A WEB BASED HEALTHCARE MANAGEMENT SYSTEM

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"Don't afraid to walk slowly,

but be afraid when you stand still"

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Project Overview – An Abstract

The project generally involve around the basic information about medical, health, drugs and diseases. This kind of information is vital yet has a very limited access.

The tradition that when we get sick, then we go to see doctor and ate whatever medicine that the doctor gave, well, does not apply here anymore. People should know at least a simple thing about their health or medical status. They should know what they eat, what cause the illness or how to prevent it. This is possible as the system targets on medical students and the public to make the system useful and helpful to them. The database section is thought the best part for the user as it gives the exact idea of possible ailment. Medical student who wants a fast accurate data on symptoms, drugs or herbs can use the databases as their best platform to search for what they are looking for.

So, education and knowledge are the two main keys to the existence of this project. It hopes to be a mechanism to disseminate a well informative, educative, fast and accurate data. Articles, discovery updates and medical information; and links to various informational sites are expected to help people learn be more inquisitive and educated. All the information can be access at any time as it is online which packed with endless information from around the globe. The system also has been designed to be user-friendly system that allow user interactivity.

There also are discussions on taboo issues like sexuality (child pornography) and marriage. It is to help people understand the whole concept, for not being

prejudiced towards those issues as they have their own pros and cons. Users will be encouraged to voice out their view to make the discussion interesting and mature. This is where Forum section comes.

In order to inject some consciousness to the people, morality issues on medical field also will be brought forward. The system aimed to make the public get the accurate idea and understand the right concept about the right things. Do doctors have the right to undergo euthanasia on patient that asks them to do so? Do we degrade the status of human kind by allowing human cloning? Questions like these often make us think whether it's right or wrong. And there is always a room for discussion.

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INTRODUCTION

1.0 INTRODUCTION

1.1 Project definition

When we talked about medical information, we would think doctors or clinics. Then appears in our mind lots of our money flowing to this people. In other words, it is expensive to get medical information, even a simple one. Well, people might say, we have books or magazines to refer, but how long do we have to rely on this costly material to get a simple fact of our own humankind. If we refer to these books for instance, do we get the whole concept of what are looking for? Do we understand all the terms and issues brought forward in the book? Some more, we don't have fast links to other related or similar facts that we want to know. There cannot be one complete book on medicine. The field is too broad and interconnected to be explained in one book. Books we usually found discussed only limited things with limited relevancy to others.

Then some people would say it is already an expensive field and only those selected people can achieve up to that stage, to be a doctor or a specialist. So they charged us with high cost when we go to get advise from them. Surely we cannot deny that, but don't we have the right to have a better living and choice?

Generally, the information we gained in everyday life from experiences, past knowledge or rumours are inaccurate and incomplete. We often tend to get different ideas or concepts of things in so many fields. That would make our sense of believing understand the wrong thing and put our knowledge at waste. Indirectly, it makes our mind static and others with better access to medical information will leave us behind.

People need to have other source of information where they can have what they want to know at minimal cost or even free. A place that gives all the information and related matters on what they looking for, like endless facts, pictures graphics, sounds or videos.

People change in time and they have become more open minded nowadays. This includes in discussing sensitive or critical issues like sexuality, euthanasia, human cloning or in vitro pregnancy. What is more important, they need to be educated and to be well informed about these things. What we are facing today is that we don't have adequate sources to it.

1.2 Objective of the system

Health always comes first in our day life and ironically we seldom seek further information about it until we somehow get sick or injured. Ignorant is not the right word to describe this phenomenon. It just we were too neglected to the matter and take it for granted.

- Disseminating information

The main purpose of this system is to give the real current information generally about health, diseases, drugs and family planning to people. What is more important is to make sure all the information needed is well received, fast, accurate and of course in a cheap way.

- Fast and accurate data

Usually we will refer to books, which we think the fastest and the best source, when curiosity hits us about certain matter. But, do we always understand the whole concept and idea by just reading books? There's nobody to ask or just to make sure the accuracy of the facts. Some more, books or magazine can be very costly and troublesome to get.

- Availability of data

Well, the system is to quench the thirst of those with loaded curiosity. To make it easy to learn anything as all of the information is just at their fingertips. With few clicks and typing, user might discover more than they can imagine. As the system is on the web it is available all the time, 24 hours a day and it's free.

- User friendly system

The system is expected to be user friendly with nice graphed screens and readable fonts. The informative aspect is well considered as well as attractiveness of the screens. It will be carefully programmed to make sure novice users have all the directions and information on what to do when they get into the system.

- Links of information

This system is also expected to have useful links to other related sites on the Net. It is to make sure users have the chance to get unremitting information of what they want to know. They don't have to open many windows for just to search about one thing.

1.3 The Project Scope

The system is mostly focus on medical students though it doesn't have absolute indication on saying that. The fast, interconnected, useful and accurate medical information muchly available on the system with easy access. The diagnostic section, diseases dictionary and drugs vocabulary might help the student to get essential information faster than looking on books.

However, in general, the system is for everybody. Those with inquisitive mind and anchored with pack of curiosity might found the system useful and interesting. It is to educate people that are matter most for the developer. Knowing that our society has a very little knowledge on what has big impact on life which is truly important, it is kind of accountability to develop a system like this. The taboo issue section might give the public a whole new idea and might bring great reaction from them and that's good.

Those with information seeker instinct might found the links with according field very useful. Apart from the system, people have the opportunity to discover other related and useful domains and get more information.

As on the system side, there will be certain things in the system that cannot be explained in details and this is one of the system's limitations. One of the main objectives of the system is make sure people understand the concept and idea of what being brought up. In medical field, many things need to be practically done, in order for us to understand. This kind of thing will be just briefly discussed or mentioned.

People will be told to follow up to certain links on the web or just go straight to medical expertise for further information.

1.4 Project limitation

The system cannot be a perfect system as the current online systems. Time frame given to build it is too short and it is quite an impossible thing to make it the excellent one. All the possible limitations need to be understand, so we know what to expect when it is built later.

The limitations are:

- Information with limited access

  It is important to bear in mind that healthcare and medical field is a really wide field. It has many other related subsections under the major subject we often heard. For example, *anastomosis* is a procedure in vasectomy operation, which is a subject to prevent the ejaculation of sperm while intercourse. Things like this are interconnected one by one and to cover it entirely will take a long time. However, all of the information will be upgraded and added by time to time.

- Limited interactivity

Among the example of interactivity that can be seen on the system is the diagnosis part. User will get response when they click certain area of what they want to get a check up. But the interactivity aspect in the system is quite limited, as time given to build a strong JavaScript/VB Script is very limited. To have the script for an interactive object needs a thorough work and the time to do it is limited.

- Limited links

  More time is needed to do a detail selection on a well dependable links to certain section. For instance, the Service Section. The information on a few healthcare organizations or hospitals is hard to analyze on how good they work online. So, a really good links is a bit difficult to get. But this insufficiency is will be corrected as the links will be selected back after a detail analysis is done.

- Limited issue of discussion

  The time shortage to make few things possible is the major hurdle of this project. This includes on having a good, well selected and shortlist taboo issues that want to present to the public. This aspect is essential, as it is the center of user's attraction on the site when they first log on to the page. The issues need to be informative, interesting and can pull user's attention.

- System design

  It is an important thing to understand that the system design is a subject to change in the future. The enhancement of its functionality and attractiveness is vital as people might tend to get bore when being serve the same kind of thing for long period of time.

LITERATURE REVIEW

2.0 LITERATURE REVIEW

2.1 Finding

In search of useful, informative and firm requirements, the finding of all the information must cover broad areas of fields. It also must have a strong relevancy in what being discussed. It is important enough to avoid any information repetition and eventually put on redundancy. The society deserved a thorough and fair knowledge in order for them to learn as many things as possible in a short of time. It is quite a sad thing when the information brought up is less efficient or can make people bored when we stand up for quantity, not quality.

Therefore the findings of these information come from books, magazines, Internet and surveys are well thought and comprehensive. Here is a simple and informative synopsis of those findings:

2.1.1 Books

1. Parasitologi Asas – Kaedah Diagnosis Protozoa dan Helmint Manusia
   by Arbain Kadri.

   This book written specifically to show the usual methods in diagnosis Protozoa and Helmint protozoa. The author has covered all the aspects about the parasites diagnostic which often done in lab. Among others, it exposes the parasite diagnostic methods like preparation and examination of blood/feces and concentration techniques. The author hopes the book will help students in medical

fields and those that involved in parasite diagnostic to improve and learn about the subject.

2. Microbiology – 700 Questions & Answers

   by Charles W. Kim

   This book is designed to give a thorough review of medical microbiology with exam-style questions and explanatory references to major texts. All aspects of microbiology are covered, including basic mechanisms of microbial physiology and immunology, pathogenic bacteriology, virology, medical mycology and medical Parasitology. A section devoted to a review of the infections diseases caused by microorganisms, fungi and parasites is also included.

3. Parasitology

   by K. Chandra Shekar

   This book comes in 3 volumes – problems, Helminth and Medical Ethomology and systemic or clinical Parasitology. Each topic is subdivided into various disciplines. The students hope to gauge their proficiency in the subjects, which covered both exhaustive and in-depth.

2.1.2 Internet

Information found in the Internet is diverse, ample and informative. In order to make better understanding on this field, few websites has been selected and examined.

It has its own good and bad of cause but this site has received few recognition from their achievement to educate people in their creative informing techniques. The detail review of each site will be discussed in later section.

All of information and data from these websites give ideas and whole concept of what a health care website should have. It shows many things like how the section should be divided, what have the most important relevancy to human health and issues that should be taught to the people. Usually, people take common ailment like cold and fever for granted. They didn't know that with these simple things, sometimes it might cause a serious problem in unexpected way.

The databases for certain diseases and conditions also are being shown. The subsections and hierarchy of system flow also learned. There are many links to other websites that have the similar or related subject too. These links are essential for information seekers to gather and expose to all kind of related data of what he or she is looking for.

2.2 Analysis

Analysis is an early step to know the existence of project requirement specification. Few websites that had been chosen were thoroughly analyzed to point out their good and bad. All of the advantages and disadvantages are very important, as it is the main indicator the development of good system and databases.

- www.healthweb.org

This website links to specific, evaluated information resources on the World Wide Web selected by libraries and information professionals at leading academic medical center in the Midwest. Selection emphasizes quality information aimed at assisting health care professionals as well as consumers in meeting their health information needs. The objective of this site is to develop an interface, which will provide organized access to evaluated non-commercial, health related, and Internet access resources. The resources will include those currently available as well as new resources developed in collaboration with other organizations. The interface will integrate educational information so the user has a one-stop entry point to learn skills and use material relevant to their discipline.

This website has earned many recognition for its outstanding achievement in fulfilling the information needs. Among others:

1. Reference Site for April 1999 from Library Spot of the Month
2. Award for Achievement in Health Information Management from Medical Library Association.
3. Award for Medical Excellence from E-Medical Online, Inc
4. Clean Bill of Health Award from Hardin MD.

After done a simple yet thorough analysis on this site, a well thought advantages and disadvantages are as follows:

Advantages

- Well-selected information

  It is true on what is said in the objective of this website. The information gathered through the links is accurate and describe in details.

- Simple interface

  For the purpose of neatness and minimalist, the interface is organized and simple. Maybe the developer wants a change in the interface that varies from the regular websites on the Net where always stuck with stuffy graphics and icons.

- Summarize of websites

  This is the only websites that have the highest relevancy in much needed medical related information with well-selected links and information. One of the purpose is to avoid junk websites where exposes wrong information and informatively immoral.

Disadvantages

- Unattractive interface

  Though the main purpose is to have a neat interface, but if too simple it may cause a slight bore to people. The next time they might jump to sites with more graphics and icon. There are only two font colors, which is dull and static. People nowadays want more vibrant interface.

- No search engine section

  Search engine is a vital thing in certain websites. If people with no experience in medical field and looking for something he doesn't sure of, he must expect a search engine in the first interface. Here, we have none and that's not good.

- No directions

  This site have limited and non-descriptive sections. For novice information seekers, the already have sections are unhelpful and limited. They need something with more directions and know where to go. A broad and informative yet descriptive section is much in need.

- www.accenthealth.com

Though not many information known about this company, it provides a well diverse field of information. The medical and health criteria are well organized and documented in 11 wide sections. The sections covered Healthy Lifestyles, Nutrition, Women's Health, Men's Health, Children's Health, 50's & Beyond, Complementary Health, Mental Health, Shop!, Cool Tools, Newsletter, Message Boards, Contact Us and Help. Generally, it covered all domains of what is much needed from the public.

Apart from that, this site also has sections for key-in databases for user to search anything they want to know. It covered drugs, diseases, herbs, medical procedures, health topics and ailment conditions that are absolutely intelligent and organized. The search engines for Search Our Site also good and fast. Glad to say that this website is almost make it to development perfection.

After done a simple yet thorough analysis on this site, a well-thought advantages and disadvantages are as follows:

Advantages:

- Variety of sections

  This is the most prominent touchstone of this site. All the sections are well diverse and cover their own way of giving intact information. The division and selected of criteria is good.

- Attractive interface

  The selected colors in the first interface are nice and not too diverse. The division of area to be colored is well thought and accurate. Meanwhile, simple and fit-in graphics placed in the right and strategic places in the interface. It is not too big or too small, not too many or too less, or not too 'creative' or not too dull. The interface also has a good size of fonts. The developer knows where to plan the right kind and the right size of fonts to be included.

- Good database

  Among other selected databases is the ailment conditions database, drugs database and herbs index database. Every box of shown database has a list of categories that is related. From the categories, there have many more details on numerous matters waiting for user to click. What is more important, there aren't any data redundancy and all the information are accurate.

- Good diagnostic sections

  It covered almost all kind of diseases and ailment symptoms. It explained about the matter thoroughly and gives extra information on the subject. The drugs database also has a good standard.

Disadvantages:

- Stuffy interface

  On the first glance, the interface has too many things in one page and it is not good. Though it is attractive, it is still considered stuffy on the second glance. The developer should not have done this, fitting every bit of information in one place. It might be better with less small sections.

- Uninformative links

  The links listed are not up to satisfaction in finding certain information or data. This criterion is judged by information similarity, familiarity and relatedness.

- http://onhealth.com

Though it has 10 sections all together but the division of each section is not that good. It covered sections like Diseases & Conditions, Women, Family, Baby, Alternative, Lifestyle, Food & Fitness, Library, Community and Shopping. Every section except Diseases & Condition has two or three subsections with certain related title.

After done a simple yet thorough analysis on this site, a well-thought advantages and disadvantages are as follows:

Advantages:

- Cover alternative drugs like herbs

  This site served a good herbs index apart from the already have drugs database. The list of herbs (through alphabetical index) has many materials and details like you never heard of.

- Discussed good lifestyle issues

  The board of discussion is good and informative. They have also certain life guides and advise for developing a better human life and civilization. The subject of discussion is well selected and fair.

- Have online chat room

  If user have the time and want to seek anything (information, knowledge, advise, friend, experience, etc) from the people around the world, they can use the chat room. It works as a medium to bring together people for discussion and views changing venue. It is an effective way of communication.

- Have good consultation

  Though not all section has the opportunity to have this facility, but it is already good enough. The sections are Women, Alternative and Food & Fitness. Any question can be e-mailed and it will be answered by the recognized medical experts in a short period of time.

- Good database

  The drugs database and ailment condition database is good. It covered ample area with organized and accurate information.

Disadvantages

- Uninformative links

  The links listed are not up to satisfaction in finding certain information or data. This criterion is judged by information similarity, familiarity and relatedness.

2.3 Synthesis

All the disadvantages found in the analyzed websites can be improved and upgraded. It is mostly involved in the design process that need to be emphasizes in certain aspects, intelligently. Here is little suggestion that most probably will be instilled in the exact system later:

- Good interface design

  The overall design or outlook is vital. People use to judge or impress by something on their first glance. Three most influence factors for an interface is color, font size and graphic. To make the interface looks good; it must have a suitable color to what the page is all about. If we think health, we will think peace, calmness and sweet serenity. The colors like light yellow and navy blue are just fit and nice to fill the screen. It of course must be simple and has good match. The basic is, there cannot be more than four or five separate colors in a window and no more than seven

in a system interface. It should be used selectively and consistently. Color can improve user interfaces by helping users understand and manage complexity.

