Name	: Yew Choo Hean
Matrix Number	: WET000218
Year	: 3
Subject Code	: WXET3181
Title	: Virtual KLIA(Kuala Lumpur International Airport)
Supervisor	: Pn Nurul Fazmidar
Moderator	: En. Phang Keat Keong

Abstract

Thesis is a subject that compulsory for all of the final year students of Computer Science or Information Technology in University of Malaya. It's divided into two phases and each phase is supposed to complete in each semester of final year. Thesis phase 1 (WXES 3181) is carried out in the first semester followed by thesis phase 2 (WXES 3182) in the second semester. To fulfill the requirement of my faculty, Virtual KLIA (Kuala Lumpur International Airport) has been chosen to become the title of my thesis.

To success my thesis, I have apply all the knowledge and experience that I have gained throughout the 3 years in University of Malaya. Besides that, the knowledge and experience that I gained during the Industrial Training that I have gone through also helps me a lot in successing my thesis. I also have a chance to learn more skills of others authoring tools due to the requirements of my thesis. I believe that this will help me a lot in my future employment.

Virtual KLIA is a web-based system that will focus more on one of the famous and important place in Malaysia, KLIA (Kuala Lumpur International Airport). Due to this reason, there would a lot people either our own local residents or foreigners like to know more information about it. This system allows users to get information about KLIA and feel the environment of the Departure Level in 3D environment. Besides that, map will be included in the system to let users know how to getting there. The system will also let users know about the facilities and services provided by KLIA.

Acknowledgements

I would like to gratefully acknowledge the contributions of several people who helped me to accomplish my thesis. Their help, cooperation, guidance, and understanding were crucial to the success of my thesis.

Firstly, I would like to acknowledge the efforts of my supervisor, Pn. Nurul Fazmidar, who accepted my proposal on Virtual KLIA (Kuala Lumpur International Airport). Your guidance, cooperation, patience, and understanding were crucial to the success of my thesis. Besides that, you also have give me certain idea that really helps me a lot in successing my system.

Secondly, I would like to acknowledge the efforts of my moderator, En. Phang Keat Keong, who listens to my presentation and giving me advise as well. Your advices and suggestions would certainly help a lot in my thesis. It would improve my implementation of my thesis.

Thirdly, I would like to acknowledge those who help me and give me information about KLIA, especially the those who are at the information counter of KLIA. Thanks for willing to talk to me and give me information.

Not forgetting all my friends that help me along the way. They have given me some of the information needed in my thesis especially during my research.

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1.1 Overview

KLIA (Kuala Lumpur International Airport) at Sepang is designed and built to be an efficient, competitive and world-class airport for Asia-Pacific region. **KLIA** compromises two building which are Main Terminal Building and Satellite Building. The 241,000 square meter Main Terminal Building is designed to allow an annul capacity of 25 million passengers. This Main Terminal Building consist of 5 main level which are:

- Ground Level
- Level 2
- Level 3 (Arrival Level)
- Level 4
- Level 5 (Departure Level)

Virtual KLIA is a web-based project that allows users to visit this web page through Internet to get information and feel the environment of KLIA. This system will present the environment of KLIA in 3 dimension ways. KLIA is a very important place for local and foreign people, for them to reach or depart from Malaysia. Public would like to know about more information and structure of KLIA. Due to huge area of KLIA, this project will mainly focus on Level 5 (Departure Level) in Main Terminal Building of KLIA.

1.2 Project Objective

The objectives of this project are listed as below:

- To develop a system that present KLIA (Departure Level) with 3-dimension environment.
- To provide information about KLIA to user.
- To develop a guide for you users to travel around KLIA.
- To let users about the facilities and infrastructure provided by KLIA.
- To reduce the trouble and problem while users are traveling around KLIA.
- To let user to have a pre-concept of KLIA before they have come to the real place.
- To let the users to study the structure and architecture of KLIA buildings especially level 5.
- To encourage the use of 3D technologies and Virtual Reality in developing system.
- To show the advantages of using 3D technologies.

1.3 Project Scope

- To expose and introduce the environment KLIA to users.
- Allow users to navigate along the area of level 5 (Departure Level).
- To let users know more about KLIA including the history and all kind of information.
- To present the facilities and infrastructure that provided by KLIA to users.
- To give users a clear view of KLIA even they are not in the real place.
- To let users view the structure and architecture of KLIA buildings.
- To give a guide to users how they going to reach and leave KLIA by all kind of transportation service that exist and also the fees as well.

1.4 Target User

The focus target user of this system is actually wide and unlimited. This system not only focus only on certain people but to the whole community. The system of Virtual Kuala Lumpur International Airport (KLIA) can handle by any people not bound to age, profession as long as the user know how to handle computer with mouse. This is because this system is actually web based and allows user to navigate the system by using mouse to get information they need. This system will allow those user who interested with KLIA to know more about KLIA especially tourist.

1.5 Project Schedule

This project started with doing research on what language and authoring tools that going to use. In the same time, gathering of KLIA information also running.

This has started on the first semester of year 2002/2003. Basically this project can divide into 2 phases. First phase of project will be implement on the first semester of year 2002/2003 and the second phase of project going to implement on the second semester of year 2002/2003.

These are the 4 chapters that carry out at first phases:

Chapter 1	Introduction
Chapter 2	Literature Review
Chapter 3	Methodology
Chapter 4	System Analysis

Another 4 chapters that carry out at the second phases:

Chapter 5	System Design
Chapter 6	System Implementation
Chapter 7	System Testing and Maintenance
Chapter 8	System Assessment

Month	June				July				Aug				Sept				Nov				Dec				Jan			
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Preliminary Study and Planning																												
Literature Study																												
System Analysis																												
System Design																												
Prototype																												
Development and Coding																												
Unit Testing																												
System Testing																												
Documentation																												
Implementation and Maintenance																												

Table 1-1 : Project Schedule

1.6 Project Process

In the process to develop this system, there are actually a few phases of process involve, these phases are Analysis phase, Design phase, Implementation phase, Testing phase and Documentation phase.

1.6.1 Analysis Phase

In this phase, informations about the web pages of this system are gather and analysis. Those informations are get from Internet, magazine related and Kuala Lumpur International Airport. Besides information about KLIA, information about software and hardware required also gathered as well. This phase also give more details about the project objective, scope and target user.

