

ONLINE MEDICAL ADVICE SYSTEM (TELE-KESIHATAN)

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ABSTRACT

'TELE-KESIHATAN' (Tele-Kes) is computer information system . The aim or objective of this system is to provide greater access to higher health quality to the users, by harnessing current and emerging multimedia and information technologies.

The system provides information on diseases , health tips, and treatments . These information will be more customized and personalized. The user can post any comments or any question that is related to this system. This system also has an online doctor, where the user can interact with the doctor through mail. Besides that the system also will provide location of nearest medical center so that in case of emergency the user just can rush to nearest hospital. This system will be updated from time to time according to new health information so that the user are more alert and aware of new diseases.

This online medical system will be a web based system so that everyone can get the information wherever they are. And also the users will be able to gain more knowledge on health in many perspective.

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Chapter 1



Introduction

CHAPTER 1 : Introduction

1.1 Introduction to 'TELE_KESIHATAN'

Over the past few decades, many various systems have been developed give knowledge and information about health to users. Up until today the real effects of computers have yet to be recognized for its capability of putting clinicians closer to the information they use in making patient care decisions. Thus the 'Tele-kesihatan' System (Tele-Kes) proposed for this project is not at all a new concept but comes from a respected lineage. The health Information and Management Systems Society, which is based in America, stated during annual meeting recently that the computerized medical record is slated to become the key medical information system of tomorrow[1].

However while efforts are being made to computerize the medical information , TELE-KES is a smaller implementation Telemedicine that gives provides users useful information. This 'Tele-Kesihtan' (TELE-KES) is an information system that provides health information through internet. The system's aims is to maintain people in the wellness paradigm. The system is not only a technology but it is the appropriate use of technology on health care process that focus on the individual to achieve greater access to health information and advise. It empower individuals, families and communities to manage their health in partnership with healthcare providers. These information will be more customized and personalized. This is because the user don't have waste time on

reading all the information available, but only search and access directly to the relevant information that they want.

The search engine will help the user to get the information quickly and accurately. This saves the users time. Since this is a user friendly system , this will fulfil users requirement. This system will play an increasing role in developing the health system of future that balances the importance of remaining well the need to prevent and treat diseases and disabilities, and that is focused on the needs of patients and families.

1.2 Definition of TELE-KESIHATAN'

'Tele-Kesihatan' is a system that built based on information system. The main aim of this system is to provide greater access to higher quality healthcare to all users, by harnessing current and emerging information technologies. This system explains about diseases, treatments, and other relevant information. The user also can interact with online doctor to clear any doubts.

The information will be customized and personalized. This means the information is categorized. So the users can access to the information that they need only, not all the information. So when user click on a certain disease, brief explanation of the disease, treatment tips, symptoms, conditions , all these information will be displayed. The system enables the administrator to update the information according to time and changes.

1.3 Importance of the system

Currently people are going from one place to other place to get their medical treatment.

They either go to hospital and see a doctor or they call fix an appointment ,so that they can visit the doctor at the particular time or the doctor can come and see them at that time.

A doctor can only spare a particular time to one patient one day. Since he has a lot of patient to see one day , the patient are not provided with detailed information about the disease , about the treatment and other health information.

Moreover the people only will be explained of the sickness that they have got , and if they have other queries about other sickness, diseases , treatments that it is not related to their disease , they will not get a proper information from the doctor. So people are provided limited information for limited time.

So 'Tele-kesihatan' system is the most and possible solution to this problems. As these health information that are provided electronically are from medical experts, trustable and saves time.

At one particular time , people can access to this system , and get more related information that they want to know. The information provided are latest, updated, detailed and can fulfill user requirements. So people don't have to consult a doctor every

time they want to know something about health , this saves either parties time. Moreover the information can be accessed any time by anybody.

So the main function of this system is to provide related health information to the public properly and effectively.

1.4 The Aims of the System

The main aims of developing this system are :

1. To fully attain users potential in health
2. To motivate users to appreciate health as a valuable asset
3. To take positive action to further improve and sustain their health status to enjoy a better quality life.
4. Enable the user to access the health information easily and effectively.

1.5 Objective Of The System

Through the development of the system , the following objectives will be fulfilled

1. To reduce the limitation of accessibility to the health information. (from anywhere , anytime user can access and gain knowledge about health)
2. To motivate individuals to maintain /lead a healthy life.
3. To empower and encourage the individual to take greater responsibility for his/her state of health.

4. To improve health information and education outreach nation-wide, by providing affordable , reliable , up-to-date and quality health information and education in a user-friendly and easily accessible way , from the home or close to home.

1.6 Scope Of The System

The scope of my system is to provide

1.6.1 Information on medical treatment -

1.6.1.1Disease Information

This system will list down some common and dangerous disease which includes the scientific name, normal name, cause of the disease , and full description of the diseases .

1.6.1.2 Treatment tips / prevention

This includes the proper treatment , medicines advises on how to cure the sickness.

However if the treatment or the terms that are used in this part are not clear, users are advised to consult a doctor first.

1.6.1.3Critical stage/ cured stage/uncured stage

This includes the information about how serious is a disease, and symptoms of early stage, critical stage and stated whether it can be cured or not.

1.6.2 Information on medical services -

1.6.2.1 Location of nearest hospital /campaigns/press statements

The aim of this part is to provide the users with the information of medical centers in Malaysia . This will make their life easy to find a medical center in case of emergency. And also other relevant health information like health campaigns held by Ministry of Health, health news that released by all the press (Malay Only).

1.6.2.2 Online appointment with doctors/mail to doctors

To communicate with doctors to fix an appointment or ask about health questions or mail to the doctors and state their current condition after treatment without going directly and consoling them.

1.6.2.3 Health test/ tips

Here will be few online health tests to check your level in physical, and mental aspects.

1.7 significance of the System

The main aim of this TELE-KES is to provide information about health to the public. To reach this aim, it is important to display useful information to the users. The search engine and user friendly concepts that is applied in this system will fulfill this requirement. The system is developed by applying the concepts , principal of system development and information systems and database concepts. The system focuses into areas like data storage, data retrieval , processing events , accessing methods and others.

1.8 Limitation of the System

The main aim of the system is to provide information about health. But not all the diseases can be displayed. A research has been done , and according to statistical report from Ministry

Of Health , some common diseases will be displayed(diseases that causes death) and these information will be categorized. It is very important to note here that these information is 'NOT' a substitute to a doctor, but it helps us to improve our knowledge on health.

1.8 Expected Outcome

This report will lead me to build a online Health information system. This report will give us a picture about the system that is going to be build.

With this system, user can easily find the information that they need. The users don't have to go and consult a doctor every time when they have a doubt about health. This is really a waste of time and energy. This system will provide the user with the information about diseases , treatment, symptoms , nearest hospital, mail to doctor , help desk, and health tests.

The system is the user friendly system. Interface of the system enhanced with attractive feature and mainly uses graphical environment. Like icons, menu, and buttons. The system is flexible reliable , easy to use and prepares help menu or user manual for further information.

The front-end of the system would be a graphical user interface which is easy to use while the back-end of the system would be the database that performs data storage, data manipulation , update data, and so on. But the most important aspect of this system is to provide health information according to the users requirement.

1.9 System Development

1.9.1 system Development Methodology

The development methodology for the system is System Development Life Cycle(SDLC). Each phases in SDLC is presented discretely and never accomplished as separate step. Several activities can occur simultaneously and activities may be repeated [kendall 1992]. Activities was planned and divided according to analysis, design ,implementation , testing , documentation and maintenance.

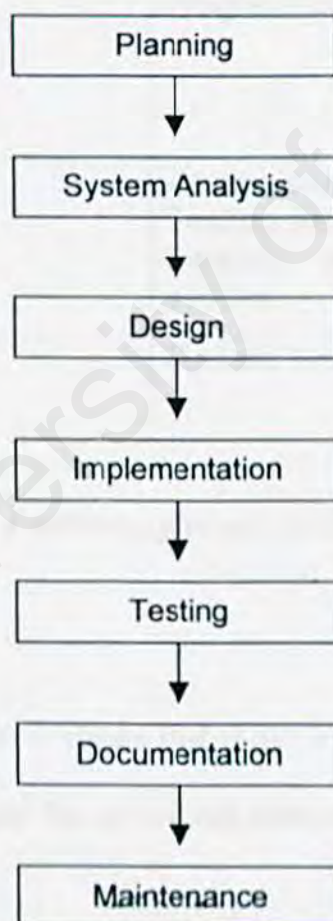


Figure 1.1 System development life cycle

Phases		Activities
Analysis	Data collection	Interview Observation
	Data analysis	Hierarchical Chart Data flow diagram
Design	Logical design	Design process Design input / output Design interface
	Physical design	Design database Data dictionary
System Implementation		Programming
System Testing		Testing module-module Testing database access Testing other requirement of the system
Maintenance & Enhancement		Update system from time to time

Table 1.1 activities planned for TELE-KES

1.9.2 Project Milestone

This project milestone is important to ensure that al the development phases are implemented in an appropriate period of time and the system can completed on schedule.

ID	TASK NAME	JUL'00	AUG'00	SEP'00	OCT'00	NOV'00	DEC'00	JAN'01	FEB'01
1	FEASIBILITY STUDY								
2	IDENTIFY PROBLEM								
3	IDENTIFY SCOPE								
4	IDENTIFY OBJECTIVE								
5	SYSTEM ANALYSIS								
6	DATA COLLECTION AND ANALYSIS								
7	REQUIREMENTS								
8	SYSTEM DESIGN								
9	LOGICAL DESIGN								
10	PHYSICAL DESIGN								
11	SYSTEM IMPLEMENTATION								
12	SYSTEM TESTING								
13	SYSTEM MAINTENANCE								
14	DOCUMENTATION								

Table 1.2 Project Milestone for Tele-Kes

1.10 Software and Hardware Requirements

1.10.1 Software Requirements

The software used to develop and TELE-KES is

Programming technology

- Active server page (ASP)
- visual interdev
- visual basic

database server

- Microsoft SQL 6.5
- Microsoft access

Programming language

- html

software

- print shop deluxe
- paint
- front page
- adobe photoshop

1.10.2 Hardware Requirement

The hardware and system requirements suggested for OMA are :

1. Win 95 or win NT 3.51 or later
2. 486 or higher processor
3. hard-disk with 1.2GB space
4. 16MB of Ram
5. CD ROM
6. Mouse
7. VGA or higher resolution video adopter
8. Other standard computer peripherals

1.11 Overview Of TELE-KES

Once the user has accessed to TELE-KES , first there will be an introduction screen where it welcomes the user to the system. There is no password needed to access the system. Then it will automatically go to another page where user can select which link they want to go to.

These links are as below



Figure 1.2 Welcome page

This is the introduction page. After 5 second it will automatically go to next page home.htm

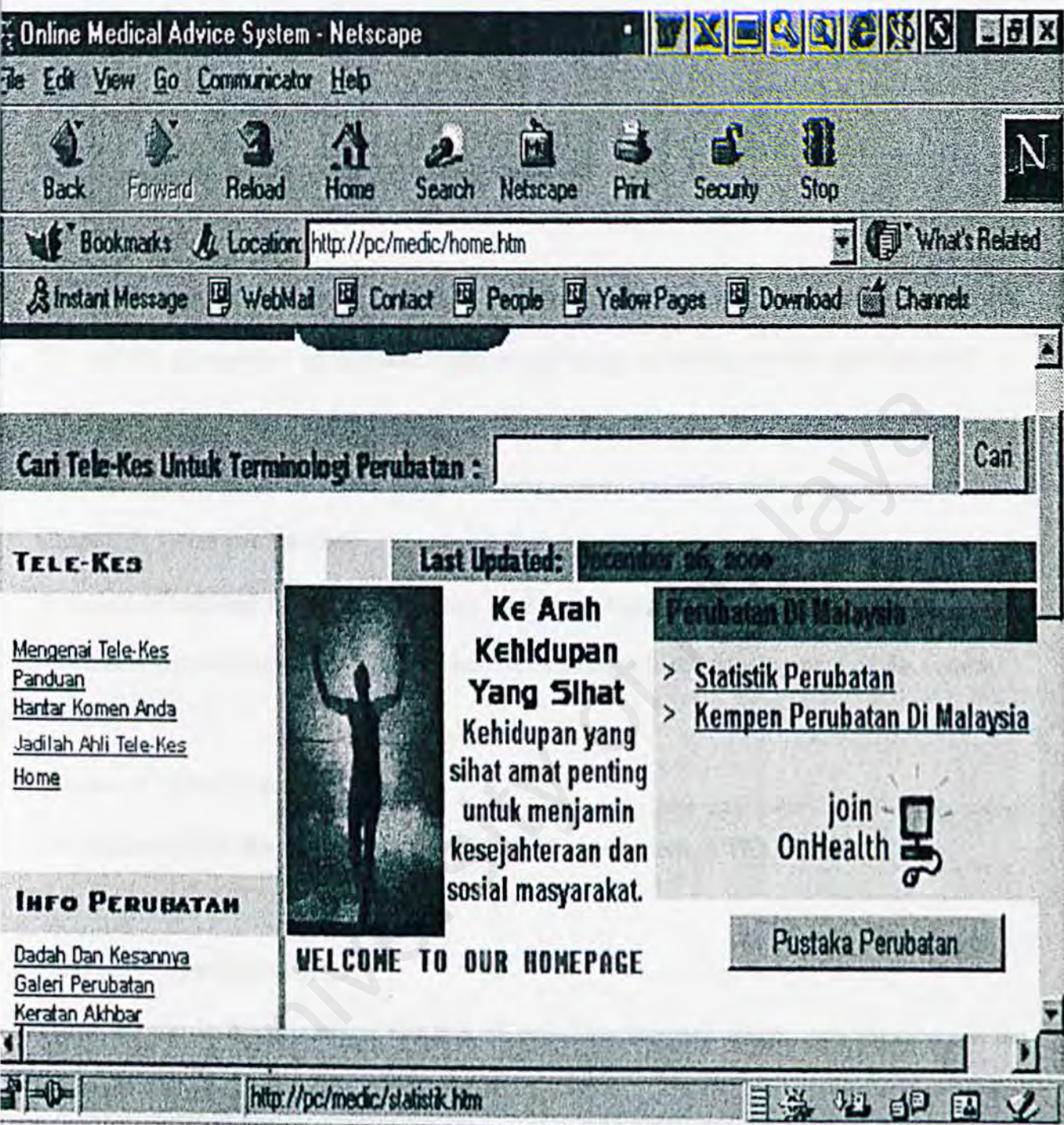


Figure 1.3 Main Menu

This is the main menu where it links to other pages. All the links will be showed in Chapter 4 - System design. There

1.12 Overview of chapters

The documentation consists of 7 chapters, namely:

Chapter 1 : Introduction

An introduction the concept of medical information systems as well as general overview of TELE-KES. Discussion of system objectives and scope as well as project schedule and software and hardware requirements.

Chapter 2: Literature Review

A review of existing system and research on the underlying concepts and principles of a medical information system. Also discuss the tools used in the development of the system.

Chapter 3: System Analysis

An analysis of the functional and non functional requirement of TELE-KES

Chapter 4 : System Design

Describes the design process of TELE-KES including database design , process flow and the design of the user interface.

Chapter 5: System Implementation (coding)

Discuss the coding of TELE-KES using ASP, VB script, Java Script to make TELE-KES functional.

Chapter 6: System Testing

Details the types of testing conducted on TELE-KES and the results of the testing .

Chapter 7: system Evaluation

Explains the strengths and weakness of the system and explores the possibilities of further improvements in the future.

Chapter 2

Literature Review

CHAPTER 2 : Literature Review

This chapter explains 4 major aspects:

- 1) Intelligent system
- 2) Human computer interaction
- 3) Telemedicine
- 4) Internet and other computer system

Reviews on these four aspects will future help me to build a appropriate system. So it is important to have sufficient knowledge in these aspects .

2.1 Intelligent System

Intelligent system are knowledge based system that are capable of achieving complex tasks in a human like intelligent way. Advanced computer technology, advanced instrumentation technology and many other recent development have made it possible for system to emulate the various capacities associate with human intelligence, skills such as reasoning decision making , pattern recognition , bearing and adaptability.[4].

Various model of computation termed as 'soft computing have been develop to deal with complexity inherent in intelligent system. The principal aim of soft computing is to exploit imprecision and uncertainty in order to achieve tractability robustness and low cost. Uncertainty is a crucial in real systems. Several areas contributing to soft computing including fuzzy logic, neural network computation, genetic algorithms and evolutionary computation , theory or fuzzy or non additive measures; rough set theory , and theories dealing with imprecise probabilities.

Some particularly powerful combinations of these areas are **neuro fuzzy** computation , fuzzy genetic algorithms rough fuzzy set, or fuzzy rough sets.

In order to emulate intelligence , skills, experience, and intuition of human being, such as a system would need a knowledge base an inference engine and user interface.

2.1.1 Knowledge base

The knowledge base contains highly specialized knowledge on the problem area, better known as "domain knowledge". It is provided by human experts and consists of the problem facts, rules, concepts and relationships. The knowledge base may be represented as semantic network, frames, predicate calculus or if then rules (most widely used)

2.1.2 Inference Engine

The inference Engine is the knowledge processor that is modeled after human reasoning. It simulates a human expert by working with available information. On a given problem, coupled with the domain knowledge , to infer conclusions. Iterative methods have been one of the principal concerns in determining the success of knowledge-based system and can be generalized into two categories : fuzzy relational and non fuzzy interface method.[6].

2.1.3 Fuzzy relational Inference Method

Zadeh introduced fuzzy logic as a mathematical formalism to model the uncertainty of natural language. The conventional (boolean) logic was extended to handle the concept of partial truth values between "completely true" and "completely false".

Variables such as "whiteness" are mapped to values in the interval to indicate the truth or membership value. The value 0 is used to represent complete non-membership (not white) 1 is complete membership (very white) and values between are used to represent intermediate degrees of membership.

2.1.4 Non fuzzy Inference Methods

Other methods of inference in knowledge based systems were based on the Bayesian method, certainty factors and Dempster - shafers theory at evidence. The Baye's theorem is based on the likely hood to quantify the strength of a rule and assumes independent variable in its model of inferencing. Thus is a shortcoming as the complexity increases tremendously when variable are dependent. The approach of certainty factors estimates the certainty of a hypothesis given the evidence as the difference of the degree of belief and disbelief of the hypothesis.

However the sum of the certainty of the hypothesis given the evidence and the certainty of a false hypothesis given the evidence is not necessary one. The Demster -shafer theory corrected this problem. It is also based on the degree of belief and disbelief as in the certainty factor approach. However it is computationally expensive.

2.2 Human-computer Interaction

HCI is the study of how people design, implement and use **interactive** , organization, and society. This encompasses the ease of use as well as new interaction technique for supporting user task, providing better access for information and creating more powerful forms of communication. It involve input and output devices and the interaction technique that use them; how information is presented and requested ; how the computer actions are controlled and monitored ; all form of help ; documentation and training ; the tools used to design, build , test and evaluate user interface and the process that developers follow when creating interface.

User experts highly effective and easy -to - learn interfaces and developed are realizing the crucial role the interface plays. Surveys in USA shows that 50% of the design and programming effort on projects is devoted to user interface portion.

2.2.1 Importance of HCI

The HCI is critical to the success of product in the market place as the safety, usefulness And pleasure. There is substantial empirical evidence that employing the process, technique and tools developed by the HCI. Community and dramatically decrease costs and increase productivity. Saving are attributed to decreasing task time, fewer errors greatly reduced user disruption , reduced burden on support staff, elimination of training and avoidance of changes in software after release.

Computer systems develops have not paid much attention to computer ease of use. Sometimes the implementation of the user interface can be at fault, such as when several people died from radiation over closes partially as a result of faulty cursor handling code in the Therac. Effective user interface to complex application are indispensable. The recognition of their importance in other disciplines is increasing. For Artificial Intelligence technologies such as agents, speech and learning and adaptive systems, effective interfaces are fundamental to general acceptance. HCI subdisciplines such as information visualization and algorithm animation are used in computational geometry, database, information retrieval, parallel and distributed computation, electronic commerce and digital libraries, and education.

2.2.2 HCI Development

HCI is a research area of increasingly central significance to computer science, other scientific and engineering disciplines, and an ever expanding array of application domains. Thus more prominent role follows from the widely perceived need to expand the focus of computer science research beyond traditional hardware, software issues to attempt to better understand how technology can more effectively support people in accomplishing their goals.

HCI research is highly successful today and has fundamental change computing. Examples are the ubiquitous graphical interface user interface toolkits and interface builders. Even the spectacular growth of the world wide web is a direct result of HCI technology. It is the interface improvements more than anything else that triggered thus explosive growth.

2.2.3 Difficulties in designing Effective User Interface

At the same time that a human-centered approach to system development is of growing significance, factors conspire to make the design and development of systems even more difficult than in the past. Thus increased difficulties follows from the disappearance of boundaries between applications as we start to support people's real activities ; between machine as we expand facilities; and between people as we begin to realize the importance of supporting organization and group activities.

Another important HCI factor is that different users from different conceptual or mental models about their interactions and skills (different ways of learning and keeping knowledge and skills (different "cognitive style" as in for example "left brained " and "right brained" people). In addition, cultural and national differences plays a part. Another consideration in studying or designing HCI is the user interface technology changed rapidly , offering new interaction possibilities to which previous research findings may not apply. Finally user prefer change as they gradually master new interface.

The user interface is perhaps is most important part of an application; it's certainly most visible. To users , the interface is the application; they probably are not aware of the code that is executing behind the scene. No matter how much time and effort put into writing and optimizing the code the usability of application depends on the interface.

Features of user interface :

- Includes sophisticated **graphical user interface (GUI)**
- Includes a user friendly interface
- Allows secure and confidential access to information
- Has a short response time (timely information)
- Is accessible from many places
- Includes a reliable access procedure
- Minimizes keyboards use by including infrared controllers , mouse, touch pads, and touch screen
- Provides quick retrieval of desired information
- Is tailored to management styles of individual executives
- Contains self-help menu

Important issues in building an user interface are :

- Choice of input and output devices
- Screen design
- Human-machine interaction
- Use of colors and shading
- Information density
- Use of icons and symbols
- Information display format

2.3 Tele medicine / Telehealth

Broadly defined telemedicine , is the transfer of electronic **medical data** (i.e high resolution , images , sounds life video, and patient records) from one location to another. Thus transfer of medical data may utilize a variety of telecommunication , technology, including but limited to ordinary telephone lines, ISDN, fractional to full ATM, the internet , intranets and satellites. Telemedicine is utilized by health providers in a growing of medical specialist, including but limited to dermatology, oncology, radiology, surgery, cardiology, psychiatry , and home health care.

Telemedicine reflects the application of physiological and medical knowledge, through simulations and sensing and effector systems integrated with information and telecommunication technologies, to facilitate operational and medical decision making, enhance medical training, and deliver medical treatment across all barriers. From the medical perspective, advances in information and telecommunication technologies can be exploited to military advantage through their combined application with advanced biomedical technologies. Telemedicine derives capability from technological advances across a number of fields including telecommunications, space sciences, materials science, computer and software engineering, artificial intelligence, perceptual psychology, robotics, and medicine. Telemedicine reflects health care's contribution to and utilization of the theater-wide military command and communications system.

2.3.1 Trends observed in Telemedicine

- Using telemedicine in correctional facilities and home health care settings, can significantly reduce the time and cost of user transportation.
- fine -tuning the management and allocation of rural health-care emergency services by transmitting images to key medical centers for long distance evaluation /triage by appropriate medical specialist.
- permitting physicians doing clinical research to be linked together despite geographical separation , sharing patient records and diagnostic images.
- Improving medical education for rural healthcare professional , where rotation is made possible by linking several community hospitals together with the sponsoring medical school.

In general the numerous and ever expanding application of telemedicine allows its users to reduce burdens of inferior health care access through utilization of technology.

Because of telemedicine , geographical isolation need no longer be an insurmountable obstacle to the basic needs of timely and quality medical care.

2.3.1.2 Telemedicine Technology

Two different kinds of technology make up most of the telemedicine application in use today. The first called store and forward is used for transferring digital image from one location to another. A digital image is taken using a digital camera ('stored') and then sent ('forwarded') to another location. This is typically used for non-emergent situations, when a diagnosis or consultation may be made in the next 24-48 hours and sent back.

The other widely used technology, two way interactive television (IATV), is used when a consultation between the patients, primary care provider and specialist is necessary.

Video conferencing equipment at both locations typically an urban and a rural location, allow a real-time consultation to take place. This means the user/patient don't have to travel to an urban area to see a specialist and in many cases, provide access to information. Almost all the relevant information have been found to conducive to this kind of consultations including psychiatry, internal medicine, rehabilitation, cardiology, pediatrics, obstetrics and gynecology and many more.

2.3.1.3 Advantage of telemedicine

The use of telemedicine can provide several advantages. It can make specialty care more accessible. Video consultation from a rural clinic to a specialist can alleviate prohibitive travel for patient. Video conferencing also opens up new possibilities to continuing education for isolated or rural health practitioners, who may not be able to leave a rural practice to take part in profit meetings or educational opportunities.