One more factor is the font size. If the page only has one size of font, it surely looks dull and dim. So, a good interface must few types of font with different sizes. It depends on how much stress we to give upon the word or subject. The basic size is 10. Usually, developer will make the font bold to stress that it is important and make it italic to inform it has double meaning. This is something common and logic to do. The font size must fit in the columns, let say in the section area. Good designs of font are Times New Roman and Comic Sans MS. Page with fewer graphic is better.

Sometimes, very large amounts of information must be visualized graphically if they are to be meaningful. Graphics or icon usage is a way of exposing relationships, which are not obvious from the raw data. For instance, the diagnostic section where few things need to be explained by pictures. Only important and suitable icon should be added to mark the meaning and attractiveness of the subject or section.

- Good division of sections

Healthcare and medical field is interconnected with a very broad coverage area. Thus, there are many sections that need to be cover in the web page. One of the disadvantages of current system is pack with sections that make it look stuffy. So, the expected system thought to have few major sections with many subsections under it. So it looks better for the interface. User only may see the subsection when they click on the major section that they

are interested. By doing this, the spaces left can be filled with other interesting information or cool graphics. It might looks neat, attractive and not stuffy.

- Database

The database is the most important thing as it is the heart of the system. It is the reason of the existent of the project. Basically, there are two main databases, the drug database and conditions/symptoms database. Both the databases will talk about their fields in details with accurate explanation and understandable information. It will of course cover a wide are of healthcare and medical fields. But the best part is all of the information will be carefully analyzed and only the suitable data will be selected.

- Good links

Information evolves through time and we cannot cope it only under one roof. So we need links that can connect us to other informational sites that can explain other things to us. The links will be well selected where it has high relevancy on the subject discussed before. There is no such thing as junk sites that link to the links.

- ToolTips

This is a small functionality that the system has. When user place the cursor on certain text or icon, a small box that describes the usage of the mark will appear. This will enhance user understanding on the text or icon before they can further click on the right information that they want.

- Easy and fast downloading

  Most of pages in the system or the website have less graphics or pictures. Only important and relevant graphics will be placed on the system and that's will cover a small size of files. So, it is easy to download the page as most of it is only text-contained.

- User interactivity

  This one important criteria that can make the system better. So, the diagnostic section will have small icon that will interact with user. Though it is little, it is thought the best function for the moment.

- Value added service

  The system developed with the objective to give something to the public. Whether it helps finding their needed information or to give advises on what can be done to solve their curiosity. So, the system comes up with an alternative section that gives links and line to make way in certain area like link health insurance companies or to hospitals that offer related service to the one user is looking for. This is indispensable to the public.

- Hits counted function

  This function will tell the user how many visitors had visited the site. It is important to know how often the site has win to get public attention. Any analysis upon the site's popularity or usability to the public will be easily done.

- User guidance

  This part is for the novice user. The direction and guidance to browse over the website will be explained through the system documentation. The messages produced by the system are in response to user actions.

- Error messages

  When users commit any mistake and the system fail to response, an error will be displayed. It will tell user what to do or give options where to go. The error messages will be polite, concise, consistent and constructive. It will not sound abusive or have associated beeps or other noises, which might embarrass the user.

2.4 Summarization

Most of the literature surveys done by surfing the Internet. The idea and design of the interface are wise to say influenced from the current online system. All of the three systems that being analyzed, were almost to perfection if we look on their requirement needs and database design. What we can say more, when these sites have found other's professional recognition worldwide. But, we hope that the new oncoming system is more *malaysianized* which targeting on our own people. It is from Malaysia to Malaysians with all the 'ingredients' are from own Malaysians. The system will have more local issues like traditional herbs, medical success in the

country, taboo issues like sexuality and domestic abusing, and links to local welfare organization.

Reviews from the Internet also give broad idea and perception on types of section that is compulsory or optional to the new system. The selected information within each section on the sites which explain bit by bit about certain subject also gives the precise idea on what to be explained and what need to be stressed out in the system that going to be developed.

Apart from the Internet, the few books that talk about few medical things also being analyzed to get enough understanding about certain healthcare and medical matters. The interview with few medical students did help on collecting requirement specifications. Their opinions are vital; as they are among the group of people that in the system target. The system hopes to be useful to the undergraduates undergoing the medical course.

All the advantages and disadvantages of the three websites have been carefully analyzed and the problems or insufficient found have been synthesized. This will explain the objective of the new system, to overcome the 'leak' and 'lack' of the current online system.

METHODOLOGY

3.0 METHODOLOGY

3.1 Planning.

3.1.1 The Internet An Overview

In the last few years, the Internet has become one of the most discussed computer technologies. Everyday we hear about its content, its future, and how we have to get access to it. Businesses are scrambling to work their presence on 'the Net'. And for individuals and educational institutions, the Internet has become the 'thing' to be on. If it were to continue growing at the current rate, the entire population of the world would be on the Internet by 2004. Calling it a 'network of networks' would be true if it struck to its origin as ARPANET and NSFNET. But the Internet has become something greater than the sum of its connections. Certainly no one could have predicted how it's more from a military computer network to a public and commercial network would affect the way we think about information and communication.

3.1.1.1 The structure of the Internet

If the Internet were to be defined strictly in terms on how it is put together, then calling it a 'network of networks' would be appropriate. Another way to understand the Internet is to see it as layers of networks that increase the amount of connectivity as you move up to higher level; which the number of networks that can be directly accessed raises. The starting point for everyone on the Internet is an Internet Service Provider (ISP). An ISP can be a commercial provider, a corporate computer network, a school, college, university, or the government. Some users may be connected on a LAN, some may get access using modem and a SLIP or PPP connections; and some may have access to a mainframe computer shell account using

a modem. All ISPs are connected to the Internet through other ISPs. On the lowest layer, one local ISP is connected to another local ISP.

On the next level are the ISPs that are the access points to regional backbone network. These networks cover specific areas: usually states or provinces. Most local ISPs will be connected to these regional access points. At the next level are the national backbone access points that are connected to regional access points or local ISPs. Finally, the access points of one country's national backbone network are connected to the access points of another country's national backbone, thereby making the Internet an international network.

3.1.1.2 Routers and TCP/IP

How a request finds its way to the right site and how that information finds its way to request is determined by two elements: routers and TCP/IP protocols. Routers (also referred to as gateway) are like telephone operators. They connect one network to one or more other networks. They also have routing tables that determine how information from a network should be sent through the Internet. Routers have an IP address for each link. When a packet arrives at an IP router, the router decides where to send it next. The way that a router makes its decision can vary. Some simply send packets in a set sequence. Some randomly alternate the routers by which they send a packet. More sophisticated system measures the traffic and send packets through the least busy lines.

The secret brew that makes the Internet work is the TCP/IP set of protocols. The Transmission Control Protocol (TCP) and the Internet Protocol (IP) are the main

components of the Internet, and a part of the Internet's growth is due to their compatibility with so many networking technologies, computers and operating systems. IP is the components that move packets of data from one node to another. The TCP component is what verifies the delivery of data from your computer to another computer. IP assigns a unique IP address to every networked computer in the world. This address identifies both the network on and the computer. It is made up of four numbers separated by periods.

There are three classes of IP address. Class A addresses use the first number to identify the network and the last three number to identify the computer. Class B addresses uses the first two numbers to identify the network and the last two numbers to identify the machine. Class C addresses (the most common one available) uses the first three numbers to identify the network and only the last number to identify the computer. An IP class is related to the number of computers on a network. Since it is easier to remember a name rather than a number, the Internet allows the use of a Domain name. Domain Name Services (DNS) is a database of domain names that determines the IP address of the data's destination. All domain names are registered with a National Domain Register or with InterNIC Registration Services.

3.1.1.3 What is HTTP?

The Hypertext Transfer Protocol (HTTP) is the foundation protocol of the World Wide Web (WWW) and can be used in any client/server applications involving hypertext. The data transferred by the protocol can be plain text, hypertext, audio, images, or any internet-accessible information.

Essential concepts that are part of HTTP include the idea that files can contain references to the other files whose selection will elicit additional transfer request. Any web server machine contains, in addition to the HTML and other files it can serve, on HTTP daemon, the program that is designed to want for HTTP request and handle then when they arrive. The web browser is an HTTP client, sending requests to server machines. When the web browser user enters file requests the browser builds on HTTP request and sends it to the Internet protocol address indicated by the URL (Uniform Resource Locator). The HTTP daemon in the destination server machine receives the request and, after any necessary processing, the requested file is returned.

3.1.1.4 What is FTP?

FTP (File Transfer Protocol), a standard protocol, is the simplest way to exchange files between computers on the Internet. Like the HTTP, which transfers displayable web pages and related files, FTP is an application protocol that uses the Internet TCP/IP protocols. FTP commonly is used to transfer web page files from their creator to the computer that acts as their server for everyone on the Internet. It is also commonly used to download programs and other files to your computer from other servers.

The web browsers can make FTP requests to download programs as well as to update (delete, rename, move and copy) files at the server.

3.1.1.5 What is Intranet?

A web site or series of web sites that belong to an organization. Only the organization's members can access it. Many corporations use an Intranet rather than

the Internet, to offer their employees easy access to corporate information, which preventing outside access to that data. In simple terms, the Intranet is the descriptive term being used for the implementation of Internet technologies within a close confinement (eg: a corporate organization), rather than for external connection to the global Internet. It lies behind a firewall, accessible internally by users of a particular organization.

It has all the features of Internet, combining text, graphics, audio and video in exactly the same way to make the information easy to access. Many organizations employ this technology to disseminate information and services throughout the enterprise. This implementation is performed in such a way as to transparently deliver the immense informational resources of an organization to each individual's desktop with minimal cost, time and effort. Lately, Intranets have captured the imagination of a growing number of corporations.

3.1.2 Client/Server computing

The premise of client/server computing is to distribute the execution of a task among multiple processors in a network. Each processor is dedicated to a specific, focused set of subtasks that it performs best, and the end results is increased overall efficiency and effectiveness of the system as a whole. Splitting the execution of tasks between processors is done through a protocol of service requests, one processor, the client, requests a service from another processor, the server. The most prevalent implementation of client/server processing involves separating the user interface portion of an application from the data access portion. On the client, or the front end,

of the typical client/server configuration is a user workstation operating with a Graphical User Interface (GUI) platform, usually Microsoft Windows, Macintosh, or Motif. At the back end of the configuration is a database server, often manage by a UNIX, NetWare or Windows NT.

Client/server computing is the logical extension of modular programming. Modular programming has its fundamental assumption that separation of a large piece of software into its constituent parts (modules) creates the possibility for easier development and better maintainability. Client/server computing takes this step further by recognizing that those modules need not all is executed within the same memory space.

3.1.2.1 Evolution of Client/Server Computing

In the 1970's departmental managers' fond that relying on central mainframe – based application hindered their ability to rapidly respond to business demands. Application development time within the central information system (IS) was too slow and the result was not tailored to the specific needs of adept. Though the deployments of PCs enabled workers have computing power and data at their command and enabled department-level managers to select needed application quickly, this has its drawback. In a pure PC environment, cooperation among users was difficult. Over within a department, there needed a departmental-level database and departmental formatting and data usage standards. The solution to these requirements is departmental-level client/server architecture the success of departmental architecture paved the way for the enterprise-level client/server

computing. The dominant theme for such architecture is the reestablishment of control over data by the central IS organization but in context of a distributed computing system, no one enter the client/server computing concept. Today, the most common type of server is the database server, besides as data storage. It also handles requests and responses from the client.

3.1.2.2 Client/Server Computing Models

Gardner group came out with the five ways of describing the different client/server styles based on hour they split the three components of any application: user interface, business application logic, data management. The five styles are distributed presentation, remote presentation, distributed presentation, remote data management, and distributed data management. Show below is the client/server computing is modeled based from IBM.

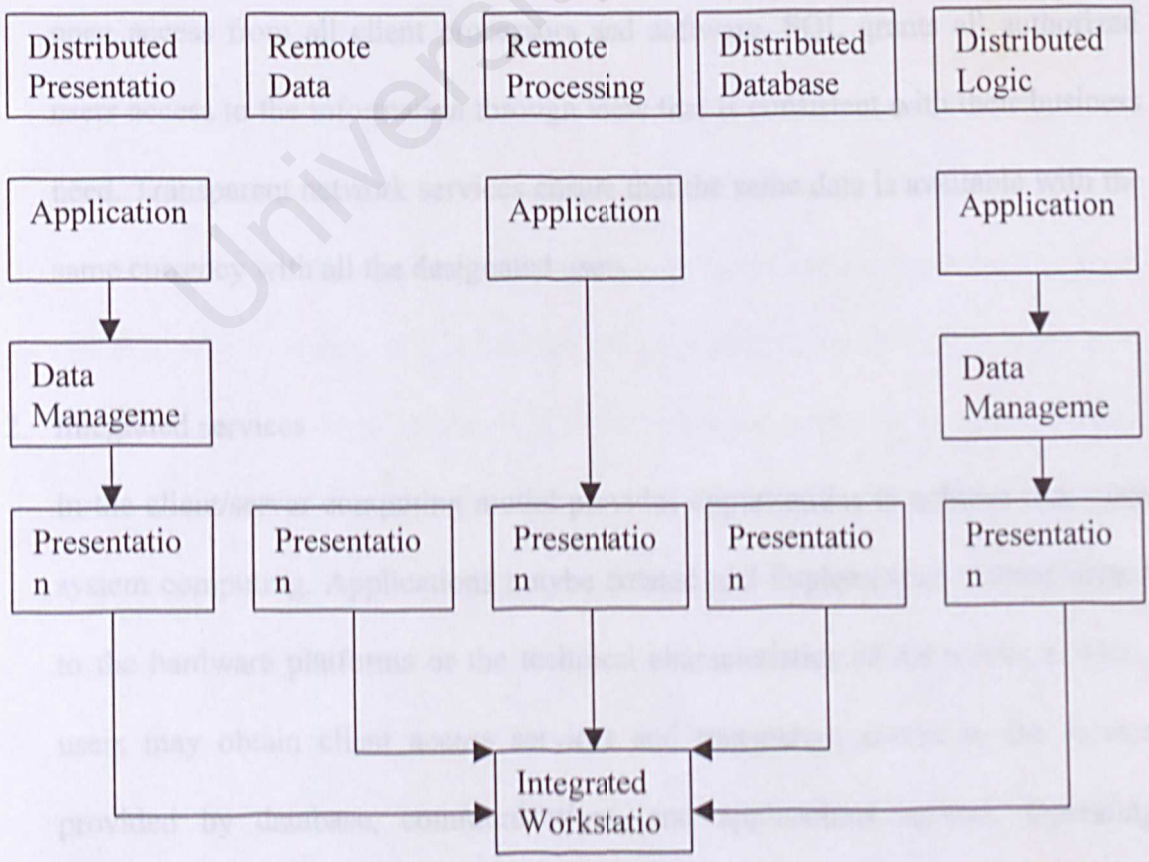


Diagram 1

3.1.2.3 Advantages of Client/Server Computing.

Client/server computing provides the means to integrate personal productivity application for an individual employee or manager with specific business data processing needs to satisfy total information processing requirement for the entire enterprise.

1. Enhanced data sharing

   Data that is collected as part of the normal business process and maintained on a server is immediately available to all authorized users. The use of Structured Query Language (SQL) to define and manipulate the data provides support for open access from all client processors and software. SQL grants all authorized users access to the information through view that is consistent with their business need. Transparent network services ensure that the same data is available with the same currency with all the designated users.

2. Integrated services

   In the client/server computing model provides opportunities to achieve true open system computing. Applications maybe created and implemented without regard to the hardware platforms or the technical characteristics of the software. Thus, users may obtain client access services and transparent access to the service provided by database, communications, and applications servers. Operating

systems software and platform hardware is independent of the application and masked by the development tools used to build the application.

3. Data interchangeability and interoperability

Almost all the development tools used for client/server development expect to reference a back-end database server accessed through SQL. Network services provide transparent connectivity between the client and local or remote servers. Systems developed are finally reading the point at with this heterogeneity will be a feature of all production – class database engine products. Most systems that have been implemented to date use a single target platform for data maintenance. The system development (SDE) and tools must implement the interfaces to the vendor database and OS products. It provides the capability to make ad hoc request for information.

4. Centralized management

As process steers away from the central data center to the remote office and plant workstation server, and local area network (LAN) reliability must approach that provided today by the centrally located mini-and mainframe computers. The most effective way to ensure this is through the provision of monitoring and supports from these same central locations. A combination of technologies that can 'see' the operation of hardware and software on the LAN, monitored by experienced support personnel, which provides the best to achieve the level of reliability requested.