1.6.2 Design Phase

In this phase, the designs of the project structure are started. Module user interfaces required were determine and define. Title needed and suitable are chose and determine.

1.6.3 Implementation Phase

In this phase, ideas from design phase will be implement and convert into program code. Integration of Elements that support the development of system started. These process involving the skills of code programming to increase the ability of the web pages.

1.6.4 Testing Phase

The purpose of this phase is to make sure the developed system can be run without problems and errors to meet the objective that defined early in analysis phase.

1.6.5 Documentation Phase

System that already develops will be evaluated and changes will be made if needed to make the system more effective. Summary about the project in aspect of advantages and disadvantages will make. Besides, ideas how to make the system more advance in future will list.

Chapter 2: Literature Review

This chapter is about all the research that has done before the process of system developing run. All these researches have done by try gathering the information of existing system, programming language and authoring tools. Nevertheless, some information about KLIA likes history, maps are also gathered.

2.1 Overview of KLIA

KLIA (Kuala Lumpur International Airport) at Sepang is designed and built to be an efficient, competitive and world-class airport for Asia-Pacific region. It was open formally by Duli Yang Maha Mulia Yang Dipertuan Agong Tuanku Jaafar. KLIA is located at the top of the southern corridor of Peninsular Malaysia, bordering the states of Selangor and Negeri Sembilan. A good network of highways and expressways link KLIA to the rest of peninsular Malaysia. From Kuala Lumpur, primary access is through the North-South Central Link Expressway (ELITE). A second access is via the North-South Highway (PLUS) eastern route, which links the southern towns like Seremban and Malacca to the airport via the Nilai Interchange. An Express Rail Link is currently being constructed, linking Kuala Lumpur (KL Sentral) to KLIA and vice versa. Once operational in 2002, a City Air terminal will be establish where departing passengers can check-in their luggage, receive their boarding passes and proceed to board the train to the airport. Immigration clearance will be completed at the airport. Travel time between KL Sentral to KLIA will be 30 minute. **KLIA** compromises two building which are Main Terminal Building and Satellite Building. The 241,000 square meter Main Terminal

Building is designed to allow an annul capacity of 25 million passengers. This Main Terminal Building consist of 5 main level which are:

- Ground Level
- Level 2
- Level 3 (Arrival Level)
- Level 4
- Level 5 (Departure Level)

Ground Level and Level 2

This 2 level connected passenger to the car park with a link-bridge. Besides that, it also provided services like bus stop, registration counter, telephone food garden and so on.

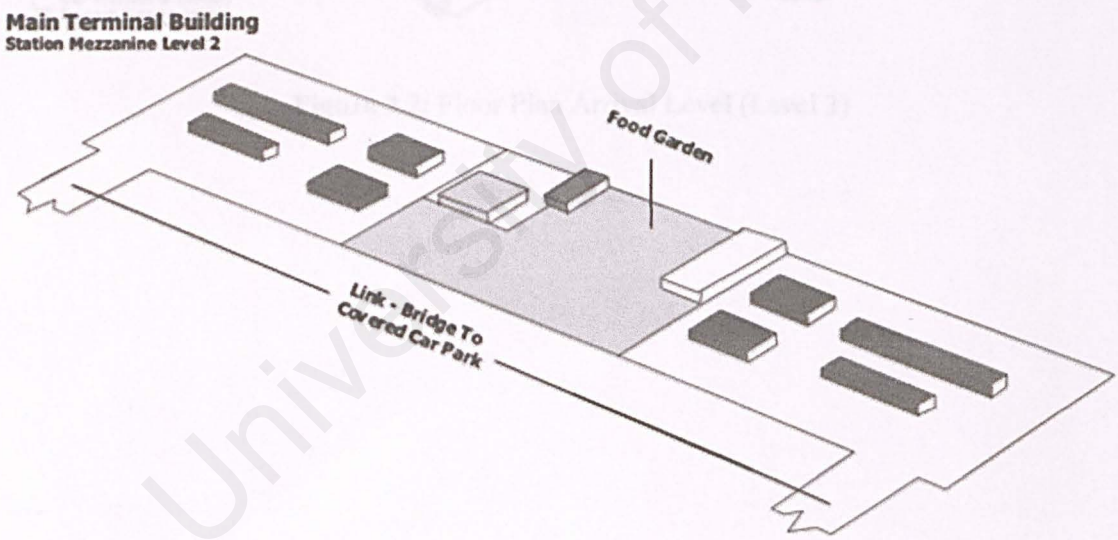

Figure 2.1: Floor plan for Level 2 of Main Terminal Building

Level 3(Arrival Level)

This is an important level, which the passenger will arrive after their flight. In here, we have supermarkets, restaurants, luggage counter, arrival immigration counter and so on.

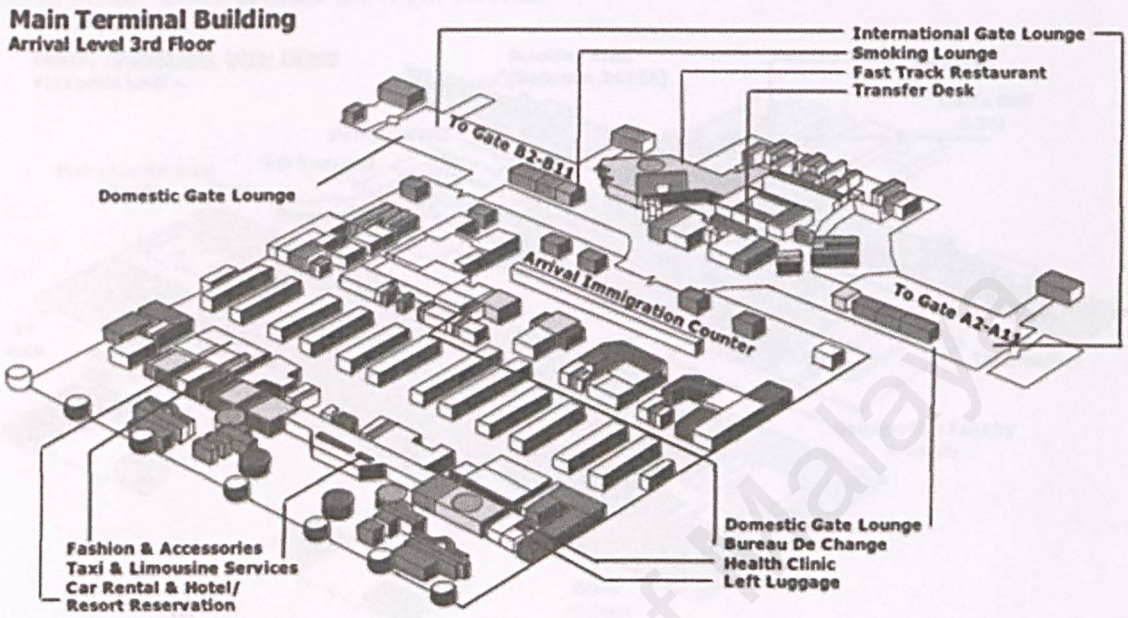

Figure 2.2: Floor Plan Arrival Level (Level 3)