2.3.2 Surveys on existing online medical system or telemedicine

I have also viewed few online medical websites regarding telemedicine and telehealth. Here are the examples of the websites

2.3.2.1 Conclusion From the web site

From the review and research that was done on these web sites can conclude that

1. All the system is in english, not in 'Bahasa Melayu'
2. Certain systems don't have online doctor
3. The information given is sometimes not clear
4. The disease information, symptoms and treatment all are mixed , not organized properly

2.3.2.2 Justification of the existing system to suit TELE-KES

1. So I from the web site conclusion I have decided and by the advice of my moderator and supervisor , I will build the system in 'Bahasa Melayu' so that this system will help the Malaysian to know more on health information. Besides that there are a lot of systems in English , so it would be a different system if it is build in Malay.
2. Not only that I will include a help desk for users who are not familiar with web system. This help desk will assist the user to find their information.

3. Besides that my system will have an online doctor so that users can ask any question

2.3.3 Survey on MOH Telemedicine / Telehealth

Besides reviewing telehealth web sites I also went to Ministry of health to know more about their telehealth system.

Here are the overview of their system:

❖ Definition of Telehealth

Telehealth refers to the integration of information technologies , medical and health technologies, telecommunication technologies and human -machine interface technologies to deliver healhtcare and to promote the health status of the people.

❖ Visison of telehealth

To go beyond the traditional mode of healthcare delivery. It aims to provide greater access to higher quality healthcare to all Malaysians, by harnessing current and emerging multimedia and information technologies.

Ultimately the future healthcare system will be supported and strengthened by Telehealth.

❖ Development of Telehealth

1) Lifetime Health Plan

Of the four applications the LHP is the most complex encompassing. The objective of the Lifetime Health Plan is a proactive and prospective Personalised Lifetime. Health Plan (PLHP) for individual and families to help reduce premature diseases and disabilities resulting in longer and healthier life, this will contribute significantly to personal , family and community well being.

Component of LHP project:

- a) Personalised Lifetime Health Plan (PLHP)
- b) Clinical support system
- c) Group data services

2) MASS customised /personalised health information and Education (MCPHIE)

This application will provide health information , education and advice that is customised and even personalised

The objectives of the pilot project are as follows:

- To enhance the preventive and promotive approaches under taken by the MOH in managing people's health status.
- To motive individuals to maintain people's health status.
- To empower and encourage the individual to take greater responsibility for their health
- To empower health information and education outreach nation-wide by providing affordable , reliable , up to date and quality health information and education in a user friendly and easily accessible way from home or close to home.

MCPHIE services will be given via the internet interactively, and via the care providers or call centers.

3) Telehealth Call Centre

This will be provided to extent the reach of the four telehealth services to the people who may not have internet access.

Services provided by call center:

- health information and advice over the phone
- help to make appointment with relevant health care center
- health directory
- health news
- registration to LHR

4) Teleconsultation

Primary objective is to extend specialist care to remote health clinics and health centres where there are lack of specialist.

Teleconsultation functionality

- teleconsulting
- telescreening
- teleradiology
- teleEG
- teleultrasound
- tele pathology
- teleechocardiology

5) Continuing Medical Information

It concerns the provision of CME through distance learning methods for healthcare professionals.

CME services

- Electronic Courses
- Virtual Resources
- Online Professional community services

Since their system is very large system , I have only concentrated on their third application that is MASS customised /personalised health information and Education (MCPHIE) . From the review of this application , I found that I have to give information in more personalised way and the system has to be interactive, user-friendly , and easily accessible way. This is because it involves user and computer. Not doctor.

2.4 INTRODUCTION TO INTERNET

2.4.1 Definition of Internet

Internet is a network of organisational internal computer networks. Organisational internal computer networks can be a hospital computer system, corporate computer system and others. Each participative computer network such as personal computer and LAN, WAN is called a **node**. A node may include several other networks. Computer system or network (node) is connected to internet by TCP/IP. TCP/IP is a communication protocol.

2.4.2 History of Internet

The internet was initiated in 1969 as a project of the U.S Department of Defence, to test the feasibility of a wide area computer network over which researchers, educators, military personnel and government agencies could share data, exchange messages and transfer files. Today internet is used over 30 countries by governments, universities and private individuals and organisations.

Common internet services are :

- Information retrieval services (Ftp & Gopher)
- Information search services (Archie, Veronica)
- Communication services (E-mail, Telnet)
- Multimedia information services (World Wide Web)

2.4.3 Open Systems Interconnection

OSI is a seven-layer model of protocols for computer - to - computer communication.

Initially presented in 1979 this layered approach was an attempt provide interpretability among computers. The benefits are :

- Network software and hardware engineers can allocate tasks among network resources more easily and effectively.
- Network managers can assign responsibility within their departments more effectively.
- Seven layers of OSI are , Physical, Data, Network, Transport, Session, Presentation and Application.

2.4.4 TCP/IP

The TCP/IP protocols were introduced in 1974 during the development of the predecessor of the Internet, ARPANET (Advanced Research Projects Agency Network).

The developers were Vint Cerf and Bob Kahn (Cerf joined MCI in 1982). ARPANET was constructed so researchers could share information with university, military and defense contractors to study how communications could be maintained during disasters.

Four layers of TCP/IP are application, host-to-host, internet and network access.

2.4.5 World Wide Web (WWW)

The World Wide Web is a client-server technology that uses the Internet (and the TCP/IP network protocol) as a communication tool to easily and inexpensively disseminate customizable documents and other information on a world-wide basis.

The Internet (or the National Information Highway) is a mechanism to transport message packets between users. In the same way that busses, cars, and trucks travel the Interstate Highway System, the World Wide Web describes a specific type of vehicle that transports message packets on the information highway.

2.4.6 HTTP

HyperText Transport Protocol (HTTP) is used to transfer HyperText Markup Language (HTML) documents across the Internet. These protocols were based on a proposal by Tim Berners-Lee at CERN (The European Particle Physics Laboratory) in 1989. HTTP provided a means of transparently moving from document to document and indexing within a document.

HTTP is an application-level protocol that enabled what is commonly referred to as the World Wide Web. HTTP is a generic, stateless, and object oriented service that can be used to transfer data independently of the system.

HTTP is also used for communication between user agents and various gateways, allowing hypermedia access to existing Internet protocols and designed to allow such gateways, via proxy servers, without any loss of the data conveyed by those earlier protocols.

2.4.7 Steps to build a web page

There are four main process to build a web page. These are

- ❖ Creating Image

There are a lot of software that can assist us in this image creating, such as corelDraw, Adobe photoshop and other software that is based on user friendly and easy to use.

- ❖ Create a layout for web base

This would be a child play with the help of Microsoft Front page 98, Adobe Pagemil, Netscape Composer and other softwares.

- ❖ Upload web base

This process will be easy by using software like Jgaa's War FTP Daemon, Winstock FTP, Win FTP, Cat Soft's Serv-U .

- ❖ Getting an URL and connection for search engine

This is the last process. We can connect to some popular search engine like yahoo, altavista and other search engines. This will enable the user come across our system when they are looking for any medical system.

2.4.7.1 What is a good web page

- ❖ Quality of information
- ❖ Quality of Image, colors, graphics,
- ❖ Quality of user friendliness

2.4.8 COMPUTER BASED INFORMATION SYSTEM

A computer-based information system (CBIS) is composed of hardware , software databases telecommunications , people and procedures that are configured to collect, manipulate, store and process data into information [Ralph,1996].

2.4.8.1 Management Information systems

One branch of CBIS is Management Information System. The primary purpose of an MIS is to help an organization achieve its goals by providing managers with insight into the regular operations of the organization so that they can control , organize and plan more effectively and efficiently. If short an MIS provides managers with information used to provide feedback to various business operations . In doing so an MIS supports the value -added process of an organization .

A manufacturing MIS for example can help managers monitor a manufacturing a process that adds value raw materials by assembling them into finished products . For the most part this is accomplished through various summary reports output by the MIS. These summary reports can be obtained by filtering and analysing the highly detailed data contained in transaction processing database and presenting the result to managers in a meaningful way. These reports support managers by providing them with data and information for decision making in a form and fashion they can readily use.

The primary difference between the reports generated by the transaction processing system or TPS and those generated by the MIS is that MIS reports support managerial decision making at higher levels of management, where the decisions themselves tend to be less structured and less routine. While a TPS most often supports organizational efficiency, an MIS supports managerial effectiveness.

One important role of the MIS is to improve effectiveness by providing the right information to the right person in the right fashion at the right time.

2..4.9 DATABASE

Traditional approach to data management produced many problems like data integrity, data redundancy, multi-user access and so there was a desire to develop a more efficient and effective means of organizing data. The result was the database approach to data management. A database approach is one in which a pool of related data is shared by multiple application programs. Rather than having separate data files, each application uses a collection of data files that are either joined or related together in the database.

The database approach can offer significant advantages over the traditional file-based approach. For one by controlling data redundancy, the database approach can use storage space more efficiently and increase data integrity [Ralph,1996]. The database approach can also provide an organization with increased flexibility in the use of data. Because data once kept in two files is now located in the same database, it is easier to locate and

request data to be processed in a number of ways. A database also offers the ability to share data and information resources . This can be a critical factor in coordinating organization -wide responses across diverse functional areas of a corporation.

In order to use the database approach to data management, additional software database management system (DBMS) is required. DBMS consists of a group of programs that can be used as an interface between a database and the user or the database and application programs . Typically, this software acts as a buffer between the application programs and the database itself.

The most important condition for high quality information system is Relational Database. Relational database uses data stored in tables which simplifies the data maintenance and simple query language to request information. Relational databases are easily portable to other hardware platforms. Benefits using relational database :

- Easy set up
- Simple maintenance
- Easy definition of relations
- Structured query language
- Speed
- Flexibility and portability
- Support great number of hardware platform

Chapter 3



Methodology & System Analysis

University of Malaya

Chapter 3 : Methodology and System Analysis

A requirement is a feature of the system or description of something the system is capable of doing in order to fulfil the system's purpose[2]. System Analysis is an activity that encompasses most of the tasks that is collectively called computer system engineering. System analysis enable the system engineer to specify software function and performance, indicates software interface with other system elements and establishes design constraints that the software must meet.

A complete understanding of software requirements is essential to the success of the software effort[3]. Knowledge about end-user attitudes prior to computerization may contribute to planning for the training and implementation process. Tailoring these processes to meet the varying needs of user groups may result in a higher level of functional use of the system and less stress to the persons involved in its use.[18].

The system should have the following objectives[2]:-

Identify user's needs

Evaluate the system concept for feasibility studies

Perform economic and technical analysis

Allocate functions to hardware, software, people, database and other system elements

Establish system schedule constraints

Create a system definition that forms the foundation for all subsequent engineering work

System and Requirement will determine a methodology for developing Online Medical Advise (OMA). This section provides an overview of software development life cycle before focusing on its requirements.

3.1 Software Development Life Cycle

The process model is used to develop OMA is an amalgamation of the waterfall model and the incremental prototyping model. The waterfall model will be used in the implementation of the overall OMA system. The incremental model is useful for medical inference system development with the need for modification of inference algorithms or the addition of rules to increase the capabilities of the system.

The phases involved in SDLC

1. System requirement and analysis

Requirement that describes the system's behavior or activities, were defined under the guidance of En. Mustapha and medical experts. It is divided into functional requirement and non functional requirement.

2. System Design

The requirement will be translated into solutions. Screen prototype will be developed to ease the designing of the system. System design represents the functional of the system in a manner that may readily be transformed to one or more computer programs.

3. System Development

In this phase incremental prototyping will be used. Each modification or incremental of the new functionality to a module (the inference Engine) will produce a new release.

This release will act as a prototype. Then it will be tested for functionality or accuracy.

These process incremental and prototype will be repeated until all the functionality of the system is full implemented.

4. Integration Testing

After combining all the individual component of the system , the working system will be tested to ensure that it works.

5. System Testing

The whole system will be tested to ensure that all the requirement have been fulfilled.

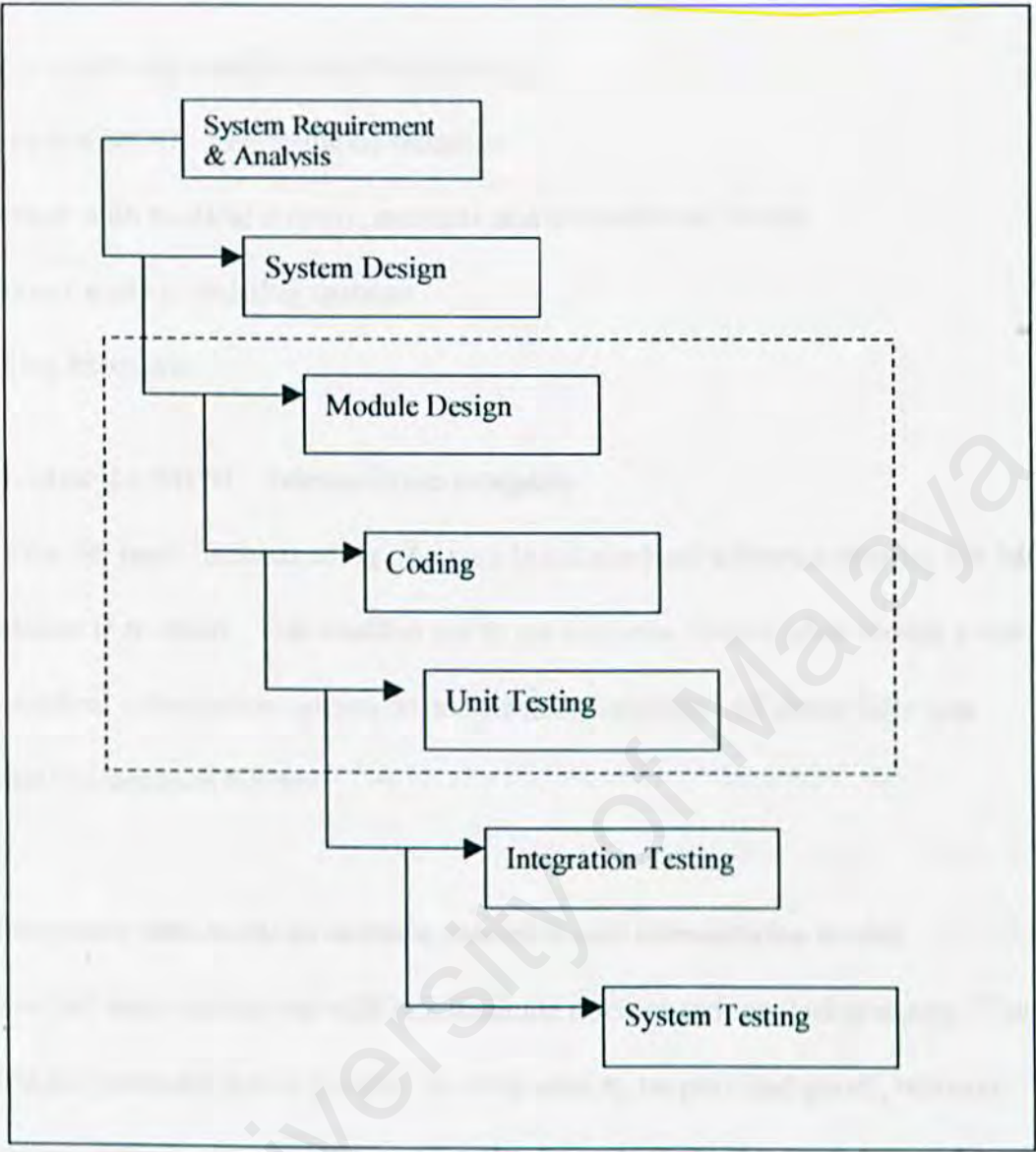


Figure 3.1 SDLC Cycle

3.2 Fact Finding

Fact finding is an essential part of any software development process. Fact finding is conducted in order to have a through understanding of the system to be developed.

Among the methods used for fact finding are :-

1. Review the MOH Telemedicine template
2. Interview with medical doctors, students and telemedicine health
3. Analyze / study of existing systems
4. Reading Materials

3.2.1 Review the MOH Telemedicine template

To provide the basic understanding of a web based medical inference system, the MOH telemedicine is reviewed. This enabled me to get a clearer picture what should a web based medical information system do and its functionalities. All these facts were discussed in Literature Review

3.2.2 Interview with medical doctors, students and telemedicine health

Interview had been carried out with telemedicine doctors and medical students. The main user of this system are public people. So they need to be provided good, relevant information. Efforts were made to extract the doctor's medical knowledge as this would provide a guide for the creation of the knowledge base. Also the inference method is highly dependant on the doctor's reasoning process. The main problem that surfaced was the difficulty for doctors to organize.

3.2.3 Analyze / study of existing systems

A study was conducted on the operations specifications of existing systems, telemedicine sites, as discussed in the Literature Review..

Examples of web site visited:

www.medhelp.com
www.webmd.com
www.onhealth.com
www.oing.com

3.2.4 Reading Materials

Relevant literature was gathered from a variety of sources. The journal library and Proquest CDROM services in the University Malaya's main library were of great help in seeking information on information system and the current need of medical information systems. Searches of the internet also proved useful in finding out about the specifications of current medical information systems that are being marketed over the internet.

3.3 TELE-KES Architecture

TELE-KES is a web based information system for all users. The architecture of TELE-KES is presented in this section. Before implementation, decision must be made as whether to use two-tier or multi-tier architecture. TELE-KES operates only at one level, in other words all users to the system will have the same access. While the architecture of

TELE-KES is not exactly client server it is designed to run at more than one terminal at a time.

This is done using open Database Connectivity (ODBC) . ODBC provides an alternative to using the Microsoft Jet database engine to access data. The ODBC interface usually is faster than the Microsoft Jet Engine and uses less workstation memory than Microsoft Jet. The ODBC interface is capable of accessing data in client server databases and Microsoft Access format databases.

The ODBC interface doesn't actually talk to the database but instead links the ASP program to defined data sources. This data sources can be flat file database such as dBASE and FoxPro, relational databases such as Microsoft Access server, or any other file format for which an ODBC interface driver is available. Most importantly when an ODBC interface is used, the ASP program does not link directly to the data source but talks to the ODBC front end alone. The ODBC front end then uses removable drivers to translate the requests into a format understood by the target data source. Figure below illustrate how ODBC works.

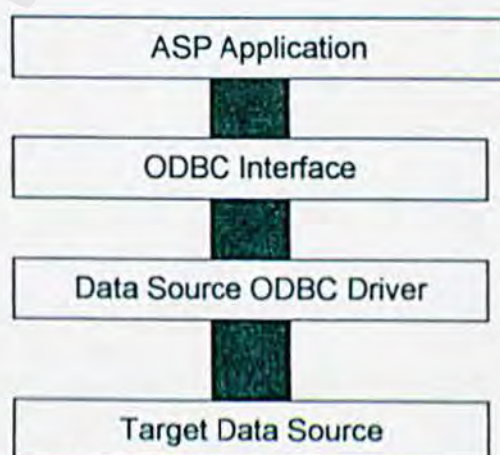


Table 3.2 ODBC Connection

Using an ODBC connection, TELE-KES will be able to retrieve relevant information.

3.4 System Requirements

3.4.1 Functional Requirements

The functional requirement describes the interaction between TELE-KES and environment (user). There are a set of functions that are required to be included into the system. The functional requirements for TELE-KES are as below:-

3.4.1.1. Input of signs , symptoms for diseases

When a user proceeds to diagnose a patient, he/she will have to input the patient's signs and symptoms into the system. However the user may encounter difficulties in determining the severity of each sign or symptom as the matter is very subjective. Each user has his or her own perspective of the severity . Therefore the system will allow the user to modify their previous input anytime before submitting them to the inference engine.

3.4.1.2. Settings for the Inference Engine

- ❖ screen the information

This function enable the user to access to few choices with the help of buttons, web icons and menu choice. This is to provide information.

- ❖ Number of different diseases

User can choose the various disease information, either by search engine or by pull down menu. These results will be provided together with their cause, symptoms, treatment, and prevention.

3.4.1.3. Inference Result

Upon completion of all the input and settings, TELE-KES will submit the input to the inference engine for processing. The following result will be provided:-

- ❖ Information by the inference Engine

Diseases , locations, medical terms, test to be make , risks of death will be displayed according to the users requirements

- ❖ compare

A comparison between the signs and symptoms obtained from the patients and those associated with the differential diagnoses will be made. This section will contain the

signs and symptoms of the selected differential diagnosis and its severity values from the database.

3.4.1.4. other requirements

❖ Report Module

This module will help the user to access to information that they want to

❖ Help module

This module will show the help desk for the user that are not used to this system.(User guidance)

❖ Form module

This module will consist of forms , so that user can fill in and check their tests and risk of death health conditions and also few health tests will be available for users .

3.4.2 Non functional Requirement

Non-functional requirements are the features that are important to develop a system with full functionality and constraints under which the system must operate and the standards which must be met by the delivered system. The non-functional requirements for OMA are :

(iv) Modularity

The program coding is done using modular approach where a complex large routine is broken down into smaller modules. This approach is used as it enhances maintainability, reusability of the program code and improves the readability of the program code.

(v) Flexibility

OMA enable user to enquire student, staff and financial information online and generate report as a hard copy or display on the screen. Forms are displayed for the users to input data and view report generated. Graphical user interface enables the users to interact with the system in flexible manner.

(vi) User-friendliness

Even if a system can perform valuable functions, it is not favoured if it is not a user-friendly system. OMA is a menu driven system where user can perform various tasks by choosing a specific option from different levels of menu by using arrow keys or mouse. Prompts and messages are displayed to guide the user along the system operation.

(vii) Maintainability

Tele-Kes is also enhanced with maintainability feature where the program can be understood, corrected if an error is encountered, adapted if its environment changes or enhanced if the user desires change in requirements.

(viii) Availability

OMA is able to handle user inquiries and produce reports at a timely basis. When queries are made, the system is able to fetch data and display the result after manipulation.

CHAPTER 4 : System Design

4.1 System Design

Design is the creative process of converting the problem into a solution; the

development of the solution is a creative process. The system specification is used to define the problem. A solution to the problem is something that satisfies all the requirements of the problem.

System Design

The system design process involves the following steps:

- A description of the major software components and their functions
- The hierarchy and flow of the software components
- The data structures and data flow

A well-designed system of application software or application has the following characteristics:

- The design should exhibit a hierarchical organization that makes efficient use of system resources (software)
- The design should be modular. The working of the system should be broken down into modules so that distinct functions can be isolated from each other.
- The design should provide the best and separate representation of data and processing.
- The design should lead to modules (e.g. subroutines or procedures) that should exhibit independent functional characteristics.

CHAPTER 4 : System Design

4.1 System Design

Design is the creative process of transforming the problem into a solution ; the description of the solution is also called design. The requirements specification is used to define the problem. A solution to the problem is something that satisfies all the requirement in the specification [2].

The technical design describes the hardware configuration, software , needs communication interfaces, and the input and output of the structure [2]. It usually includes the following items :

- A description of the major hardware components and their functions
- The hierarchy and function of the software components
- The data structures and data flow

A well designed system or application system or application has the following characteristics[3].

- The design should exhibit a hierarchical organization that makes intelligent use of control components of a software
- The design should be modular. The working of the system should be broken down into modules so that distinct functions can be isolated from each other.
- The design should contain distinct and separable representation of data and procedure
- The design should lead t modules (e.g subroutines or procedures) that should exhibit independent functional characteristics

- The design should lead to interfaces that reduce the complexity of connections between modules and with the external environment.
- The design should be derived using a repeatable method that is driven by information obtained during system analysis

4.2 Database design

A database design is any large collection of structure data stored in a computer system

Databases are just one of the components of information systems, which also include

application programs and user interface[14]. Database design refers to the process of organizing the data fields needed by one or more applications into an organized structure. This structure must foster the required relationships among the fields while conforming to the physical constraints of the particular database management system[13]

A variety of designs make data design essential. These include data redundancy application performance , data independence , data security and ease of programming[20]. All are important factors in the data processing environment , and all can be adversely affected by poor database design.

The database used in TELE-KES was formulated using Microsoft Access 97 and includes information on the diseases, symptoms, locations of hospitals and medical terms. The database is then linked to front page applications in order to perform functions to retrieve information from a search result. In a relational database, a table is a collection of unique instances of similar data. Normalization reduces data redundancies , and helps to eliminate data anomalies that result from those redundancies.

4.2.1 Data Dictionary

The data dictionary is a reference work of data about data compiled to guide system analysis through analysis and design[15]. It is a integrated repository of all types of data produced, managed exchanged and maintained in an organization[16]. The following are the tables in TELE-KES database.

Field Name	Data Type	Description
name	Text	The unique name of disease
introduction	Memo	A brief explanation about the disease above
cause	Memo	Cause of the disease
symptom	Memo	common signs /symptoms of the disease
treatment	Memo	treatment of the disease
prevention	Memo	some prevention ways of the disease

Name	introduction	cause	symptom	treatment	prevention
AIDS	aids adalah sing.....	penyakit ini disebabkan	Ujian pengesah..	menjalani pem.....	angan melakukan hubungan seks dengan or....
Batu Karang	Pemendapan...	ketidaksempurnaan	sakit pada ba...	bergantung	Minum 1.5 liter air setiap hari teruta....