3.1.2.4 Client/server Architecture

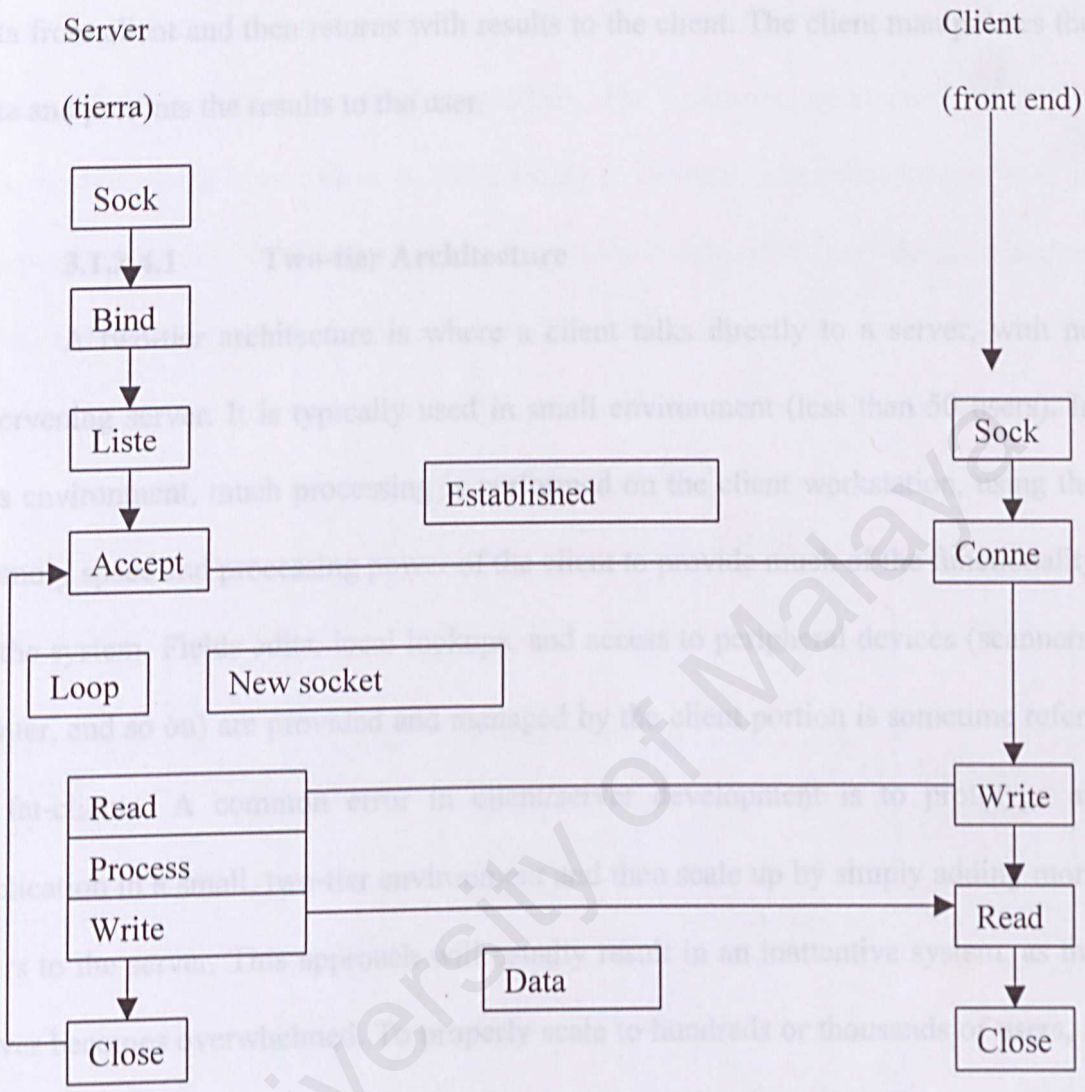


Diagram 2

The client/server architecture has been called the model of computing of the 1990s with this architecture; the calling module becomes the 'client' (that which request a service), and the called module becomes the 'server' (that which provides the service). This is usually result in putting the processing to the user or client machine and the data management and storage server. Depending on the application

and software used, all data processing may occur on the direct or split between the client and the server. The server is connected via a network. Server software accepts data from client and then returns with results to the client. The client manipulates the data and presents the results to the user.

3.1.2.4.1 Two-tier Architecture

A two-tier architecture is where a client talks directly to a server, with no intervening server. It is typically used in small environment (less than 50 users). In this environment, much processing is performed on the client workstation, using the memory space and processing power of the client to provide much of the functionality of the system. Fields edits, local lookups, and access to peripheral devices (scanners, printer, and so on) are provided and managed by the client portion is sometime refers as fat-client. A common error in client/server development is to prototype an application in a small, two-tier environment and then scale up by simply adding more users to the server. This approach will usually result in an inattentive system, as the server becomes overwhelmed. To properly scale to hundreds or thousands of users, it is usually necessary to more to a three-tier architecture.

3.1.2.4.2 Three and Multi-tiers Architecture

A three-tier architecture introduces a server (or an 'agent') between the client and the server. The role of the agent is manifold. It can provides translation services (as in adapting a legacy application on a mainframe to a client/server environment), metering services (as in acting as a transaction monitor to limit the number of simultaneous request to given server), or intelligent agent services (as mapping a

request number of different servers, collating the results, and returning a single response to the client). The movement from two-tier architecture to three-tier or multi-tier is due to the needs for a scalable and maintainable system and the wide variety of clients within a large organization. The multi-tier architecture as shown below, each of the major piece o functionality is isolated. The presentation layer is independent of the business logic, which in turn, is separated from the data access layer. This model requires much more analysis and design on the front end, but the dividends in reduced maintenance and greater flexibility pays off. This model exhibits a much thinner client by bringing some processing tasks back to the server.

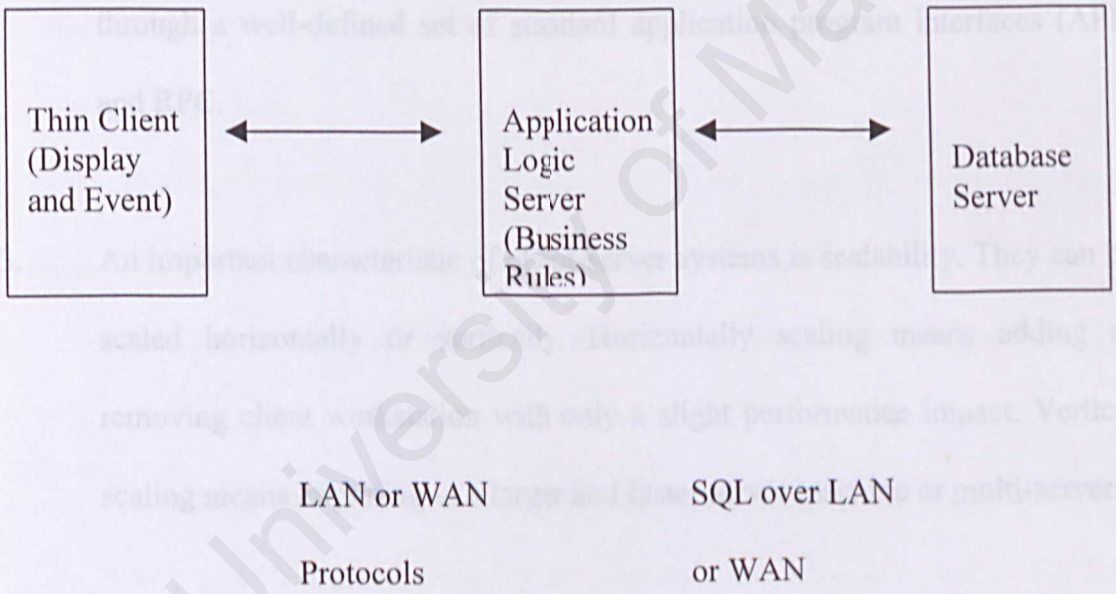


Diagram 3

3.1.2.5 Characteristic of Client/Server Architecture

The basic characteristics of client/server architecture are:

1. Combination of a client or front-end portion that interacts with the user, and a server or back-end portion that interacts with the showed resource. The client

processes certain solutions-specific logic and provides the interface between the user and the rest of the application system. The server process acts as a set engine that managers showed resources such as database, printers, modems, or high-powered processors.

2. The front-end task and back-end task were fundamentally different requirement for computing resources such as processor speeds, memory, disk speeds and capacities, and input/output devices. The environment is typically heterogeneous and multi-vendor. The hardware platform and OS o client and server are not usually the same. Client and server processes communicate through a well-defined set of standard application program interfaces (API) and RPC.

3. An important characteristic of client-server systems is scalability. They can be scaled horizontally or vertically. Horizontally scaling means adding or removing client workstation with only a slight performance impact. Vertical scaling means migrating to a larger and faster server machine or multi-servers.

3.1.2.6 Web-based Application

In essence, a web application is a web site designed to do more than simply present pages and hyper medium links to its users – it actually acts as a front end of data processing. A web is like any other application uses the Internet/Intranet and browser present data and retrieve information.

For instance, consider the notion of a web site designed to give a company's salespeople the ability to access product information and confirm orders while on the head. Using HTML, the basic interface for this sales database can be made available on the web. With the appropriate browser software and a Internet connection (perhaps even over a cellular modem), a sales person for your company has nearly instant access to the information that she needs.

Once the data are entered on the page, they are passed by the product in the database or taking the order. The result of these programs can be generated complete with HTML codes, so that the answers can be viewed by the sales person in her web browser. [2]

3.1.2.6.1 Why using web application?

There are many good reasons to commit to creating a web application on the WWW.

1. No installation required – one of the advantages of the web application has over a typical application is that the users are not required to install any files on their computers. This enables users to access the application at any location at any time, as long as they have access to the Internet/Intranet.

2. Multimedia presentation – a web application allows the presentation of information in multimedia styles. A web site allows you to do thing that are simply not possible in any other medium. Until some of the visual impact of

television, the informational utility of print, and the personal appeal of radios, the web is an effective tool for taking information to another level.

3. Higher performance – processing of info can be performed more efficiently. It also allows developers to modify the application without having to distribute updates to all of the users. [3]

3.1.2.6.2 Web Server

The WWW is the truly 'intergalactic' client/server application. This new model of client/server consist' the thin, portable, 'universal' clients that talk to superfat servers. In its simplest incarnation, a web server returns documents when client asks for them by name. The client/server communicate using a protocol called HTTP. This protocol defines a simple set of commands; parameters are passed as strings, with no provision for typed data. The web is being extended to provide more interactive forms of client/server computing. [4]

3.1.2.6.3 Database Server

With the database server, the client passes SQL request as message to the database server. The results of each SQL command are returned over the network. The code that processes the SQL request and the data reside on the same machine. The server uses its own processing power to find the requested data, instead of passing all the records back to a client and then letting it find its own data.

Database server provides the foundation for decision-support system that requires ad hoc queries and flexible reports. [4]

3.1.2.6.4 Web Browser

A web browser is a software program that known how to contact a web server (using the HTTP protocol), request a given document from that web server, and display that document returned by the server to a human server.

There are many different types of browsers; the most popular ones are Netscape Navigator and Microsoft Internet Explorer. The appearance of a document will vary from browser to another depending on the capability of each browser and the system and preference.

3.1.2.7 Transition of Client-Server to Web-based System

The most significant difference between these two approaches lies on the promise for the future and how each adapts to industry direction and trends. With the web-based architecture, the role of the client (browser) and the server, when designed correctly can also provide the best of the traditional client-server architecture.

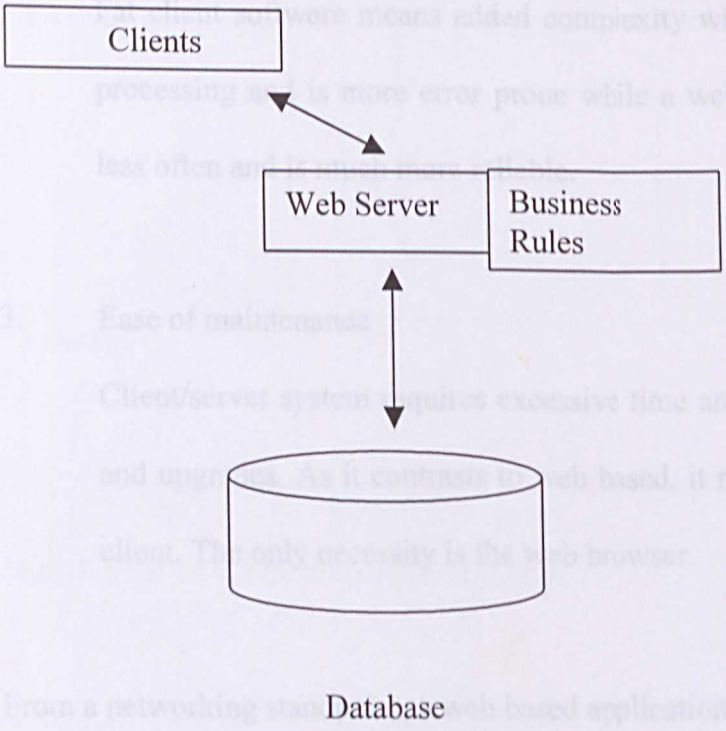


Diagram 4

3.1.2.8 Difference between Client-Server Architecture and Web-based Architecture.

1. Adaptability

   Client-Server systems cannot easily take advantages of new technology such as network computers, Intranet and Java. Web-based application, which is in Java/Active-X form, represents a retreat centralized computing, away from the empowering effect of desktop computing.

2. A much thinner client

   A classic application results a fat-client a web-based application results a much thinner client, the thinnest being using pure HTML on the application.

Fat client software means added complexity which allows it to handle more processing and is more error prone while a web server client (browser) fails less often and is much more reliable.

3. Ease of maintenance

Client/server system requires excessive time and expenses for the installation and upgrades. As it contrasts to web based, it requires less installation on the client. The only necessity is the web browser.

From a networking standpoint, a web based application means:

- Less complicated software
- Better performances
- The possibility of bringing same interesting new technology such as network cards into the company.

A Summary of Three-tier Architecture

Tier	Server type	Characteristic	Responsibility	Tools
User Services	Client application	GUI interfaces	Presentation & Navigator	4GL, desktop application
Business Services	Business Server	Business object, properties & method	Business policies, rules & security	Some 4GL, Cobol, C
Data	Data Server	Raw database -	Integrity of decision &	DBs,

Services		manager	Independent data	Messaging system

Table 1

Mainframe Vs Client/Server Architecture

Characteristic	Mainframe	Client/Server
• System management	Integrated	Few tools available
• Management	Centralized	Distributed
• Hardware/Software	Proprietary	Multiple vendor
• Vendor	Single	Multiple
• Security	High/Centralized	Relaxed/Decentralized
• Data manipulation cap abilities	Very limited	Very flexible
• Application development	Over-structured, time consuming, application backlogs	Flexible, better productivity tools, rapid application development
• End user platform	Single task, dumb terminal, character based, low	Multitasking, intelligent PC, GUI, better productivity

	productivity	

Table 2

3.1.2.9 Client-Side Programming

Consideration on Development Tools

The technology of the Internet Web browser had made it possible to create platform-independent. Easily developed applications. A web can be easily created to perform the action of a feature-light client because it is simply a web page. Distribution is possible over either an internal Web (Intranet) or a wide area network (Internet) with no change to the actual code.

3.1.2.9.1 Java Script

JavaScript is a compact, object-based scripting language by Netscape for developing client and server Internet applications. Netscape Navigator 2.0 (and later versions) can interpret JavaScript statements embedded in an HTML page. When Navigator requests such a page, the server sends the full content of the document, including HTML and JavaScript statements, over the network to the client. The navigator then displays the HTML and executes the JavaScript, producing the results that user sees

Client-side JavaScript statements embedded in an HTML page can respond to user event, such as mouse-click, forms input and page navigation. JavaScript and Java are similar in some ways but fundamentally different in others. The JavaScript language resembles Java but does not have Java's static typing and strong checking. JavaScript support most Java expression syntax and basic control flow constructs. JavaScript has a simple, instance-based object model that still provides significant capabilities. JavaScript also supports function without any special declarative requirements.