Level 4

This level was equipped with Press Conference Room, VIP room, clinic, restaurants, information counter and immigration enquiry counter. Besides that, there are other airlines offices besides MAS office, which provide the flight service.

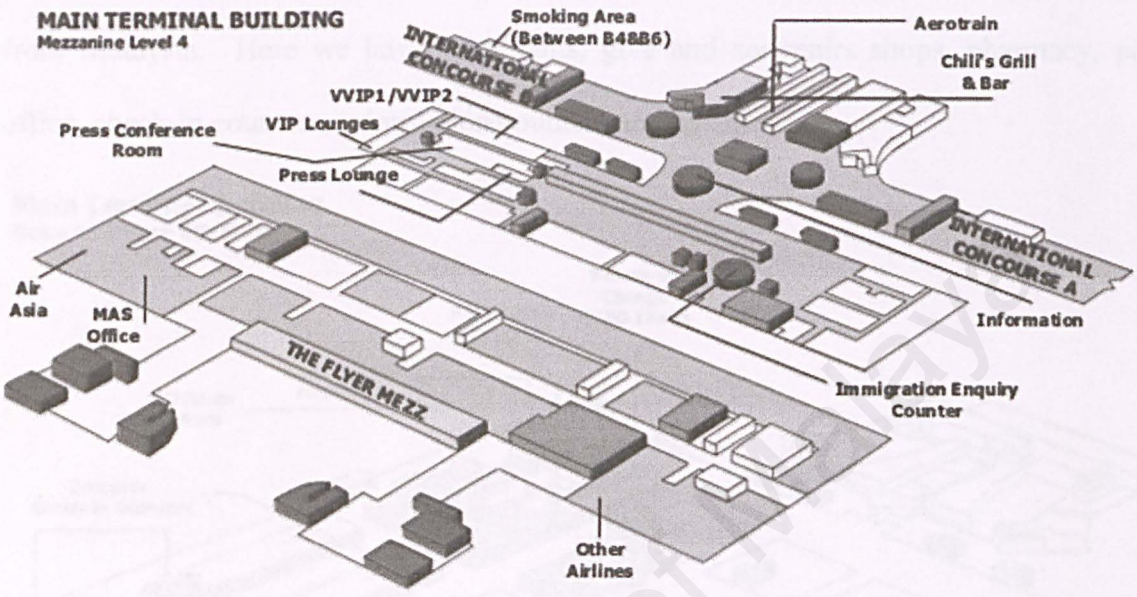

Figure 2.3: Floor Plan for Level 4

Level 5 (Departure Level)

This is the most important level within the airport and also this is the floor that I'm going to create the virtual tour so that user can navigate in a 3D world to know more about this floor. This floor provides services and facilities to passenger, which is going to depart from Malaysia. Here we have restaurants, give and souvenirs shops, pharmacy, post office, check-in counters, information counters and so on.

