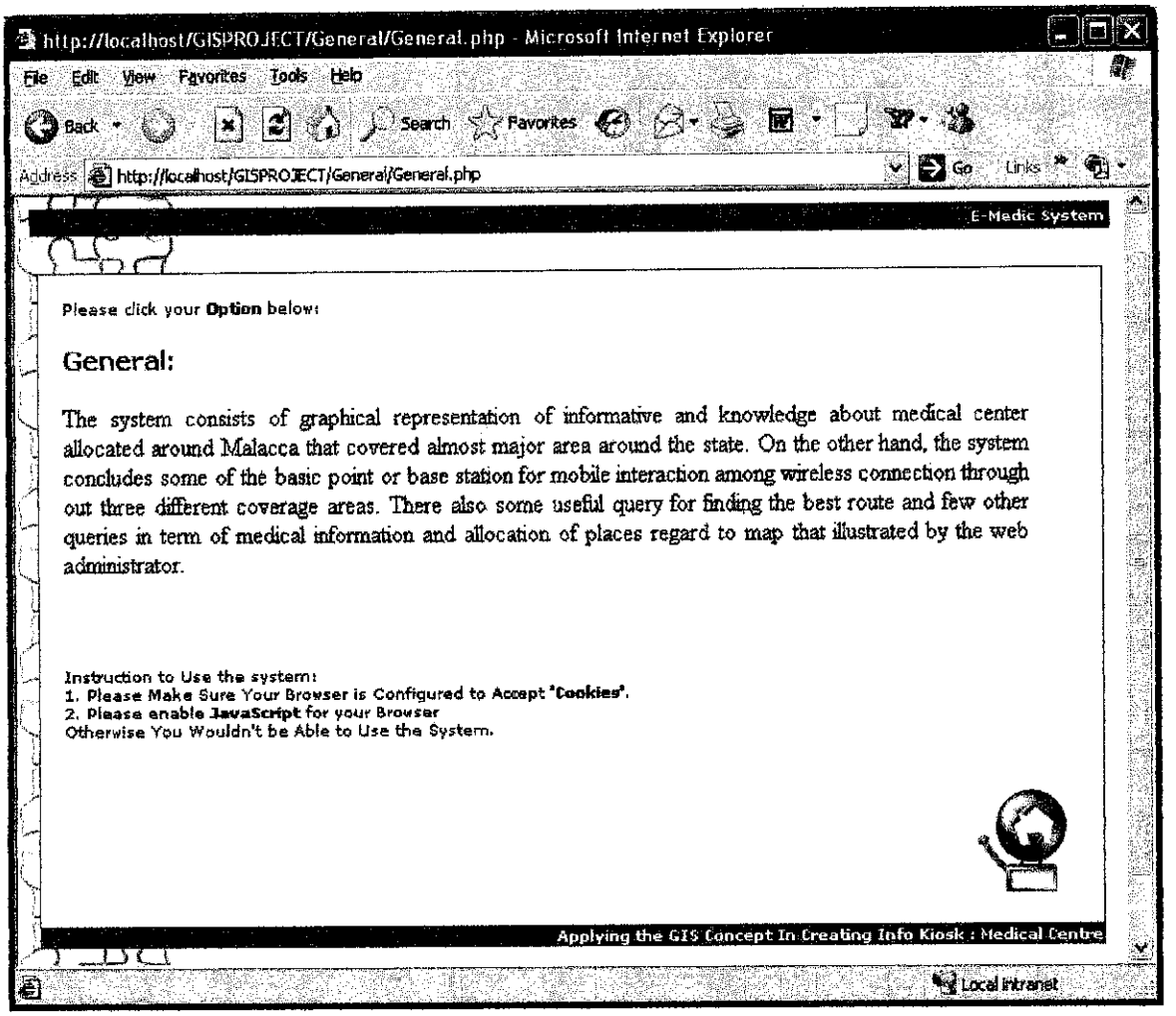
4) Next, showed the correct way to enter user name and password for accessing the main function page of the system.

6.1.5 System Main Page



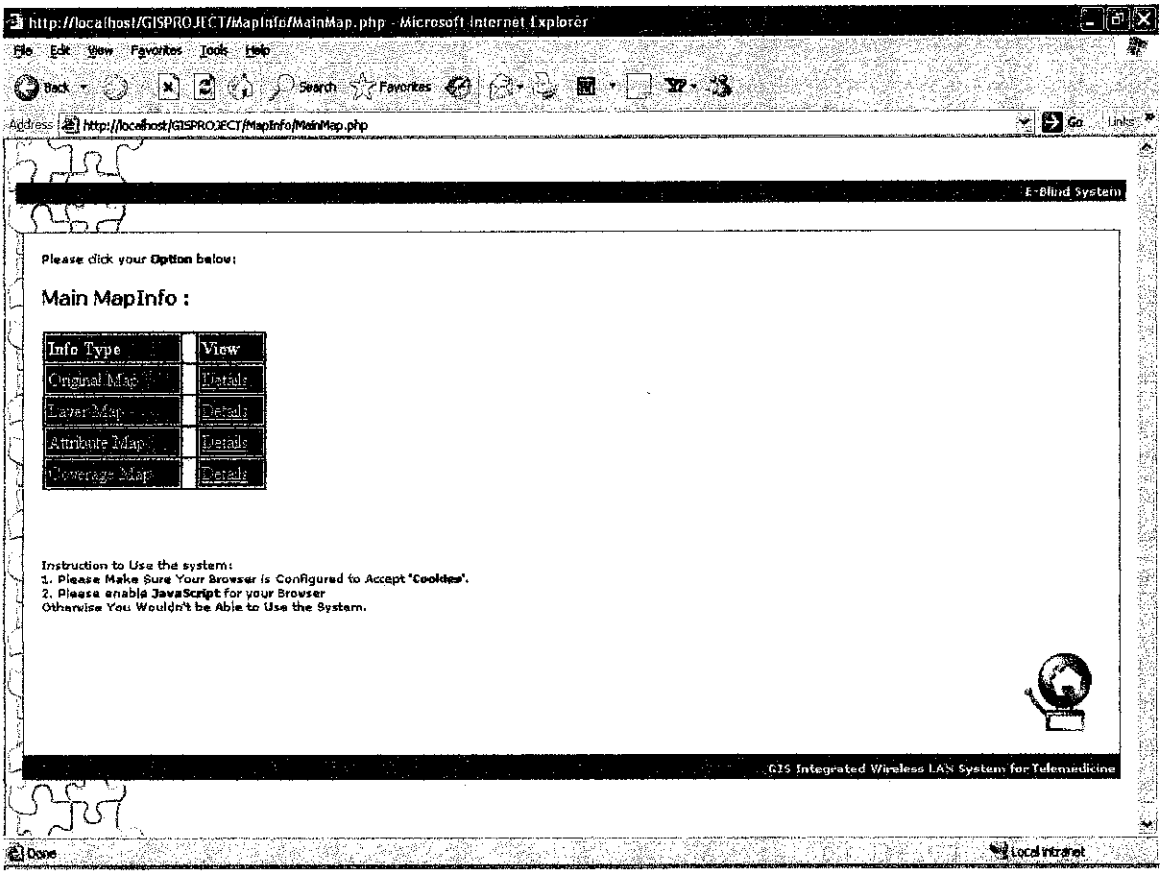
5) This is the system main page. It consists of few buttons that implemented as animated click button. These function page are stated as general, map info, medical info, base station info, query, update, reference and log out.