Table 4.1 Disease Table

Table 4.1 shows all the information on the diseases, which will be used when user type their diseases.

Field Name	Data Type	Description
place	Text	state
name	Text	name of the hospital
address	Memo	address
kriteria	Text	whether it is Government or private
fax	Text	fax number
tel	Text	telephone number

Place	name	Address	Kriteria	Fax No	Tel No	Contact
Johor	Hospital Batu Pahat	Jalan Korma Batu Paha	Kerajaan	07-4322544	07-4349497	
Perak	Hospital Taiping	Jalan Taming Sari	Swasta	05-6884013	05-6835453	

Table 4.2 Location table

Table 4.2 contains information on the locations of the Government and private hospital in Malaysia.

Field Name	Data type	Description
term	text	Medical terms
description	Memo	A brief description on the term

Term	Description
Acute	Penyakit yang datang secara tiba-tiba dan mempunyai
Autoimmune	Penyakit autoimmune adalah keadaan dimana penyakit

Table 4.3 Medical Terms Table

Table 4.3 shows medical terms and its description

Field name	Data type	Description
age	text	age of the users
sex	text	sex of the users
health	memo	their health conditions
death	memo	their death risks

age	sex	health	death
1	f	Periodic blood pressure checkup	Your greatest death risk this
2	m	Blood cholesterol screening at leas	*Your greatest death risk this

Table 4.4 checker table

Table 4.4 contains information about sex , age , their disease and risks of death

4.3 Program design

Program functionality design is based on the system requirements stated in chapter 3. It translated the system requirements into system functionality. The design focuses on the system.

4.3.1 System structure chart




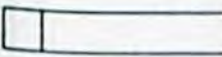
The system structrue chard is based on the functionality modules. The figures below show the system structure for TELE-KES .

4.3.2 Data flow Diagrams

Data flow diagrams graphically characterize data processed and flows in a business system. To understand the information requirements of the users of TELE-KES, they

must be able to conceptualize how data moves through the organization, the process or transformation that the data undergoes, and what the outputs are. Although interviews and investigation of hard data provide a verbal narrative of the system, a visual depiction can crystallize it in a useful way[2].

Data flow diagrams consist of four basic components that are used to chart the flow of the data.

Component	Description
	The double square is used to depict an external entity that can send or receive data from system.
	The arrow shows movement of data from one point to another , with the head of the arrow pointing to the data's destination
	A rectangle with rounded corners is used to show the occurrences of a transformation process.
	This open ended rectangle is used to represent a data store is where data is held for a time within the system

The advantage of data flow diagrams include : -

- ❖ The simplicity of notation
- ❖ Using them to gain clearer information from users
- ❖ Allowing the system analyst to conceptualize necessary data flows without being tied to a particular physical implementation
- ❖ Allowing analysts to better conceptualize the inter-relation of the system and its subsystems.

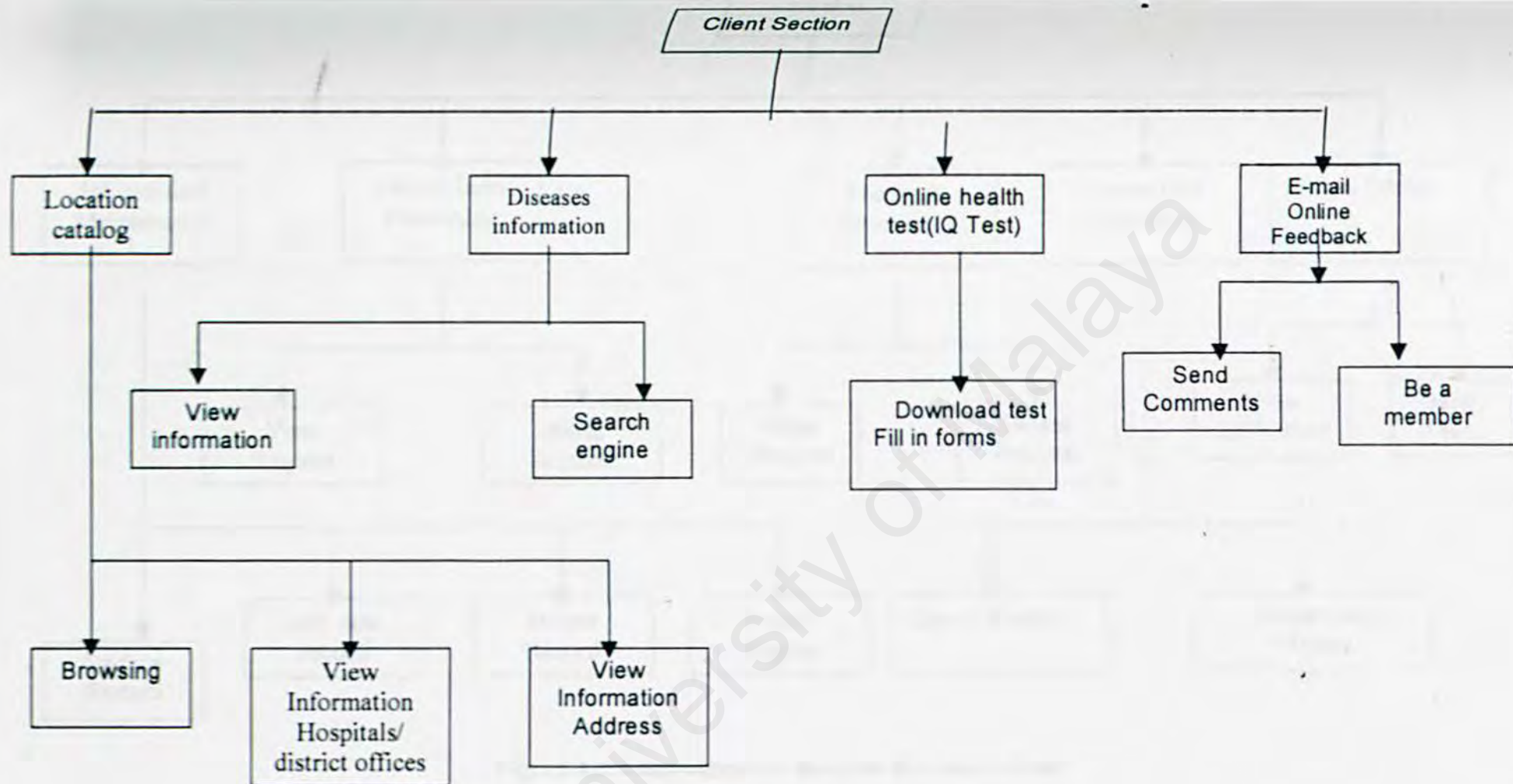


Figure 4.1 Client Section Structure Chart

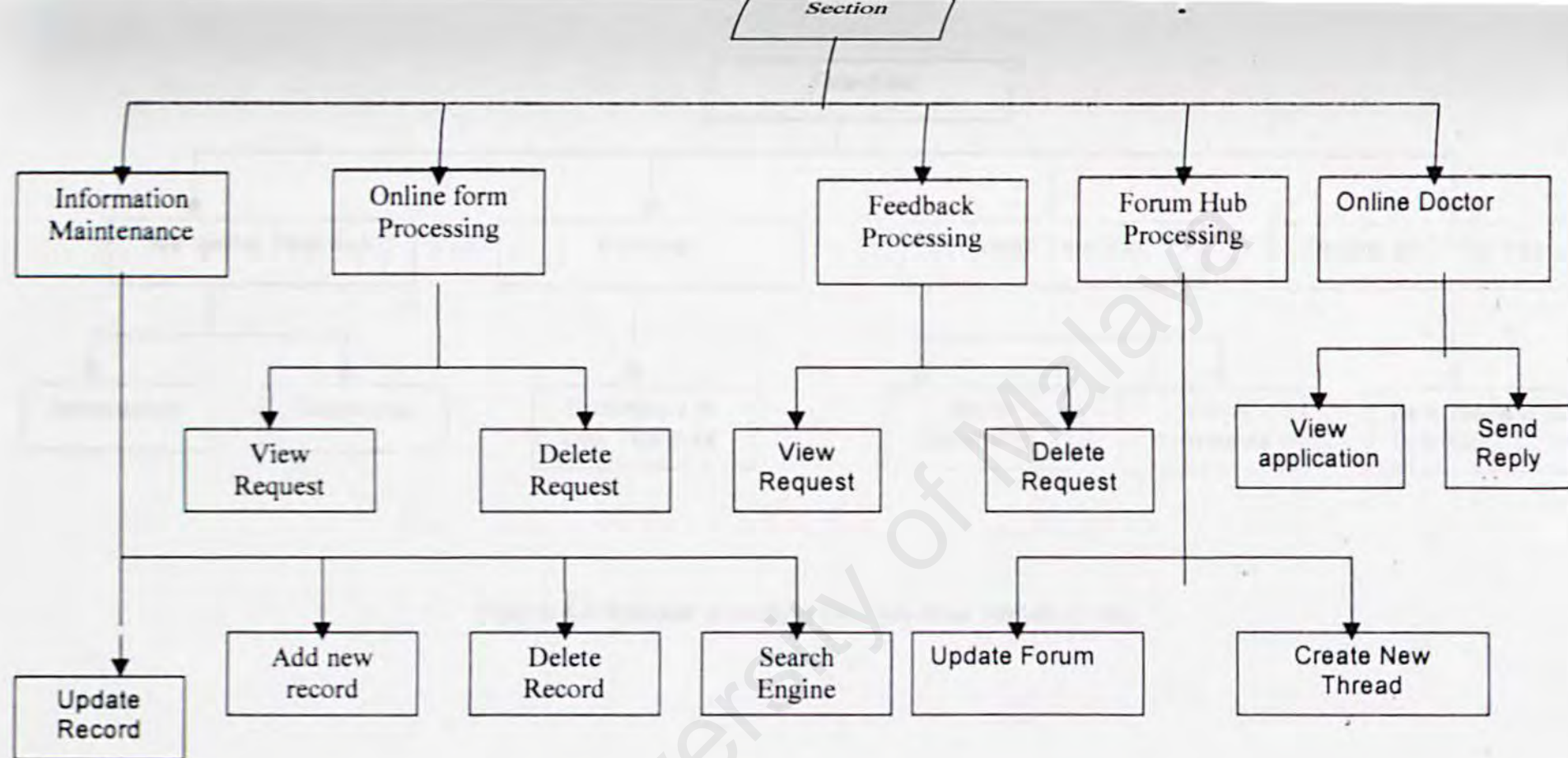


Figure 4.2 Administration Section Structure Chart

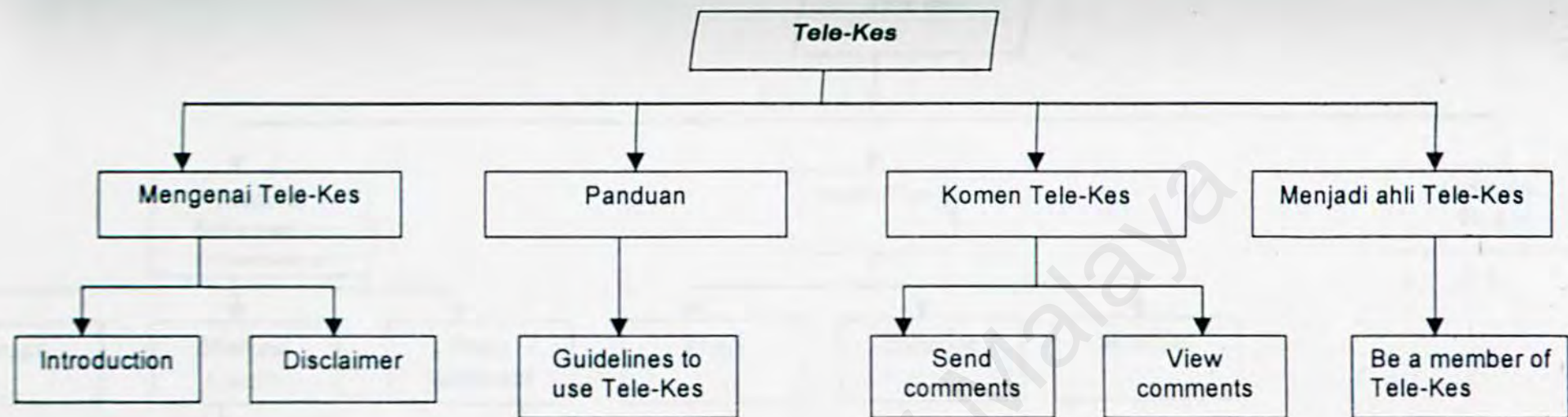


Figure 4.3 System structure for Tele-Kes introduction

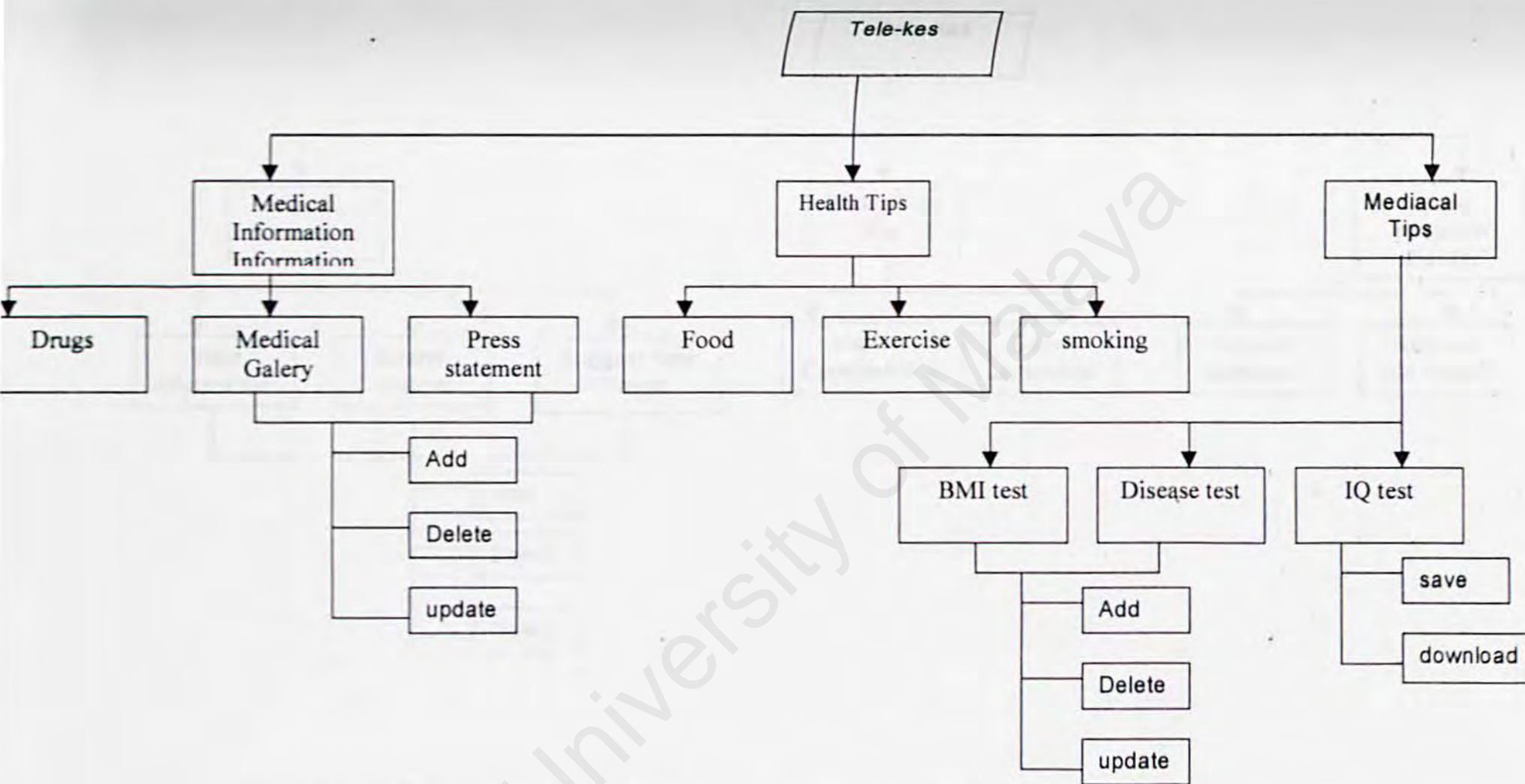


Figure 4.4 System structure for Health Information

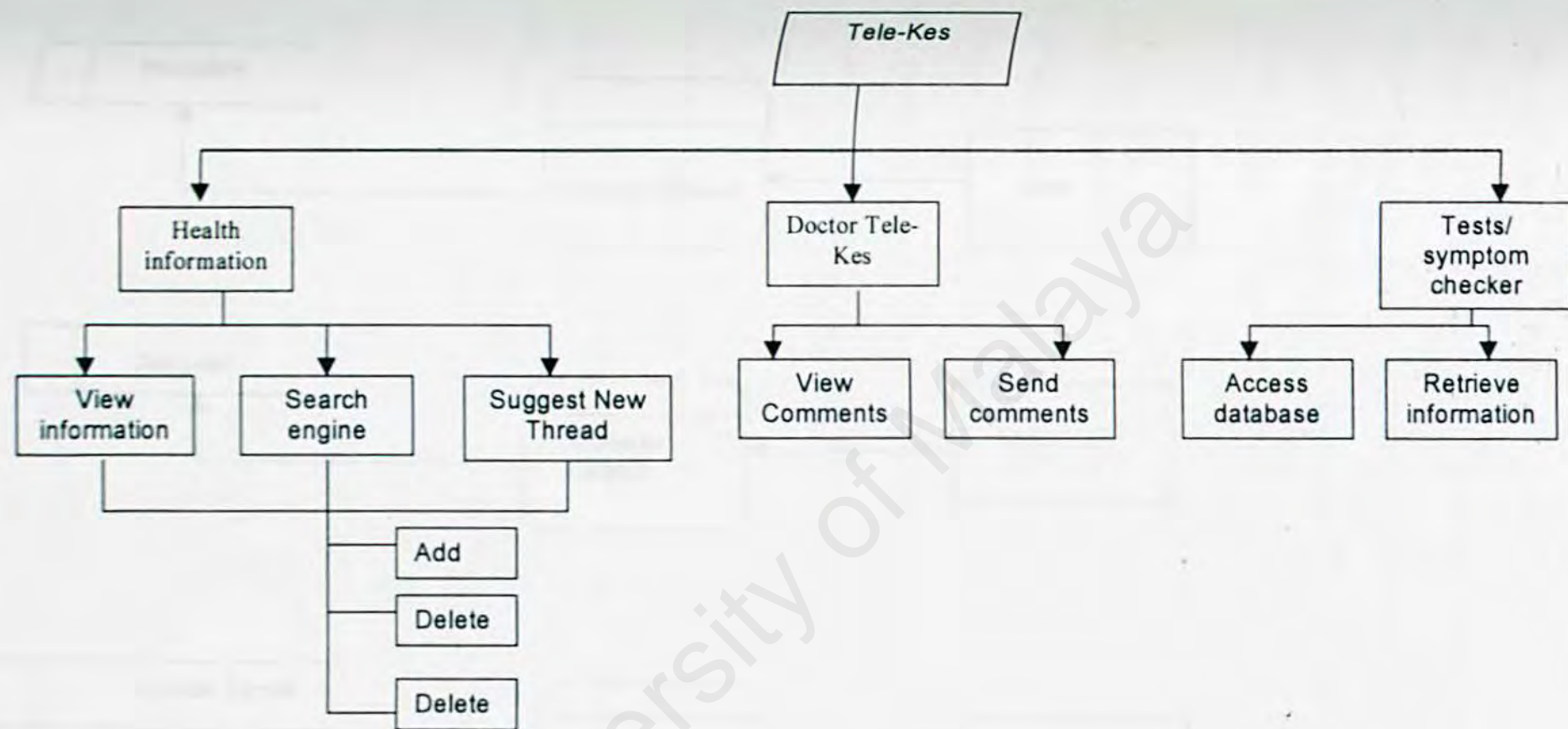


Figure 4.5 System structure Chart for disease information, doctor Tele-Kes and symptom checker

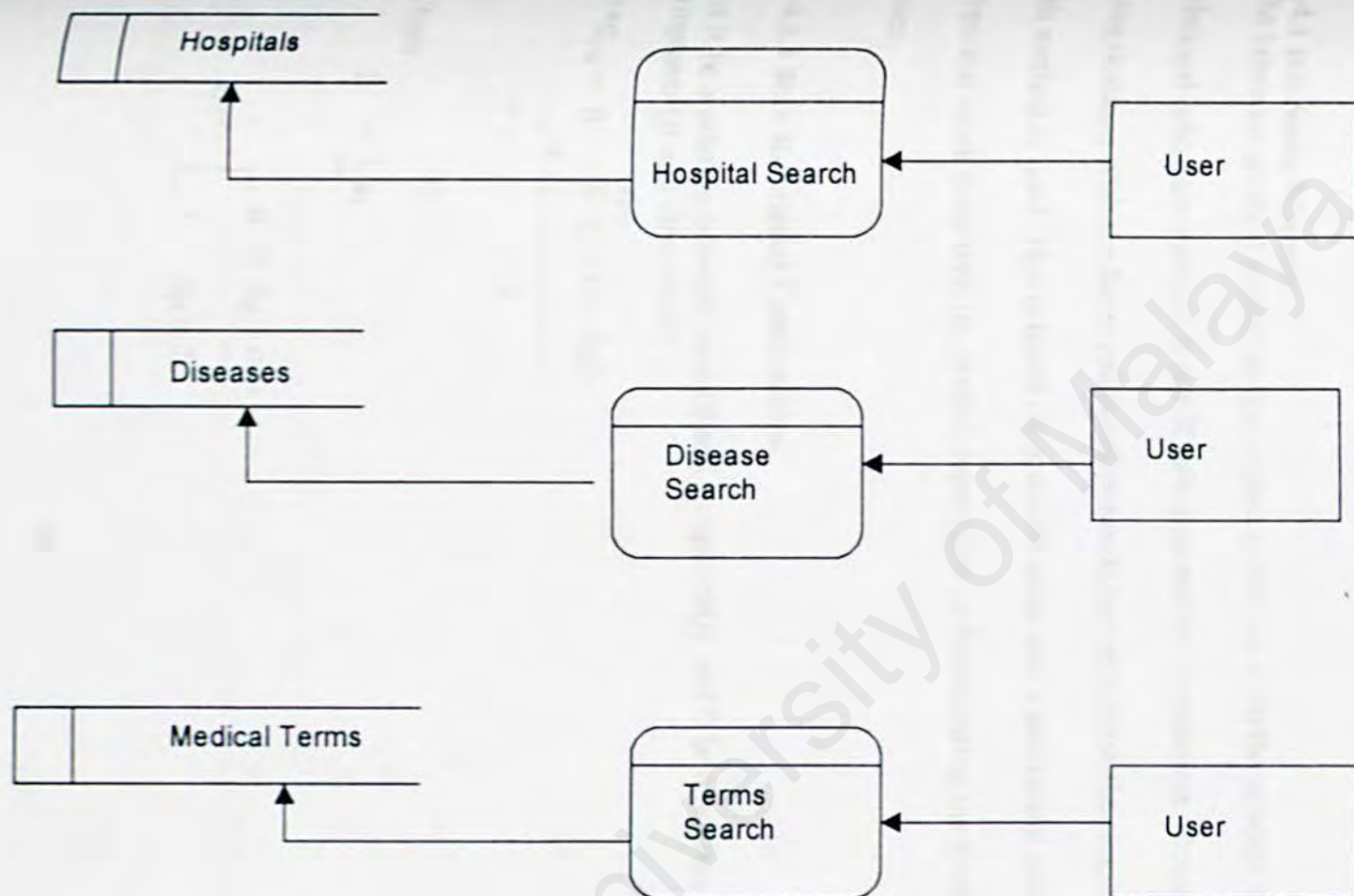


Figure 4.6 Data Flow Diagram for Tele-Kes

4.4 Inference Engine Design

The inference Engine is the part of the system that works with the signs and symptoms that were entered by the user and produces differential diagnoses as its output. This process is dependent on the knowledge that is stored in the knowledge base. This section will focus on the method used for the inference engine.

4.4.1 Inference Method

The inference method is used in this project is derived from the concept of the fuzzy relational inference method. It is still based on subset containment. However there are complications with the fuzzy relational products and as a result the simplest way to do this method is used. This is based on common sense and a substantial amount of empirical work done with the project supervisor on investigating the product with test cases.

4.4.1.1 Star Relational Composition

Let R be a relation between users(i) and symptoms(j), and S be a relation between symptoms (j) and diseases(k).

$$(R \circ S)_{ik} = \frac{\beta \sum_{j=1}^{K_j=1} (1 - |R_{ij} - S_{jk}|)}{\alpha \chi}$$

Where

$$\beta = \sum_{j=1} k_j$$

$$k_j = \begin{cases} 0 & \text{if } R_{ij} = 0 \text{ or} \\ 1 & S_{jk} = 0 \end{cases}$$

$$\alpha = \sum_{j=1} m_j \quad \text{Otherwise}$$

$$m_j = \begin{cases} 0 & \text{if } R_{ij} \neq 0 \\ 1 & \text{otherwise} \end{cases}$$

$$\chi = \sum_{j=1} n_j$$

$$n_j = \begin{cases} 1 & \text{if } S_{jk} \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

Here the relations will be modeled with binary tables.