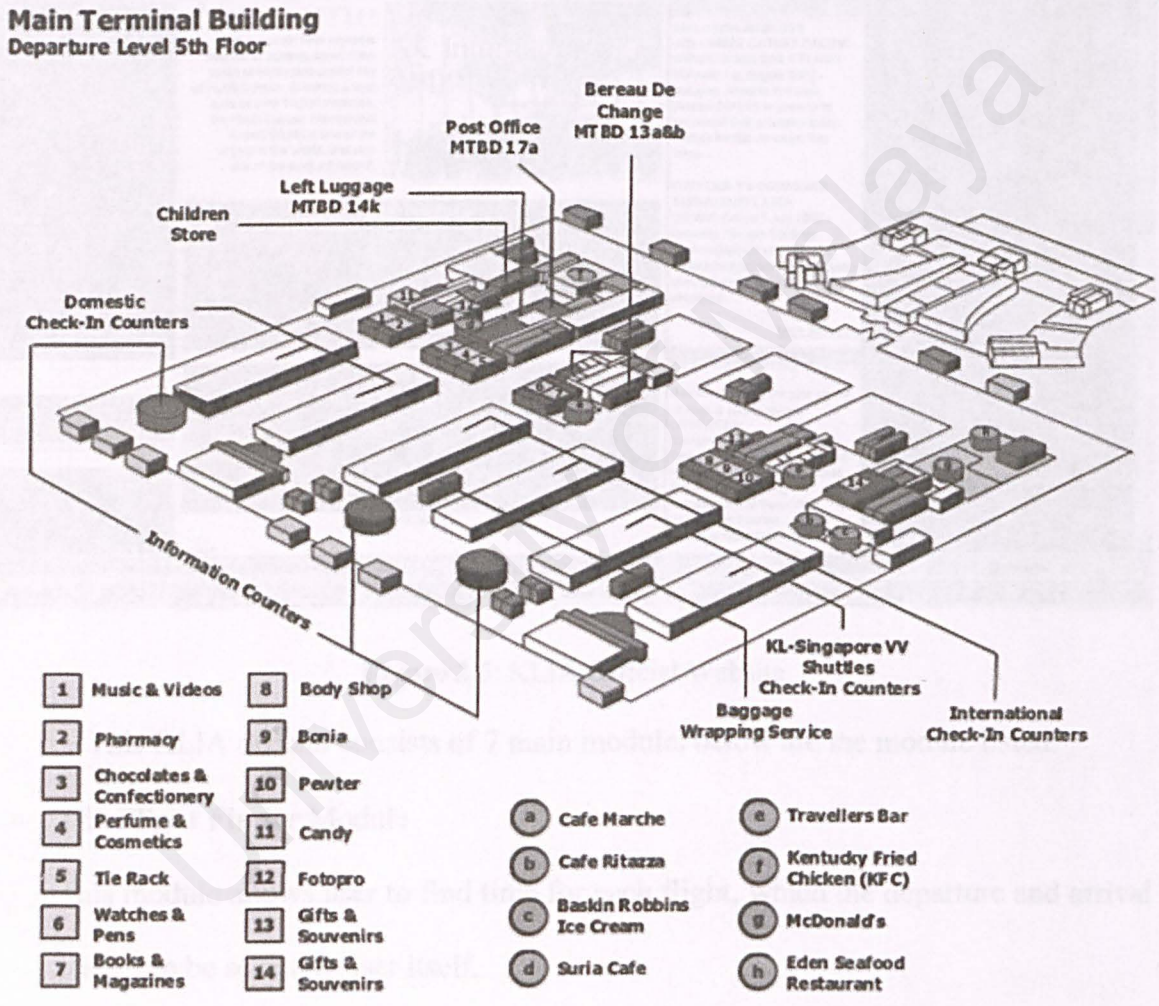

Figure 2.4: Floor Plan for Level 5(Departure Level)

2.2 Analysis Study

2.2.1 Case Study 1– KLIA Official Website

URL: http://www.klia.com.my

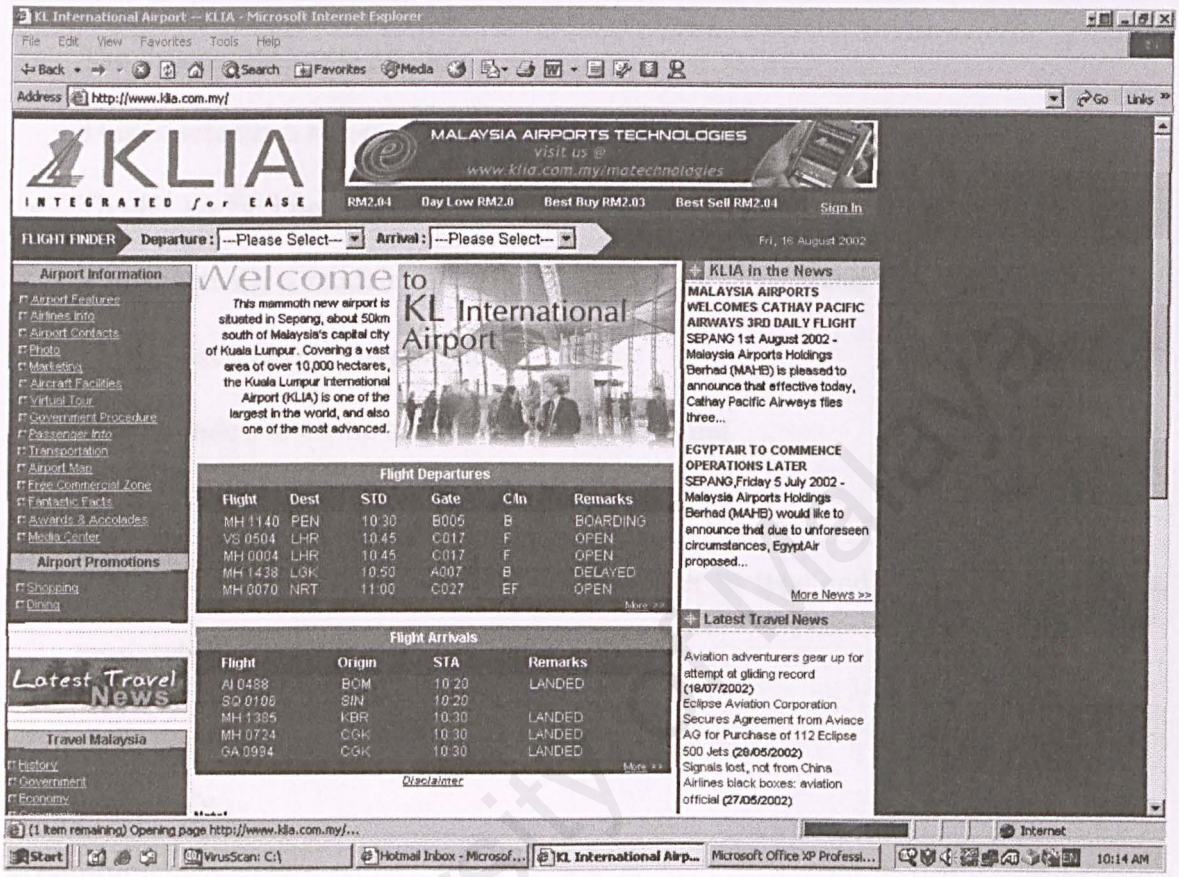

Figure 2.5: KLIA Official Website

This KLIA official consists of 7 main module, below are the module listed:

- The **Flight Finder** Module

  This module allows user to find time for each flight, which the departure and arrival place can be select by user itself.

- The **Airport Information** Module

  This module will show the user all kinds of KLIA information like features, contacts, photos, facilities, maps, transportation etc.

- The **Airport Promotion** Module

  This module will show the user of the latest promotion that offer by KLIA. Example like promotion of air flight tickets, dining, shopping, hotels etc.

- The **Travel Malaysia** Module

  This is actually a sub-module that link to others Malaysia tourism website.

- The **KLIA In The News** Module

  This is actually a module that shows all the latest news about KLIA.

- The **Latest Travel News** Module

  This module shows the latest news about traveling.

- The **Search** Module

  This module is a search engine that allow user to type and search information by keywords.

Result of Study

Strength:

This site use simple design and mostly text-oriented make it fast to load. The simple design of interface allow use to handle it easily. Give user complete information about KLIA.

Weakness:

Even there is a virtual tour module, but this module only show a 360 degree picture and let the user to turn a round. Don't have a real virtual tour to allow use navigate around the area of KLIA. Cannot give user a real concept how KLIA look like.