6.1.6 The General Page



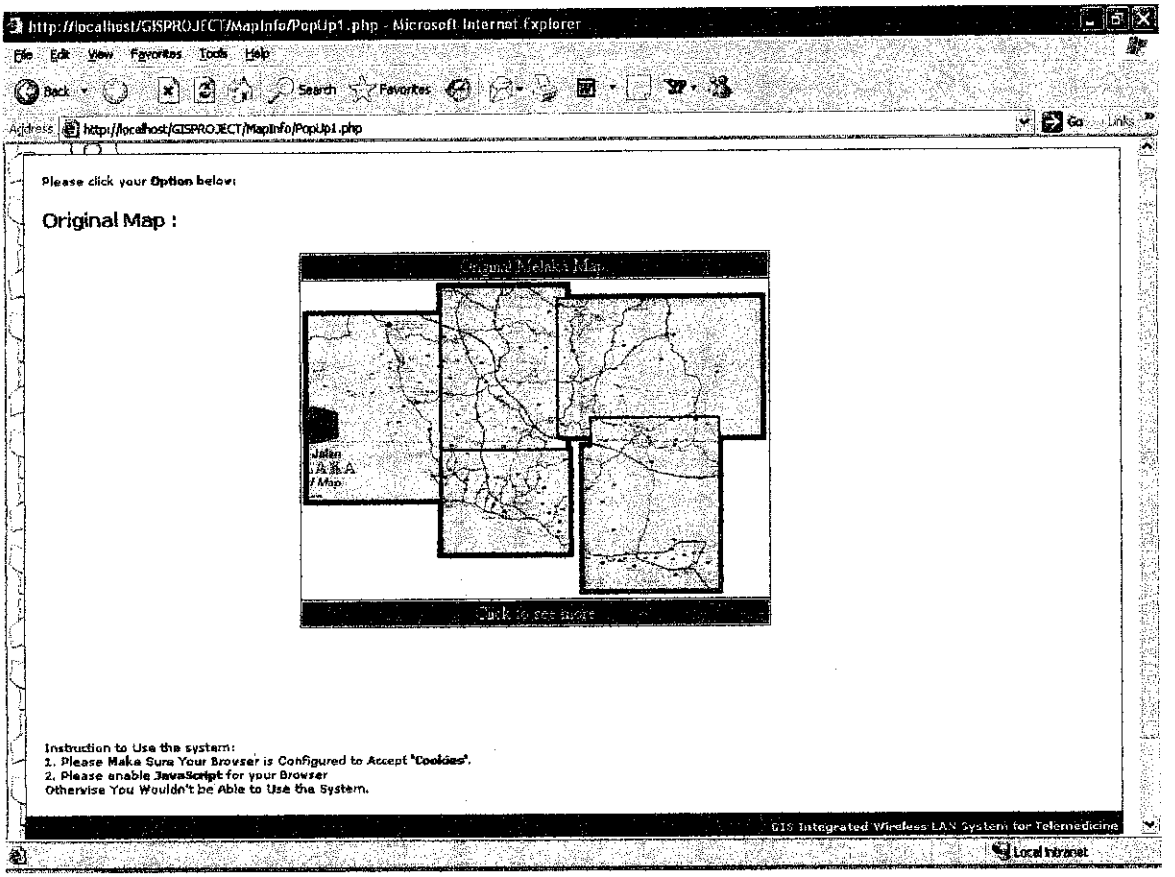
6) The general page works as information site that mostly tells about either objectives or scope of the system just as an introduction page.

6.1.7 Map Info Page



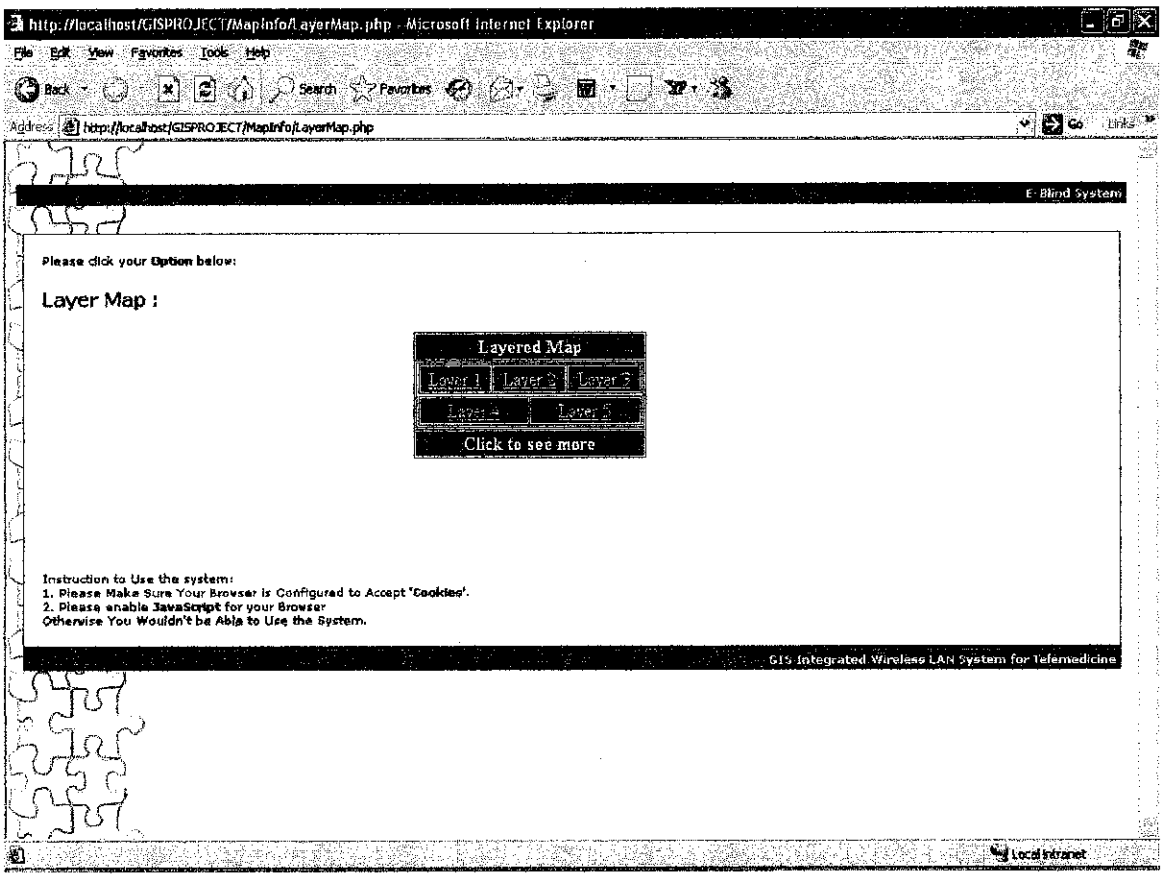
7) Here is the map info page that tells about few working layers to describe and digitize map with attribute and some particular data. There are original, layer, attribute and coverage map. When user click on the text 'Original Map' the screen as below will appear.