3.1.2.9.2 VB Script

VB Script is a member of Microsoft's Visual Basic family of development products. It is a scripting language for HTML pages on the World Wide Web and corporate Intranets. It brings active scripting to a wide variety of environments, including Web client scripting in Microsoft Internet Explorer and Web Server scripting in Microsoft Internet Information Server

In many ways of VB Script program is like JavaScript program, at least in terms of how it fits in an HTML file. Procedures, defined as discreet blocks of code that have been assigned a name, are placed in the header, the section between the tags. Other non-procedure code is placed in the file body. VB Script code must be enclosed in HTML comment tags to prevent it from being displayed in browser that do not support VB Script. VB Script is a subset of Visual Basic

Nearly everything in VB Script is part of Visual Basic. The major difference lies in what is lost: a significant number of things included in Visual Basic are not a part of VB Script. Potentially dangerous operations that can be done in Visual Basic have been removed from VB Script, including the capability to access dynamic link libraries directly and to access the file system on the client machine.

3.1.2.10 Server-Side Programming

3.1.2.10.1 Active Server Page (ASP)

ASP is a server based scripting language that is used to build database driven web sites where the browser may have no scripting at all. Here are some related facts:

- ASP is free for Windows NT or Windows 95/98 – Internet Information Server 3.0 had the first ASP with all its essential features. IIS 4 (also called NT OPTION PACK 4) contains the latest ASP and all its goodies.

- ASP scripts can be tested offline with Personal Web Server (PWS) on Windows 95/98.

- ASP code is mixed within HTML on a page - it does not need to be compiled separately or deployed. HTML coders can just add ASP commands to their page freely.

- ASP scripts are pure ASCII ands can be edited with notepad or more sophisticated tools like Visual InterDev.

- ASP code is not biased towards any browser – it runs on the server and can serve up pure HTML to any browser even one that supports no scripting.

- ASP can allows browser users to manipulate databases (view, edit, manage) from any browser by serving up HTML with ADO (Active Data Objects). It also allows HTML web pages to generate database updates, which the server takes care of. Server databases can be from any vendor as long as an OLEBDB or ODBC driver is available.

- ASP supports server components built with other languages. People familiar with Java, C++, VB and Delphi can ensemble their compiled code easily into a component that HTML programmers can call within their ASP page.

- ASP has many 3rd party components (both free and commercial) you can acquire for free to reduce your programming time.

- ASP supports VB Scripts syntax or Java Script syntax upon initial installation. VB Scripts is the most popular way most user code because it is simpler than Java Scripts. Other language like Perl Script can be added to ASP for free.

- ASP supports distributed and transactional architecture by coding with Microsoft Transaction Server (MTX) and Microsoft Message Queue (MMQ) that are part of an ASP installation at no additional cost.

- All common servers and machine also can support it. For instance, instant ASP runs on Linux, Novell, Sun, Macintosh, SGI, SCO, Dec Alpha, IBM OS/2, AS/400 and Windows. It also supports Apache, Fast Track/Enterprise Servers, Sun web server, Java web server, IIS, and Lotus Domino.

An ASP is similar to a common gateway interface (CGI) application in that all involve programs that run on the server, usually tailoring a page for the user. When a client request a web document, the server locates the file, reads it into memory, and then locates the portions of the file to be interpreted as script. The resulting page is sent to the client containing only client-side code such as HTML, JavaScript or VB Script. ASP is a feature of Microsoft Internet Information Server (IIS), but since the server-side script is just building a regular HTML page, it can be deliver to almost any browser.

There is a choice to use server-side ASP or client-side script. However, server-side script will result in an easily displayable HTML page. Client-side script such as JavaScript may not work as intended on older browser. In conclusion, ASP has a lot of benefits especially in web browser application.

The advantages of ASP:

a. Ease of use

b. Speed of execution

c. Browser independence

d. Low processor overhead

e. Simple database connection

f. Support Visual Basic and JavaScript

3.1.2.10.2 Servlets

Servlets are server-side Java programs that provide a means of generating dynamic Web content. A Servlets is the opposite end of an Applet. A Servlets can almost be thought of as a server-side Applet. Servlets run inside the Web server in the way that Applet run inside the Web Browser. In order to run Servlets inside the Web server, the server must have a Java Virtual Machine (JVM) running within itself. Unlike Applets, Servlets are not constrained by security restrictions.

They have the capabilities of a full-fledged Java program and can access files for reading and writing, load classes, change system properties, etc. They are restricted only by the file system permissions, just like other Java Servlets do not require a specialized server. To run a Java Servlets, the first thing is a Java Virtual Machine running on the server.

Additionally, the server has to support the Java Servlets API. This API defines how and when the Servlets communicates with the server. Essentially, the Servlets API is a well-defined set of function calls to get and send info to and from the server.

The Servlets needs to be able to access server-defined variables, issue redirects, send error messages, and the like. Sun is aiming to make Servlets the new Web server paradigm. The advantages of Java Servlets are:

a. Faster than CGI script because they use a different process model. Servlets only need to be loaded once, while CGI programs need to be loaded for each request.
b. A standard API that is supported by many Web Servers
c. Have all of the advantages of the Java language, including ease of development, platform independence, security and easy database access
d. Can access a large set of APIs available for the Java platform

3.1.2.10.3 Lotus Agents

Agents is one of the features contain in Lotus Notes. Agents are self-contained mini-programs that can be implemented and used in many ways. An Agents is a design element containing Notes code (for instance a formula) that runs in the background – either on a predefined schedule or whenever a certain event occurs in a specific database.

The power of Agents lies in their ability to auto make a series of operations. Agents play an important role in the design and implementation of Lotus Notes client/server applications. Customized Agents created by designers or users can perform simple task such as filing documents or sending mail, but also perform more powerful functions, such as manipulating documents and exchanging data with other application. In Lotus Notes, an agent consists of a document selection formula, a trigger, and one or more actions. Actions can be implemented by using either

predefined Notes Macros, writing Lotus Script code or directly integrate Java applications.

3.1.2.10.4 Lotus Script

Lotus Script is an embedded, BASIC scripting language with a powerful set of language extensions that enable object-oriented application development within and across Lotus products. The Lotus scripting language is broad enough to cover many programming problems that cannot be handled using regular database fields or forms. The script can be written once and reused many times. Lotus Script offers a wide variety of features of a modern, object-oriented programming language. Its interface to Notes is through predefined object classes. Notes oversee the compilation and loading of user scripts and automatically includes the Notes class definition to allow more efficient coding. The advantages of Lotus Script:

a. Superset of BASIC – since Lotus Script is a superset of the BASIC language, it is easy to learn, especially for Visual Basic users.
b. Cross-Platform – Lotus Script is a multi-platform BASIC-like scripting language. Major platforms are supported, such as Windows, Macintosh, OS/2 and Unix. Scripts developed on Windows will execute unchanged on Macintosh, OS/2, Unix or any other supported platform.
c. Object-oriented – Notes Release 4 and beyond provide Notes Object Classes that are available to Lotus Script. Script can be written to access and manipulate these objects. The scripts are event-driven, such as by an action, clicking the object or button, opening a document, or opening a view.

d. Included in Lotus Application – since all the Lotus products support Lotus Script, these products are able to access Notes classes using Notes-supplied Lotus Script extension. Another advantage is that only language is needed to become proficient in writing script in other Lotus products.

3.1.3 Consideration of Implementation Platform

Consideration on Operating System

3.1.3.1 Windows NT 4.0

Microsoft has released an incredibly robust and stable operating system called Windows NT in September 1993. Microsoft has outstandingly staked its unique position with a server OS. Microsoft's previous development of OS/2 with IBM did not create the single standard UNIX alternative that was hoped for.

NT provides the preemptive multitasking services required for a functional server. It provides excellent support for Windows clients and incorporates the necessary storage protection services required for a reliable server OS. Its implementation of C2 level security goes well beyond that provided by OS/2 and most UNIX implementations. It will take most of 1994 to get the applications and provides an industrial strength platform for business critical applications. With Microsoft's prestige and marketing muscle, NT will be installed by many organizations as their server of choice. At the moment, a large number of Windows applications are available, with an increasing number that leverage the 32-bit or multiprocessing

nature of NT. Besides that, Microsoft's Back Office suite provides good integration of many server applications, including system management and a database.

The internals of Windows NT were written from scratch and centered on microkernel-style architecture similar to UNIX. This microkernel gave Windows NT preemptive multitasking. Additionally, Windows NT made use of process threads, an idea popularized by Larnagie Mellon's MACH OS – to support symmetric multiprocessing. NT Server 4.0 includes not only the Windows 95 user interface but a host other features, such as network OLE, Internet Information Server (IIS) 2.0, RAS Multilink and RAS AutoDial, Point-to-Point Tunneling Protocol (PPTP), fully integrated DNS and WINS, integrated multi-protocol router, expanded driver support, improved performance, and much more.

One thing that most important is Microsoft's Windows NT package contains Microsoft Internet Information Server 4.0 (IIS 4.0) which perfectly compatible with the server computing side to develop the system using Active Server Page (ASP). It is the only World Wide Web server that is tightly integrated with the Microsoft Windows NT server OS and is designed to deliver a wide range of Internet and Intranet server capabilities. IIS 4.0 was designed to deliver on the following objectives:

- Integration with NT server

  Because of the tight integration with NT server, IIS is easy to setup and manage, fast and secure

- Comprehensive web server condition

  IIS includes a built-in search engine, streaming multimedia capabilities, rich log file and tools.

- Easy-to-develop, powerful web-based application

  IIS introduces ASP, which makes posting dynamic content and development of web base application easy.

3.1.3.2 Windows 95

Windows 95 is billed as the graphical, user-friendly interface of the 90's. it has a desktop on which user can spread all the work and flip from one project to the next by poking around with the mouse. Besides that, it is multitasking OS. Which means that user can listen to music while editing a spreadsheet. In addition, it also can be configured as a client to a server. Therefore, it is possible to run a client/server application in Windows 95.

3.1.3.3 Linux

Linux is a free, UNIX work alike designed for Intel processor on PC architecture machines. Linux is not UNIX, as UNIX is a copyrighted piece of software that demands license fees when any part of its source code is used. Linux was written from scratch to avoid license fees entirely, although the operation of the Linux OS is based entirely on UNIX and it shares UNIX's command set. Linux support a wide range of software, from TeX (a text formatting language) to X (a

graphical user interface) to the GNU C/C++ compilers to TCP/IP networking. Linux is also compliant with the POSIX.1 standard, so parting application between Linux and UNIX system is a snap.

3.1.3.3.1 Linux Vs Unix

UNIX is a trademark of X/Open. Linux is not a trademark, and has no connection to the trademark UNIX or X/Open. UNIX is one of the most popular OS worlds wide because of its large support base and distribution. It was originally developed as a multitasking system for mini computers and mainframes in the mid-1970s, but it has since grown to become one of the most widely used OS anywhere, despite its sometimes-confusing interface and lack of central standardization. UNIX is a multitasking, multi-user OS.

This means that there can be many people using one computer at the same time, running many different applications. (This differs from MS-DOS, where only one person can use the system at any one time). Under UNIX, or users to identify themselves to the system, they must log in, which the system identifies you), and entering your password, which is your personal secret key to logging in to your account. Because only you know your password, no one else can log in to the system under your username. In addition, each UNIX system has a hostname assigned to it. It is this hostname that gives your machine a name, gives it characters class, and charm.

The hostname is used to identify individual machines on a network, but even it your machine isn't networked, it should have a hostname. Versions of UNIX exist for many systems, ranging from personal computers to supercomputers. Most version o

UNIX for PCs is quite expensive and cumbersome. Where does Linux is free (solves the expensive part), very powerful, and easy to install and maintain by an individual (so much for the cumbersome part).

3.1.3.3.2Features in Linux

Important features in Linux that is unique:

- Full multitasking and 32-bit support. Linux like all other versions of UNIX is a real multitasking system, allowing multiple users to run many programs on the same system at once. Linux is also a full 32-bit OS, utilizing the special protected-mode features of Intel 80386 and later processors and their work-alike.

- The X Window system is the default industry standard graphics system for UNIX machines. A complete version of the X Window system, knows as Xfree86, is available for Linux. The X Window system is a very powerful graphics interface, supporting many applications.

- TCP/IP support. This is the set of protocols that links millions of university and business computers into a worldwide network known as the Internet. With an Ethernet connection, you can have access to the Internet over phone lines with a modem.

- Virtual memory and shared libraries. Linux can use a portion of your hard drive as virtual memory, expanding your total amount o available RAM. Linux also implements shared libraries, allowing programs that use standard subroutines to

find the code for these subroutines in the libraries at run time. This saves a hope amount of space on your system; each application doesn't store its own copy o these common routines.

- The Linux kernel uses no code from AT&T or any other proprietary source. Much of the software available for Linux is free. In fact, a large number of utilities in Linux are developed by the GNU project at the Free Software Foundation in Cambridge, Massachusetts. However, Linux enthusiast, hackers, programmers, and recently even commercial companies from all over the world has contributed to the growing pool of Linux software. Linux support (almost) all the features of commercial versions of UNIX. In fact, some of the features found in Linux may not be available on other proprietary UNIX systems.

- GNU software support. Linux supports a wide range of free software written by the GNU project, including utilities such as the GNU C and C++ compiler, gawk, groft and so on. Many of the essential systems utilities used by Linux are GNU software.

- Linux is compatible with the IEEE POSIX.1 standard. Linux has been developed with software portability in mind, thus supporting many important features of other UNIX standards.

- Built-in support for networking, multitasking, and other features. You'll see this touted as 'New Technology' in systems such as Windows NT. In fact, UNIX (and now, Linux) has implemented this "new technology' for more than 15 years.

3.1.3.4 Why choose NT?

1. Compatible with Microsoft and Netscape

- Microsoft Window 95/98 is the worldwide most preferred desktop OS and the leader in developing software. Meanwhile, Netscape specializes in innovative cutting edge of today's Internet application.
- Most of the programming tools in today's trend are Microsoft based developed language. For instance, Visual Basic, Visual C++, Visual J++. More over, some DBMS tools such as Microsoft InterDev and Microsoft SQL are going popular in most corporations.
- Most of today applications are Windows and DOS compatibility. Integrity of module into system will not need any patch from different software developer. Thus it lessens the time and cost in developing system. This is beneficial than the previous developed software in terms of investment.
- Linux or UNIX OS do not offer much software development tools especially web-based publishing software lack of development tools has contributed to less efficient and slow progressing OS. Most of the applications in UNIX are developed via a command line computer and simple test editor.

2. Costs savings

- Windows NT is a very cost-effective OS with the budget around RM2000, a fully functional internet server is running in matter of days.
- Microsoft provides support and maintenance for the purchased software. It is advisable to utilize other Microsoft products since incentives will be given.

- Windows NT scalability where it can move to more even faster, multiprocessor PC server or a high performance RISC (Reduced Instruction Set Computer) based server, thus offer flexibility of the OS.
- In order to make certain modification in UNIX, the whole OS needs to be recompiled which is differ from NT in major configuration only by rebooting the server. Hence, it cuts administration time and cost.

3. User friendly environment

- Interface o Windows NT 4.0 environment origin from the Windows 3.x OS where the first and foremost Windows live interface that offer multitasking with the user-friendly features.
- Differ from UNIX or Linux OS where most of the tasks are performed by command script, which is definitely very troublesome. Furthermore the user interface is too cryptic is not user-friendly at all and a great of time may be wasted by learning some command task.
- Besides cryptic user interface, UNIX application demands steep learning curve where it is very difficult for new user. Thus, it is time consuming and waste lots of learning time and cost.
- Complicated installation procedure. Each UNIX machine has their different documented installation procedure. Prior to installation, the source code (kernel) needs to be compiled.

4. Security

- The distribution of Linux and UNIX source code is widely available in the Internet. Besides the administrator benefited from the source code, the potential hacker has the possible vulnerability point of attack.
- However this differ from Windows NT where most of the applications are not freely available in the Internet. Besides, Windows NT OS utilize binary codes, thus result complicated vulnerability point of security. As a result, this can seriously compromise the security of many servers at a time where they use the same code.

Some more, NT has other objectives with the right foundation:

Premise	Description
➢ Portability	The system would need to run on different hardware platforms with minimal.
➢ Security	It could be locked down through software, meeting NSA's C2-level criteria.
➢ Compliance and compatibility	It could be POSIX-compliant, run existing Windows application and support open international standards.
➢ Scalability	It could Support Symmetric Multiprocessing (SMP).
➢ Extensibility	It could be easily expanded only writing to a well-defined application-
➢ Ease of Internationalization	

	programming interface (API). It could easily be ported to run in numerous different languages and writing systems, with minimal modification to the software.