2.2.2 Case Study 2– Metro The Star KLIA site

URL: http://metro.thestar.com.my/klia/

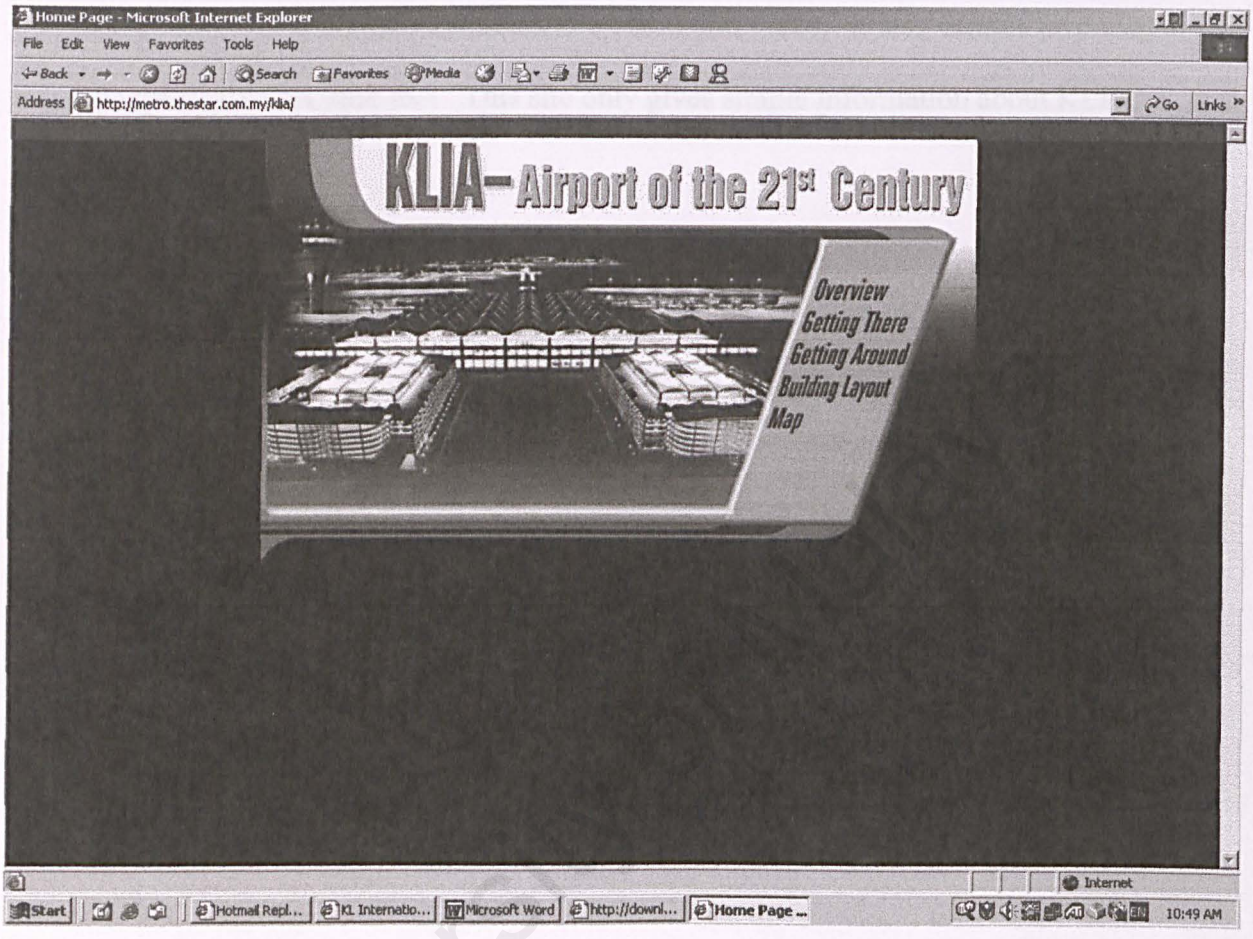

Figure 2.6: Metro The Star KLIA site

This site is a normal information web site that provides information about KLIA. Use can use the buttons at the menu to access the modules within the site easily to get information.

Result of Study

Strength:

This site use simple design and mostly text-oriented make it fast to load. The simple design of interface allow use to handle it easily. Give user information about KLIA.

Weakness:

Don't have any virtual tour to allow use navigate around the area of KLIA. Besides, it lacks of multimedia elements like audio and video. It also cannot give user a real concept how KLIA look like. This site only gives simple information about KLIA.