6.1.8 Original Map



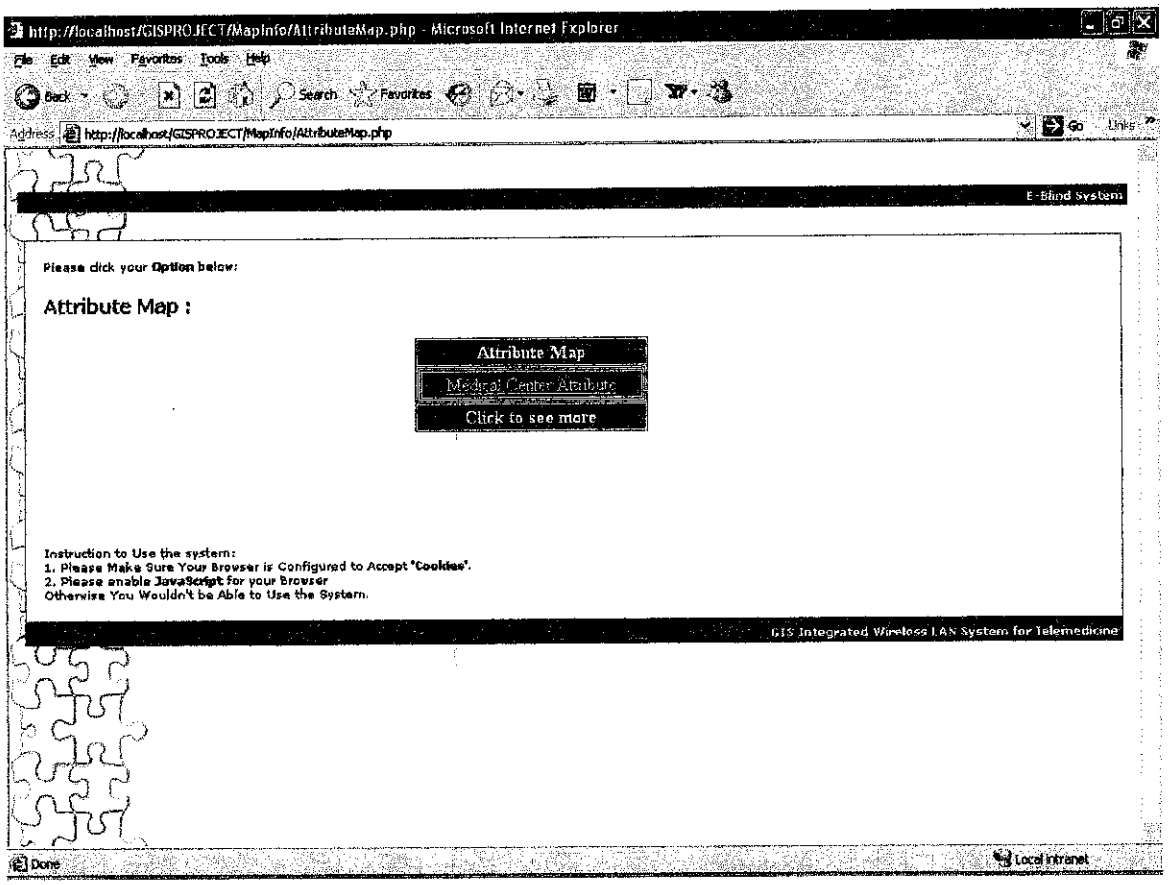
8) Here is the original map that we gathered data such as road name, location name and others to help locate the medical center real destination or route.

6.1.9 Layer Map

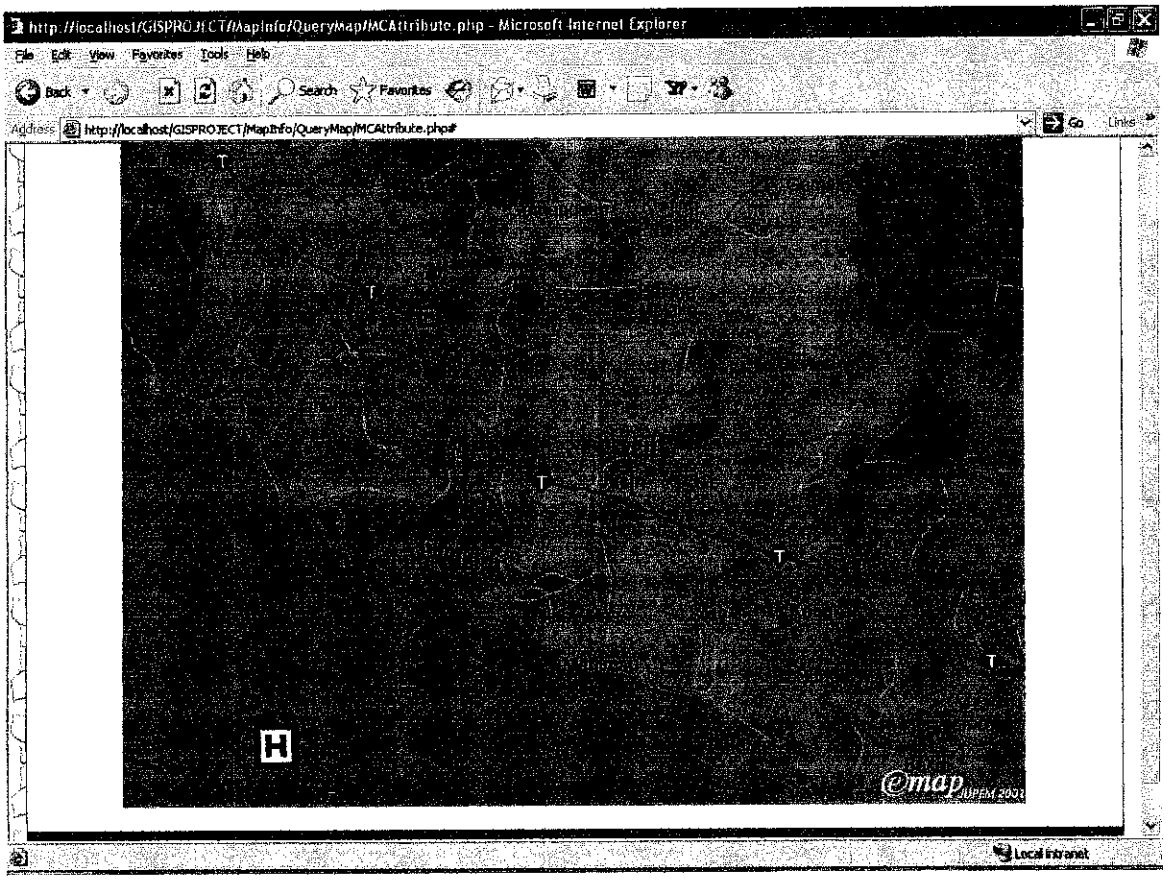


9) Here are some collections of phase by phase to implement-layered map. User can view the map from the basis till the complete once.