User to signs/symptoms is modeled by Relation (PE) or R

Signs /symptoms to Diseases is modelled by Relation (ED) or S

Relation (PE)

E ₁	E ₂	E ₃	E ₄	E ₅
0.5	0	0.8	0	0.9

Relation (ED)

	D1
E1	0.7
E2	0.2
E3	0.8
E4	0
E5	0.7

Table 4.1 Fuzzy Relation of user to signs/symptoms and signs/symptoms to disease

Only 2 tables are involved during the computation, E_i is all the signs and symptoms of all the diseases.

4.4.1.2 Methodology for Inference Engine

❖ Matching

During every element of the user's input is matched against the elements of each diseases in database.

❖ Final working Diagnosis

Finally when the process of matching are over, the function is performed for each disease in the database using the formula described earlier. Using Disease A as an example, the formula can be summarized in words.

$$(R*S)_k = \frac{\beta \sum_{j=1}^{Kj=1} (1 - |R_{ij} - S_{jk}|)}{\alpha \chi}$$

$(R*S)_k$ represents the certainty value for disease A

$\sum_{j=1}^{Kj=1} (1 - |R_{ij} - S_{jk}|)$ represents the certainty value for disease A

α represents the number of signs and symptoms from the user's input

β represents the matching signs and symptoms

χ represents the number of signs and symptoms from Disease A

The final result consists of the list of diseases its certainty value. The disease with the highest certainty value will be the most probable diagnosis.

(This is the techniques that used to relate disease and symptoms for the number of user that use the system)

4.5 Architecture Design

The architecture of Tele-kes is presented in this section. Before implementation , decision must be made as whether to use a two-tier or multi-architecture.

4.5.1 Application Architecture

The Tele-kes is designed to be a 3 tier architecture , which is believed to be a more loosely coupled design for the components used.

In the architecture the frontier tier is the presentation /application tier that consist of all necessary applications. In this layer the main presentation component that appears to the user is the internet Explorer 4.0 browser, HTML, JavaScript and ASP will be used to provide the most flexible and dynamic interface to the users. Those functions that are provided in the tier will be supported by the processing in the functionality/service tier.

The middle tier is known as the functionality service /service tier. The communication between this tier depends on the Hypertext Transfer Protocol(HTTP) for the web pages transfer. Functional components that exist in the functionality /services tier are the diagnosis component, the processing of disease data and administration of user. The Active Server Pages (ASP) will be used for the processing of web pages in the server.

The bottom tier is the data repository of Tele-kes. The data repository is built up of the Access database. They function as the main database. The components in the functionality tier that need the database can be connected through the combination of the Access and Open Database Connectivity. (ODBS).

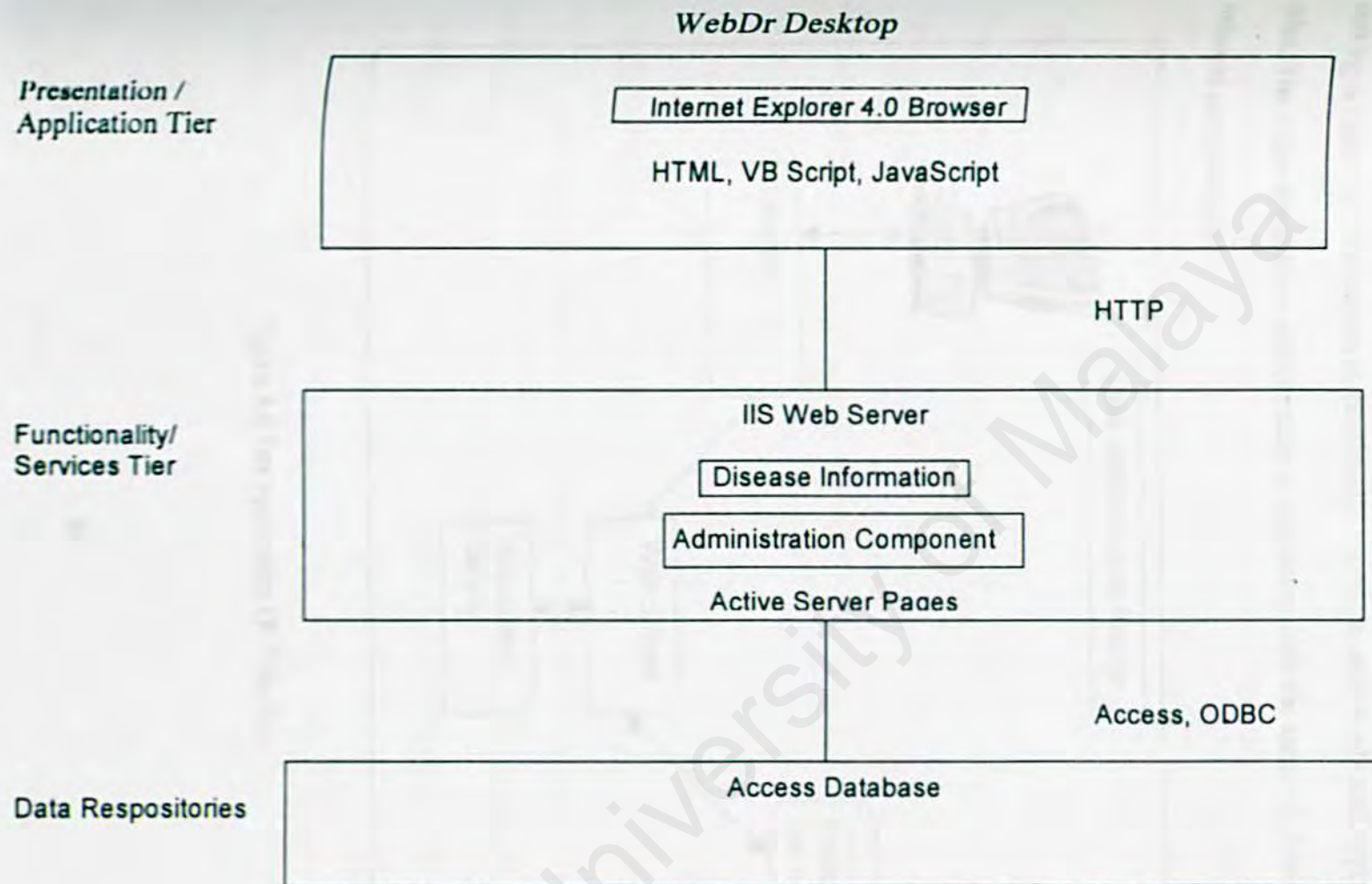


Figure 4.7 Architecture of Tele-Kes

A 3-tier application uses the client/server computing model. Please refer to figure 4.8

With three tiers or parts, each part can be developed concurrently by different programmers coding in different languages from the other tier developers. Thus the programming for a tier can be changed or located without affecting the other tiers, making it easier for the system to continually evolve as new needs and opportunities arise. The 3 tier application architecture is consistent with the ideas of distributed object oriented programming.

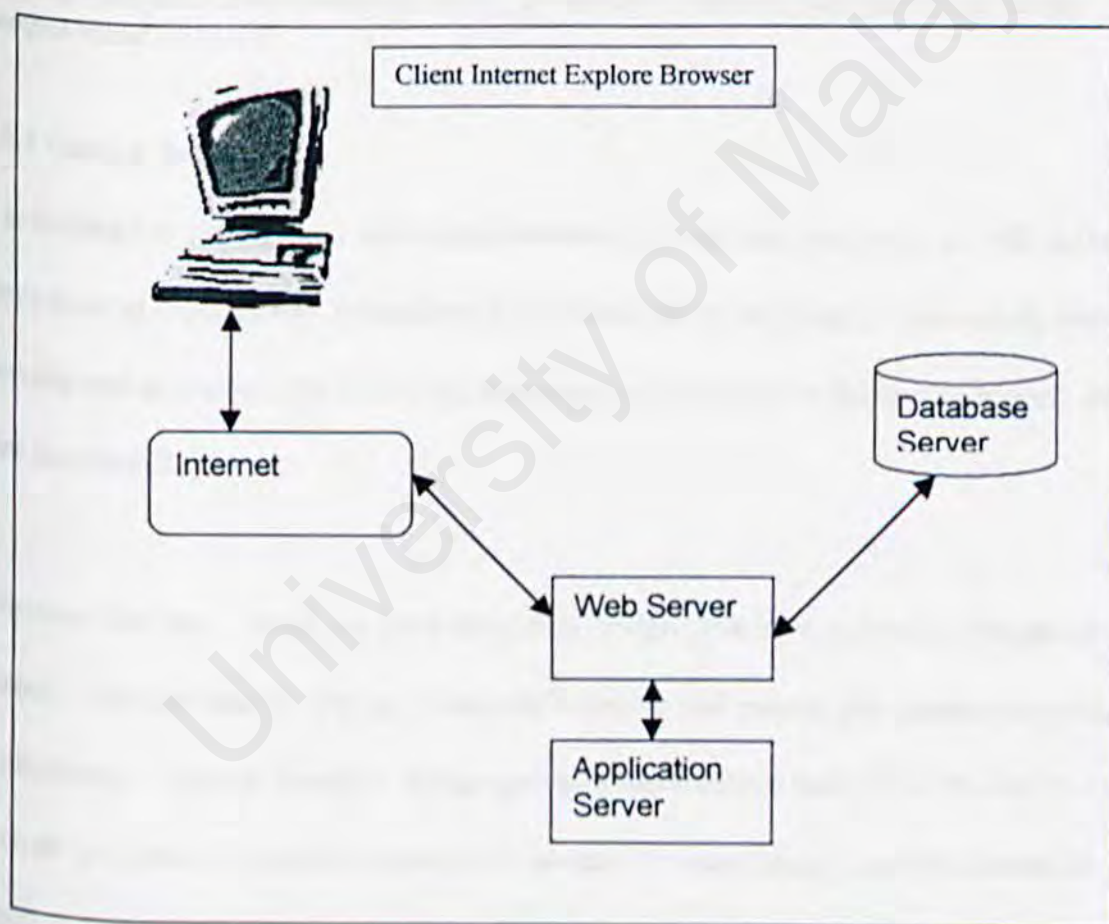


Figure 4.8 Tier Application Of Tele-Kes

4.6 User Interface Design

A user interface is simply the means by which an application communicates with the user, and the user with the application. The effectiveness and user acceptance of an application are determined primarily by the design of the user interface[33]. Ben Shneiderman [36] in his book said

"Frustration and anxiety are part of daily life for many users of computerized information systems. They struggle to learn command language or menu selection systems that are supposed to help them do their job. Some people encounter such serious cases of computer shock terminal error , or network neurosis that they avoid using computerized systems"

4.6.1 Human factors

It is essential to identify and understand the activities the user performs, as well as the user's general capabilities , experience and limitations in the areas of perception, memory, learning and attention. The following design principles relate to the human aspects of the user interface[22].

Empower the user - one of the most important design principles is putting the user in control. The user has the ability to take the initiative and control the interactions with the applications. The user interface design provides mechanisms that allow the user to control the type of information presented the rate of presentation , and the manner in which it is presented.

Reduce the user's information load - a good user interface avoids overloading the user's memory. For example the user should not be expected to recall a set of complex commands or options.

4.6.2 Presentation

Presentation refers to the visual aspect of the user interface - the overall layout arrangement, color, font, shape and size of the object. The following design principles address the presentation aspect of the user interface environment.

Create aesthetic appeal - the representation of the user interface should be visually pleasing. Color, font, shape and size, arrangement, space and other components of visual communications affect the aesthetic appeal of the user interface.

User meaningful and recognizable representations - the appearance of objects should be visually consistent with one another as well as with other objects in the operating environment. The representations should be clear, meaningful and visually distinguishable among objects.

Maintain a consistent user interface - A consistent interface refers to the similarity in appearance and layout of the components. A more critical aspect of a consistent interface is functional consistency. Functional consistency means that the same action should have the same result regardless of the mode the application is in.

4.6.3 Interaction

Interaction is the means by which the user controls the execution of an application. The concept of pointing to an object and then selecting it, often referred to as simply point and select, is an essential factor in achieving effective human application interaction. The following design principles address the interaction aspect of the user interface environment :

Use direct manipulation - the user works directly with an object using a pointing device.

Direct manipulation affords the user visible and immediate results. Interaction with various objects is easily accomplished by the drag-and-drop method of direct manipulation.

Provide immediate feedback - in performing a task a function, it is important that the user receive the result immediately. Feedback can be extrinsic (provided by the system) or intrinsic (provided by the user's internal sensing systems).

Make the interface forgiving - the computing system should tolerate or accept user actions that do not conform precisely to system specifications without negative consequences to the user. When the user is in control, he or she should be able to explore without fear of causing an irreversible mistake.

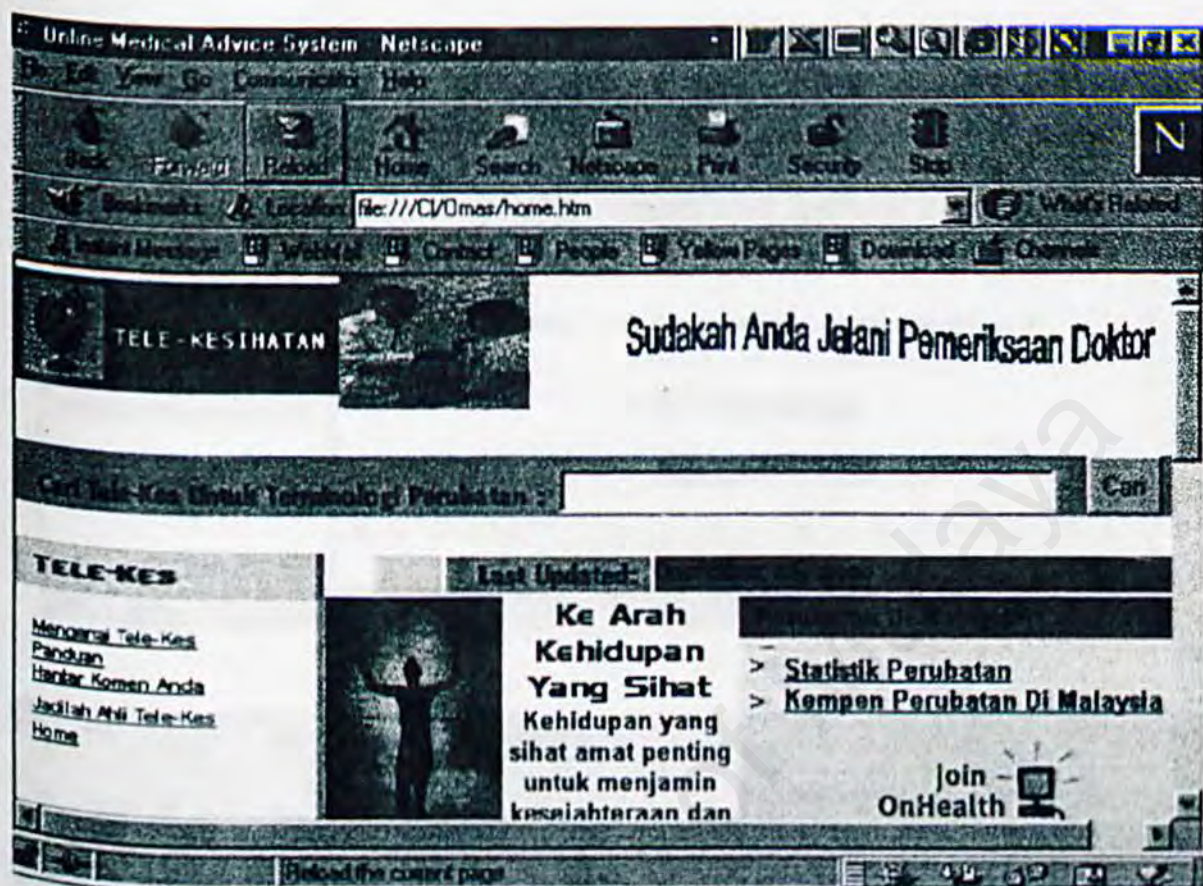


Figure 4.9 Home.htm

This is the home.htm page where this is main page where user can link to other pages.

The other pages are as follows.

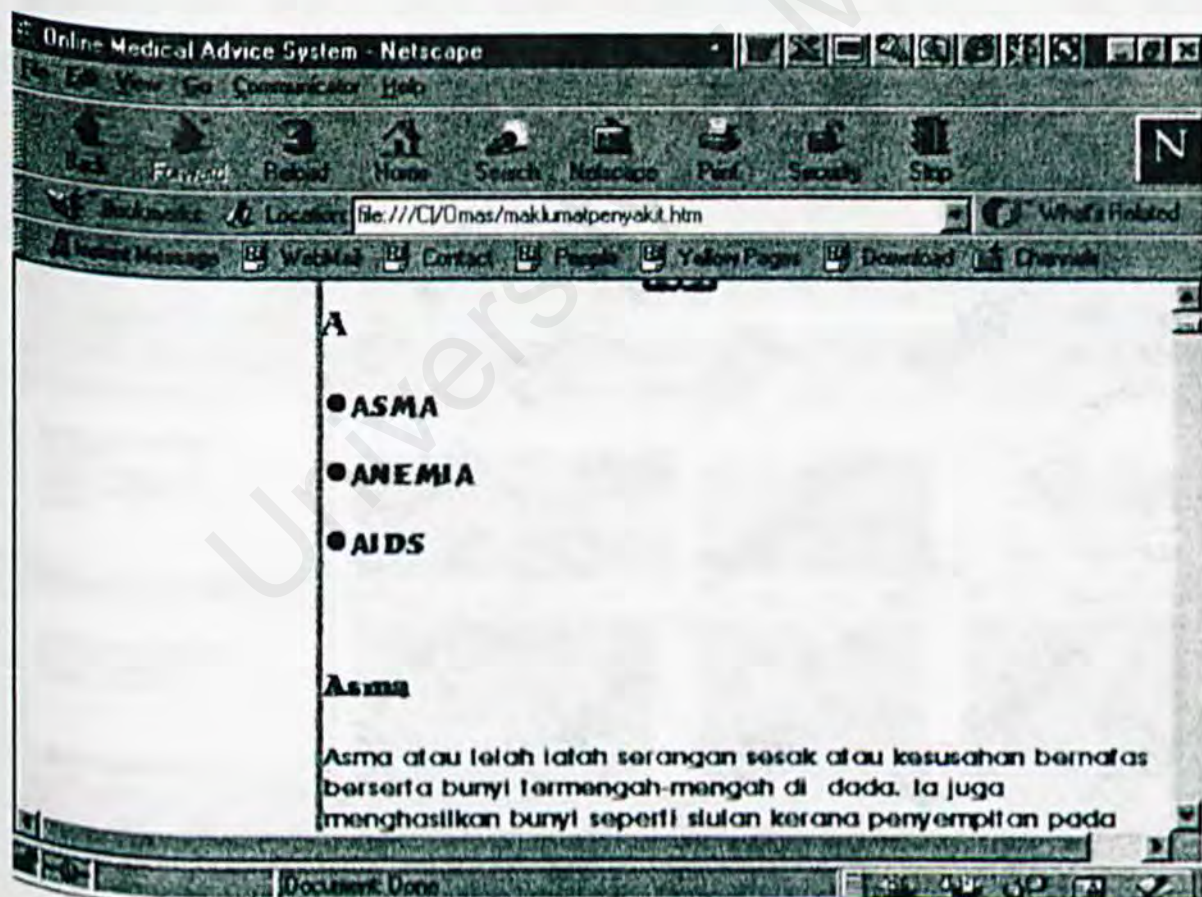


Figure 4.9 maklumatpenyakit.htm

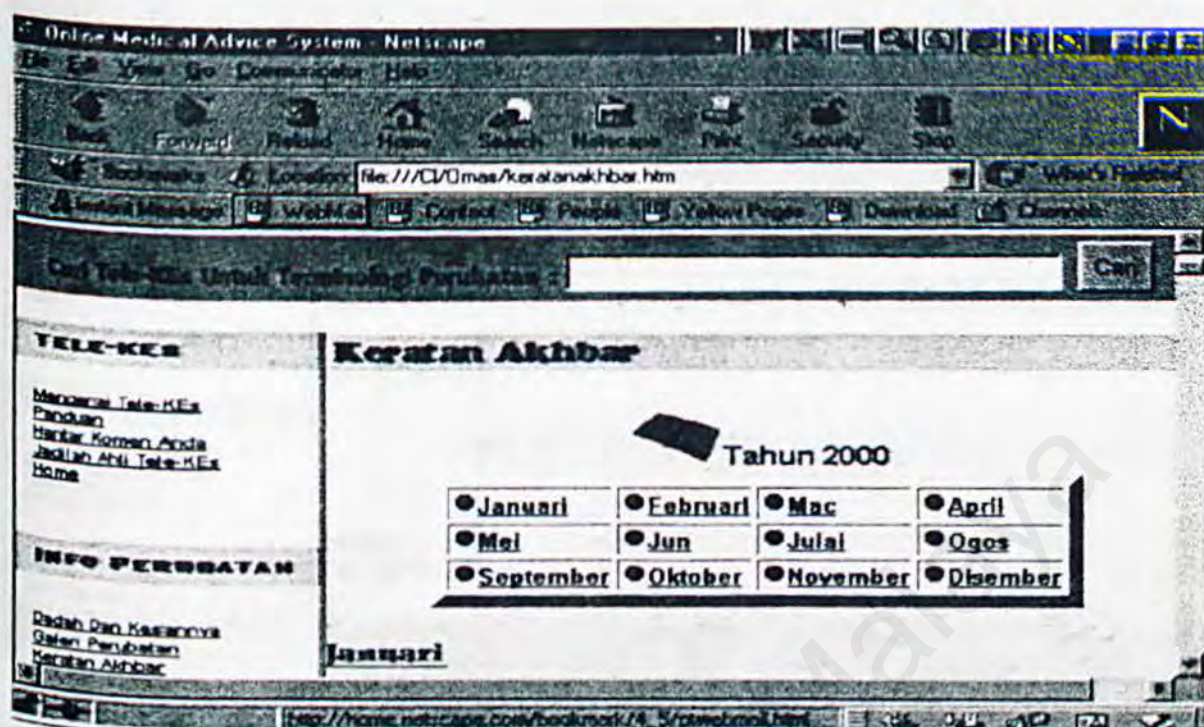


Figure 4.11 Keratan Akhbar.htm



Figure 4.12 Kampankesihatan.htm

Online Medical Advice System - Netscape

file:///C:/D:/mas/simptompenyakit.htm

TELE-KES

Mengenai Tele-Kes
Panduan
Hantar Komen Anda
Jadilah Ahli Tele-Kes
Home

INFO PERSEKUTUAN

Dapatkan Dan Kesannya
Galeri Perubatan
Keratan Akhir

KERATAN

Penguji & Risiko Kematan

Lelaki :

Nyatakan Umur:

Keputusan Reset

Penguji:

Risiko Kematan

http://mas.netnasa.com/bodemah/.../Simptompenyakit.htm

Figure 4.13 Simptompenyakit.htm

Online Medical Advice System - Netscape

file:///C:/D:/mas/uji/penyakit.htm

TELE-KES

Mengenai Tele-Kes
Panduan
Hantar Komen Anda
Jadilah Ahli Tele-Kes
Home

INFO PERSEKUTUAN

Dapatkan Dan Kesannya
Galeri Perubatan
Keratan Akhir

KERATAN

Pengira Berat & Kalori

Berat Badan Ideal Untuk Lelaki

Note: Sekiranya anda 6 Meter sila masukkan 0 dalam petak CM. Jika tidak pengiraan tidak akan tepat.