2.2.3 Case Study 3– Millersville University Virtual Tour

URL: http://cs.millersville.edu/~webster/work2/campus.dir/

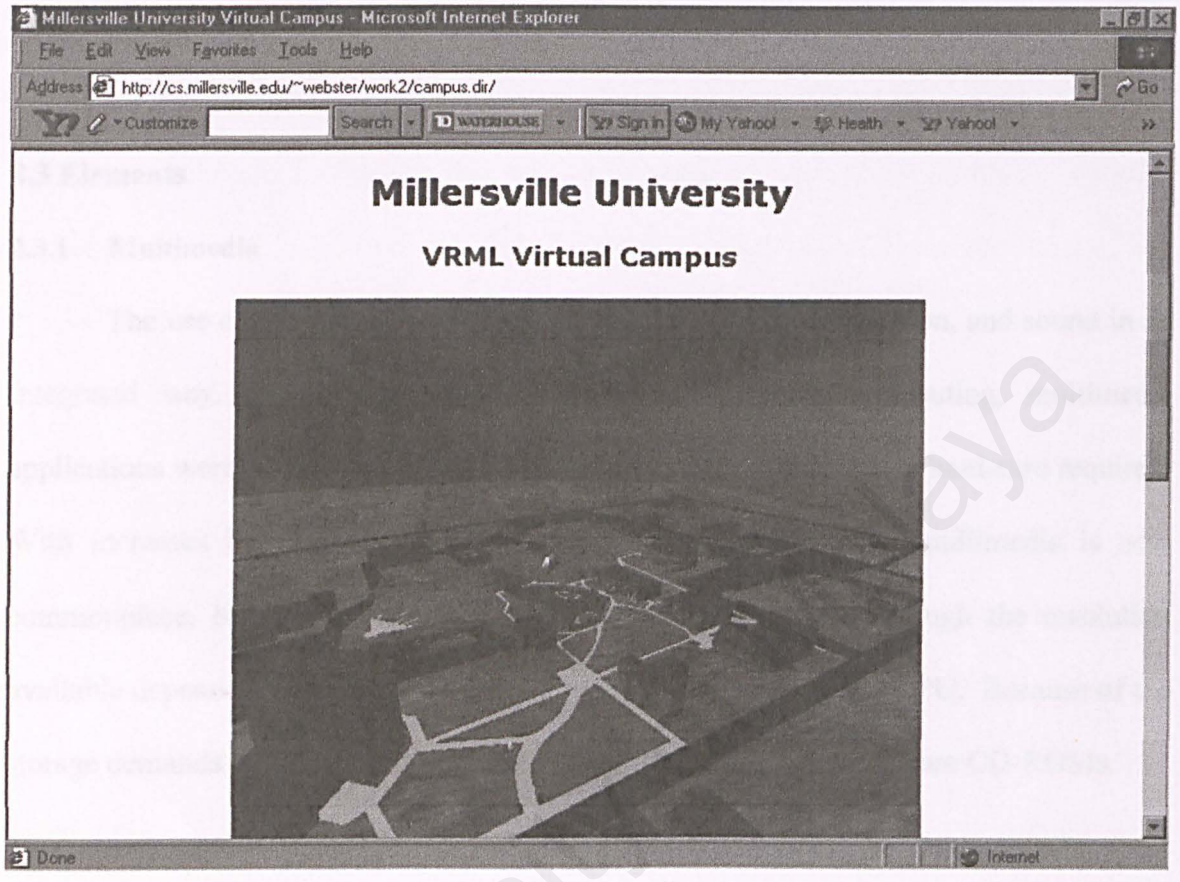

Figure 2.7: Millersville University Virtual Tour

This site created by Millersviller University students. The purpose of the site is to create a 3D virtual reality world of their own campus. Allow users to navigate within the 3D world to feel the environment of their own campus.

Result of Study

Strength:

This site uses VRML to create the 3D virtual reality world and its look realistic. Its allow user to navigate within the 3D world. Each and every part within the 3D world can be seen clearly. The 3D models are very attractive.

Weakness:

Lack of using of the background sounds. The description by text is too short and simple. Not much information is given.

2.3 Elements

2.3.1 Multimedia

The use of computers to present text, graphics, video, animation, and sound in an integrated way. Long touted as the future revolution in computing, multimedia applications were, until the mid-90s, uncommon due to the expensive hardware required. With increases in performance and decreases in price, however, multimedia is now commonplace. Nearly all PCs are capable of displaying video, though the resolution available depends on the power of the computer's video adapter and CPU. Because of the storage demands of multimedia applications, the most effective media are CD-ROMs.

The main areas of application of multimedia which are most commonly found on the market and in everyday life are:

Entertainment

Education and training

Health

Visual animation

Financial transactions

Arts and culture

Corporate services

2.3.2 Animation

A simulation of movement created by displaying a series of pictures, or frames. Cartoons on television are one example of animation. Animation on computers is one of the chief ingredients of multimedia presentations. There are many software applications that enable you to create animations that you can display on a computer monitor. Note the difference between animation and video. Whereas video takes continuous motion and breaks it up into discrete frames, animation starts with independent pictures and puts them together to form the illusion of continuous motion.

2.3.3 Video

Refers to recording, manipulating, and displaying moving images, especially in a format that can be presented on a television. Refers to displaying images and text on a computer monitor. The video adapter, for example, is responsible for sending signals to the display device. A recording produced with a video recorder (camcorder) or some other device that captures full motion.

2.3.4 Audio

Digital audio comes in many different formats, and multiple formats will be a fact of life for the foreseeable future. Groups like MPEG have created open standards, but even formats based on the same MPEG standard may not compatible with each other because of proprietary components.

Fortunately for consumers, many hardware and software players are able to support multiple formats—so if you purchase digital music in any of the major

formats (MP3, WMA, etc.) you will be in a good shape. If a format does become obsolete, plenty of tools are available for converting digital audio to different formats.

2.3.5 3D Graphic

3d graphic the field of computer graphics concerned with generating and displaying three-dimensional objects in a two-dimensional space (e.g., the display screen
). Whereas pixels in a 2-dimensional graphic have the properties of position, color, and brightness, a 3-D pixels adds a depth property that indicates where the point lies on an imaginary Z-axis. When many 3-D pixels are combined, each with its own depth value, the result is a three-dimensional surface, called a *texture*. In addition to textures, 3-D graphics also supports multiple objects interacting with one another. For example, a solid object may partially hide an object behind it. Finally, sophisticated 3-D graphics use techniques such as ray tracing to apply realistic shadows to an image.

Converting information about 3-D objects into a bit map that can be displayed is known as *rendering*, and requires considerable memory and processing power. In the past, 3-D graphics was available only on powerful workstations, but now 3-D graphics accelerator are commonly found in personal computer. The graphics accelerator contains memory and a specialized microprocessor to handle many of the 3-D rendering operations.

2.3.6 Virtual Reality

An artificial environment created with computer hardware and software and presented to the user in such a way that it appears and feels like a real environment. To "enter" a virtual reality, a user dons special gloves, earphones, and goggles, all of which receive their input from the computer system. In this way, the computer controls at least three of the five senses. In addition to feeding sensory input to the user, the devices also monitor the user's actions. The goggles, for example, track how the eyes move and respond accordingly by sending new video input. To date, virtual reality systems require extremely expensive hardware and software and are confined mostly to research laboratories.

The term *virtual reality* is sometimes used more generally to refer to any virtual world represented in a computer, even if it's just a text-based or graphical representation.

2.4 Language

2.4.1 HTML

HTML (Hypertext markup language) is the "language of the web". HTML will indicate how a web page will look. HTML is based on SGML (the Standard Generalized Markup Language), a general category of markup languages. In practical terms, HTML is a collection of styles (indicated by markup tags) that define the various components of a World Wide Web document. The language works on the principle of applying tags (information before and/or after conventional text) to standard ASCII text. Hypertext tags are enclosed by these symbols: < >.

2.4.2 ASP

ASP is a server-side scripting technology. ASP is indeed HTML page with an .asp extension. ASP allows for HTML and a scripting language such as VBScript, JScript or Perl to be interspersed in a Web page. When a browser requests an ASP page, the Web server generates a page with HTML code and sends it back to the browser.