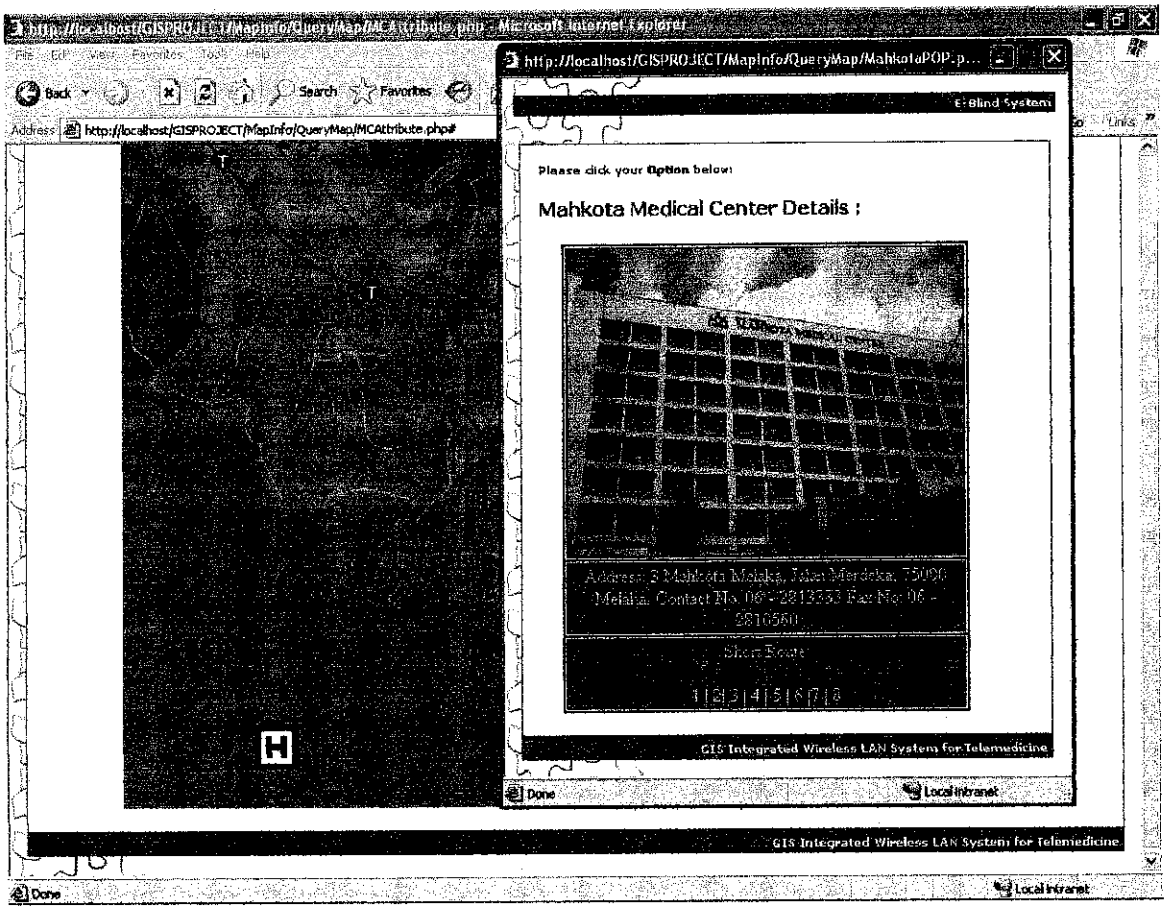
6.2.1 Attribute Map



10) Attribute map consist of pop-up build knowledge for medical allocation. When user click on the text the screen as below will appear.

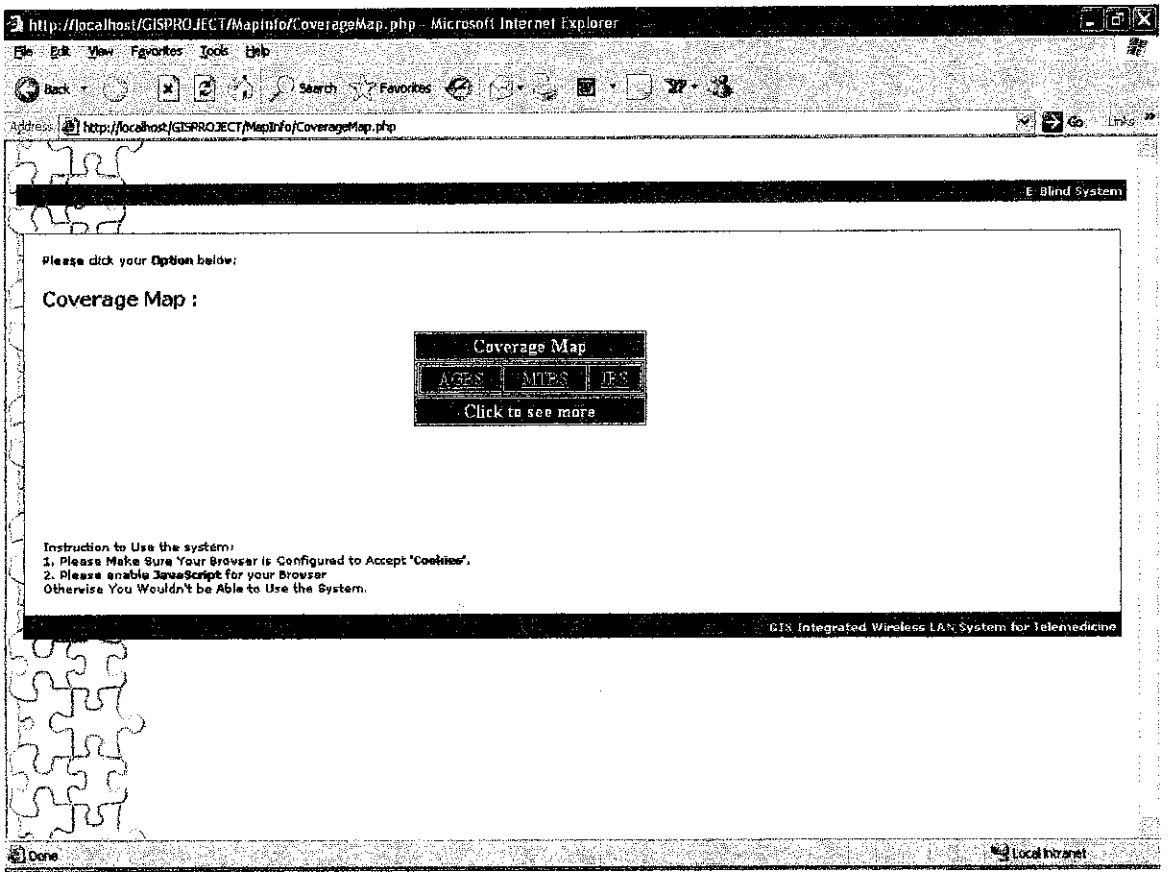


11) Here show map that have been placed with medical allocation and attribute database driven to allocate nearest medical center around Malacca that cover three base station(Alor Gajah, Jasin and Melaka Tengah). User can click on the hotspot which is label 'H' inside the map.