Masukkan tinggi dalam Meter: dan CM:

Tekan butang selepas masukkan ketinggian:

Keputusan: KG

**Tambah tolak 10% daripada berat untuk jatuh berat.

Document Done

Figure 4.14 Ujian Penyakit .htm

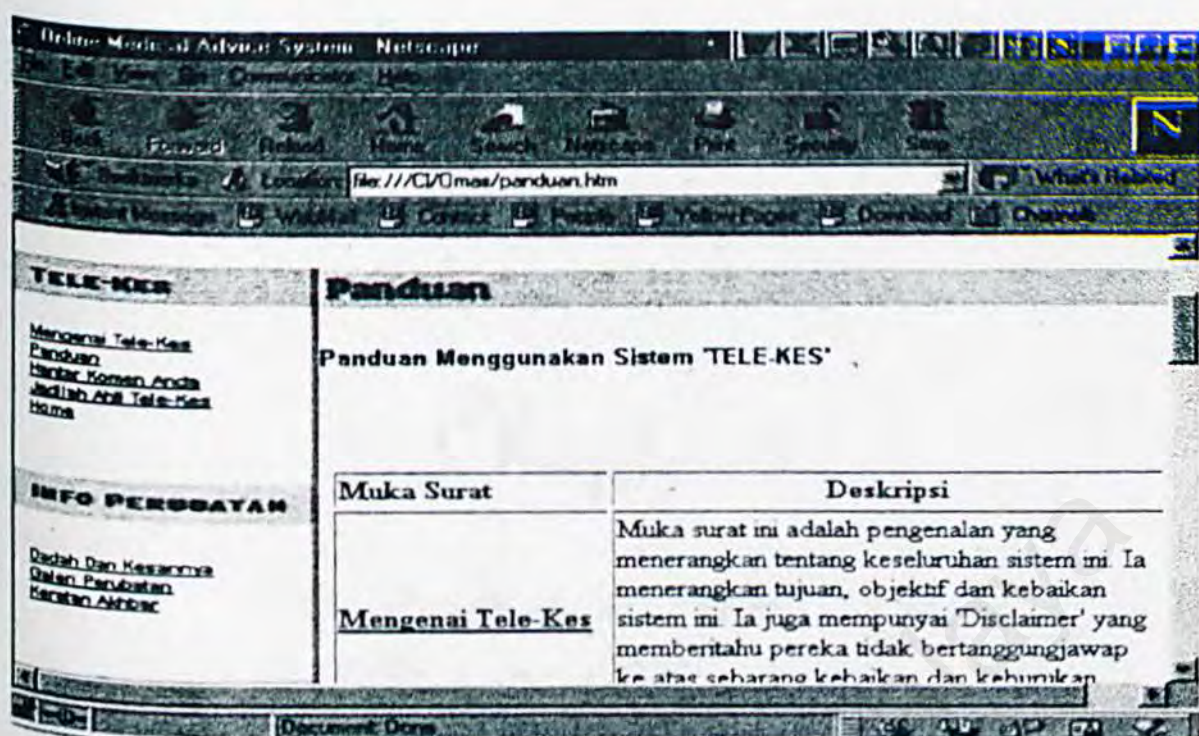


Figure 4.15 Panduan.htm

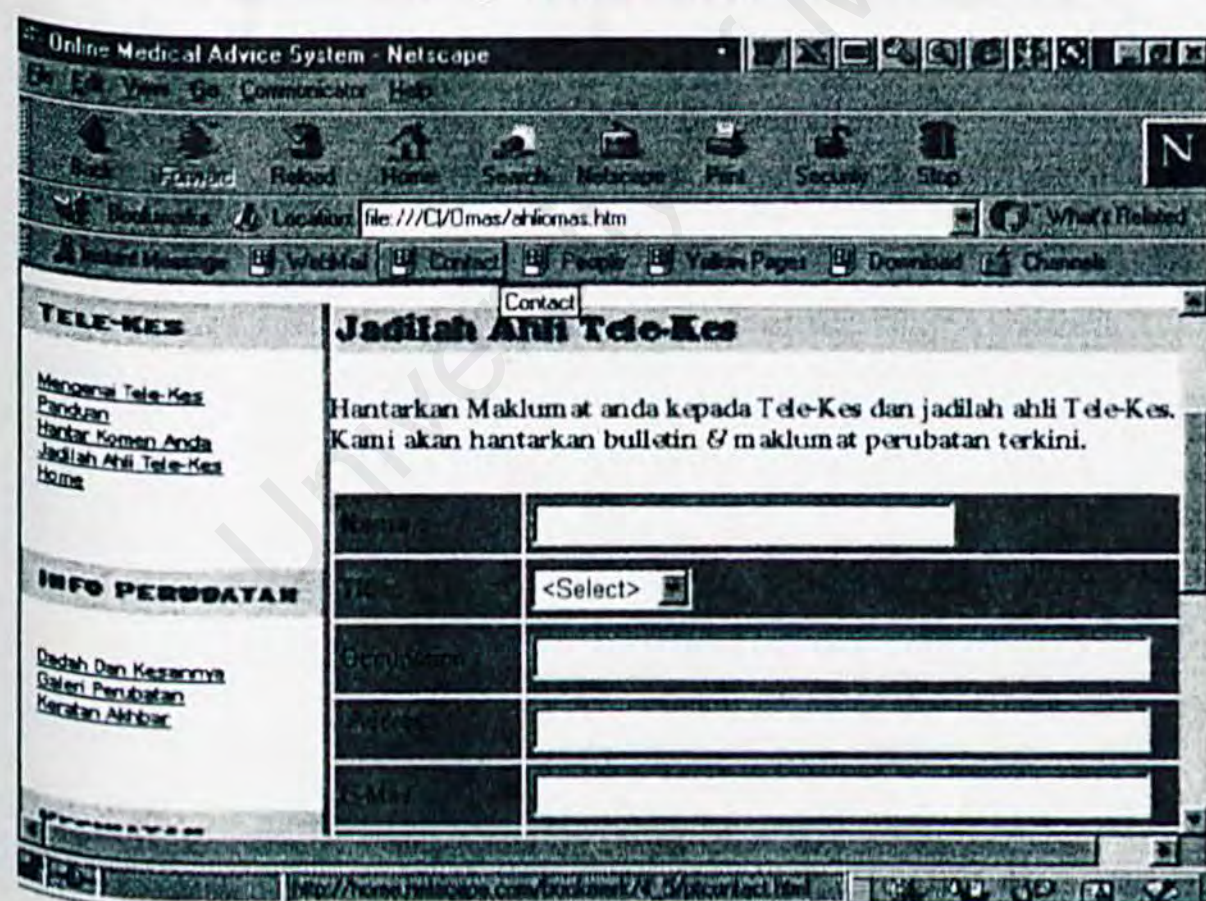


Figure 4.16 ahliomas.htm

CHAPTER 5: System Implementation

At this stage, the system is ready for implementation. The implementation phase involves the actual installation and testing of the system in the live environment.

The quality of the implementation is crucial for the success of the project. It is important to ensure that the system is installed correctly and that it meets the requirements of the users.

There are several factors that can affect the quality of the implementation, including the skill of the implementation team, the quality of the hardware and software, and the quality of the documentation.

It is important to plan the implementation carefully and to have a contingency plan in place in case of any problems. It is also important to communicate with the users throughout the implementation process.

Once the system has been implemented, it is important to monitor its performance and to make any necessary adjustments. It is also important to provide training to the users and to provide ongoing support.

The implementation phase is a critical part of the project and it is important to ensure that it is done well. It is important to have a clear plan and to communicate with the users throughout the process.

By following the steps outlined in this chapter, you can ensure that your system is implemented successfully and that it meets the requirements of the users.

Remember, the implementation phase is not just about installing the system, it is about ensuring that the system is used effectively and that it provides the benefits that you intended.

Good luck with your implementation!

Chapter 5: System Implementation

The implementation phase is a critical part of the project and it is important to ensure that it is done well. It is important to have a clear plan and to communicate with the users throughout the process.

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Good luck with your implementation!

Chapter 5: System Implementation

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CHAPTER 5: System Implementation

5.1 Introduction

The quality of data is a measurement of how consistently correct that data is within certain preset limits. Effectively coded data facilitates accurate data entry by cutting down on the quality of data required, hence the less chance of inputting incorrect data[20].

The development of a windows-based program scratch through the use of third generation programming languages such as C is very time consuming and tedious, and therefore not effective for efficient program development. As users today are more inclined to programs that rely heavily on pointing and clicking with minimum keyboard activity, it is crucial the applications appearances through a visual method.

The use of Visual Basic Script to develop the application greatly cut down on the development time needed.. what would have previously taken many lines of code, could be accomplished in VB script by the simple action of dragging and dropping a control onto the form.

Also Visual Basic provides ODBC Direct functionality that is a truly efficient mechanism for dealing directly with open Database Connectivity (ODBC) - disease database engines.

5.2 Code Documentation

Code documentation is a set of written descriptions that explain to a reader what the programs do and how they do it. Internal documentation is descriptive material written directly within the code. All other documentation is external documentation. Code documentation begins with the selection of identifier (variables and labels) names, continues with connecting and ends with the organization of the program.

5.2.1 Internal Documentation

Internal documentation contains information directed at the person who will be reading the source code of the program and might possibly enhance the application. Thus in TELE-KES summary code is provided to identify the program and describes its data structures, algorithms and control flow. A statement of purpose dictating the function of the module and descriptive comments are embedded within the body of the source code to describe processing functions.

5.2.3 External Documentation

External Documentation is intended to be read by those who never look at the actual source code of a program. External documentation gives the programmer a chance to explain more broadly than might be reasonable within the program's comments.

In Tele-Kes the external documentation consist of a user manual which explains to the user how to use Tele-kes. It gives instruction on operating and using Tele-Kes. The use

of screen shots and pictures gives the user a clearer picture of what Tele-kes is used for how to use it.

5.3 Input/ Output

The style of input/output adheres to the following guidelines:

- ❖ Validate all input data
- ❖ Keep the input format simple
- ❖ Label interactive input requests, specifying available choices or bounding values.
- ❖ Keeps the input format uniform
- ❖ Label all output and design all reports

5.4 Input Validation

The input data in Tele-kes is validated and checked in order to ensure the smooth flow of the program. There are several possible ways to ensure data validity. Among them are as follows[22]

i) Test for missing data

This validity test examines data to see if there are any missing items. Additionally the record should include the key data that distinguishes one record from all others and the function code telling the computers what to do with the data.

```
If txtData (0).Text "" Then
```

```
    Please enter your age",
```

```
    Exit
```

```
End If
```


ii) Test for class or composition

this type of validity test checks to see that data field that are supposed to be **exclusively** composed of numbers do not include letters and vice versa. This test was incorporated into the Tele-Kes coding in order to ensure that non-numerical figures were not entered into fields meant for numbers of dates. The coding made exceptions for decimal points (in the case of currency fields) and slashes and dashes (in the case of date fields)

```
If KeyAscii <> 47 And KeyAscii <> 45 And KeyAscii <> 8 then
```

```
If KeyAscii < Asc("0") Or KeyAscii > Asc("9") Then
```

```
KeyAscii = 0
```

```
"You can only enter number"
```

```
End If
```

```
End If
```

iii) Test for range or reasonableness

These validity tests are really a common-sense measure of input that answers the question of whether data fall within an acceptable range or whether they are reasonable within predetermined parameters. A reasonableness test ascertains whether the item makes sense for the transaction.

The reasonableness test was written into the coding of Tele-Kes to ensure that users did not accidentally key in wrong data. For example a simple test was coded in order to ensure that the data entered by the user were entered in the right sequence.

```
if (umurx > 20 && umurx < 35)
```

```
{
```

```
  form.calc1.value = " (1) Ujian Paps Smear jika aktif dalam
```

```
  persetubuhan. (2) Pemeriksaan tekanan
```

```
  darah berkala. (3) suntikan tetanus setiap 10 tahun. ";
```

```
}
```

iv) Test for comparison with stored data

Another test for validating input data that is used in comparison of the data to the data that is already stored in database. As an example , when requesting for a disease of an user the input of users will be compared to the data in database. Tele-Kes will first perform a search to see if the code number exists in the database.

```
%
```

```
Set rsterm = Server.CreateObject("ADODB.Recordset")
```

```
cmdTemp.CommandText = "SELECT * from [diseases] where name = '" &
```

```
Request.form("disease") & "' "
```

```
cmdTemp.CommandType = 1
```

```
Set cmdTemp.ActiveConnection = database1
```

```
rsterm.Open cmdTemp, , 1, 3
```

```
%>
```


v) Test for invalid data

checking input for invalid values only works if there are only a few valid values. This test is only feasible in situations where values are restricted and predictable and is divided into a limited number of classes. If data is assigned to any other class the values are invalid.

An example of this test is in the 'ujian penyakit'. Where user have to input their age for testing. But the user have to be 18 years and above . So if the user enter 18 years and below, an error message will appear.

```
If age < 18
{
Please enter age above 18
}
```

CHAPTER 6: System Testing

6.1 Introduction

Testing is a critical part of the software development process that is focused on finding

faults in order to create a reliable and high-quality product. The goal of software

testing is to discover faults, errors, or deficiencies in the software before it is released

to the end users. Testing is a systematic and controlled process that involves

executing the software under test and comparing the results with the expected

results. Testing is a continuous process that occurs throughout the software

development lifecycle, from requirements gathering to deployment.

(4)

Software testing is often referred to as verification and validation. Verification refers to

the set of activities that ensure the software correctly implements a specific function. Validation, on

the other hand, refers to the set of activities conducted to ensure that the software that has

been built is traceable to the customer's specifications and requirements [1].

TELE-KIOS was also subjected to rigorous testing in order to discover and correct as

many faults as possible. TELE-KIOS underwent unit testing, integration testing, and

finally acceptance testing.

CHAPTER 6: System Testing

6.1 Introduction

Testing is a critical part of the software development process that is focused on finding faults in order to create as fault-free application as possible. Because the goal of software testing is to discover faults, a test is considered successful only when a fault is discovered or a failure occurs of the testing process. Testing does not prove the absence of errors but only show that software errors are present. Fault identification is the process of determining what fault or faults caused the failure, and fault correction or removal is the process of making changes to the system so that the faults are removed.

[41].

Software testing is often referred to as verification and validation. Verification refers to the set of activities that the software correctly performs a specific function. Validation, on the other hand, refers to a set of activities conducted to ensure that the software that has been built is traceable to the customer's specification and requirement[2].

TELE-KES was also subjected to rigorous testing in order to discover and correct as many faults as possible. TELE-KES underwent unit testing, integration testing and finally acceptance testing.

TELE-KES was tested with following characteristics.

Testing began at unit (module) level worked its way outward towards the integration of the entire system.

Different testing techniques were used at different times.

Testing and debugging are separate activities, but all testing activities incorporate debugging.

6.2 Views of the Test Object

During the testing phase, the test object can be viewed as either a block box or a white box. If the test object is viewed from the outside as a closed box or black box whose contents are unknown, the testing involves feeding input to the closed box and noting what output is produced.

When the test object is viewed as white box the structure of the test object is used to test in different ways. For example, test cases can be devised to execute all the statement or all the control paths within the component(s) to be sure that the test object is working properly.

TELE-KES was tested with a combination of black box and white box testing. Black box testing and white box testing need to be mutually exclusive. Any test philosophy can lie somewhere in between. The choice of test philosophy depends on many factors, including The number of possible logical paths.

Since TELE-KES is a relatively small implementation, there are limited number of logical paths in the program coding. Therefore white box testing is a feasible option when testing the application . if there were a large number of logical paths, the component would be difficult to test thoroughly.

The nature of input data

The input data involved in TELE-KES is fairly generic, that is there are few instances where the data that can be entered is limited. The only area where input data is controlled is in fields that only accept numeric values.

The amount of computation involved

The computation involved in TELE-KES is kept to be a minimum. For example computation is used in calculating the patient's age, sex to search for test that should be done and risks of death that they are in.

The complexity of algorithms

The complexity of algorithms in the coding of TELE-KES is almost nonexistent. Since the coding of VB Script reads almost like common English, it is easily readable and understood.

6.3 Unit testing

Unit testing verifies the correctness of the smallest unit of the application - the **module**.

The tests are conducted in order to uncover errors within the boundary of the module.

Unit testing includes the testing of the following areas[15]:

a) Interface

the module interface in TELE-KES is tested to ensure that the data is received from another part of the program or from the user is correct. Interface testing also tests to ensure that the data that flows out of the module into the other parts of the application is correct.

Local Data Structure

The unit testing conducted on TELE-KES also serves to examine the data structure of the module to ensure that the data stored in the module temporarily maintains its integrity during the execution of the module,

Independence path testing

All branches of the module's coding in TELE-KES are executed at least once to see whether it works as it should.

Boundary conditions

It ensures that the module operates properly at the boundaries established to limit or restrict its processing.

Error handling

Testing of the error handling capabilities of the modules in TELE-KES. The module should be able to detect and recover from any error that occurs during its execution. For example the system should give error messages when the user put in wrong data. The error message is "Maklumat tidak didapati".

6.4 Integration Testing

Once unit testing has been completed all the individual units are combined into a working system. The integration is planned and coordinated so that when an error occurs, there is some idea of where the error could have occurred. Integration testing is a systematic approach for constructing the program structure while simultaneously conducting tests to uncover errors by the interfacing.

Integration testing for TELE-KES was done using the bottom-up approach. Components at the lowest level of the hierarchy are tested individually first and then later all the individually tested components are jointly tested. This approach was done repeatedly until all the components are tested.

This system allows faults to be discovered in each unit before combining them, which facilitates the tracking of faults when they occur.

6.5 Environment Setup Testing

The environment setup testing was aimed to ensure the integrated environment has been implemented correctly and performs its function correctly. This part of testing is akin to the unit testing for the individual modules.

Environment setup testing is performed on each component of the established environment, in the case of this project each development software that was installed immediately after each component was installed and configured it was tested to ensure that its configuration was correct. This is because errors in the installation can later affect the development and delay progress, as the source of the error has to be traced back.

Among the most important aspect of the environment setup testing was to test for security settings. This section was tested to ensure that the basic security was not breached. In Tele-Kes, the database are the main component to be tested.

6.6 Accuracy Testing

As this is a medical information system, there is a need to test the accuracy of the system. This was also done using many users cases. All the calculation were tested, so that it will give a perfect answer according to their input.

6.7 User acceptance testing

The user acceptance survey (Appendix) was conducted to find out whether TELE-KES was successfully implemented and accepted by the users. The users comprised of two doctors and three lecturers.

All 5 of the respondents found the system to be user friendly. The language used in the design of TELE-KES was easily understood by all and did not present any confusion. 2 of the respondents found the screen design to be very good while 3 of them found the screen design to be good.

The doctors found that the health information is brief and good enough for the general knowledge, and one of them suggest that more various name should be given to one disease because every one will have their own way defining disease. Therefore after the testing phase, the system was modified to allow most of the common names to one disease.

All people are satisfied with health tips and health tests. They fond that it is customized and personalized according to their age and sex. So user don't have to waste their time reading all the diseases information. They only have to read the disease that they are in risk of. They also agreed that the location of hospitals is another useful information. On the whole 4 out of 5 rated TELE-KES as very good and the other as excellent.

The following suggestion were given by the uses to improve TELE-KES:-

- that the pictures are not stagnant (moving)
- that there be a lot symptom checker
- that when the user enters wrong spelling it corrects for you
- the amount of data to be increased (disease information, medical terms and others)

Online Medical Advice System Netscape

http://pc/medic/simptompenyakit.htm

TELE-KES

Mengenal Tele-Kes
Panduan
Hantar Komen Anda
Jadilah Ahli Tele-Kes
Home

INFO PERUBATAN

Dedah Dan Kesannya
Mati Perubatan
Mati Akibat

Pengujian & Risiko Kematian

Lelaki :

Nyatakan
Umur:

Pengujian:

(1) Pemantauan tekanan darah berkala.
(2) Suntikan insulin setiap 18 tahun.

Risiko Kematian

(1) Risiko kematian yang tinggi untuk
(2) kadar Kematian keseluruhan untuk

Figure 5.3 search result for health test

Online Medical Advice System Netscape

http://pc/medic/ujianpenyakit.htm

TELE-KES

Mengenal Tele-Kes
Panduan
Hantar Komen Anda
Jadilah Ahli Tele-Kes
Home

INFO PERUBATAN

Dedah Dan Kesannya
Mati Perubatan
Mati Akibat

Pengira Berat & Kalori

Berat Badan Ideal Untuk Lelaki

Note: Sekiranya anda 6 Meter sila masukkan 0 dalam petak CM. Jika tidak pengiraan tidak akan tepat.

Masukkan tinggi dalam Meter: dan CM:

Tekan butang selepas masukkan ketinggian :

Keputusan:

****Tambah tolak 10% daripada berat untuk julat berat.**

Figure 5.4 Search result for health test



Figure 5.1 Search result for medical terms

This is the search result for medical terms. If the term that entered by the user is not in the database the system will give a default message that the search is not found. The pages is as follows.



Figure 5.2 Fault page

CHAPTER 7: System Evolution

7.1 System Overview

Diagnose the software system and predict its future evolution. Identify the software system's current state and its future state. The system's current state is the state of the system at the time of the diagnosis. The future state is the state of the system at a later time.

Chapter 7



System Evolution

There has been a lot of talk about the future of software development. It is often said that the future of software development is in the hands of the user. This is not necessarily true. The future of software development is in the hands of the developer. The developer is the one who creates the software. The user is the one who uses the software. The developer is the one who is responsible for the software's evolution. The user is the one who is responsible for the software's maintenance.

However, the user is also responsible for the software's evolution. The user is the one who provides the feedback that the developer uses to improve the software. The user is the one who provides the requirements that the developer uses to create the software. The user is the one who provides the data that the developer uses to test the software.

CHAPTER 7 : System Evaluation

7.1 System Review

Throughout the software development phase, problems were encountered and for the most part resolved. The system was evaluated to identify its strengths, limitations and possibilities for future enhancement. Tele-Kes has achieved its main objectives and fulfilled all the criteria that were proposed in the proposal. It is a user friendly telehealth system. Given the required age, according to sex, users can know what they are risk of and what are the medical check up that they should do.

There has always been an issue in using computer for health information. Medical officer feel that nothing can replace the existing way of gaining medical information that is consulting a doctor but they feel that this system can improve the users knowledge in health information. Accuracy and reliability are also very subjective in a system for medical researches. Thus 100 percent is impossible for this system. But I have tried my best to give perfect results according to users input.

However, Tele-Kes is flexible in a way that it is not case sensitive, it gives instructions when wrong data is keyed in.

7.2 Problems and solutions

7.2.1 Problems and solutions in System Analysis & Design

i) difficulties in understanding Medical terms

As undergraduate of the faculty of Computer Science and Information Technology there were difficulties in understanding the medical terms. It posed a big problem in designing the knowledge base. And a lot of time was spent in studying the medical terms. However I have gained the help of medical students interpreting medical terms.

ii) Difficulties in interpretation

As this system was done in Bahasa Melayu all the information gathered was translated into bahasa Melayu. As medical terms are in English, sometimes I don't know the terms in Bahasa Melayu

iii) Lack of time in research

At the beginning time and effort were put into the research in symptom with the help of Dr. Abdullah of Ministry of Health (Telemedicine) department. But this idea was abandoned due to the difficulties in formalizing the inference method. Thus only 3 symptom was produced because of time constraints in doing the research on the subject matter. It will be enhanced later.

iv) unfamiliarity with new programming languages

It was difficult to learn few programming languages in this short period. Most of the reference book provide guidance in using data control to connect to the database.

However the data control method is rather limited in its functionality and therefore was not considered a viable option. Help was sought from friends in using alternatives methods to connect to the database.

v) Problems in connecting to database & Setup problem

After the system was finished , some of the database retrieval functions is not working.

Since I was doing my project at home , I faced problems in transferring all the files to the computers in lab and thus publish it from there itself. Testing has been done few times to ensure that the system functionality is working accurate.

7.3 System Strength

1. Web enabled

The Tele-Kes implementation is based on web technology. This means that the current implementation is deployable over the internet. Employing a client server approach allows loads to be shared between the client and the server , thus reducing the burden on the server and allowing it to provide better service.

2. User friendly

Tele-Kes was developed to be as user friendly as possible user are provided with instructions what do to . the flow of the pages was designed to follow the logic of the program. Users will also familiar with the interfaces as most of the pages have a standard look. For example the submit button will always be at the bottom , links to the other pages will always be at the left column and so forth.

3. Complex validation

Tele-Kes provides complete validation against any input from the user. For example when the user enter their age wrongly, message box would prompt the use for any corrections.

4. Loosely coupled

All the modules under this webdr are built in three tier architecture. Therefore any changes made to the lowest level in the architecture will not influence the higher level application.

5. Accurate information

Although accuracy of this system is very subjective as well, Tele-Kes is able to produce 100% accurate results for the test cases that was provided.

7.4 System Limitaiton

1. Speed Limitations

As a web based system , problems with system speed may arise under conditions of heavy traffic

2. Browser Limitations

The internet Browser proposed for Tele-Kes is Internet Explorer. All development products that were used are Microsoft products, and Internet Explorer is also Microsoft product. And as competition between similar feature widens. Properties that are recognized in one browser might not be recognized in other.

3. Security

Since this is a information based system , there is no security system for this Tele-Kes.

4. Online Help-desk

Online help desk was not implemented due to the constraint in time. Users can only refer to panduan page for guidance in using the system.

7.5 Future Enhancement

1. Increased security

A greater amount of security can be implemented into Tele_kes by the addition of security during the transfer of information between pages. Secure pages Socket layer (SSL) could be used for this purpose. Currently information transfer is insecure due to the absence of encryption.

2. Greater Customization Ability of Interface

The current system uses a fixed interface with standard feature for all uses. Perhaps in the future a means for making this interface customizable for each individual can be implemented. Then each user would be able to personalized their interfaces.

3. Symptom checker

Future , a symptom checker based on database information retrieval could be added.

Now there is only 3 symptoms but later it will be added later with more symptoms

4. New Disease

New diseases can be added to the system as well. For the time being, this system only diagnose cardiovascular diseases. However new knowledge base can be added to the system to enable to diagnose other diseases.

5. Online help desk

Online Help desk could be implemented in the future to help with their questions

7.6 Review on Goals

7.6.1 Expectation

In overall the initial expectations set by the project have been achieved.