Table 3

3.1.4 Consideration on Database Implementation

3.1.4.1 Microsoft Access 97

Though there is other software in the market to build a good database, Microsoft Access 97 has been chosen based on few good reasons. Apart from its well-recognized product name, Microsoft Access 97 has proved that it is still a choice of user worldwide as software to learn about building databases. For this system, it doesn't need a complex or expensive product to build the databases. What in need is a compatible, workable and easy to manage software?

Microsoft Access is a relational database management system used to create and manage the relational database. Using the ODBC driver for Access, data can be retrieved from the database in the client/server system. It integrates data from spreadsheets and other databases, and is the easy way to find answers, share into over Intranets and the Internet, and build faster business solutions. Access 97 allows the user to generate, analyze and creates reports within hours of work. It integrates ease of use from the data entry point to printing in HTML.

Microsoft Access 97 offers the following features to make designing and using a database easier and make the databases more powerful.

❖ Run database utilities on an open database

User can use the compact database and repair database subcommands on the current database.

❖ Database splitter wizard

The front-end / back-end application is an application consisting of two database files. The back-end database files contain the table. The front-end database file contains all other database objects (queries, forms, reports, macros, and modules) and links to the located on a network server, and copies of the front-end database are installed on individual users' computers. The database splitter wizard creates a front-end / back-end application, splitting a database into a back-end containing the data (tables) and a front-end containing all other objects and links to the table in the back end. The original database remains unaltered.

❖ Database wizard

The database wizard creates a wide variety of complete databases for tasks ranging from household inventory to event management. Users can then add their own data.

❖ Performance Analyzer

Users can optimize the performance of some or all of the objects in database. The performance analyzer will analyzes the database, suggest the best ways to optimize its speed and performance, and then automatically makes the necessary changes as requested.

❖ Good technical support

If it's happen to occur a failure while using the software, Microsoft Access has taken a good procedure on helping user out in this matter. In the system information section, it explains in details all the possible procedures of what to do if user having any difficulties technically about the product. If user still stuck with the problem, they can contact Microsoft Subsidiary office located in each country for further guidelines.

❖ Good Help service

The product Help topic gives many options to the user. All of the possible way of understanding user problems is not taking for granted. The system tries to solve the problems by giving options of solutions depending on the nearest user difficulties. It also explains the subject in details in order user to know what they are dealing with, so when having the same problems again, they know what to do. Apart from that, Microsoft Access also offers a search engine to search for topics or subjects within the system. They have also Find Setup Wizard, which use to search for specific words or phrases in Help topics, instead of user searching for information by category.

- Tips of the day

  This function sometimes really helps. It gives user new information about Access functionality and to remind user about the fast way of working the database. For example, AutoCorrect is use to correct frequently misspelled text and replace abbreviations with long names.

- Increase performance

  Many of the aspect in Microsoft Access are being upgraded in every released version. On increasing the performance they are few like Microsoft doesn't load software components that aren't required for all databases, such as Visual Basic for Applications and Data Access Objects, until they are needed. This shortens the time it takes a database to load and improves overall performance. One more example is on ActiveX control speed. Microsoft Access has improved performance of embedded ActiveX controls. An ActiveX control like a built-in control is an object that inserts on a form to enable or enhance a user's interaction with the application. The Calendar Control is an example of an ActiveX control.

- Database

  From the database property command, users can view, change, and define database properties, such as title, object, author and reaction date, for use in locating and identifying the database.

3.1.5 Consideration on Development Tools

3.1.5.1 Hypertext Markup Language (HTML)

HTML is a simple system for defining the appearance and functionality of hypertext documents published via the World Wide Web. The most basic element of any HTML page (and, therefore, any page on the web); is ASCII text. In fact, although it's slightly bad form, a single paragraph of regular text-generated in a text editor and saved as a text file – can be displayed in a web browser with no additional codes or markings.

In most processing documents, the 'mark-up' that describes the emphasis and organization of text is hidden from the user: HTML, however, is a little more primitive than that, as it allows you to manually enter your text mark-ups tags to determine how the text will appear.

The basics of HTML are not programming, and, for the uninitiated in both realms, HTML is much more easily grasped than are most programming languages. There are two basic approaches to making an HTML page: type on the text and HTML commands yourself with a text editor, or use graphical software that generates the HTML command for you.

The HTML standard has been kept simple for efficiency. Most people who see HTML eventually develop the opinion that the standard has been kept too simple, that

it is not rich enough. The HTML standard is evolving, though, and each new version provides much-desired features. [6]

3.1.6 Consideration on Data Access

3.1.6.1 ActiveX Data Object

Microsoft® ActiveX Data Objects (ADO) is a data access interfaces used to communicate with OLEDB-compliant data sources, such as Microsoft SQL Server. Data consumer applications can use ADO to connect to, and retrieve, manipulate, and update data for SQL Server.

Architecturally, ADO is the application-level interface to OLEDB, a library of computer interfaces that enables universal access to diverse data sources. Because ADO is built on top of OLEDB, it benefits for the rich data access infrastructure that OLEDB provides, yet shields the application developer from the necessity of programming computer interfaces. On an every day basis, developers can use ADO for general-purpose access programs in business application, and OLEDB for tool, utilities, or system-level development (development tools and database utilities).

ADO is Microsoft's strategies, high level interfaces to all kinds of data. ADO provides consistent, high performance access to data, whether you're creating a front-end database client or middle-tier business object using an application, tool, language, or even an Internet browser. ADO is the single data interface you need to know for 1-to-n tier client/server and web-based data-driven solution development. [7]

3.1.6.2 Resolutions of Image

The number of pixels in a given area defines the resolution of an image. Resolution is a measurement of clarity, or details, and can refer either to an image files or the device, such as the monitor used to display it. Image file resolution is often expressed as ratio, such as 1000x2000; a similar matrix, 640x480, for example, is used to characterize monitor displays. Print resolution is alone commonly expressed in terms of dots per inch (dpi). Image file resolution and output (print or display) resolutions combine the influence the apparent clarity of a digital image when it is viewed. With the higher resolution, a clearer and sharper image will be obtains. The image with a less resolution will look blurs. [1]

3.1.6.3 Graphics Format

3.1.6.3.1 Graphic Interchange Format (GIF)

A widely supported image – storage format promoted by CompuServe that gained early widespread use on online-services and the Internet. Much of the compression in GIF is done with a technique named run length encoding (RLE).

RLE works that way suppose that an image has the same colour repeated, pixel after pixel, for 58 pixels. The row might look something like the following, where an eight-bit number represents colour.

10 20 38 38 38 38 38 38 ..... 38 27 22 .....

In this example, there are, let's say, 58 pixels in a row of colour 38. Rather than store every pixel, GIF makes this shorthand notation:

10 20 [58 copies of 38] 27 22 .....

The actual mechanisms are shorthand more sophisticated, but the principle is this: GIFs do their best compression with images that have long rows (particularly horizontal rows) of the same colour. This statement applies mostly to line art and simple graphics, and tends to apply less to photographs or photo realistic graphics.

Interlacing rearranges the rows in the GIF file. It doesn't save any room or any real download time. Because users see a full image in about a quarter of the time, however, they perceive that the image loads faster. [8]

3.1.6.3.2 Joint Photographics Experts Group (JPEG).

It is used to refer to the standard they developed for still-image compression, which is sanctioned by the International Standard Organization (ISO). Some can even play audio files. However, most browsers do not provide much more than that in terms of multimedia features.

3.1.7 Run time requirement

3.1.7.1 Server Hardware requirement

1. Server with at least Pentium III 600Mhz processor
2. At least 64Mb RAM – recommended 128Mb RAM
3. Network Interface Card (NIC) and network connection with recommended bandwidth at 15 Mbps or more
4. A hard disk for at least 4GB of storage.
5. Other standard computer peripherals

3.1.7.2 Server Software requirement

To host and manual system, the server computer needs to have various supporting software installed.

Software / component	Description
WNT Server 4.0	Network OS
Internet Information Server	Web Server Service
ASP	Server Scripting Engine
Microsoft SQL Server 7.0	RDBMS for data warehousing
Microsoft Internet Explorer 4.0	Precondition or ASP installation

3.1.7.3 Client Hardware Requirement

The client hardware requirements are quite minimal as long as it has a reasonable amount of RAM and a reasonable quality dial-up connection line. The recommended configurations are:

1. At least 32Mb of RAM.
2. A minimum 1GB of hard disk storage.
3. Network connection through existing network configuration or modem (recommended at least 36kbps).
4. A smart reader (i.e. MSK smart card reader) to access the digital certificate.

3.1.7.4 Client Software requirement

Client to have the basic Microsoft OS such as a Windows NT or Windows 95 as a basic requirement to install other software to support the system. As for compatibility reason, Microsoft products are recommended. The client software requirement falls on the browser used by users. It requires a system that run Microsoft Internet Explorer 4.0 and above or any other browser that support Active X and VB Script.

3.2 System design

3.2.1 The Prototyping Model.

The prototyping model has been thought the best approach to describe the development of this project. Why choose this approach? Because it just suitable to describe what the system is all about, how it is been design and what the modules behind the scenes of development.

A function describes in the synthesis part may seem useful and well defined. However, when the function is used with others, users may find that their initial view was incorrect or incomplete. System prototypes allow users to experiment with requirements and to see how the system supports their work. Prototyping is therefore the means of requirement evaluation. User discovers requirement errors or omissions early in the software process. Prototyping also used to validate the system design.

The diagram below shows a simple set of prototype development process done.

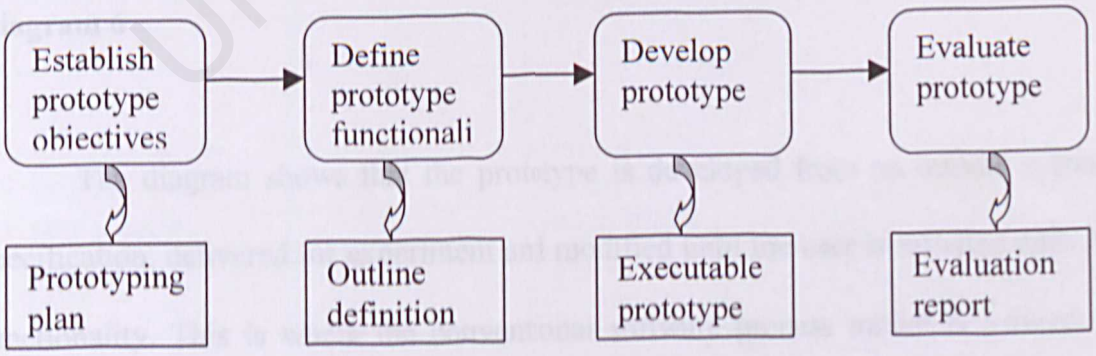


Diagram 5

3.2.2 Throw-away prototyping

This approach extends the requirements analysis process with the intention of reducing overall life cycle costs. The principal function of the prototype is to clarify requirements and provide additional information to access the possible risks. After evaluation, the prototype is thrown away. It is not used as a basis for further system development. The process of the thrown-away prototyping is shown in the diagram below.

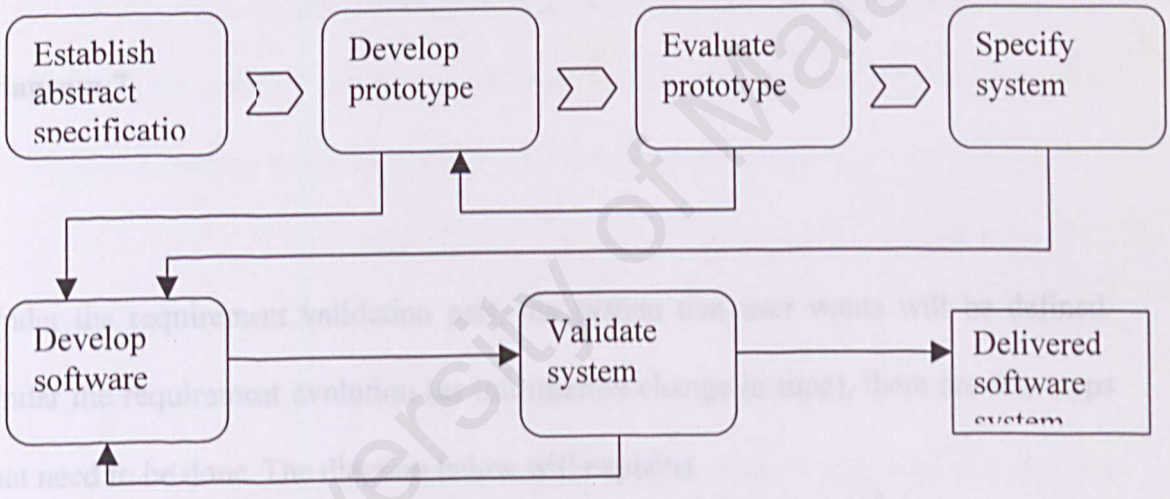


Diagram 6

The diagram shows that the prototype is developed from an outline system specification, delivered for experiment and modified until the user is satisfied with its functionality. This is where the conventional software process model is entered, a specification is derived from the prototype and the system is re-implemented in a final production version. The components from the prototypes may be reused in the production-quality system.

The Establish Abstract Specification part is a wide area as this is the development of the requirement. The diagram below shows the tasks.

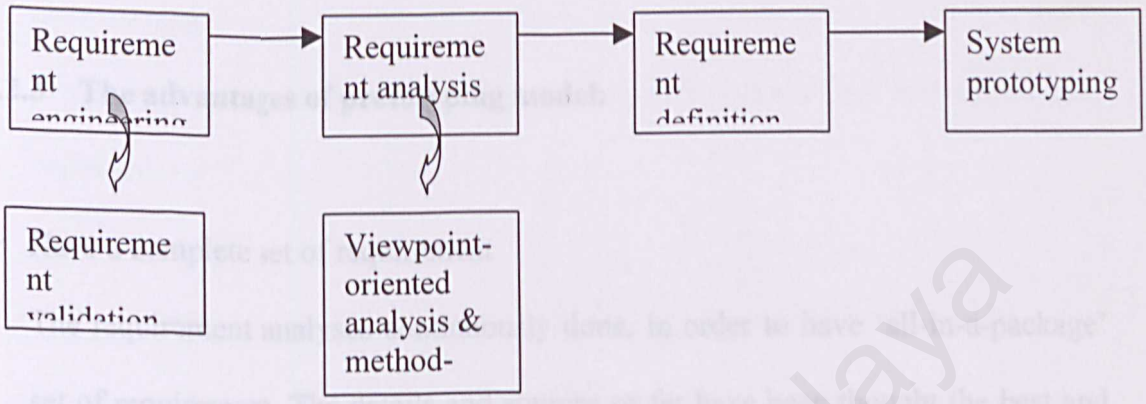


Diagram 7

Under the requirement validation part, the system that user wants will be defined. Under the requirement evolution (as information change in time), there are few steps that need to be done. The diagram below will explains.

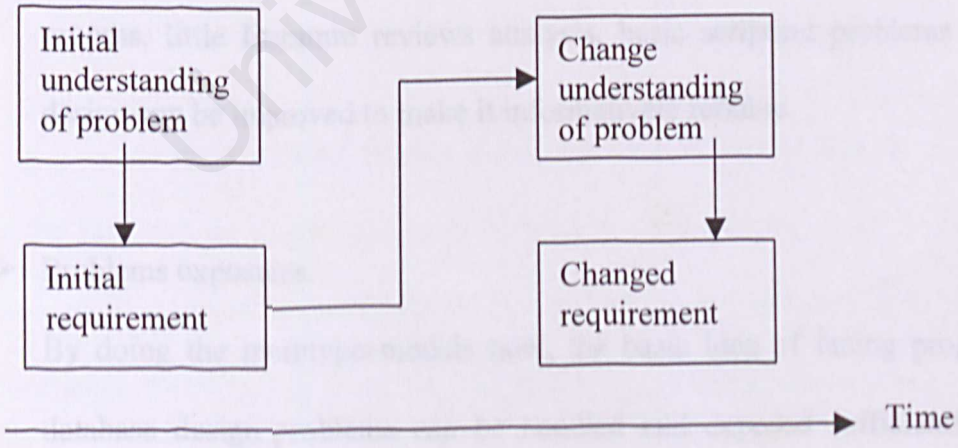


Diagram 8

Though, this approach has few general problems like the mode of use of the prototype may not correspond with the way that the final delivered system is used. The training time during prototype evaluation may also be insufficient.