One of the most important features about ASP is that it allows user to easily access data and put it on a Web page. User can simply display data from an ODBC-compliant database, or use ASP to make decisions about what to display on a Web page. User can then format the results in any way that they please.

Another important ASP feature is the ability to use cookies to store and retrieve information. The Request object has a Cookie collection, and user can use this in data processing.

2.4.3 JavaScript

JavaScript is a scripting language developed by Netscape to enable web authors to design interactive sites. JavaScript is different from Java. Although it shares many of the features and structures of the full Java language, it was developed independently. JavaScript can interact with HTML source code to enable web authors to spice up their sites with dynamic content. JavaScript is endorsed by a number of software companies and is an open language that anyone can use without purchasing a license. Recent browsers from Netscape and Microsoft support it, though Internet Explorer supports only a subset, which Microsoft calls Jscript.

2.4.4 VRML (Virtual Reality Modeling Language)

The Virtual Reality Modeling Language (VRML) is the new standard file format for describing interactive 3D objects and worlds. Besides scenes with static objects, an integrated time definition allows the construction of animated objects. The animation starts at one given point in time and proceeds until the end of the animation.

The Virtual Reality Modeling Language (VRML) is a file format for describing interactive 3D objects and worlds. VRML is designed to be used on the Internet, intranets, and local client systems. VRML is also intended to be a universal interchange format for integrated 3D graphics and multimedia. VRML may be used in a variety of application areas such as engineering and scientific visualization, multimedia presentations, entertainment and educational titles, web pages, and shared virtual worlds.

VRML is capable of representing static and animated dynamic 3D and multimedia objects with hyperlinks to other media such as text, sounds, movies, and

images. VRML browsers, as well as authoring tools for the creation of VRML files, are widely available for many different platforms.

2.5 Summary of Chapter 2

This chapter shows information about Kuala Lumpur International Airport. Besides that, also included some of the analysis studies about the existing system. In the analysis studies, the advantages and the disadvantages of the existing system are analyzed. Elements that included in the web pages are discussed.

In the end of this chapter, analysis about the programming language that going to use to develop the system also been make.

Chapter 3: Methodology

3.1 Project Management

There are a few stages need to be going through in the project development, which are:

- Determine when is the beginning of the project so that the implement of the development activities will be smoother.
- Project planning which make the activities of the process needed more clearly and details. Implementations of each planning need to be monitor and always keep on track.
- Implement the project according to the planning.
- Always monitor the progress of the changes been made to the part of planning when there are needed such as when problem appear or not meet the earlier requirement.
- The closing of the project is the end stage of project management. This show that the project has already meets the objective and early requirement.

3.2 Methodology

Methodology was defined as a collection of procedures, techniques, tools and paradigm. System development methodology is a method to create a system with a series of steps or operations or can be defined as system life cycle model. Every system development process model includes system requirements (user, needs, resource) as input and a finished product as output. The purpose of using methodology is to save time and make the process of system developing more easily.

Software Engineering has played a very important role in system developing. A systematic analysis approach, ***System Development Life Cycle*** is a standard system development methodology to ensure the process of system developing flow in a correct way. This methodology has been proven effective and use until now.

To use the approach of ***System Development Life Cycle*** to develop a system, there still can divide into a few process models. Among these models, there are:

- Waterfall Model
- Waterfall Model with prototyping
- Prototype Model
- V Model
- Spiral Model
- Transformation Model
- Phases Development Model

3.3 Waterfall Model With Prototyping

To develop the system of Virtual Kuala Lumpur International Airport (KLIA), Waterfall Model with prototyping have been chosen as the process model. There are some advantages with using of this model as below:

- Easy to understand and to use.
- Easy to explain to the customer who don't use with software developing.
- Scopes of project are well understood.
- Easier to differentiate between stages.
- To ensure the system meet the performance goals or constraints.
- To ensure the system fulfill the users' requirement.

Waterfall Model with prototyping consists of eight stages that are depicted as cascading from one to another (see Figure 3-1). Each development stage should be completed before the next begins. The eight stages are:

1. Requirements Analysis

   Understanding and determining users need by having brainstorming, eliciting and analyzing user requirements by having interview, survey or questionnaire session, collecting and specifying all the user requirements and validating requirements.

2. System Design

   Outlining system functional by having feasibility studies or case studies on current system, determining and specifying hardware or software architecture and verifying system design.

3. Program Design

   Determining and specifying program design and database design and verifying program design.

4. Coding

   Involving programming, personal planning, tool acquisition, database development, component level documentation and programming management.

5. Unit and Integration Testing

   Test units separately and integrate the tested units. Then, testing on the integrated units.

6. System Testing

   Combining all the integrated units into a system. Testing on the system. Specifying, reviewing and updating of the system test and validating of system.

7. Acceptance Testing

   Testing on system completed. The system is delivered.

8. Operation and Maintenance

   Control and maintain the system. Revalidating of system.