- ❖ A web based Information system designed and implemented
- ❖ Tele- Kes few health test and symptom checker to know our healthy state.
- ❖ Generally Tele-Kes has some basic functions that has reasonably met criterias such as reliability, user friendly and widely accessible
- ❖ a useful web based system has been successfully integrated.

7.6.2 Objective

Due to the success in meeting the project's expectations, the project objectives are reasonably achieved.

Tele -Kes is able to provide information on diseases, location on hospitals , few health tests, and some health tests. This system can currently provide user with certain functional features.

7.6.3 Conclusion

On the whole , Tele-Kes has achieved and fullfilled all of its requirements as determined during system analysis phase. It provides easy accessible to the system.

There was a lot of knowledge gained throughout the development of the application. Among the skills gained were programming in VB Script, Java Script, and database programming. Knowledge was also gained in understanding how to translate a real world problem into computer - aided solution. The developer was also able to understand all the details and concepts involved in planning and developing a system. The responsibility shouldered while developing this program will certainly prove useful upon entering the working environment .

Theories and knowledge gained throughout the course of studies were applied in the development of Tele-Kes. Although there is still room for improvement in Tele-Kes it is a fully functional system that will hopefully soon be implemented .

Bibliography

- [1] Stephen E. Smith, Medical Searching: Changes have strong implications , *Information Today*, 4 April 1998, 16-25
- [2] Shari Lawrence Pfleeger, *Software Engineering: Theory and Practice*, Prentice Hall International , Inc
- [3] Joseph Giarratano Ph.D, Gary Riley, *Expert Systems - Principles and Programming* PWS-KENT Publishing Company , 1989, --.263-265, 291
- [4] L.J Kohout and I. Stabile. Interval -valued inference in medical Knowledge -based system Cliniaid. *Internal Computations*, 2(3) 88-115, 1993
- [5] The state of the Art, http://www/telemedtoday.com/state_of_the_art.htm, June 1999
- [6] Szeimbach SL, Taylor TH, Sherrin T, Technology in the Integration of Health care in the Managed Care Setting , *Drug Benefit Trends*, 8(1) 11-14, 1996
- [7] mark L. Braunstein, Pharmacy in Cyberspace: The impact of the Internet on Community Pharmacy Practise, *Drug Benefit Trends*, 8(9):19-21, 51, 1996
- [8] Richard Dick, Elaine Steen, *The Computer Based Patient Record: An Essential Technology for Health care*, Institute Of Medicine, National Academy Press, 1991
- [9] Medical Records Institut, <http://www/medrecinst.com>
- [10] Bates DW Boyle DL, Vandervliet MB Relationship Between medication errors and adverse drug events, *Journal of General International Medicine*, 10 : 199-205, 1995
- [11] Anderson HJ, Utilization management program evolve, *Health Data Management* , 3(79)79, 1995
- [12] Erich Schonfeld, can Computers cure health care? *Fortune* , 137(6): 111-116 March 1998.
- [13] Molla Donaldson , Kathleen Lohr, *Health Data in the Information Age: use Disclosure and Privacy* , Institute of Medicine , National Academy Press 1994
- [14] [www. Oingo .com](http://www.Oingo.com)
- [15] *Visual Studio 97 - Reviewers Guide*, January 1997, Microsoft Corporation, p.11
- [16] Norton P. Davis H, DavisP, *visual Basic 4 for windows 95*, Sams Publishing 1995

- [17] Ammundsen M, Smith C teach Yourself Database Programming with Visual Basic 5 in 21 days, Sams Publishing, 1997
- [18] battini C, Stefano C, Navathe SB, Conceptual Database Design: An Entity - Relationship Approach, The Benjamin Cummings Publishing Company, Inc 1992, p.4.
- [19] Mark L. Gillenson , Database: step by Step, John Wiley & Sons , 1985, p.208
- [20] Shneiderman , Ben , Designing the user Interface, Addison Westley, 1987
- [21] Gurewich ,N., and Gurewich ,O., Teach yourself Visual basic 4 in 21 days Sams Publishing, 1995
- [22] Telemedicine is coming of Age, <http://www.aol.com>
- [23] Principles of Human-computer Interface Design, <http://www.library.unr.edu/~carolp/hciweb.html>, June 1999
- [24] WebMd, <http://www.webmd.com>, August 1999

E-mail	Or Electronic mail. Involves sending and receiving message over the network.
File	A collection of related records treated as a unit
File Transfer Protocol (FTP)	File Transfer Protocol is a protocol for moving files from one computer to another.
Graphical User Interface (GUI)	A user interface that displays graphics and characters and which provides an event model for users to control the operating environment.
Host	The controlling or main computer in a data network.
Hypertext Markup Language (HTML)	The language used to create conventional Web pages.
Hypertext Transfer Protocol (HTTP)	The native communication scheme of the World Wide Web, initially used to transfer hypertext documents.
Internet	A world-wide system of linked computer networks for data communication services such as World Wide web and electronic mail.
Internet Information Server (IIS)	Microsoft Internet Information (IIS) is an Internet file and application server included with the Microsoft Windows NT Server operating system.
Internet Service Provider (ISP)	The starting point everyone on the Internet. An ISP can be a commercial provider, a corporate computer network, a school, college, university, of the government.

Intranet	A Web site or series of Web sites that belong to an organization and can be accessed only by the organization's members.
Java	A development language that allows Web developers to create application for the Internet. The resulting application written in Java can be executed on any computer platform.
Online	Connected directly and interacting with another computer.
Open Database Connectivity (ODBC)	A vendor-neutral interface, based on the SQL Access Group specifications, announced by Microsoft in December 1991. A developer can use ODBC to access data in a heterogeneous environment of relational and non-relational databases.
Operating System	Often referred to as "OS. The set of programs that control the computer and its processing.
Protocol	A set of rules
Record	Data items brought together to form a unit. A group of records make up a file.
Remote Data Objects (RDO)	In version 2.0, RDO is a high-level object interface that directly calls ODBC for optimal speed, control and ease of programming.
Server	The computer system that responds to inquiries or transaction is from a client computer.
Standard	A commonly agree-upon, published specification for communications or systems hardware, software or interface.

Structured Language (SQL)	Query	The international standard language for defining and accessing relational databases.
Transmission Control Protocol / Internet Protocol (TCP/IP)		The term used to refer to the complete suite of protocols including IP, TCP and the associated application protocols.
Uniform Locator (URL)	Resource	<p>An address that uniquely identifies a World Wide Web site, usually preceded with <i>http:</i> such as in this fictitious URL <i>http:www.hotmail.com</i>.</p> <p>A URL can contain more detail, such as the name of the page of hypertext, usually identified by a suffix of .htm or.html</p>
Web Browser		A program that interprets hypertext markup language (HTML) and displays information on a computer screen. Using a browser, a person can read hypertext and view graphical images. A person uses a browser to view the contents of network nodes and navigate among nodes. Popular examples include Microsoft Internet Explorer and Netscape Navigator.
Web Server		A computer that provides Web services and publishes pages to intranet and internet users.
World Wide Web		A popular hypertext-based system of transmitting textual and multimedia-based information through the Internet.

GLOSSARY

Active Data Objects (ADO)	A set of object based data access interface optimised for internet based, data-centric applications. ADO is based on a published specification and ships with Microsoft Internet Information Server and Microsoft Visual InterDev
Application	A software programe or set of programs that uses the computer as a tool, as opposed to the software necessary to run the computer.
ANSI	An abbreviation for America National Standards Institute.
Active Server Pages (ASP)	Active server Pages is an open, Compile-free application environment that enables server-side scripting with native support for both Visual Basic Scripting and Java Script. It is a feature of IIS
Bit	A binary digit. The most basic unit of the data can be recognized and processed by computer. A bit can be either 0 or 1.
Bug	An error in a program or hardware function that causes the function to word incorrectly
CGI	Common Gateway Interface, a standard that defines how web servers access external programs that can run data in the format of a Web page.
Byte	A character of data, normally represented by 8 units.

Client Computer

The computer system that requests for certain tasks to be performed or that initiates transactions with another computer.

Client / Server**Architecture**

A model of computing whereby client application running on a desktop personal computer access information on remote servers or host computers. The client portion of the application is typically optimized for user interaction, whereas the server portion provides the centralised, multi user functionality.

Database

A collection of information units containing related information. Each unit is a database record.

Data Dictionary

A repository of information about data, such as its meaning, relationships to other data, origin, usage and format. A data dictionary manages data categories such as alias, data elements, data records, data structures, data stores, data models, data flows, data relationships, process, functions, dynamics, sizes, frequencies, resource, consumption and other user-defined attributes of data.

Database Management System (DBMS)

Any set of programs designed to build and maintain a database.

DLL

An executable code module that Windows can load on demand as and when programs need to use its function.

Domain Name System (DNS)

Domain Name System lets Internet users refer to host computers by names, instead of IP addresses.

Appendix A



User Manual

University of Malaya

ABSTRACT

Tele-Kes is a medical information system that is developed for the use of doctors users of all category. This use manual is meant for both the system administrator and users. As it deployed on the web , it has minimal installation prerequisites. At present all copyrights are reserved to the Tele-Kes .

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CHAPTER A.1 - SYSTEM FUNCTIONALITY AND OBJECTIVE

The main purpose of Tele-Kes is to guide and provide medical information. User can use this system to widen their knowledge in health information.

There are 4 modules in Tele-kes

- ❖ Search Engine

This module provides search engine for diseases, locations, medical terms and checker

- ❖ View pictures

Users may view medical pictures

- ❖ Health tests

Few health tests to know our health condition , also symptom checker with guided questions

- ❖ Health Information

Health information on food, emergency, drugs , smoking and so on

CHAPTER A.2 - INSTALLATION GUIDE

A.2.1 Hardware Prerequisites

A.2.1 For deployment on the server

Hardware Prerequisites for the configuration of Tele-Kes are as follows:

Recommended memory requirement of at least 64 MB

Disk storage of at least 2.1 GB or above recommended

200 MHz Pentium processor or higher

512K pipeline Burst Cache

A.2.2 Software Prerequisites

A.2.2.1 For Deployment on the server

Tele-Kes requires the following software for deployment :

Windows 98

Microsoft Access 97

Microsoft Internet Information server

A.2.2.2 For deployment on the client

Tele-Kes requires the following software:

Windows operating system

Microsoft Internet Explorer 4.0 and above

CHAPTER A.3 USER GUIDE TO APPLICATION

The URL address to Tele-Kes is <http://pc/medic/index.htm> if you are accessing from the personal computer where it was developed. However if you are accessing from university malaya it is <http://anx704/omas/home.htm>

This is the index page. After 5 second it will automatically go to first page that is home.htm



Figure A-1 Welcome Page



Figure A-2 Main Page

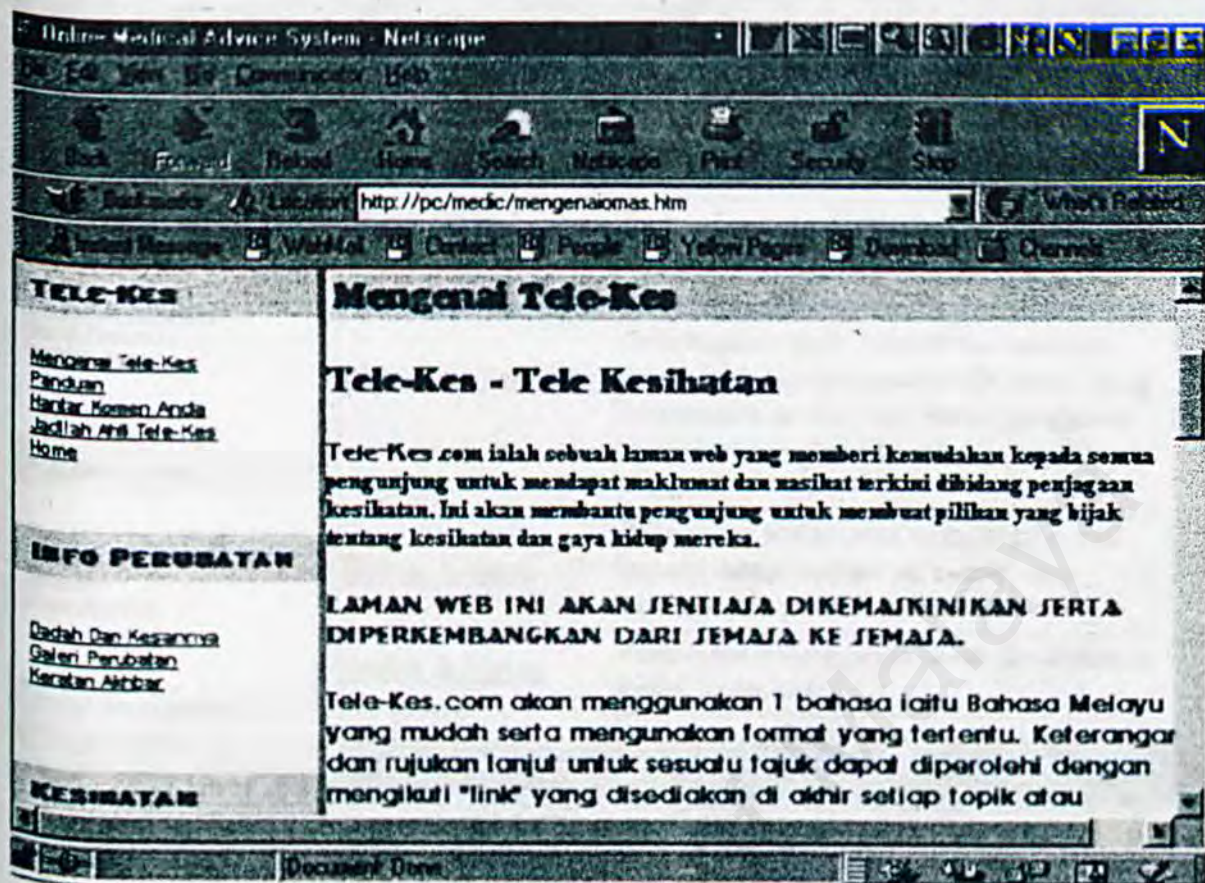


Figure A.3 Introduction page

This page is about Tele-Kes where it explains what is the system about its objective and aims.

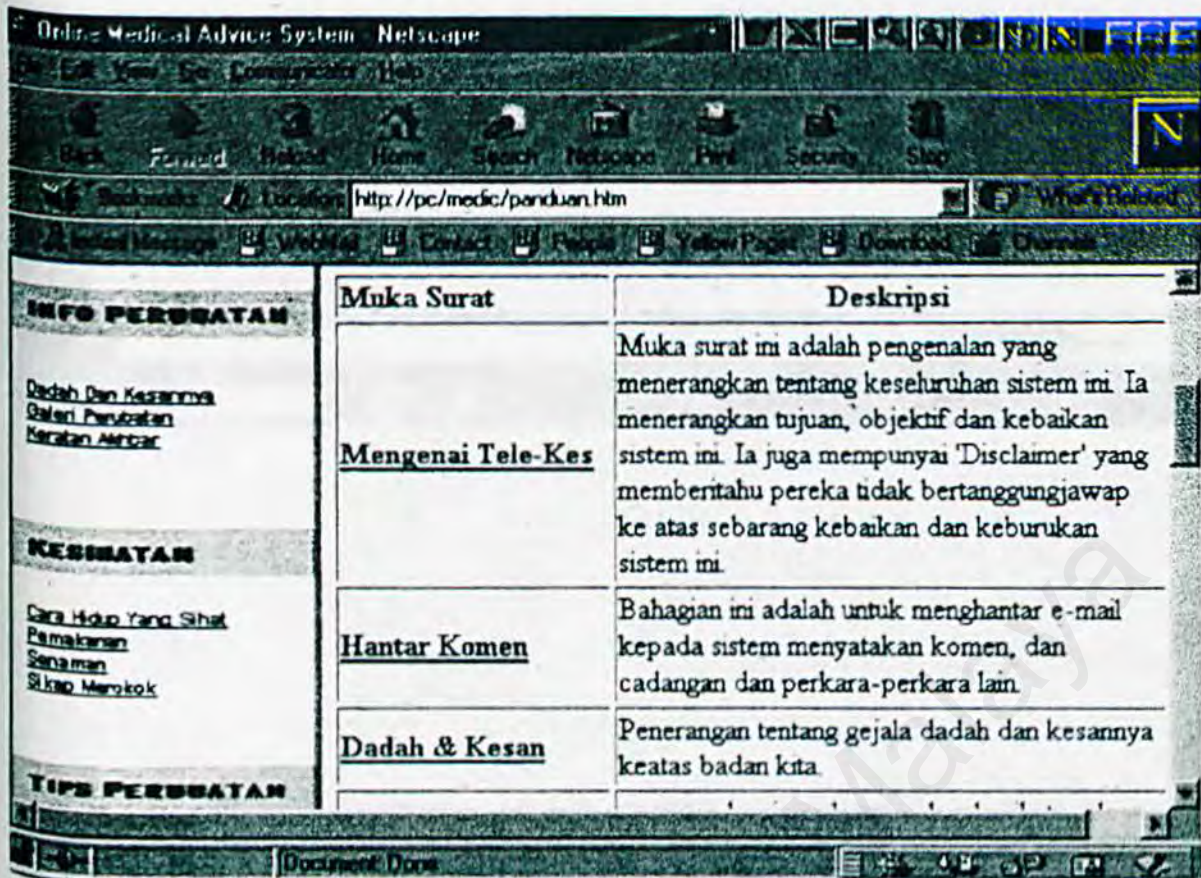


Figure A.4 Introduction page

This is guidance that explains each link and what is about and what is about and how to use the links Click on the links and you can to the page directly.

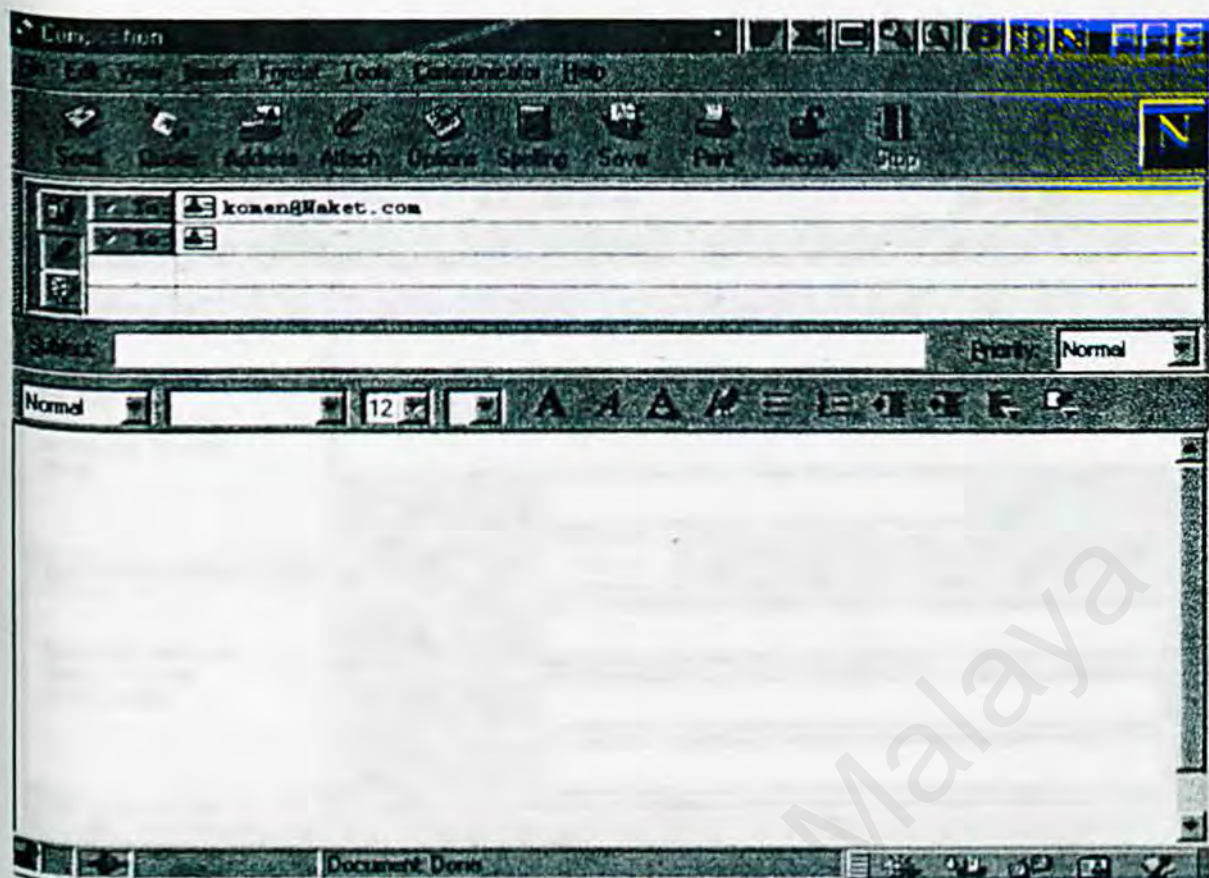


Figure A.5 Send Coment

This page is to send their comments to Tele-Kes where user can state their satisfaction, dissatisfaction, compliments and others. Click send button after you have finished. It will go to Tele-kes directly.

Online Medical Advice System - Netscape

File Edit View Go Command Window Help

Back Forward Reload Home Search Netscape Print Security Stop

Location: <http://pc/medic/ahliomas.htm>

Internet Messages Web Mail Desktop People Yellow Pages Download Channels

TELE-KES

Mengenai Tele-Kes
Panduan
Hantar Komen Anda
Jadilah Ahli Tele-Kes
Home

INFO PERUBATAN

Rajah Dan Kesannya
Galeri Perubatan
Keratan Akhbar

KEPERMINTAAN

Jadilah Ahli Tele-Kes

Hantarkan Maklumat anda kepada Tele-Kes dan jadilah ahli Tele-Kes. Kami akan hantarkan bulletin & maklumat perubatan terkini.

Name:

Title:

Occupation:

Address:

E-Mail:

Submit

Document Done

Figure A.6 Member form of Tele-Kes

This is the form to be member of Tele-Kes where user fill in their details and e-mail so that any important messages and updated health information will be sent to them. Click submit button after you have finished fill in the form.

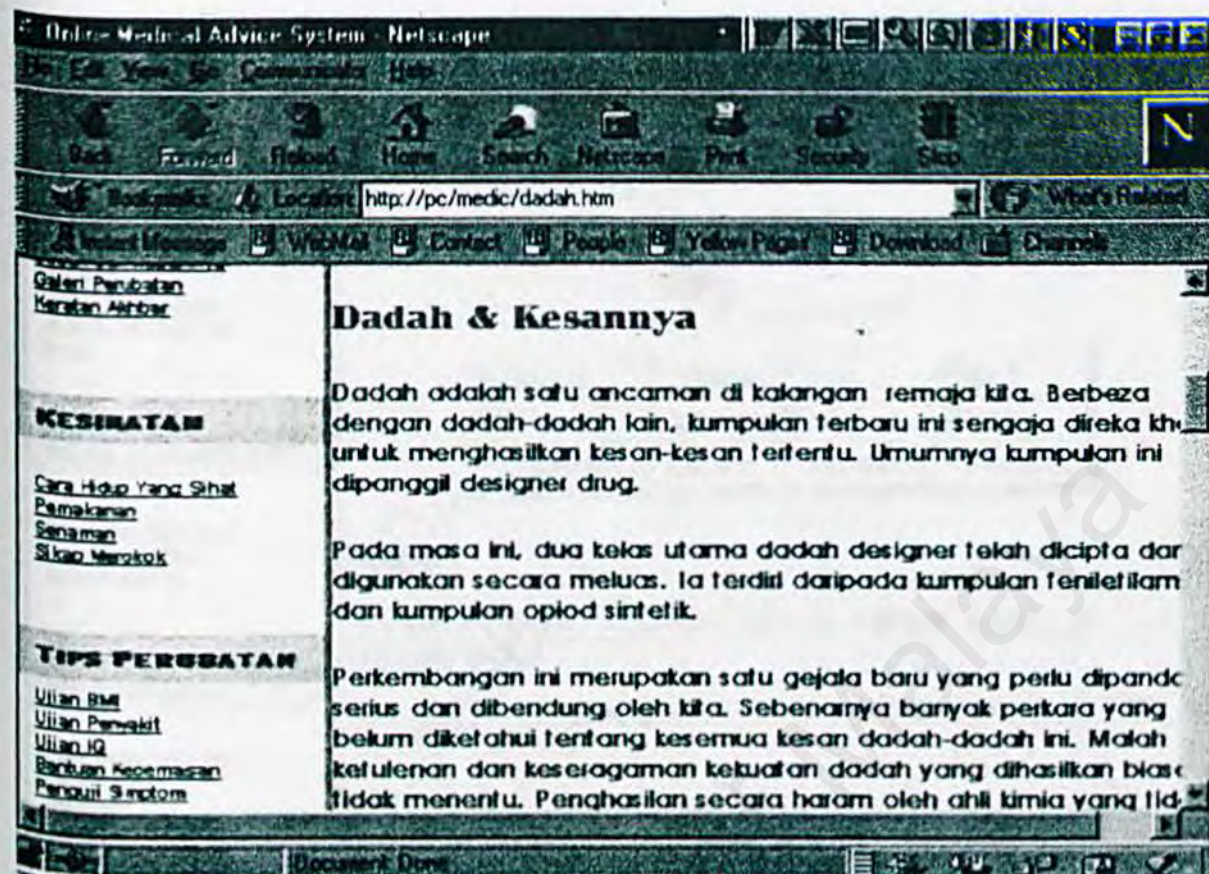


Figure A.7 Drug information page

This page contains information on drugs.