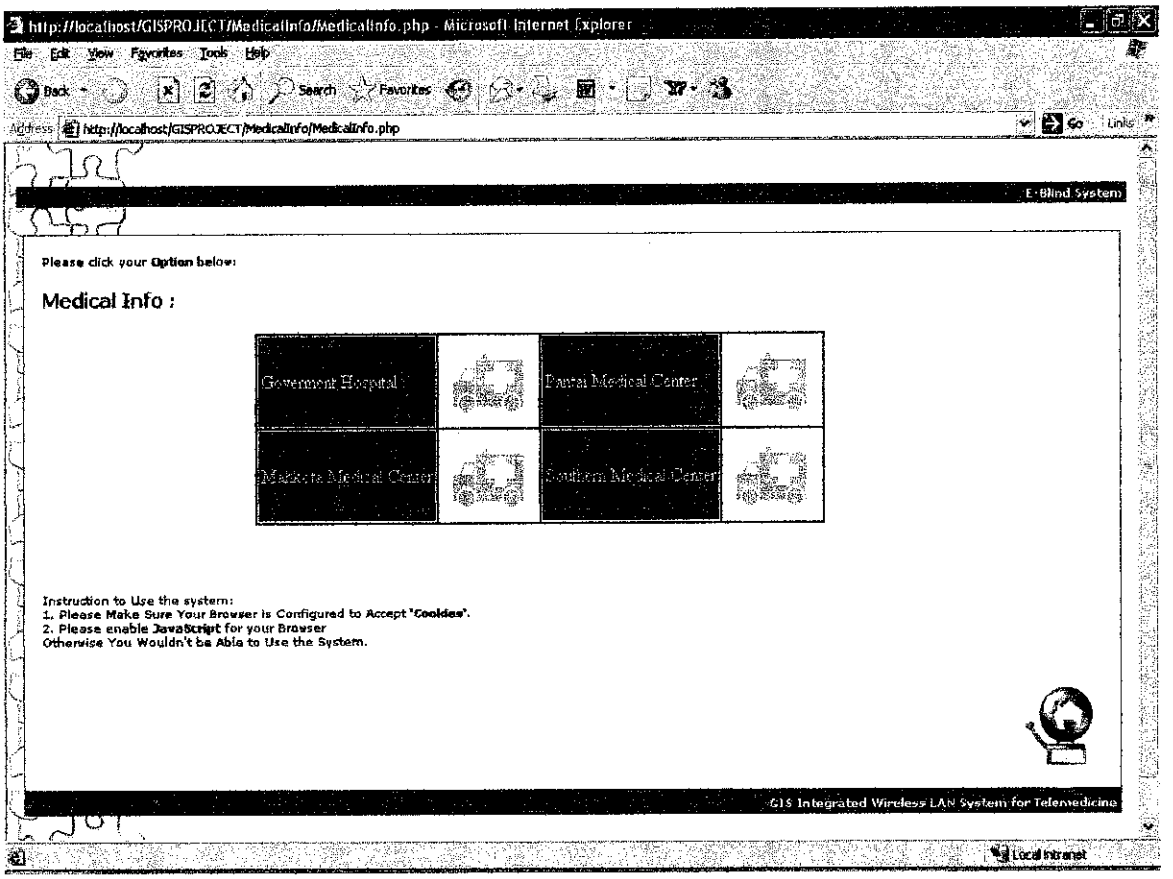
12) Here shown the pop-up script that occurs when you click on one of the label or icon "H" inside the map. The details and data of particular medical center would be shown and if you click to row of route display on the pop-up you would get some useful info from different port of destination.

6.2.2 Coverage Map

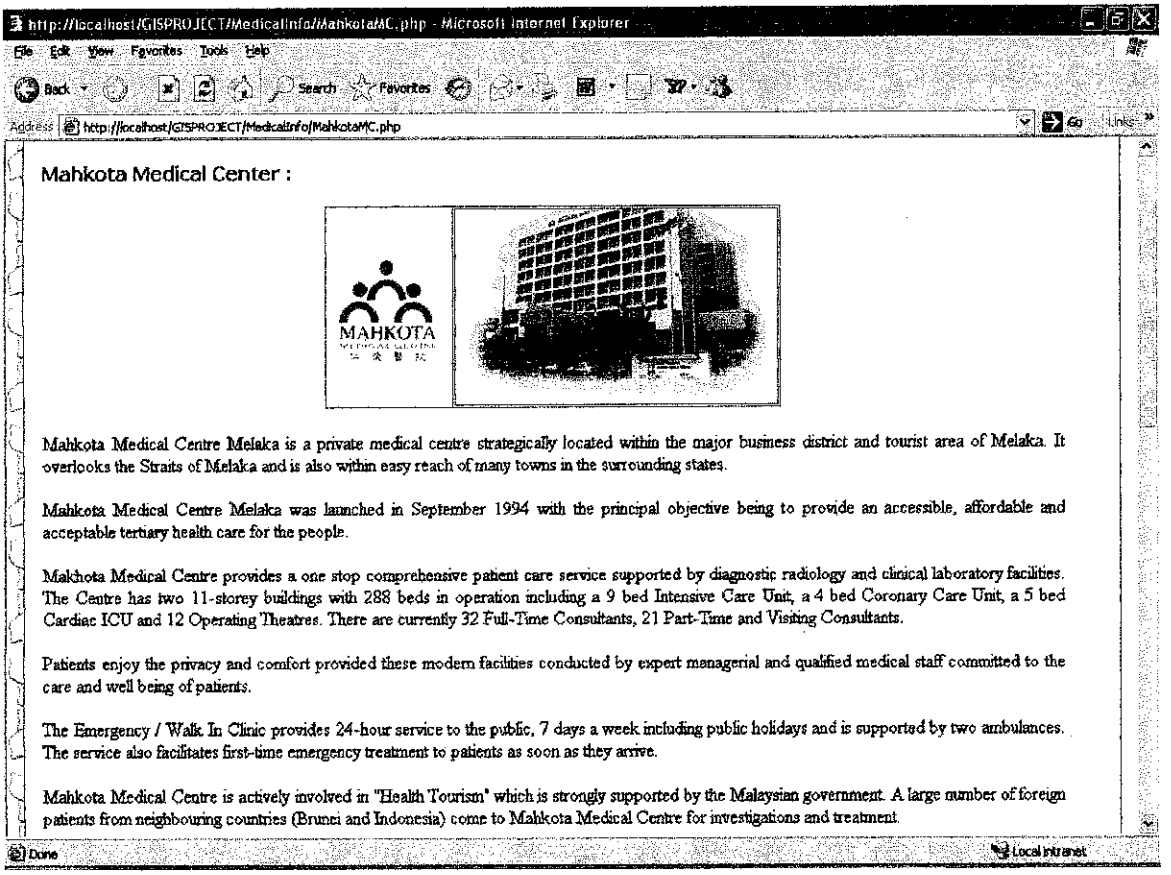


13)This is where the coverage map would be placed and it would describe the coverage of researched base station located around Malacca. Use can view each base station by click on the text.