3.2.3 The advantages of prototyping model:

- Have a complete set of requirement

  The requirement analyses continuously done, in order to have 'all-in-a-package' set of requirement. The details and sources so far have been thought the best and fulfilled the need of the people. The analysis basically done through academic surveying, asking medical students and surfing on the Internet.

- Improving 'leaks and lacks'

  Though the thorough requirement analysis done, the system's prototype still has few deficiencies that stayed unseen before. So, by going through over and over the process, little literature reviews analysis, basic scripting problems and module design can be improved to make it informatively reliable.

- Problems exposures.

  By doing the prototype models now, the basic idea of facing programming or database design problems can be handled and exposed sufficiently. So, when doing the real product soon, problems like these can be solved in a short of time.

- Time and energy savings.

  With minimal errors and complete set of requirement, there are a lot of rooms for improving other things as minimal time and energy used to build the system.

- User training

  A prototype system can be used for training users before the final system has been delivered.

- System testing

  Prototypes can run 'back-to-back' tests. This reduces the need for tedious manual checking of test runs. The same test cases are submitted to both the prototype and the system under test. If both systems give the same result, the test case has not detected a fault. If the results are different, this implies that the tester should in more detail at the reasons for the difference.

3.2.4 User interface

The user interface design is one of the most important aspects of the system. It is the yardstick by which the system is judged. An interface, which is difficult to use, will, at best, result in a high level of user errors. If information is presented in a confusing or misleading way, the user may misunderstand the meaning of the item of information. They may initiate a sequence of actions, which corrupt data or even cause catastrophic system failure.

There few characteristics of graphical user interface that available in the system like:

- Windows

  Multiple windows allow different information to be displayed simultaneously on the user's screen.

- Icons

  Icons represent different types of information like files or processes.

- Menus

  Commands are selected from a menu rather than typed in a command language.

- Pointing

  Used for selecting choices from a menu or indicating items of interest of a window.

- Graphics

  Its element can be mixed with text on the same display.

The set of characteristic must be done in such a way according to its own principles. For the system to achieve its objective, user familiarity, consistency, recoverability and minimal surprise (where user should never be surprised by system behavior) should be well thought and planned. This is the way to make the system attractive and catchy.

3.2.5 Disclaimer

The system and interface will have a feature call Disclaimer as a mark of any legal action that might be taken upon the developer in the present or in the future of

information, design or things related to the site, gained from the site by any member of the public. The suggested Disclaimer is as follow:

"This web site (including any attachment hereto) is intended solely for general and is confidential and privileged. If this should have been do to you in error, you are not to reproduce, distribute or take any action in reliance on it. Kindly notify the developer and exit the site immediately. Any e-mail is not a secure communication medium we advise that you bear in mind this lack of security when using e-mail/site. As site and/or e-mail and/or attachments may contain viruses and other interfering or damaging elements, the receipt and / or downloading of e-mail and/or site and / or attachments will entirely be at your own risk."

3.2.6 Acknowledgement

One more thing the system has is the Acknowledgement to the sources of information, design or idea distributors and contributors to the development of the site. The Acknowledgement is as follow:

Individual effort

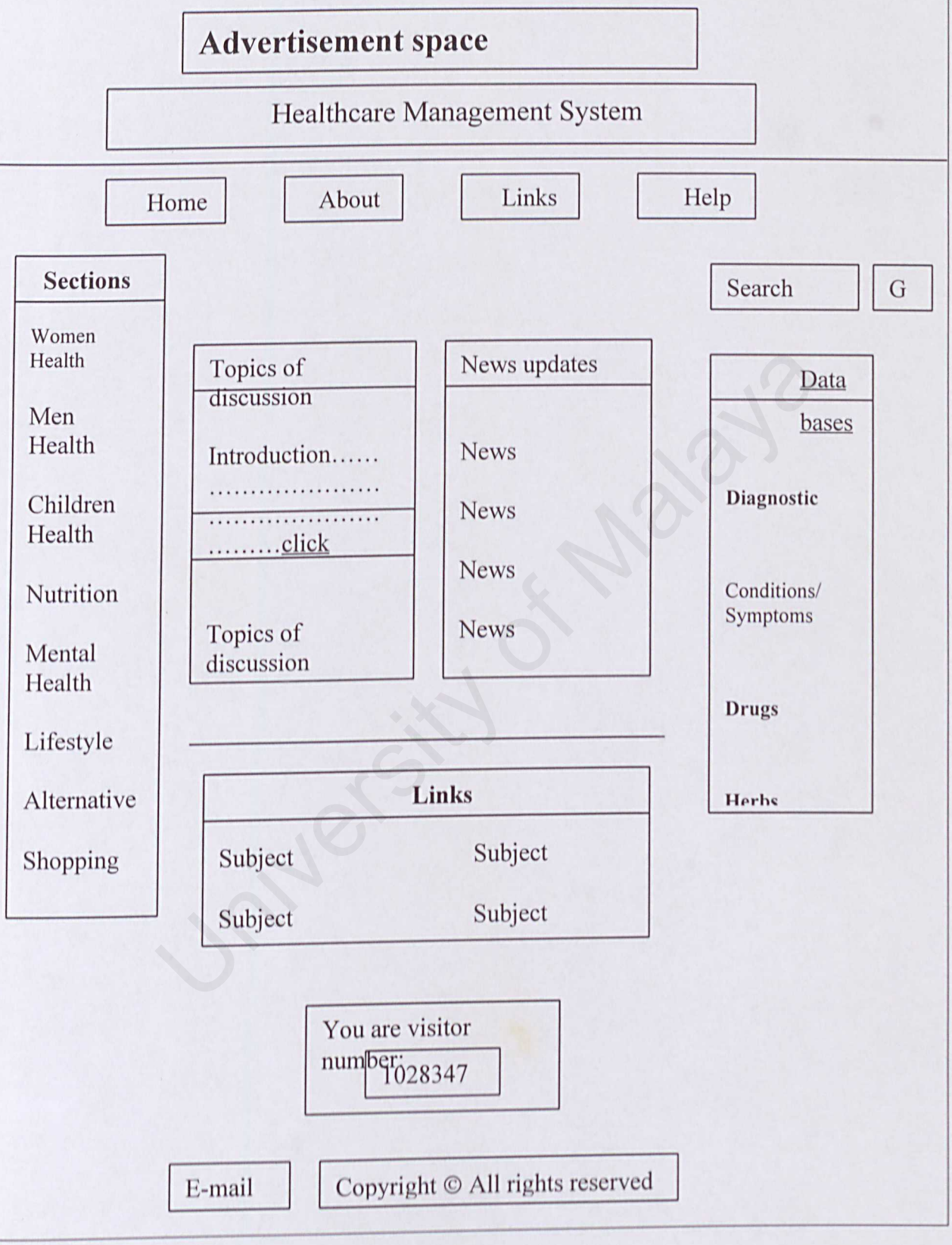
User feedback has made this site what it is today. The people who've contributed are too numerous to mention, but a few deserve special acknowledgement:

To everyone that sent suggestions, comments, compliments, and constructive criticisms, you have our heartfelt thanks.

Information Sharing and Disclosure

1. This site will not sell or rent your personally identifiable information to anyone.
2. This site will send personally identifiable information about you to other companies or people when: we have your consent to share the information.
3. We need to share your information to provide the product or service you have requested.
4. We need to send the information to companies who work on behalf of this site to provide a product or service to you. (Unless we tell you differently, these companies do not have any right to use the personally identifiable information we provide to them beyond what is necessary to assist us.).
5. We respond to subpoenas, court orders or legal process; or we find that your actions on our web sites violate the site Terms of Service or any of our usage guidelines for specific products or services.

The planned interface of the web page is below.



SYSTEM EVALUATION

4.0 System Evaluation

4.1 Problems and Solutions

During the system studies and analysis phase, a lot of studies have been carried out. Lack of knowledge in the above application has been a great obstruction.

1.Problems and solutions during system studies and analysis

There have been many hurdles, thick and thin, to make the system run smoothly and as what have been planned before. From planning for the right source of information to be broad up, to an every details of system design specification, these problems have been the essence on making a quality system. Listed below are the a few problems encountered while making the system working.

- Difficulty in choosing a programming language

As the daily schedule is tight and the time is killing in tandem, the step on using the right, most 'profitable' and easy to learn programming language is bit time consuming and became very choosy. There are two parts of choosing the right programming language, easy to learn and it's functionality. The former, basically involve around the time taken to learn and master the language, while the later, involve around the functions and usage of the language to make what is expected to have in the system, as planned before.

So, after all the fusses and confusable time, the selected programming language has been thought the best functionally and beneficially.

❖ Determine project scope

The project scope should have not been a problem but in this case, the kind of in formation that want to be broad up and the target audience is inadvertently cross each other at the planning step. More, there is a time when project scope process resulted in making other unwanted yet unexpected problems.

So, the process of developing the project scope and selecting the right data to be presented has been done painstakingly and user-oriented, making it a well documented processes.

2. Problems & Solutions during system implementation & testing

❖ Lack of experience in web-based programming

Web-based system as been discussed in the earlier part of this report, is a bit hard for a beginner. If we look on the programming side for client side and server side, both require a skilled programmer. To make a good and working scripts, ample of time need to be threw into the processes on programming steps.

So, by using trial and error steps, referring to Internet sources and asking the experts to help, this problem is miracally solved.

4.2 System Strength

It is important to stressed out the good side or the strength of the system mostly in this report as the readers might not try the system yet, face to face with it, and might not know the exact idea what is talked about in this report. Part of the system strength is shown below.

- Good use of colours

  Certain page has certain colours while other ha only one colour. Yet, they still look nice and attractive. The secret is that the developer has used an imaginative kind of colours that point out the differences between the web site and outside web sites. In the page that has only one colour, the developer has playing with its tones that totally changed the view into something nice and cozy to see.

- ToolTips

  When user place the cursor on certain text or icon, a small box that describes the usage of the mark will appear. This will enhance user understanding on the text or icon before they can further click on the right information that they wanted. The best thins about these ToolTips, the developer has creatively make it look better by instilling jokes, advises, queries and dialogues in the text that appear in the small box. This enhances the user-friendly aspect.

- Good interface design

  The interface is as vital as the information that is displayed. So, the style has to be user-friendly which user can navigate the whole web site easily without have to go out from one page to other to go to difference sections. Every time user want to go to difference sections than the current one, user can just navigate through the links that already stated in on the frame, whether on the left or on the top of the page.

- Good division of sections

  The sections have been divided into a well-documented hyperlinks that purposely suited the target audience need. Though it is a bit too medical oriented, but it is the best way to send the objective of the system to the public. Under the sections, there are many other subsections that also have been divided into their own categories.

- Informative information

  All of the information in the system is well selected and well documented so it is purposely for the need of the medical students. They need a fast, accurate and informative data, and so they have it. Whether the data is in the database or the information is in the web sites (through the section), it is the best knowledge that been broad up. The article part is among the best as it discussed the current sensitive issue on the current news. It also has a thorough explanation on the issues.

- User guidance

  In the Help manual, the developer has provided with the brief explanation on the sections and links that the user will encounter when they browser in this site. So, when a new user came in they know where to find the information that they need and might not lost in the middle of information jungle. There is also the administrator manual that talked about brief tasks that the administrator can do.

- Simple and user friendly interface

  Though the main page is a bit stuffy, but with a good selection of font usage, the page looks more user-friendly and consumable. The font size is smaller than usual, maybe 8 and 10 in size. The type is Times New Roman.

  This is one of the reasons of the frame usage, not as a plain page of text. With the left and top frame, only the middle part that changes as the entire link is directed to it. You can try the system to see it.

  The colour chosen in the page is variously attractive and user-friendly. It has not too many colours in one page; only the tone of it is diverse and well manipulated.

- Relatively fast response in document retrieval from server

  As the database is not too big and complicated, the retrieval of data or document from the server is fast. The scripting part of the server side is thought the simplest way of recalling the information or document from

the database. The connection part is also have been reorganized and retry many time to have a well-programmed scripts.

- System transparency.

  The transparency of the system is basically involve around the interlinks of pages among each other. This also includes the section pages that have the links to all other subsections and outside sections. From one side of the page, user can go far to the other side of the page in the system, traveling through many kind of medical and healthcare fields of information.

4.3 System Limitations

One thing to be stick in mind is that you can never have a perfect yet complete kind of system. There are always the limitations and intangible aspects that are not been completed, and glad to say that the system limitations are like the following.

- Browser limitation

  If you still remember in the Graphics Format, it stated that not all browser supported all kind of files that included in the system. This type of limitation is out of developer control as it is up to the user to use the kind of Internet browser that they want. The two type of Internet browser that supports the system are the Netscape Navigator and Internet Explorer from Microsoft Corporation.

- Help module

  To have a complete set of help module is a bit hard as different kind of user have a different kind of knowledge inadequacy in computer or Internet fields. So, they have a slight different need of guidance. However, the current Help module is thought the best if we look on the target audience of the system.

- Performance dependent on transmission lines

  If the system is ready but the transmission lines of connection is bad, the system will not work. It may just hang or failed to retrieve data. This limitation will absolutely degrade the system performance. However, it is out of the developer control to make it impossible to happen.

- Functions

  There is one thing that is missing in the system that is the search engine. Though in the database, the search function is really helpful in finding the possible information needed by the users, but in the web site, the developer purposely didn't include any. This is because of the tight project time frame and the search function would have to take more time to do it. The developer doesn't want any function that works inefficiently. Better have none of it than just having something that is run with problematic occurrence. It is also a matter of bringing a quality and well-selected information to the users. Users are not stupid; they know what is wrong and what is right.

- Information inclusion

  Sad to say that the information in the current system is not complete yet. There are many other sources that haven't being touch in bringing every possible information to the users knowledge. For example in the Surgical section, there are many things to be done in order to bring up the expected presentation to the users. It has no point if the web site is full of information but fail to reach the target audience and misunderstood by the users. The presentation of data is very essential and need to be taken seriously by the developer.

- Animations

  The web site has very limited animations and it has to be used in many pages. Though it is the same animation, it is equipped with a ToolTips to make it more fun and interesting. It is hard to find the right kind of animations on the Net that related with the health care field, unless the developer learns on how to create animations on the Net. Though, it is very time consuming.

- Links to local healthcare sites

  The links to local web sites in the main page are not directly interconnected to the healthcare or medical web sites but link to an informative yet popular local web portal, which have a good search engine and have a quality content of health and medical sections.

SYSTEM IMPLEMENTATION & TESTING

5.0 System Implementation and Testing.

5.1 Introduction

In order to make the system running smoothly without any problems, the factors that can make that happen should be considered thoroughly. It is not just the scripting and programming part that should be right and working, but the environment; database and a lot of testing is needed to make the system a reality.

5.2 Development Environment

The development that is acquired by the system feasibility includes the hardware and software specification. However in the Methodology part of this report, it has been stated the run time requirements for the system, whether for the client side or for the server side. For just refreshment, shown below is the table of the system software requirement.

Software	Module	Description
Microsoft Windows 98	System Requirement	Operating System
Personal Web Server	System Requirement	Web Server
Microsoft Access 97	System Requirement	Database Server
Microsoft FrontPage 2000	System Development	Web page coding
Internet Explorer 4.0	System Development	Web page browsing

Table 4

5.3 Database Development

The database name is General Symptom, which the inclusion of five tables with its own data and fields. The General Symptoms, Men's Symptoms, Women's Symptoms and Infant&Children Symptoms have the same field names. There are seven fields in each table. The other table is the Drugs table that has different names of field, which amounted to nine fields all together.

Each field in the entire table has a text data input. The field size is 255 characters at the maximum. All of the information stacked in the every field has been well selected and synthesized so that only the accurate, informational and related data that been included. The below diagram shows the example of the database table interfaces.

5.4 Program Coding

The programming language has been discussed thoroughly in the Methodology part of the report. You can refer that to look for more information on that. But here is the examples of coding that have been used in developing the system.