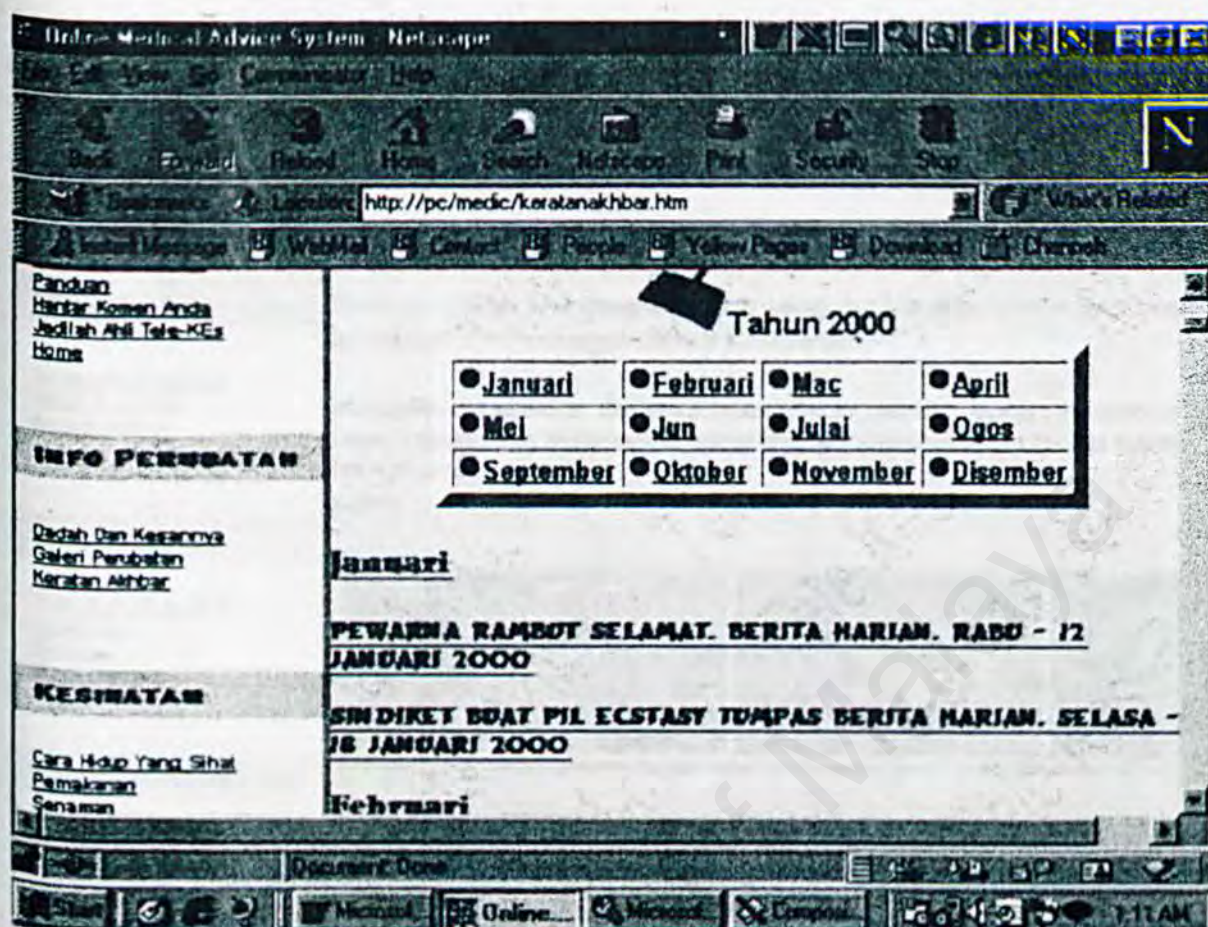


Figure A.8 Press News

This page contains all the press news for year 2000. You have to click on the months in the table to go the news headlines. Or you can even click on news headlines to go to the news straight.

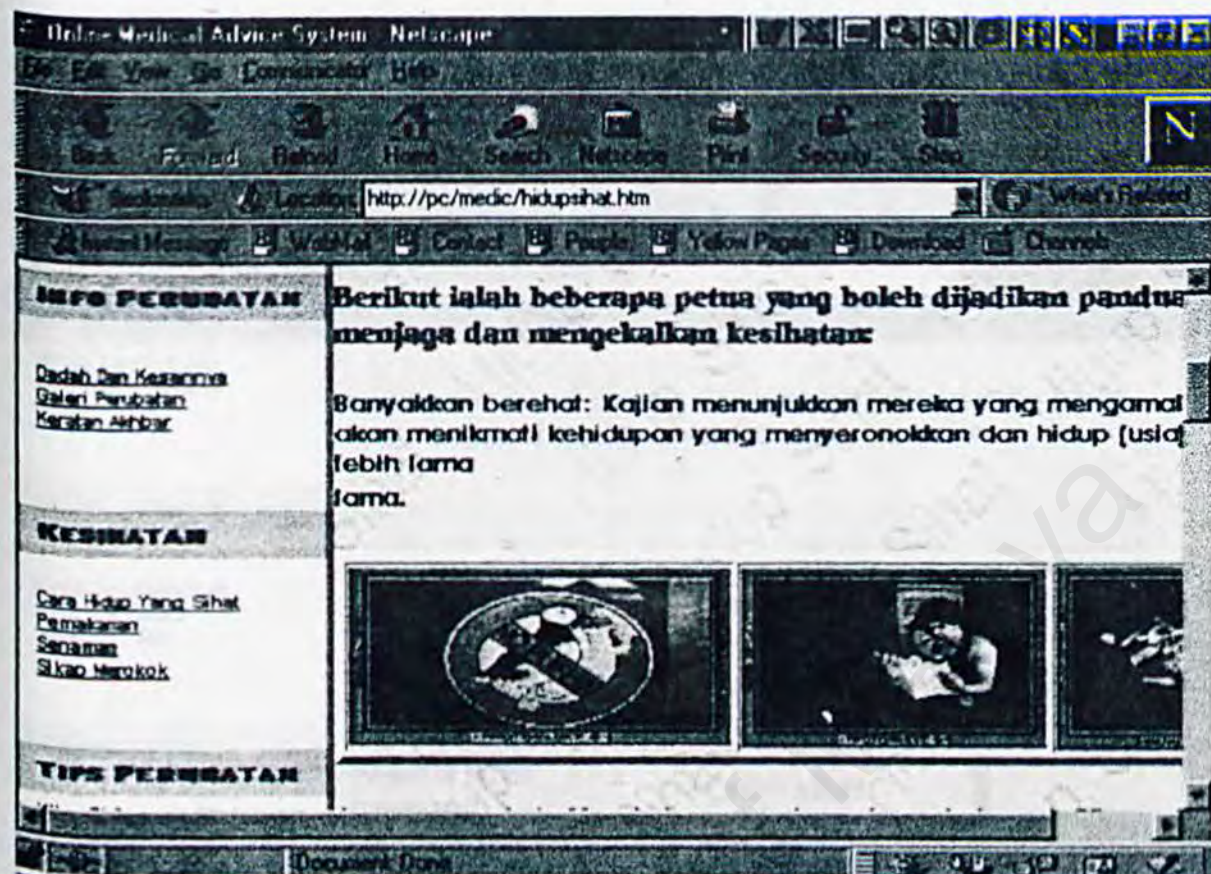


Figure A.9 Healthy Life

This page contains guidance to lead a healthy life.

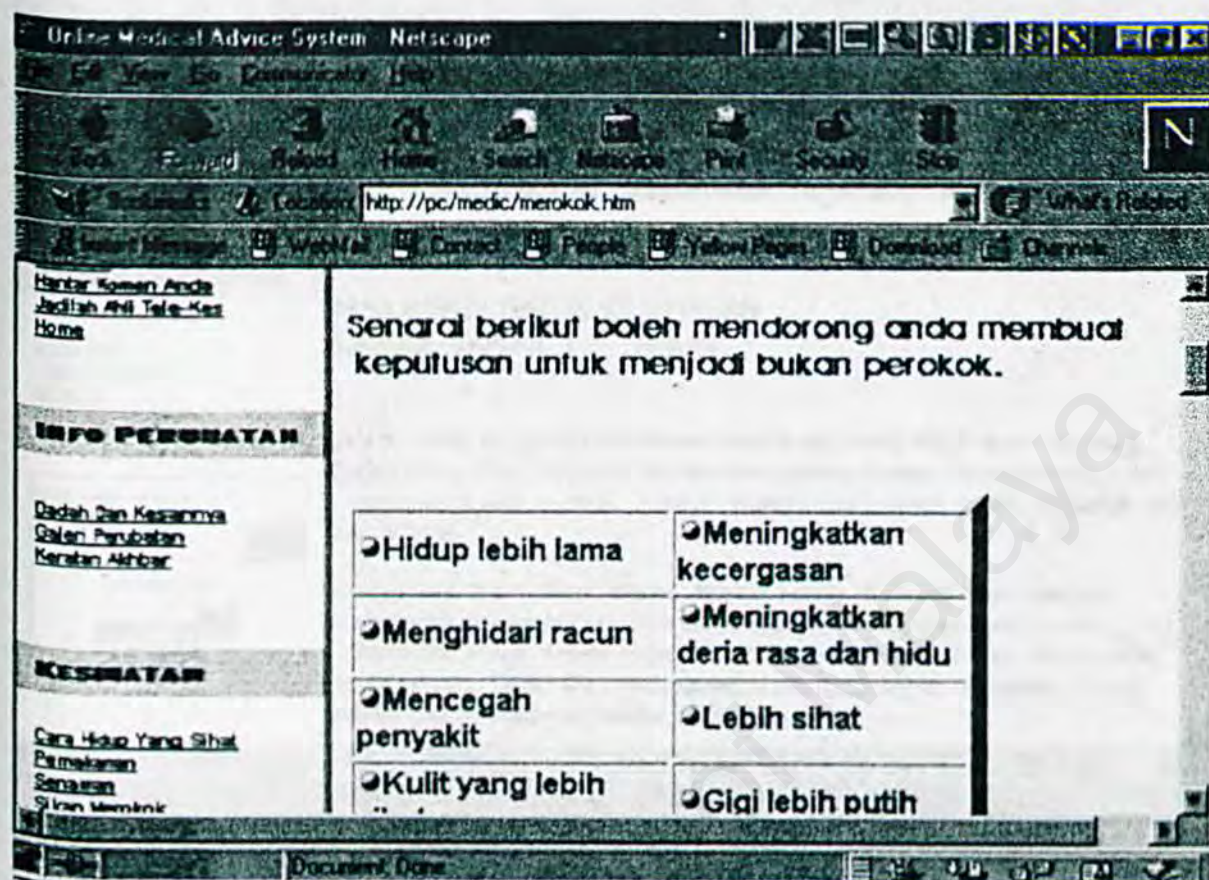


Figure A.11 Smoking information

This page contains information on smoking and tips how to quite smoking.

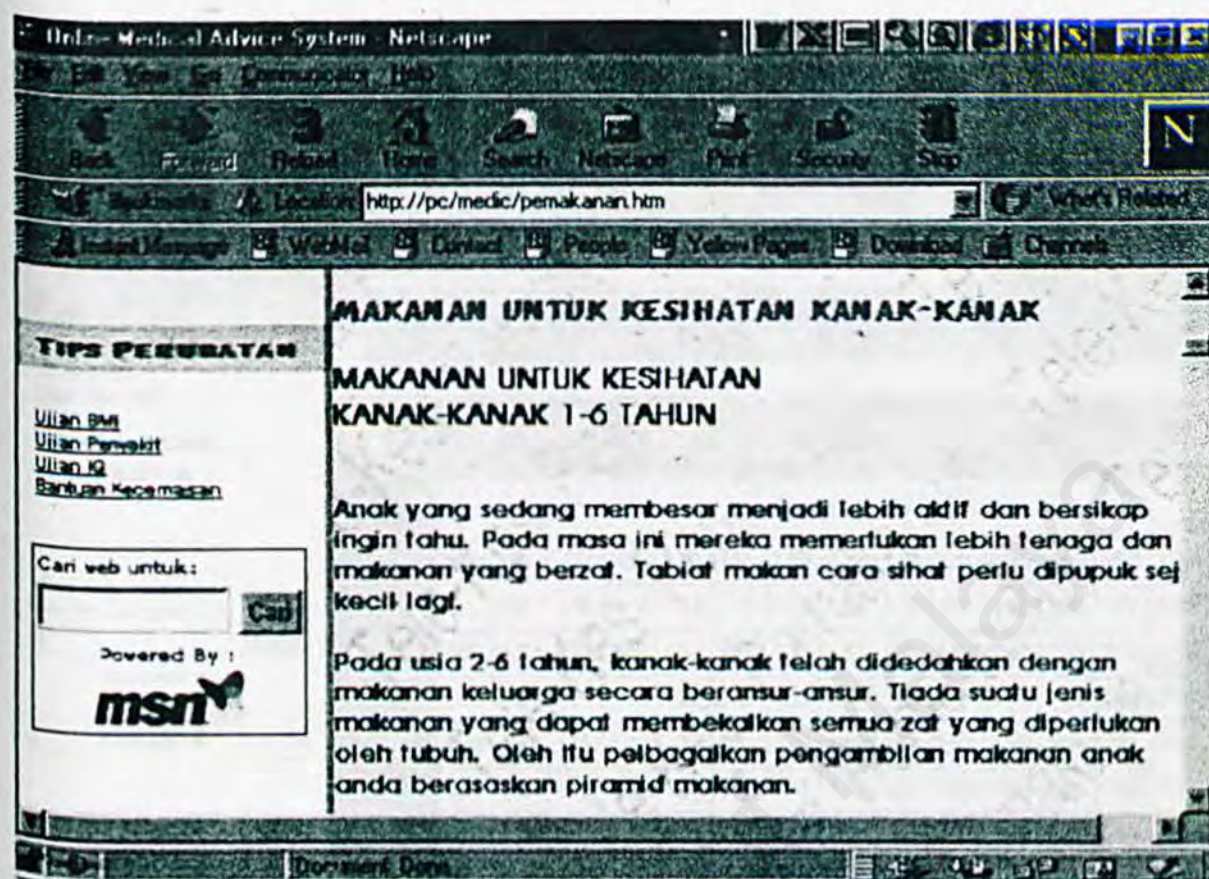


Figure A.10 Food Information

This page contains information on food and tips on vitamins, minerals, and other information.

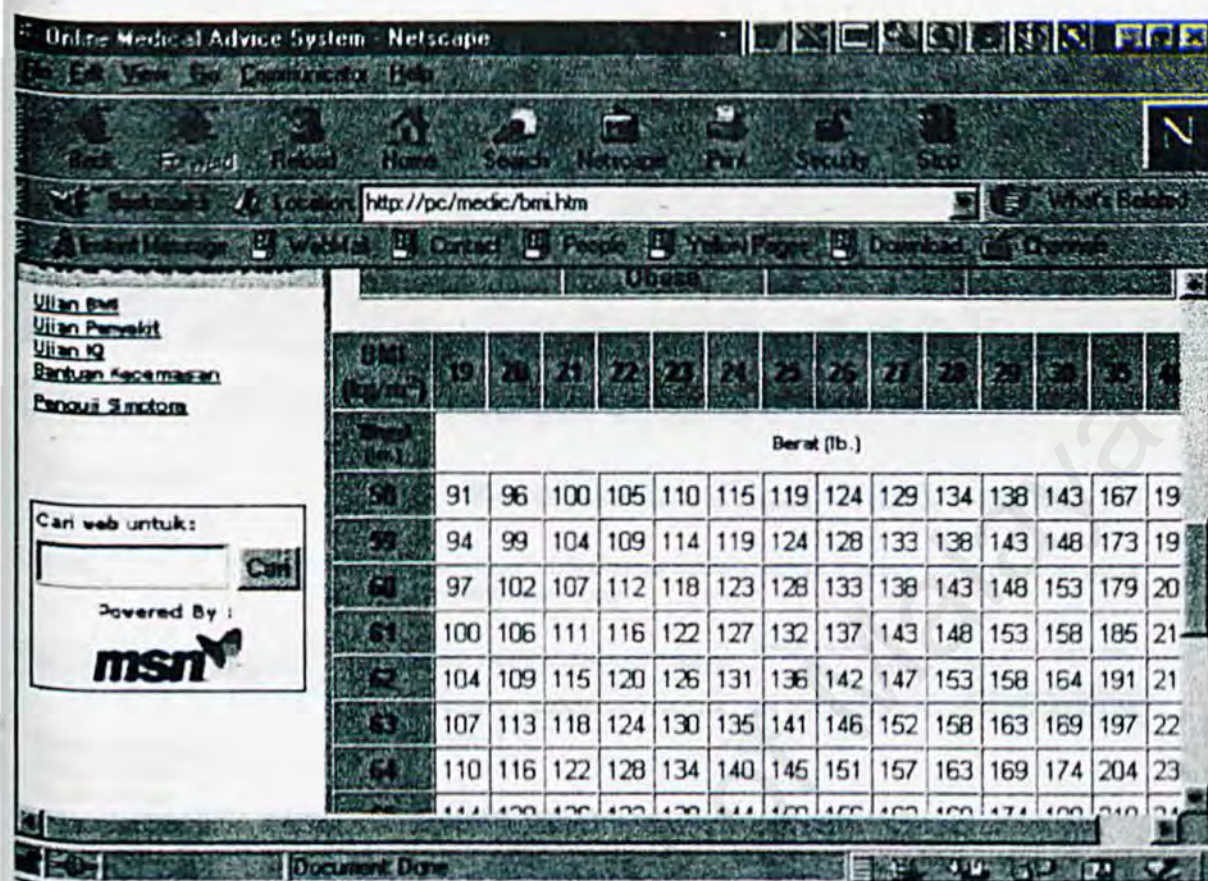


Figure A-12 BMI Chart

This is the BMI test where user have to see the height column and see what weight they should be.

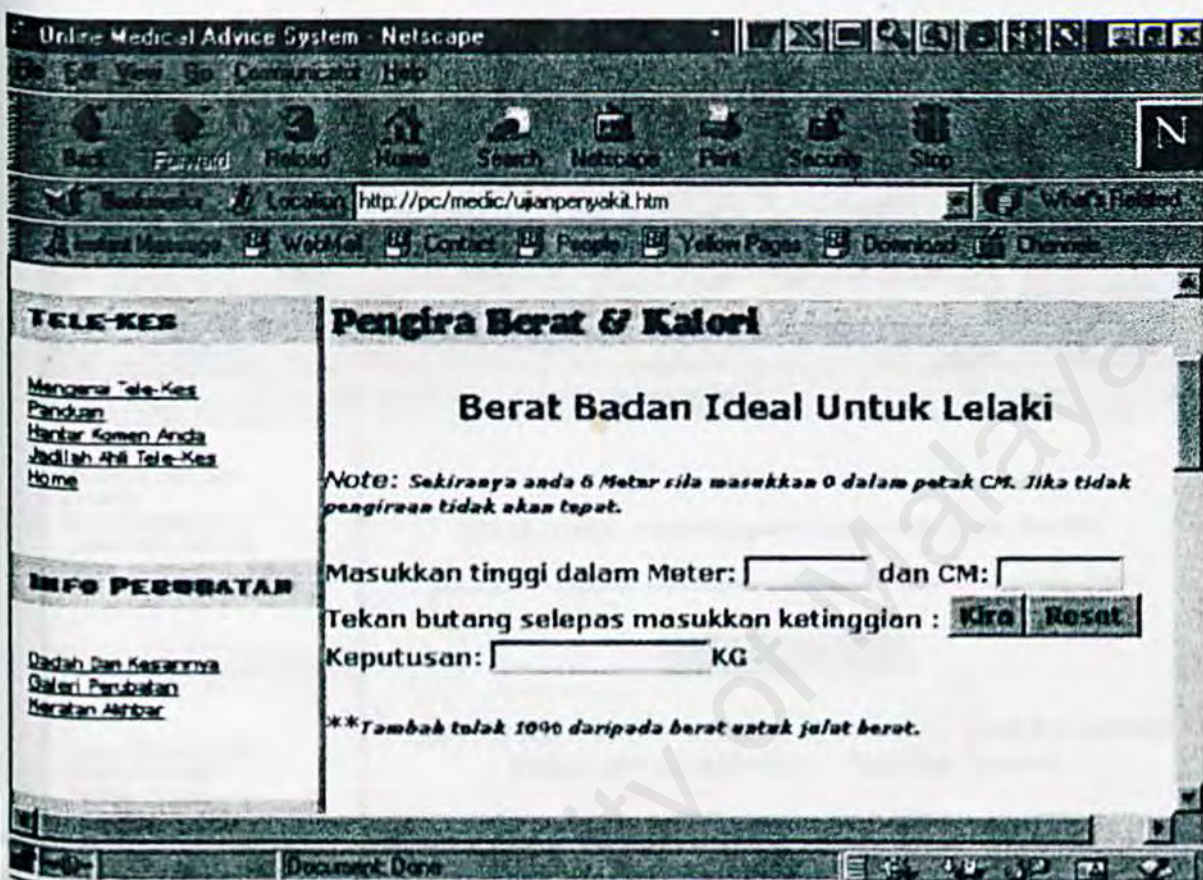


Figure A.13 Health test page

Please enter your height in Meter and Centimeter according to your sex. Then click 'kira' button. The system will give you the weight you should be in the button.

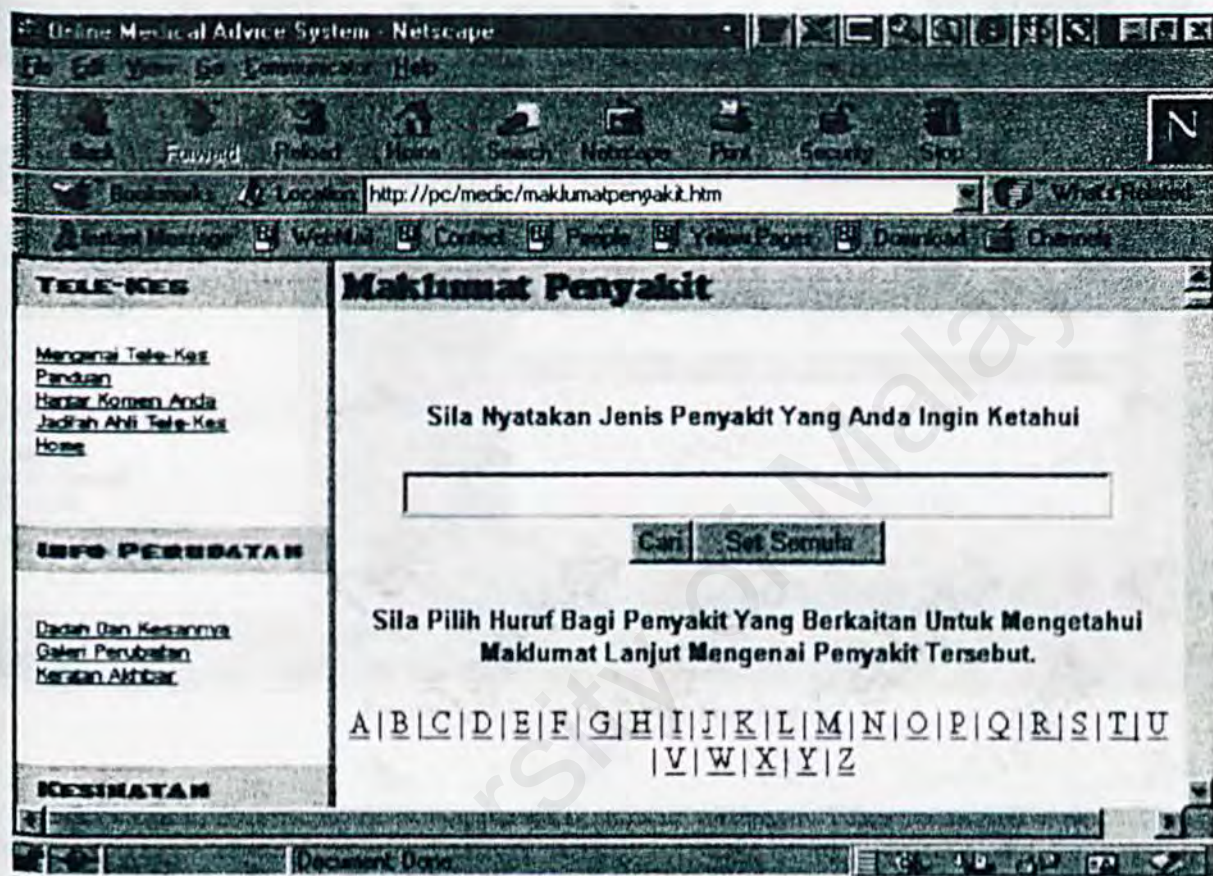
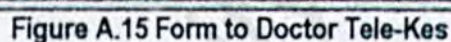


Figure A.14 Disease page

This is the disease where user have to click on the alphabets it will direct you to the diseases by the alphabets you have typed. You can also type the name of diseases in the box given and click 'cari'. It will give you the information on disease that you search.