6.2.3 Medical Info

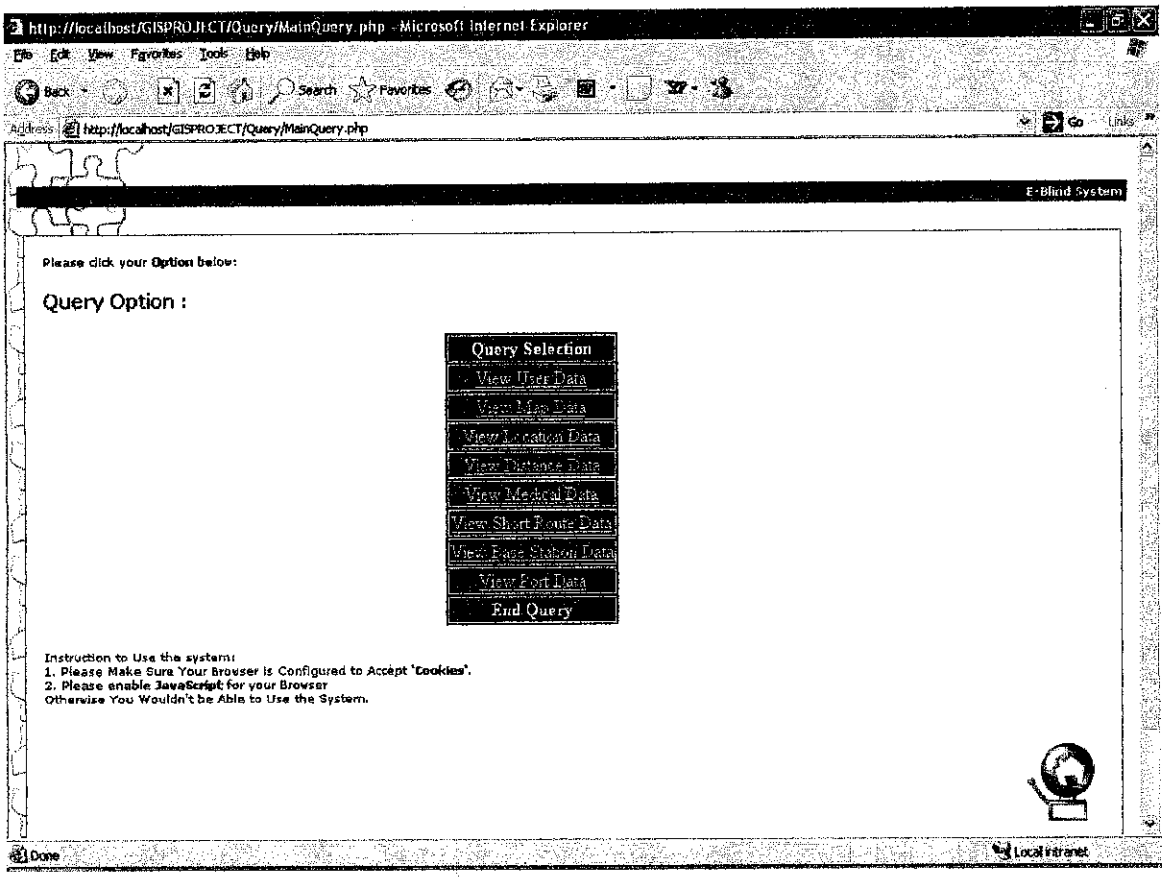


14) Here is the part where the system could give an appropriate knowledge of chosen medical center that provides best and most preferable by any patient surveyed around Malacca.

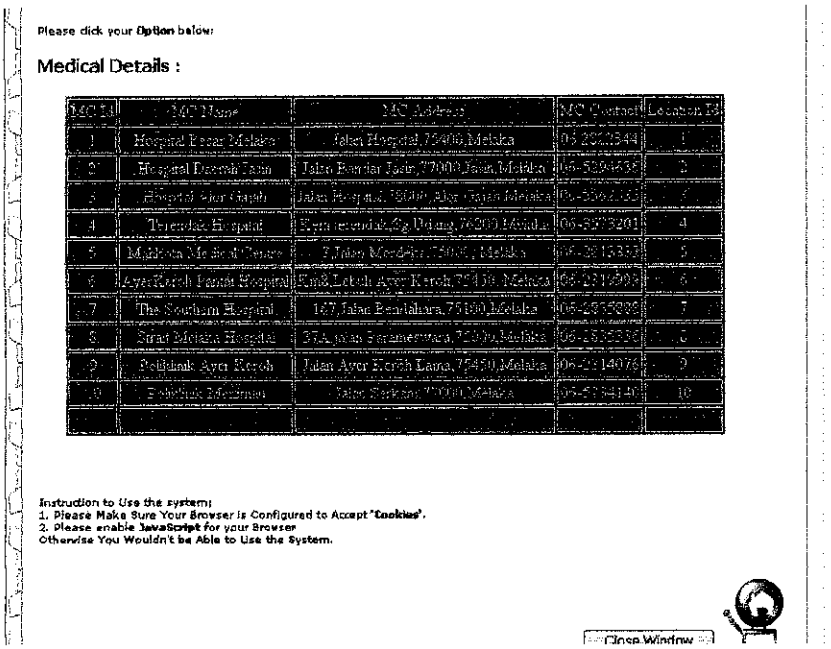


15)Here is the example when you click one of the four icons on medical info page.

6.2.4 Query Page

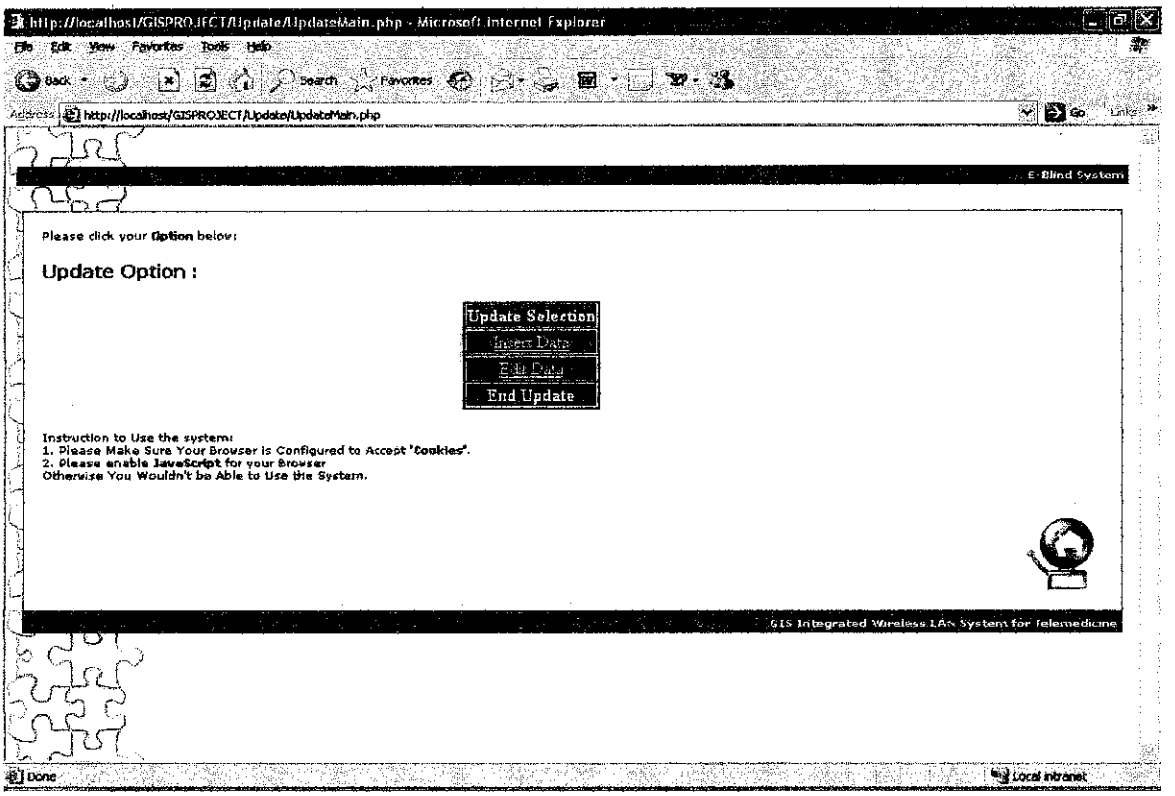


16)Here is the query page for viewing all table information.