5.4.1 JavaScript

This script is to have the Back link text.

```
<tr>
    <td width="100%">
      <p align="right"><a href="javascript:history.back()"><font
face="Times New Roman" size="2"><b>BACK</b></font></a></p>
    </td>
  </tr>
```

5.4.2 ASP/VbScript

This is in the data retrieval from database search result in the Symptoms Checker part. Though it is not complete, it is a basic part of the functions.

```
<%
Option Explicit

Dim dcnDB                   'As ADODB.Connection
Dim strDatabaseLocation     'As String
Dim rsDrug                  'As ADODB.Recordset
Dim strSQL                  'As String
```

```
Dim blnAddedWhere          'As Boolean

strDatabaseLocation = Server.MapPath
("../Database/GeneralSymptom.mdb")

Set dcnDB = Server.CreateObject("ADODB.Connection")
dcnDB.ConnectionString = _
   "Provider=Microsoft.Jet.OLEDB.4.0;" _
   & "Persist Security Info=False;Data Source=" _
   & strDatabaseLocation
dcnDB.Open

.....
.....
%>
```

5.4.3 SQL Statement

The SQL statement is used to do the database connection and the server connection. The example of script is as below.

```
Set dcnDB = Server.CreateObject("ADODB.Connection")
dcnDB.ConnectionString = _
   "Provider=Microsoft.Jet.OLEDB.4.0;" _
   & "Persist Security Info=False;Data Source=" _
   & strDatabaseLocation
dcnDB.Open

'***************
'* Basic query *
```

```
'***************
strSQL = "SELECT * FROM Drugs"
blnAddedWhere = False
'*****************************************************
'* Check whether specific name of drugs need to be *
'* added in the basic query                        *
'*****************************************************
If Request("txtdrugname") <> "" Then
   If not blnAddedWhere Then
      strSQL = strSQL & " WHERE "
      blnAddedWhere = True
   End If
   strSQL = strSQL & " Name LIKE '%" & Request("txtdrugname") & "%' "
End If
'*********************************
'* Add sorting to the SQL string *
'*********************************
strSQL =strSQL & " ORDER BY Name"
Set rsDrug = dcnDB.Execute(strSQL)
```

5.4.4 HTML

It is used in the web site programming. HTML is used together with JavaScript to make a more diverse scripting content. The example below shows.

```
<html>

<head>
<meta http-equiv="Content-Language" content="en-us">
<meta http-equiv="Content-Type" content="text/html; charset=windows-
1252">
<meta name="GENERATOR" content="Microsoft FrontPage 4.0">
<meta name="ProgId" content="FrontPage.Editor.Document">
<title>Hangman</title>
<style fprolloverstyle>A:hover {color: red; font-weight: bold}
</style>
</head>

<body bgcolor="#993399">

<table border="0" width="100%" bgcolor="#FFFF66">
  <tr>
    <td width="100%"> </td>
  </tr>
</table>

<p> </p>
<table border="0" width="100%" bgcolor="#FF99FF">
  <tr>
    <td width="43%"><b><font color="#CC0000">Hangman's
fracture</font></b>
      <p><b>This is an injury often sustained in road traffic
accidents. Rapid
      deceleration flings the neck backwards and upwards, tearing the
spinal
```

```
      cord. The fracture owes its name to the practice of hanging. If
they were
      '<font color="#FF0000">lucky</font>', the victim would have
their spinal cords severe instantly, rather
      than being asphyxiated slowly by the noose.</b></p>
      <p> </td>
    <td width="13%"> </td>
    <td width="94%"><b><font color="#CC0000">Fractured neck of
femur</font></b>
      <p><b>The commonest cause for fracture admission to hospital in
older
      women with generalized bone thinning. The fracture may
interrupt the blood
      supply to the head of the femur, which would then be at risk of
<font color="#FF0000">crumbling</font>.</b></td>
  </tr>
</table>

<p> </p>
<table border="0" width="100%" bgcolor="#FFFF66">
  <tr>
    <td width="100%">
      <p align="right"><a href="javascript:history.back()"><font
face="Times New Roman" size="2"><b>BACK</b></font></a></p>
    </td>
  </tr>
</table>

</body>

</html>
```

5.5 Testing

On the testing part, there have been few sets of testing. They are the unit testing, the integrated testing and the system testing. The unit testing, the process is only done through part-by-part of the system. For example, whether the hyperlink texts in the page are working by directing to the right site that is required to appear. Other unit testing is like the testing in database whether it can generate the query and report or not.

In the integrated testing part, the web site and the database is tested together. It is to know any overlook mistakes that might happen anytime and anywhere. In this kind of testing, the data of database will be retrieved from the database server and published on the web page. Thought the database design is too simple, but the important thing is it served a good quality of data and can run without any problem.

While in the system testing, the whole web site and the database are tested together to make a final testing before the system is published on the Internet. The system testing is including the unit and integrated testing too.

6.0 Future Expectation

In order to maintain the web site and the database attractiveness and usability, few features of both subjects must be constantly updated and changed. As said earlier, people nowadays tend to get bore with things if the presentation of it remains monotones.

6.1 Experience Gained

Technically the developer has been exposed to many new things on the computer and web field applications. Most of the essential parts of the experience are the opportunity in learning programming languages whether on the client side or on the server side. Though it is hard, with the tight time frame, the knowledge gained is real priceless.

- Web-based application

  The developer now knows how the client/server application works. How to establish the database on the server, how the system retrieve the data from the database and how the data being publish on the web page were learned by developing this web-based system. It also includes the design and making the interfaces and web pages look attractive, cool and interesting.

- ASP / VbScript

  This programming language is used in the server side scripting. A non-exist file is opened to develop a scripting that will recall the information (which is stored in the database) that needed by the user from web site, and then publish

it on the same web page. This scripting language is used together with the SQL statement to make the task happened. For more information on this programming language, please refer back to the Literature Review part of the report.

- SQL statement for database

  The Structured Query Language is used in the database connection part. The database is defined in the ODBC and this SQL statement is used as the data access to call the database information.

- JavaScript

  Please refer back in the Literature Review part of the report to see the use and the functionality of this programming language. JavaScript has been used together with HTML functions to make the web page more attractive and interesting as possible.

- ODBC

  ODBC is the programming interface that enables applications to access data in database management systems that use SQL as a data access standard. It Administrator stored in the Control Panel of every computer have few setting function – User DSN, System DSN, File DSN, Drivers, Tracing and Connection Pooling. For further information regarding these names, please go to your PC Start button, select Setting and go to Control Panel option.

6.2 Future Enhancement

- Interactive & context sensitive Help

The current Help manual though has been thought helpful, but it is still lack in certain aspect of the requirement. So, in the near future, it will be upgraded into an interactive and context sensitive manual that make user feels like home and handling with something they familiar with. It doesn't an expert to help the beginner of the system to browse for what they wanted.

- Support vision types of popular browser

The developer will make sure that all the function in the system are supported by the popular current browsers that we have and used in the market. This matter has been discussed in the System Limitations earlier in this report. Using the right kind of scripting language to make certain added functions can do this.

- Integrate with mailing capabilities.

In the current system, there are three places where user can e-mail the developer regarding anything they wanted to talk about. One in the main page, then in the message board and then in the Help manual. In the coming future, one integrated function will be make that user can view their questions and the answers from the Administrator so for other users can see it too. Though in the message board, we have this kind of interaction, but for the developer, the message board and the message center are for the user to user interaction and no Administrator interference will be possible. Administrator will enter into the board when it is really needed and necessary.

- Integrate with subject information

  As said before in the System Limitation part, the subject And information brought to the view of the users is not complete. The project time frame limited the developer to add more comprehensive and selected information regarding the healthcare and medical field. However, glad to say that all the information, data and articles are a subject to change from time to time to make sure that the user get a full house of information regarding the matter that been brought forward earlier in certain sections.

- Better compliment to the contributor.

  All of the contributors in this web site, whether they contributed the scripts, graphics, pictures, information, or links, have been complimented. But, in the compliments part of the web page is not well written to show such gratitude from the developer to the contributors. It will be remake.

- To have the recognized statement of the system information source.

  There is any statement that recognized the information brought into the mind of the user. However, it will be written as follows:

- Integrate with links to local healthcare web sites

  There aren't much local web sites or web portals that served 100 percent of healthcare information. But hopefully they are coming soon. From time to time the links to the local healthcare web sites will be upgraded and reorganized so users can go directly to the things they want to find out.

6.3 Conclusion

It is hard to believe that the project development doesn't give any impact to the developer. Well, it hell makes the students work hard and sharpen the thinking skills. All sort of task upon the completion of the project lead the student to better their work and delving to their own efforts on maintaining good and diligent working experiences.

Learning how to analysed literature materials, synthesized completed sites on the Net, and planning better system among others, really teach the student how to upgrade their effort on having new dependable expected system.

Apart from that, the objectives set earlier upon the project has been thought fulfilled and achieved so far. The thick and thin of all the aspect on developing the system has been gained through levels of analysis and documentation. It is hope to better the process of making more quality, interesting and reliable system.

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USER MANUAL

User Manual

When user first comes to the page, they will see the system main page as below.

Diagram 10

On the Left side of the web page, is the major hyperlinks of all the sections on the system.

At the top of the page, there are seven Links to certain page include the Forum (for the Message Board), Help (to go to User Manual), Discussion (to go to the discussion room) and About (to page that explains the purpose of the system).

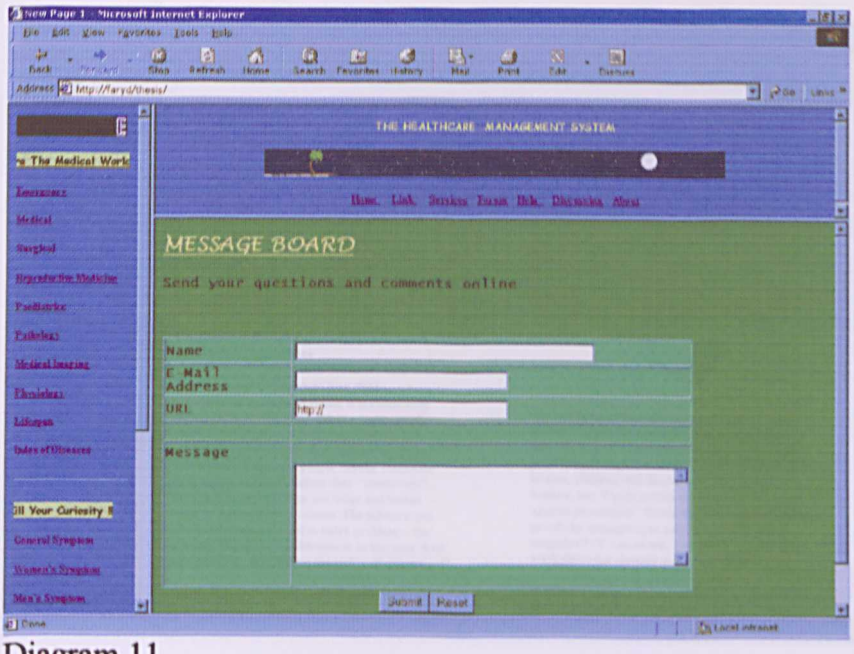


Diagram 11

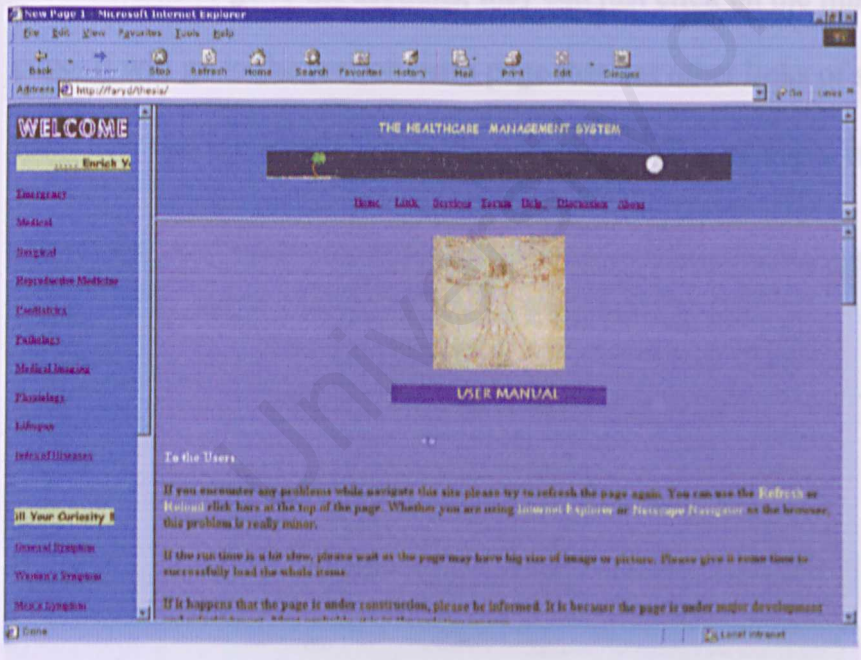


Diagram 12

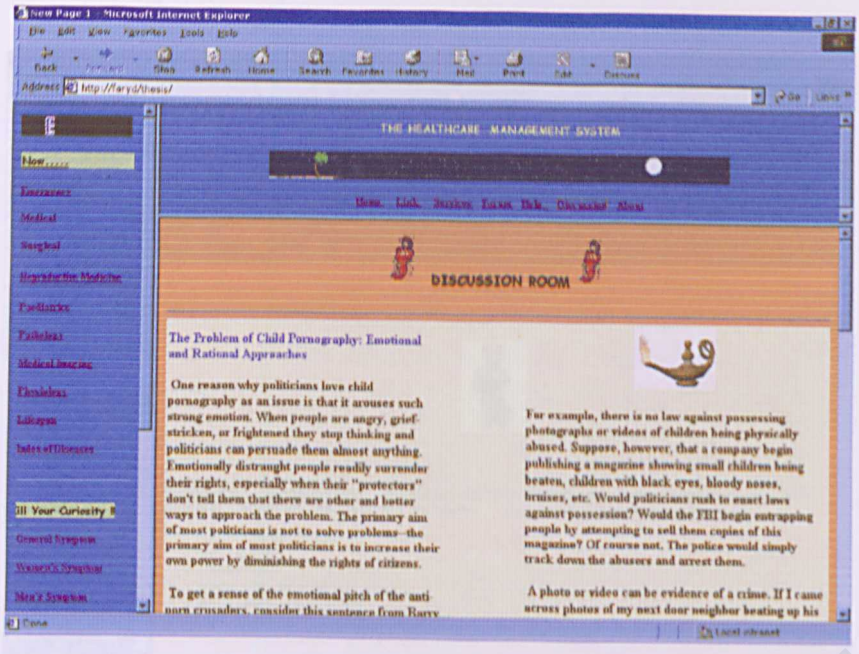


Diagram 13

If user wants to go to the sections, they can just click on the links on the left side of the page. It will go to the section main page that has other links of subsections. Then, from there user can see what's inside the subsections. The example is as shown below.

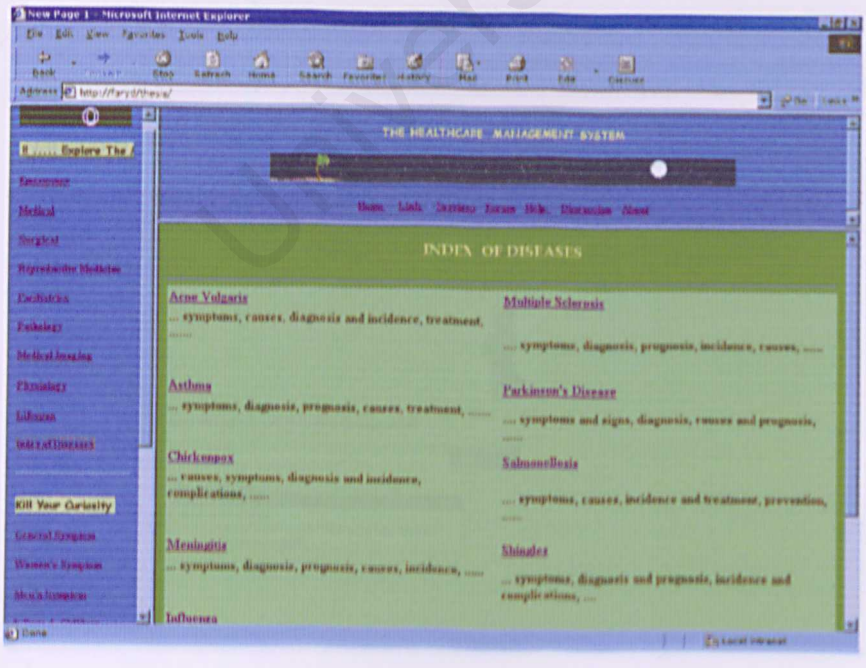


Diagram 14

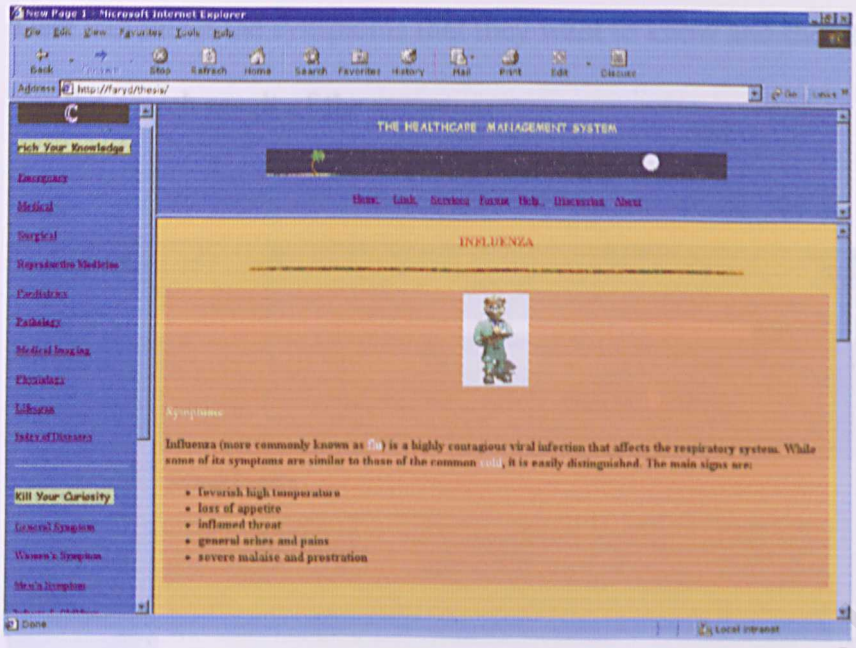


Diagram 15

If user wants to go to the database, they can click on the links of General symptoms, Men's Symptoms, Women's Symptoms, Infant&Children Symptoms to see the content of the databases. The example is as below.