A-18

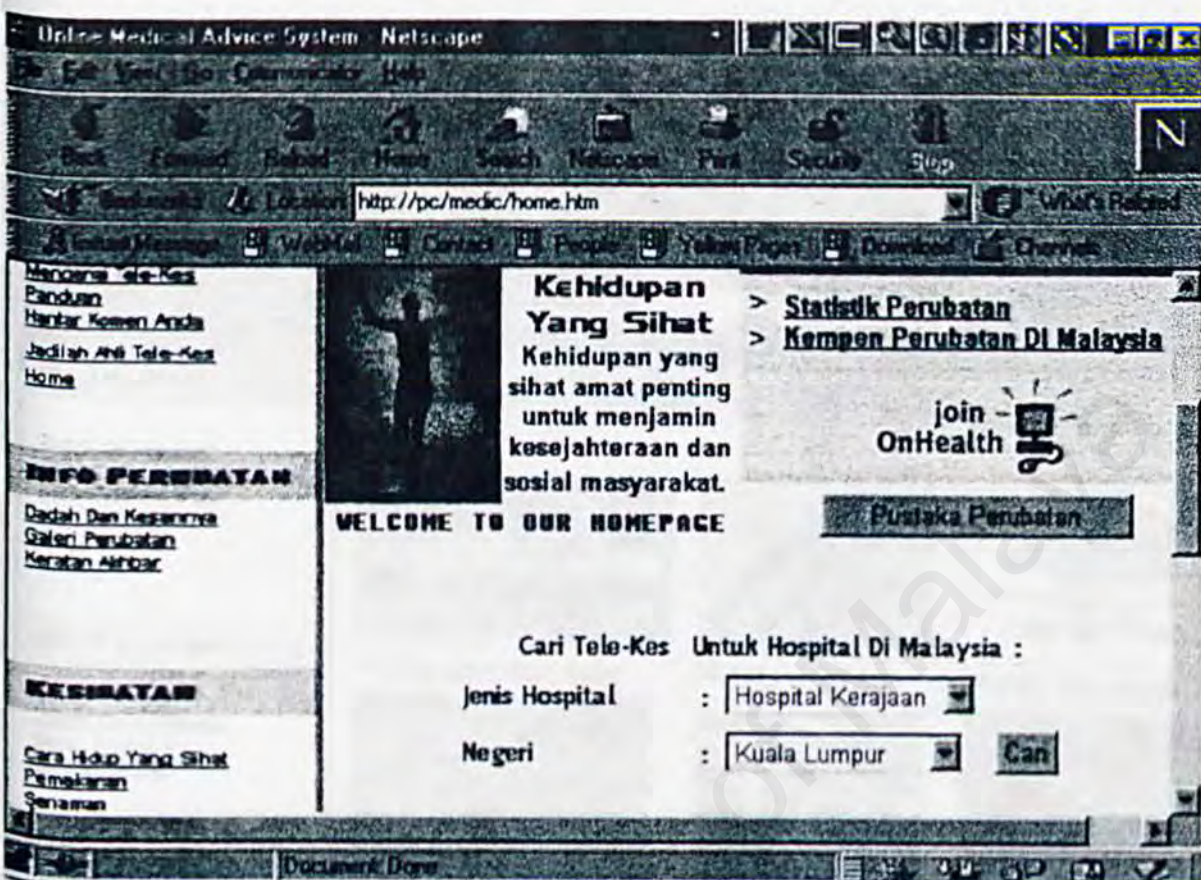


Figure A.16 Hospital Search part

This is the search part for location of hospitals in Malaysia. Click which state and type of hospitals you want. Then click 'cari'.



Figure A.17 Campaigns page

Click on the title below pictures to go to the information on campaigns.

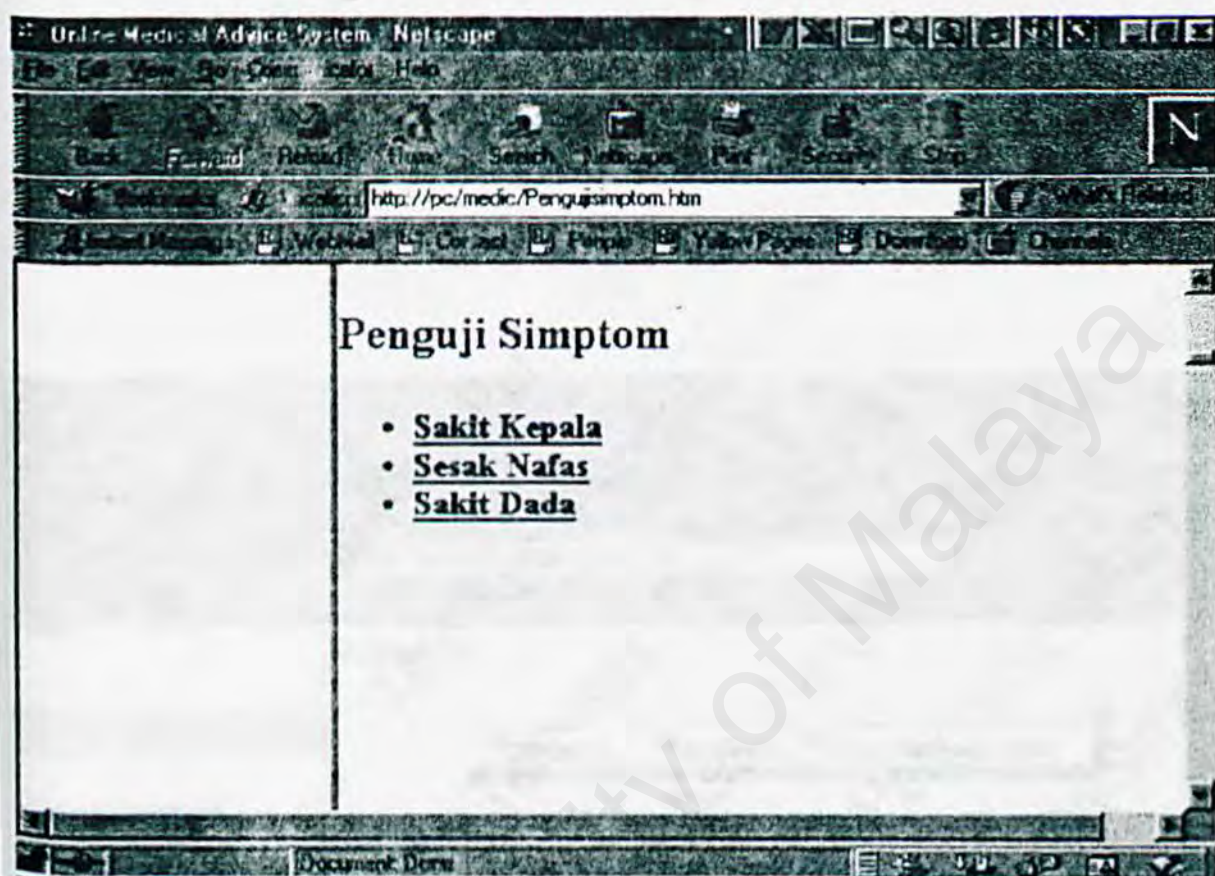


Figure A.18 Symptom Checker

This is the symptom checker page. User have to click on the symptom and they will be guided by set of questions and finally will give conclusions.

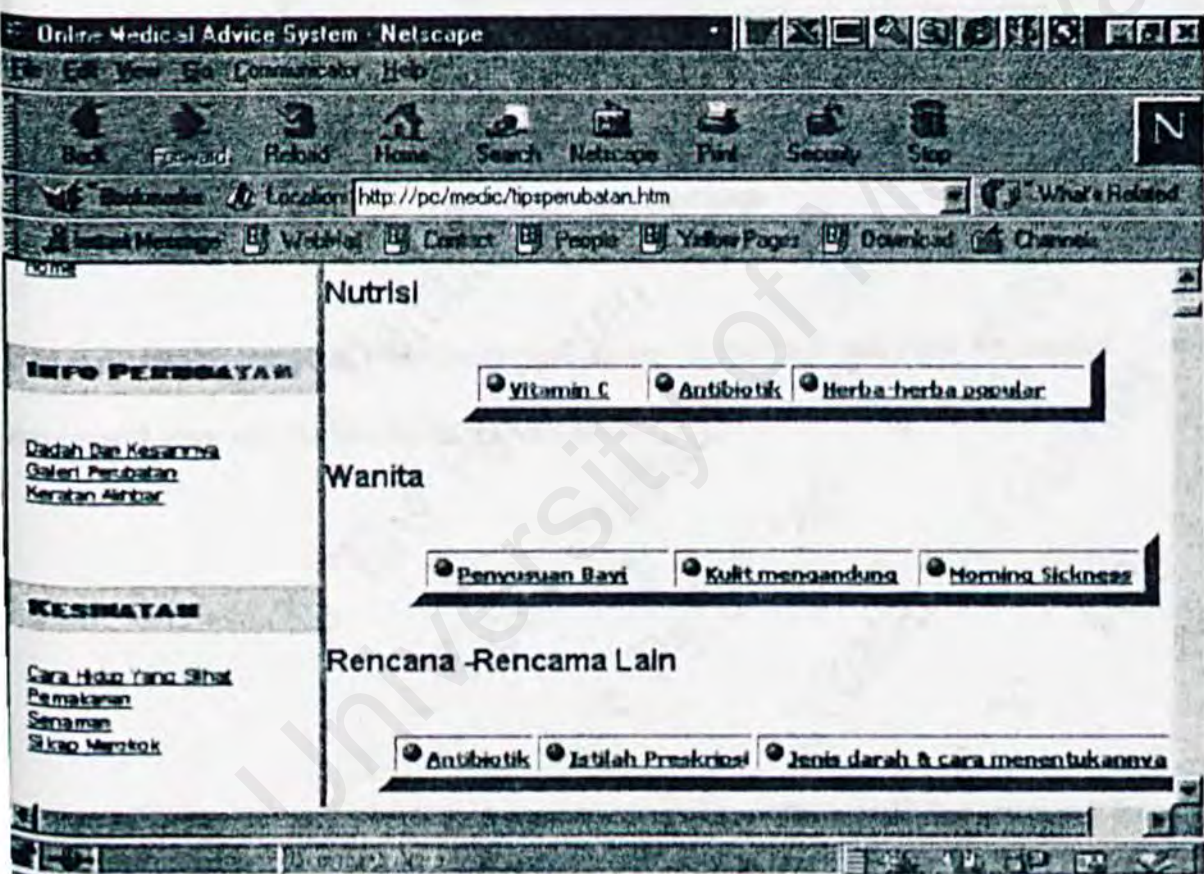


Figure A.19 Health Tips page

This is the health tips page where it is categorized into three parts. Click on the title in the table to go straight to the information.

Online Medical Advice System - Beranda

http://pc/medic/simptompenyakit.htm

Pengujian & Risiko Kematian

Lelaki :

Nyatakan Umur: 23

Pengujian:

(1) Pemeriksaan tekanan darah berkala.
(2) Suntikan tetanus setiap 10 tahun.

Risiko Kematian

(1) Risiko kematian yang tinggi untuk
(2) kadar Kematian keseluruhan untuk

Figure A.20 Health test page

This is the health test page where user have to key in their age and click 'keputusan'. The system will give you the results in the box given.

Appendix B



Coding

University of Malaya


```

PAGE="VBSCRIPT" %>
response.buffer = true %>

<head>

<title>
Online Medical Advice System</title>

</head>

<body bgcolor="#FFFFCC" marginwidth=0 marginheight=0 leftmargin=0 topmargin=0 link="#"
alink="#990000" vlink="#990000">

<!-- Top ad space -->

database1 = Server.CreateObject("ADODB.Connection")
database1.ConnectionTimeout = Session("database1_ConnectionTimeout")
database1.CommandTimeout = Session("database1_CommandTimeout")
database1.Open Session("database1_ConnectionString"), Session("database1_RuntimeUserName"),
Session("database1_RuntimePassword")
cmdTemp = Server.CreateObject("ADODB.Command")
rstTerm = Server.CreateObject("ADODB.Recordset")
cmdTemp.CommandText = "SELECT * from [diseases] where name= '" & Request.form("disease") &
cmdTemp.CommandType = 1
cmdTemp.ActiveConnection = database1
cmdTemp.Open cmdTemp, , 1, 3

rstTerm.EOF then
response.redirect "notlisted.htm"
if

height="81" width="618" border="0" cellpadding="0" cellspacing="0">
<!--this is where the "left" ad will go-->
<TD VALIGN="MIDDLE" ALIGN="CENTER" COLSPAN="3" width="159">

</TD>
<TD VALIGN="MIDDLE" ALIGN="CENTER" width="566">

</TD>
<!--this is where the "internal promotion" ad will go-->
<TD VALIGN="MIDDLE" ALIGN="CENTER" width="9"></TD>

method="post" action="term.asp">
width="625" border="0" cellspacing="0" cellpadding="0" valign="top" bgcolor="#99CCCC"

```



```

olor="#ffcc66">
th="5" height="21">&nbsp;  </td><td class="nav1" height="21"><b><font face="CopprplGoth Bd
Perubatan</font></b></td></tr>

th="5" height="96">&nbsp;  </td>
th="nav2" height="96">

ce="Arial"><b><font size="1">

dadah.htm" class="nl">Dadah Dan Kesannya</a><br>

/medcast channel toc/1666" class="nl">Pustaka Perubatan</a></font></b></font><br>

ze="1" face="Arial"><b>

galeriperubatan.htm">Galeri Perubatan</a><br>
kerataakhbar.htm">Keratan Akhbar<br>
</font>

</tr>

olor="#ffcc66">
th="5" height="21">&nbsp;  </td><td class="nav1" height="21"><b><font face="CopprplGoth Bd
thatan</font></b></td></tr>

th="5" height="96">&nbsp;  </td>
th="nav2" height="96">

hidupsihat.htm" class="nl"><font size="1" face="Arial"><b>Cara
ang Sihat</b></font></a><font size="1" face="Arial"><b><br>

pemakanan.htm" class="nl">Pemakanan</a><br>

senaman.htm" class="nl">Senaman<br>
</font><a href="merokok.htm" class="nl"><font size="1" face="Arial"><b>Sikap Merokok</b>
/a><font size="1" face="Arial"><b><br>

```

```

t>

</tr>

or="#ffcc66">
="5" height="21">&nbsp;</td><td class="nav1" height="21"><b><font face="CopperplGoth Bd
Perubatan</font></b></td></tr>

="5" height="82">&nbsp;</td>
="nav2" height="82">

e="1" face="Arial"><b>

bmi.htm" class="nl">Ujian BMI</a><br>

ujianpenyakit.htm" class="nl">Ujian Penyakit</a><br>

ujianiq.htm" class="nl">Ujian IQ</a>&nbsp;<br>
kecemasan.htm">Bantuan Kecemasan</a><br>

PengujiSimptom.htm">Penguji Simptom</a></b></font><br>

align="center" colspan="2" height="127">

t of msn module code -->
="search" id="search" ACTION="http://search.msn.com/results.asp" METHOD="get">
der=0 cellpadding=1 cellspacing=0 width=147 bgcolor="blue" align="center">
idth="143"><table border=0 cellpadding=2 cellspacing=0 width="143" bgcolor="#FFFFFF">
lspan=1 width="137"><font size="1" face="verdana,arial" color="#003399">Cari web
</font></td></tr>
wrap width="91"><input TYPE="text" id="MT" SIZE="12" MAXLENGTH="251" NAME="MT"
="SearchText"></td>
="bottom" width="40"><input type="submit" value="Cari"></td></tr>
lspan=1 width="137">
ign="center"><font size="1" face="verdana,arial" color="#003399">Powered
font><br>
border="0" src="msnlogo.gif" width="90" height="34"></p>

le></td></tr></table><input TYPE="hidden" NAME="RS" VALUE="CHECKED"><input
len" NAME="Form" VALUE="SMCLE">

```


>
head>

<SCRIPT LANGUAGE="JavaScript">

Figure13W1(form, umur1) {

eval(umur1)

```
if (umur1 > 20 && umur1 < 35) {  
    form.calc1.value = " (1) Pemeriksaan tekanan darah berkala. (2) Suntikan tetanus  
tahun. ";  
    form.calc2.value = " (1) Risiko kematian yang tinggi untuk anda tahun ini adalah  
langan atau kecedraan. (2) kadar Kematian keseluruhan untuk lelaki berumur age 25-34  
0.05 untuk 100,000. ";  
}  
  
if (umur1 > 34 && umur1 < 45) {  
    form.calc1.value = " (1) Pemeriksaan tekanan kolesterol sekurang-kurangnya setiap  
(2) Pemeriksaan tekanan darah berkala. (3) Suntikan tetanus setiap 10 tahun. ";  
    form.calc2.value = " (1) Risiko kematian yang tinggi untuk anda tahun ini adalah  
langan atau kecedraan. (2) kadar Kematian keseluruhan untuk lelaki berumur 35-44 adalah  
100,000. ";  
}  
  
if (umur1 > 44 && umur1 < 55) {  
    form.calc1.value = " (1) Pemeriksaan tekanan kolesterol sekurang-kurangnya setiap  
(2) Suntikan tetanus setiap 10 tahun. (3) Suntikan tetanus setiap 10 tahun. ";  
    form.calc2.value = " (1) Risiko kematian yang tinggi untuk anda tahun ini adalah  
ri semua jenis. (2) kadar Kematian keseluruhan untuk lelaki berumur 45-54 adalah 550.45  
,000. ";  
}  
  
if (umur1 > 54) {  
    form.calc1.value = " (1) Pemeriksaan tekanan kolesterol sekurang-kurangnya setiap  
(2) Pemeriksaan tekanan darah berkala. (3) Suntikan tetanus setiap 10 tahun. ";  
    form.calc2.value = " (1) Risiko kematian yang tinggi untuk anda tahun ini adalah  
ri semua jenis. (2) kadar Kematian keseluruhan untuk lelaki berumur >55 adalah 550.45  
,000. ";  
}
```

LANGUAGE="JavaScript">

Figure13W2(form, umur2) {

eval(umur2)

```
if (umur2 > 20 && umur2 < 35) {  
    form.calc1.value = " (1) Ujian Paps Smear jika aktif dalam persetubuhan. (2)  
an tekanan darah berkala. (3) suntikan tetanus setiap 10 tahun. ";  
    form.calc2.value = " (1) Risiko kematian yang tinggi untuk anda tahun ini adalah  
langan atau kecedraan. (2) kadar Kematian keseluruhan untuk perempuan umur 25-34  
.85 untuk 100,000. ";  
}  
  
if (umur2 > 34 && umur2 < 45) {  
    form.calc1.value = " (1) Ujian Paps Smear jika aktif dalam persetubuhan. (2)
```

```

aan tekanan darah berkala. (3) suntikan tetanus setiap 10 tahun. ";
    form.calc2.value = " (1) Risiko kematian yang tinggi untuk anda tahun ini adalah
dari semua jenis. (2) kadar Kematian keseluruhan untuk perempuan umur 35-44 adalah 141.38
0,000. ";
}

if (umurx > 44 && umurx < 55) {
    form.calc1.value = " (1) Pemeriksaan Kolesterol darah setiap 5 tahun. (2) Ujian
dar jika aktif dalam persetubuhan. (3) Pemeriksaan tekanan darah berkala. (4) suntikan
setiap 10 tahun. ";
    form.calc2.value = " (1) Risiko kematian yang tinggi untuk anda tahun ini adalah
dari semua jenis. (2) kadar Kematian keseluruhan untuk perempuan umur 45-54 adalah
untuk 100,000. ";
}

if (umurx > 54) {
    form.calc1.value = " (1) Pemeriksaan Kolesterol darah setiap 5 tahun. (2) Ujian
dar jika aktif dalam persetubuhan. (3) 'Mammogram' setiap 1-2 tahun. (4) Pemeriksaan
darah berkala. (5) Tsuntikan tetanus setiap 10 tahun.";
    " (6) pemeriksaan 'Kanser kolesterol' setiap tahun atau
oscopy' setiap 5-10 tahun. ";
    // form.calc2.value = " (1) Risiko kematian yang tinggi untuk anda tahun ini adalah
dari semua jenis. (2) kadar Kematian keseluruhan untuk perempuan umur >55 adalah 815.21
00,000. ";//
}

```

```

<title>
Online Medical Advice System</title>

</head>

<body bgcolor="#FFFFCC" marginwidth=0 marginheight=0 leftmargin=0 topmargin=0 link="#"
alink="#990000" vlink="#990000">

    <!-- Top ad space -->

    height="30" width="618" border="0" cellpadding="0" cellspacing="0">

    <!--this is where the "left" ad will go-->
    TD VALIGN="MIDDLE" ALIGN="CENTER" COLSPAN="3" width="159">
        
    </TD>

    TD VALIGN="MIDDLE" ALIGN="CENTER" width="566">
        
    </TD>

    <!--this is where the "internal promotion" ad will go-->
    TD VALIGN="MIDDLE" ALIGN="CENTER" width="9"></TD>

```



```

        form.calcval.value = 106 * 0.45359;
    }
    (TotalInches > 60) {
        form.calcval.value = ((106 + (6 * CM * 5 / 12.7)) * 0.45359);
    }
    (TotalInches == 72) {
        form.calcval.value = 178 * 0.45359;
    }
    (TotalInches > 72) {
        form.calcval.value = ((178 + (6 * CM * 5 / 12.7)) * 0.45359);
    }
    (TotalInches == 48) {
        form.calcval.value = 76 * 0.45359;
    }
    (TotalInches < 60) {
        form.calcval.value = ((76 + (2.5 * CM * 5 / 12.7)) * 0.45359);
    }
}

2><font face="Verdana" size="4">Berat Badan Ideal Untuk Lelaki</font></H2></CENTER>
="2" face="Verdana"><I><B>Note:</B></I> </FONT><font face="Verdana" size="1"><b><i>
6 Meter sila masukkan 0 dalam petak CM. Jika tidak pengiraan tidak
tepat.<br>
</b></font>

="ibw1">
face="Verdana" size="2">Masukkan tinggi dalam Meter:
E="TEXT" NAME="feet" SIZE=5> dan CM:
E="TEXT" NAME="CM" SIZE=5><BR>Tekan butang selepas masukkan
:
E="BUTTON" name="calc" value="Kira" onClick="FigureIBW1
, this.feet.value, this.form.CM.value)"><input type="submit" value="Reset">
Isan: <INPUT TYPE="TEXT" name="calcval" size=10>KG<br>
><font face="Verdana" size="2">*</font><font face="Verdana" size="1"><i>Tambah
daripada berat untuk julat berat.</i></font></b>

</td>

r="#FFFFCC">
NGUAGE="JavaScript">

FigureIBW(form, feet, CM) {
es = eval(feet * 5 / 1.524 * 12) + eval(CM * 5 / 12.7)

(TotalInches == 60) {
    form.calcval.value = 100 * 0.45359;
}
(TotalInches > 60 < 72) {
    form.calcval.value = ((100 + (5 * CM * 5 / 12.7)) * 0.45359);
}

```

```

if (TotalInches == 72) {
    form.calcval.value = 160 * 0.45359;
}
if (TotalInches > 72) {
    form.calcval.value = ((160 + (5 * CM * 5 / 12.7)) * 0.45359);
}
if (TotalInches == 48) {
    form.calcval.value = 70;
}
if (TotalInches < 60) {
    form.calcval.value = ((70 + (2.5 * CM * 5 / 12.7)) * 0.45359);
}

```

H2>Berat Badan Ideal Untuk Perempuan</H2>

e="2" face="Verdana"><I>Note:</I> <i>
 ter sila masukkan 0 dalam petak CM. Jika tidak pengiraan tidak akan
 </i>

E="ibw1">
 face="Verdana" size="2">Masukkan tinggi dalam Meter:
 PE="TEXT" NAME="feet" SIZE=5> dan CM:
 PE="TEXT" NAME="CM" SIZE=5>
Tekan butang selepas masukkan
 n :
 PE="BUTTON" name="calc" value="Kira" onClick="FigureIBW
 m, this.form.feet.value, this.form.CM.value)"><input type="submit" value="Reset">
 usan: <INPUT TYPE="TEXT" name="calcval" size=10>KG

 ont><i>Tambah
 daripada berat untuk julat berat.</i>

</td>

or="#FFFFCC">
 LANGUAGE="JavaScript">

```

Figure3331(form, feet, CM, KG, years, activity) {
    eval(feet * 100) + eval(CM)
    = TotalCM
    = KG
    = years
    = 66 + (13.7 * Kilos)
    = 5 * Centis
    = 6.3 * Age
    ty = document.bee.activity.options[document.bee.activity.selectedIndex].value
    eval.value = (Math.round(Weight + Height - Ages) * activity)

```