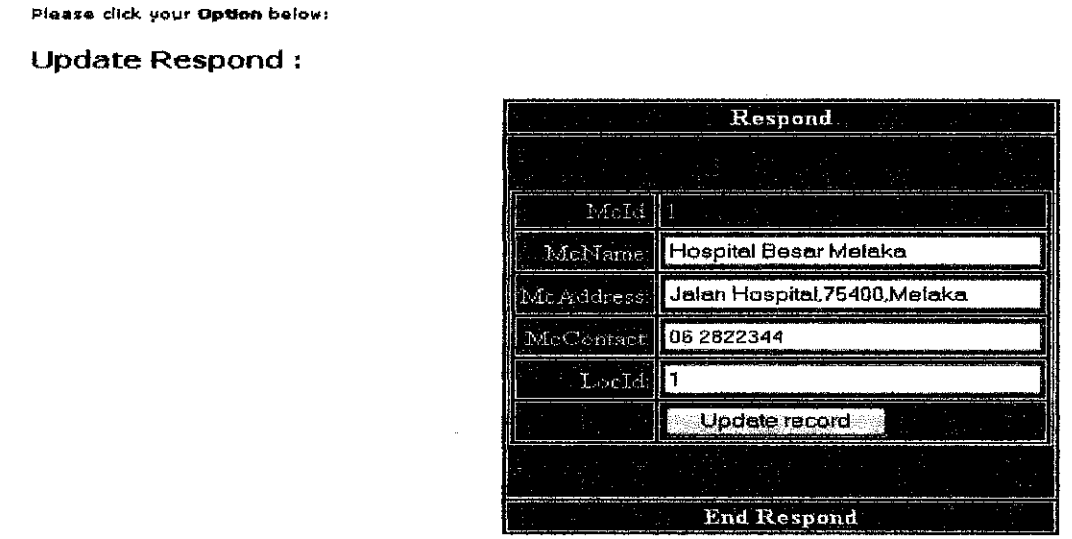


Example of Medical Centre query

6.2.5 Update Page

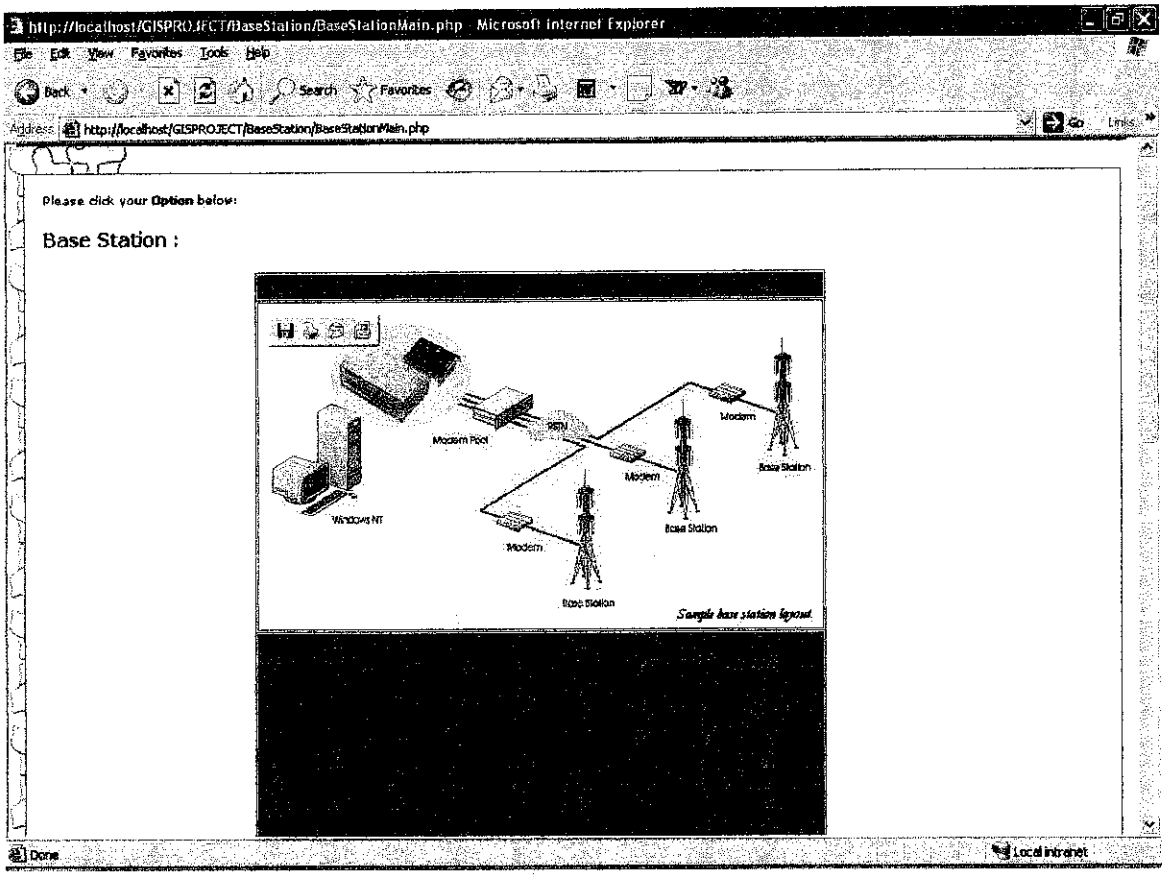


17) Here is the update main page that consists of two options that is inserting and editing function.