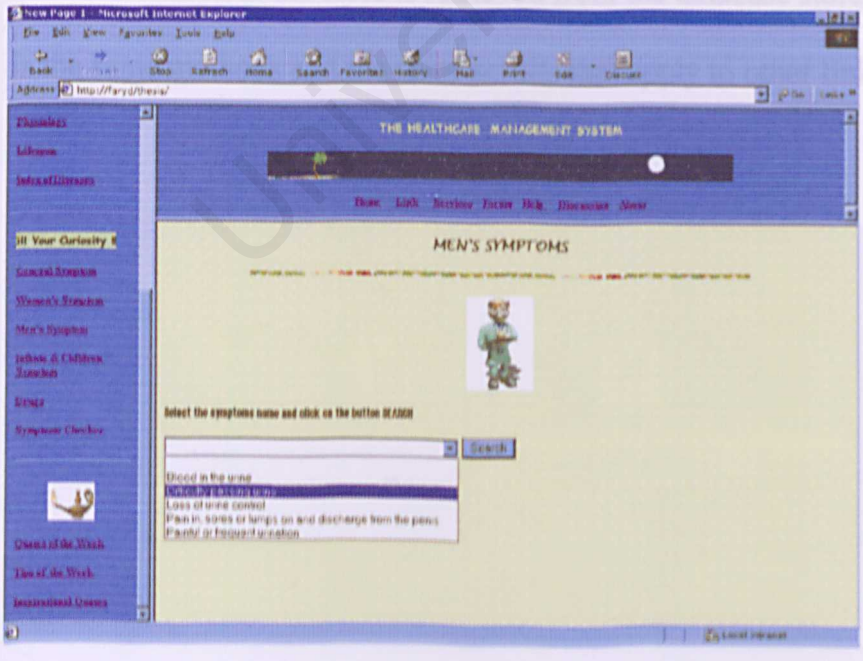


Diagram 16

User can select the symptoms that they want to know and then click the Search button to see the search result of the symptom.

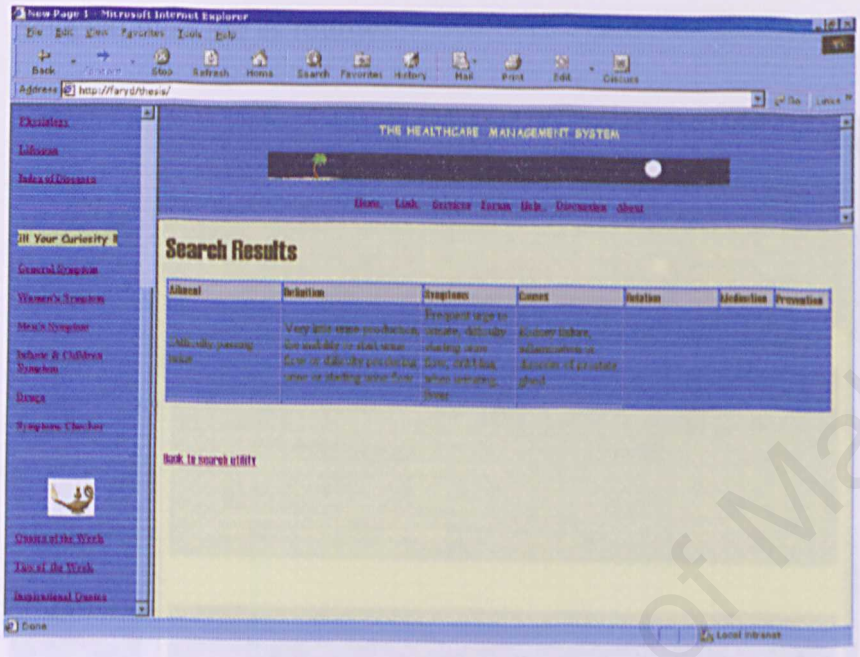


Diagram 17

The information in the table is retrieved from the database store in the database server. It is the same methods and the same results that apply to other links of database.

The information in the table is retrieved from the database store in the database server. It is the same methods and the same results that apply to other links of database.

There are also links to other web sites in the main page, rather in the top of the page. The selected links are as follows.

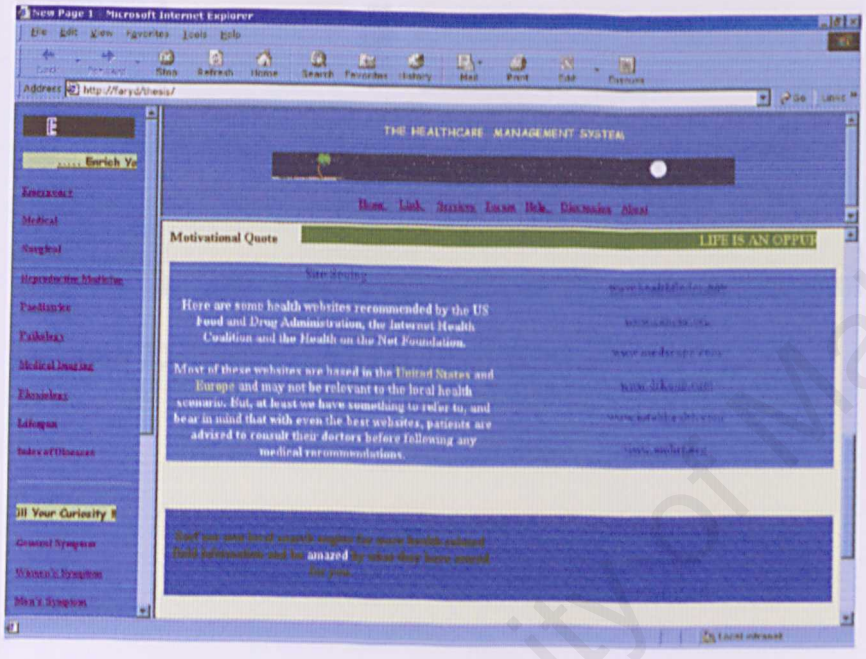
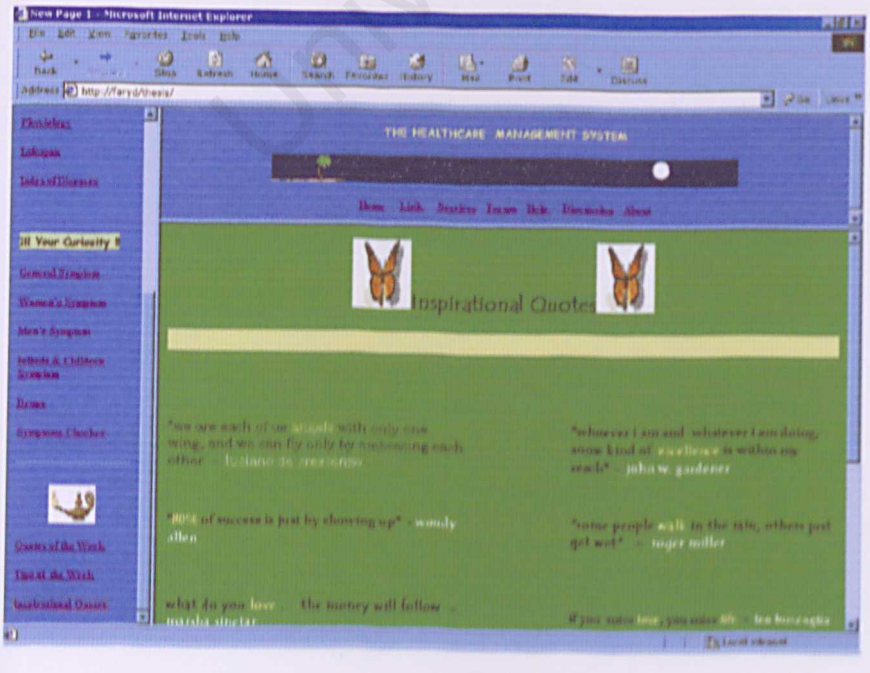


Diagram 18

There are also additional features like the one in the interfaces below. (Diagram 19)



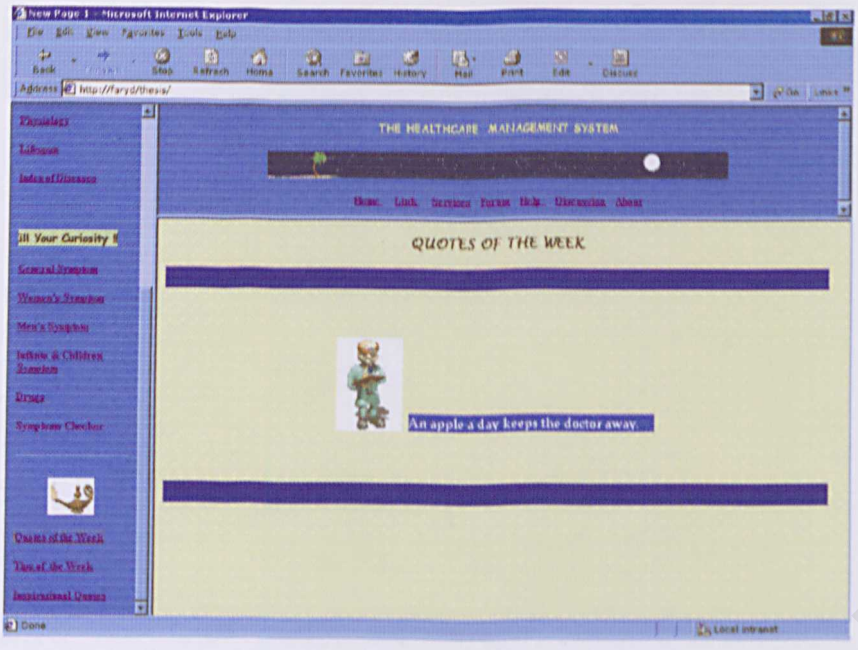


Diagram 20

ADMINISTRATOR MANUAL

Administrator Manual

The Administrator can only access the database. He has the right to delete, add or change the information regarding anything in the tables in the database. The database is stored in the database server and resides on the LAN in the FSKTM (currently). It is stored for the presentation purposes only and it will be shift to a home-based on the NET as soon as the developer get the permission to install the website and certain home site.

In the web site, all of the animations, graphics and pictures have been locked from outsiders to make copy any of it. This is to prevent plagiarism and hacking.

The General Symptom table and fields.

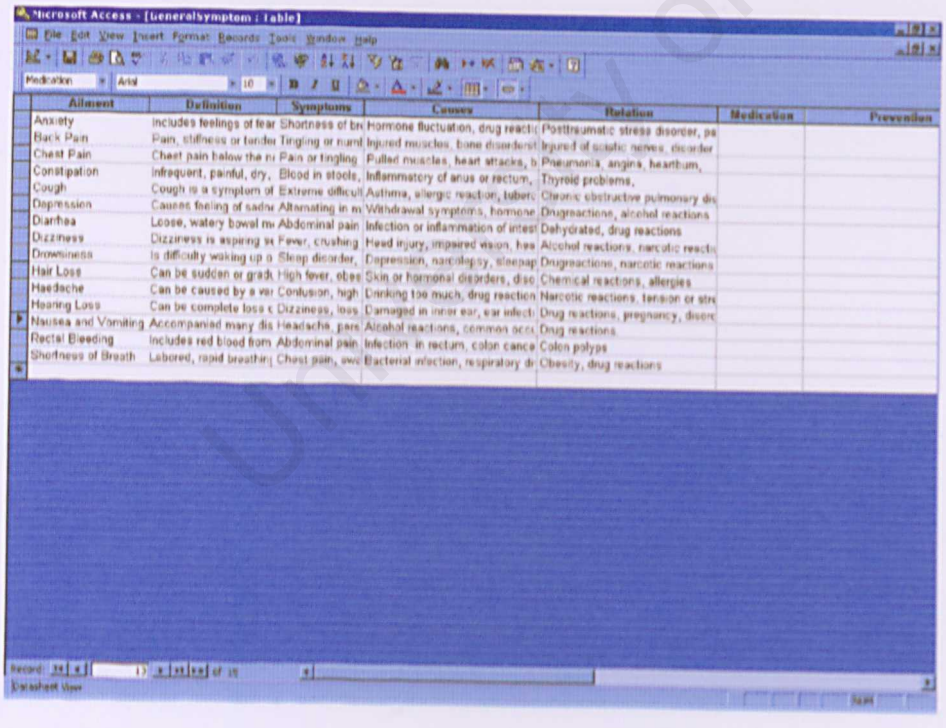


Diagram 21

The Drugs table and fields. The field names are different from other tables' names.

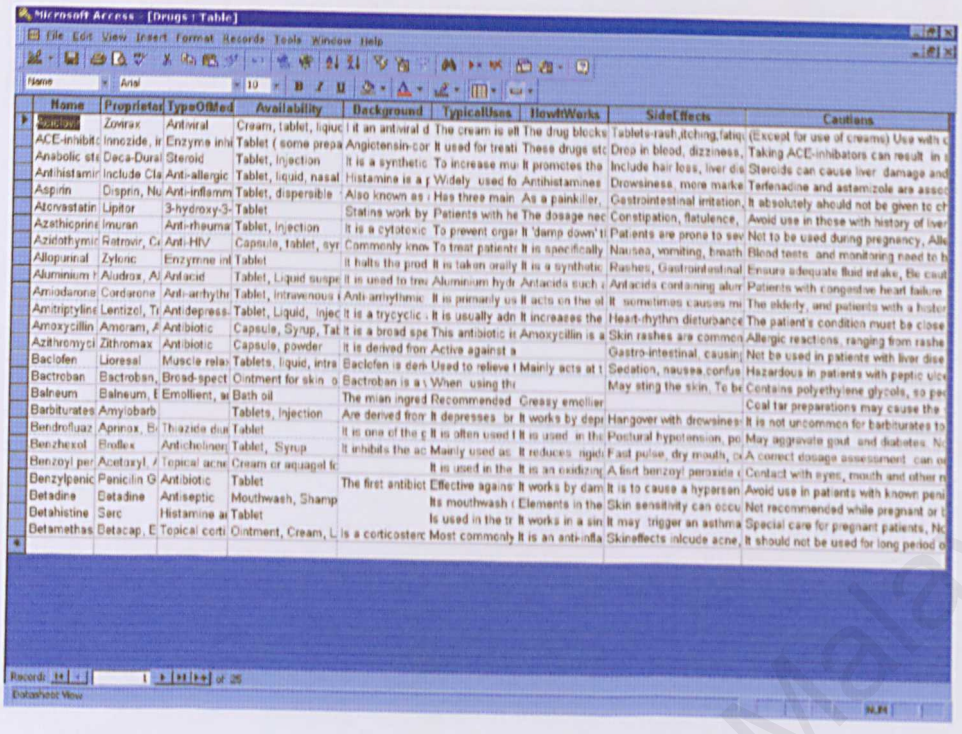


Diagram 22