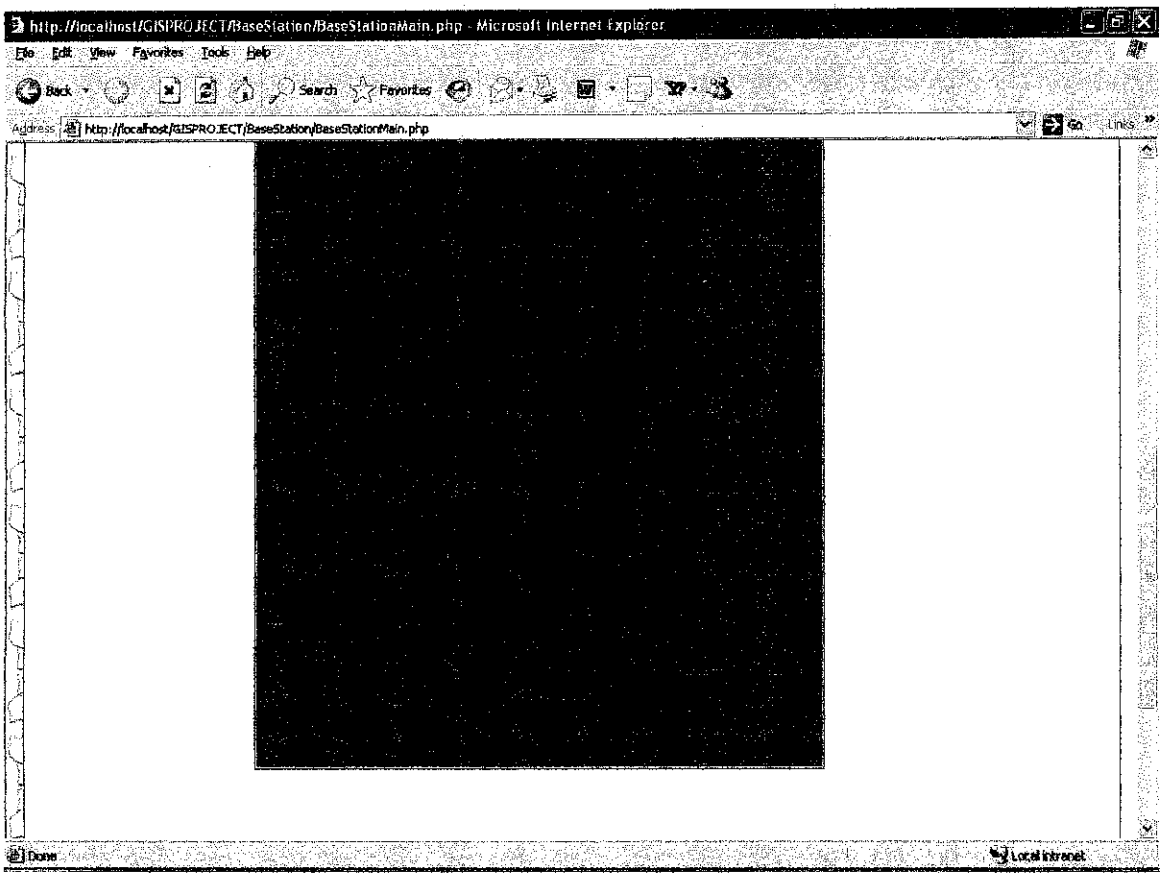


Example of updating Medical Centre

6.2.6 Base Station

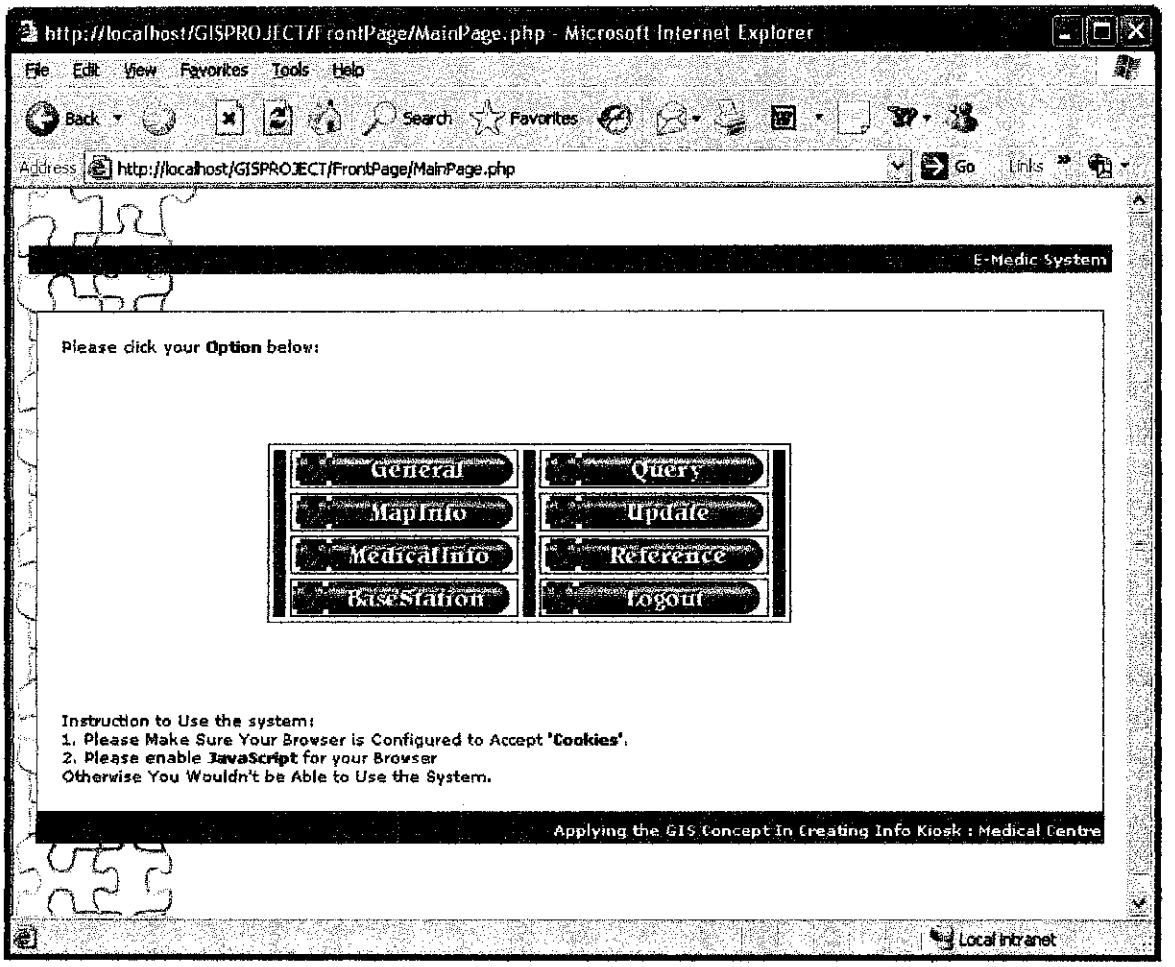


18) Knowledge about base station.



19) Ending page of base station.

6.2.7 Log out



20) The logout button functions to log out from the system back to the login page as an easy way to exit the system.

RECOMMENDATION

The following are the list of recommendation for Applying GIS Concept In Creating Info Kiosk: Medical Centre :

- Stability The system must be stored in a secured and stable web server to provide continues user connectivity and interoperability
- Maintenance the hard and software components must be checked and service regularly. Anti-virus software must be installed to prevent system breakdown due to virus attack
- Security Measures must be taken to ensure the system at high security level. The management also has to sure that only authorized user is allowed to access and modify the data by using access authorization. All information and special data process must be well protected from intruders.

FUTURE ENHANCEMENT

The developer intent to improve on every aspect of this system from the interface appearance, and functionality right down to interactivity of the web site and for enable the sharing of ideas. Views, comments and opinion from the users, forum and guestbook section can be introduce.

Finally, for most significant enhancement there would also suggested the information sharing features by introducing the connection to GIS spatial data provider around the globe. This would blend well with the GIS concept information sharing without boundary.

Furthermore, Global Positioning System can be introducing in the case to detect automatically where the user is situated. By using this GPS, the operator that using the website can automatically know without asking where is the people at that moment.

CONCLUSION

As far as concern, there is nobody has established and develops the system in Malaysia. Beside in the world only a small group of country has tried to develop and established it using different way and method but it still under research levels. Efficient and effective approaches are used in the process of developing this project to make sure that the Applying GIS Concept in Creating Info Kiosk : Medical Centre is success.

The system consists of web-based GIS application services provide better and easy to use map allocating site for medical center. Besides that the system help to display the possible assumption in term of the nearest health care center to the allocated request user. As a result this system will help a lot of people to have almost the better and faster gained information as geography matter solution.

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