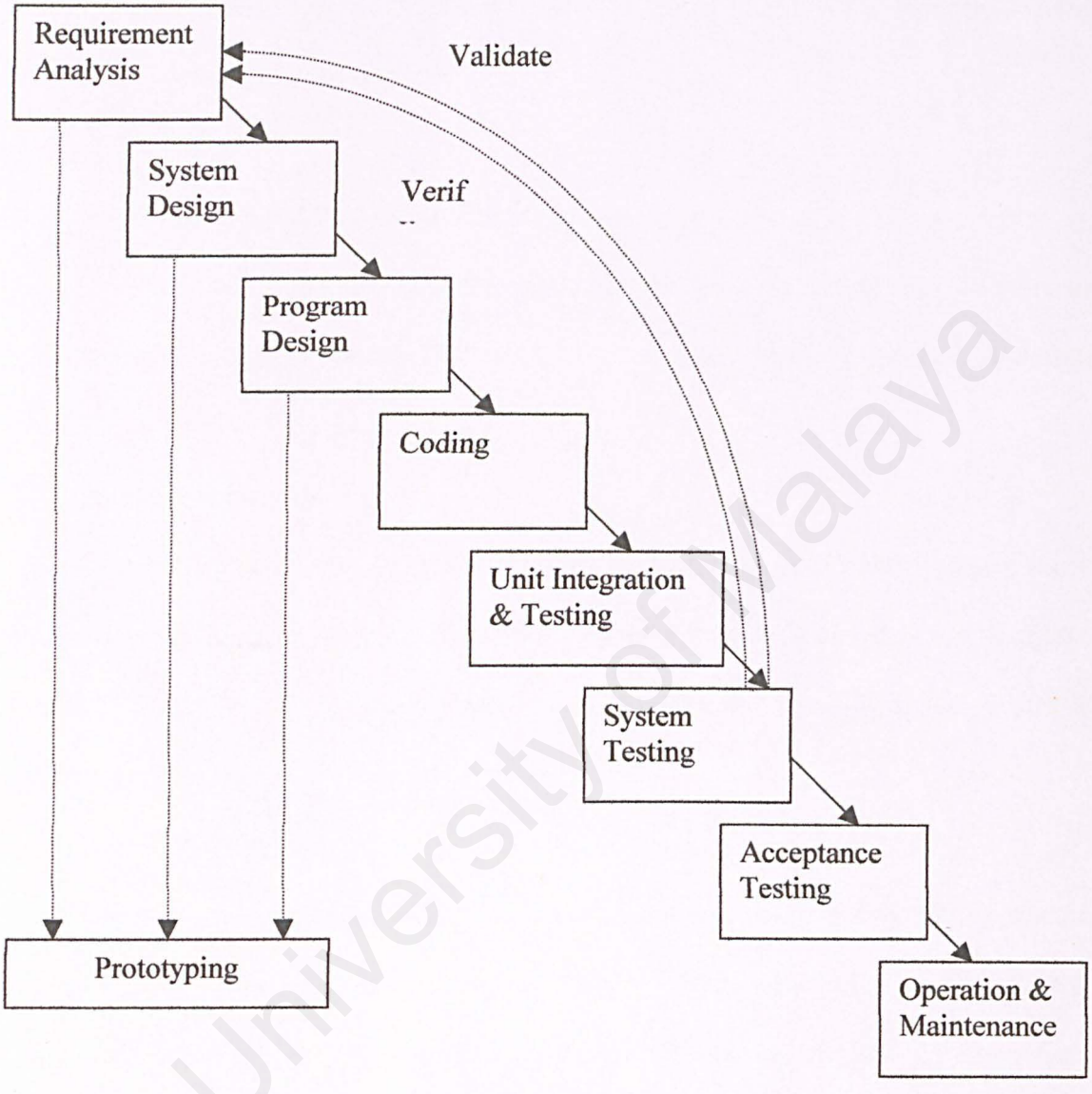

Figure 3-1: Waterfall Model with Prototyping

3.4 Summary Of Chapter 3

Generally, this chapter talks about the methodology use to develop the system. It defines how circle of the system development.

Chapter 4: System Analysis

An analysis phase is a very important phase and plays an important role to develop a high quality system. Developer have to know what are the user requirement and how the system going to operate.

4.1 Techniques Used To Define Requirements

Effective and appropriate techniques must be used to define and elicit users requirements. Research methods that have been used are Internet research and user feedback.

4.1.1 Internet Research

I have surf around the Internet for sometime to gain deeper understanding about all the authoring tools in order to choose the best authoring tools to help in this project. Besides I've been analyzing the official website to look for some information that is needed in my project and the deficiency of the website.

4.1.2 User Feedback

This is the simplest way to get to know what the user demand about the system. I have done some simple interview among my faculty course mate and those friends how always surfing the Internet to get their opinions. Below are the results from their feedback:

- A web that easy to understand and explore.
- A web that easy to access.
- A web that gives information in systematic way.
- Webs that have attractive elements like animation, multimedia and virtual reality.

4.2 Requirement Analysis

Requirement analysis can divide into 2 parts, which is ***System Requirement*** and ***Tools Requirement.*** System requirement means the modules that needed in the system and it's attribute to hit the objective of project. Tools requirement means the hardware and software needed to develop the system.

4.2.1 System Requirement

System Requirement can divide into 2 parts:

- Functional Requirements
- Non-functional Requirements

4.2.2 Functional Requirements

Functional requirement is a statement of the service or functions that a system should provide how the system reacts to particular inputs, and how the system should behave in particular situations.

- **Home module**

  This module is the main page of the website and it lets users to select which module they wish to enter. Show the latest news and simple information about KLIA.

- **About KLIA Module**

  This module will give some information that needed by user like history, introduction and so on.

- **KLIA Floor Map Module**

  This module will show the maps or plans for each floor of KLIA

- **Virtual Tour Module**

  This module lets users to navigate around level 5 (Departure Level) of KLIA.

- **Getting There Module**

  This module lets users know what kind of transportation are offer at KLIA and the fees as well.

- **Enquiry/Contact Us module**

  This module lets users to contact the authorities of KLIA if they encounter any problem by sending email and able to get response immediately.

- **Link module**

  This module will link to other website that is related to KLIA website.

4.2.3 Non-functional Requirements

Non-functional specifications are the constraints under which a system must operate and the standards which must be met by the delivered system. The Virtual KLIA System must ensure certain web application qualities like **user-friendliness.**

User-friendliness

User interfaces design creates an effective communication medium between a human and a computer. Therefore, it is very important to make sure that the interfaces fulfill user-friendliness so that it would not cause trouble to users.

- **Place the user in control**

  This will define interaction modes in a way that does not force a user into unnecessary or undesired actions. Besides, it also provides flexible interaction for different users for instance via mouse movement and keyboard commands.

- **Reduce the user's memory load**

  One of the principles that enable an interface to reduce the user's memory load is by reducing demand on short-term memory. The interface should be designed to reduce the requirements to remember past actions and results.

- **Make the interface consistent**

  The interface design should apply to consistent fashion where all visual information must be organized according to a design standard that is maintained throughout all screen displays. Apart from that, inputs mechanisms are constrained to a limited set that are used consistently throughout the application. Lastly, mechanisms for navigating from task to task are consistently defined and implemented.

4.2.4 Tools Requirement

Tools Requirement can divide into 2 parts:

- Hardware Requirement
- Software Requirement

4.2.5 Hardware Requirement

Developing of Virtual KLIA will emphasize a lot on 3D virtual, it's need to run a quite complex process to create the objects and elements. So a suitable hardware is required. Below is the list of hardware requirement:

- 1Ghz Intel Pentium 4 processor
- Windows 98 SE/Me/NT 4/2000/XP
- 128 MB of free available system RAM (256 MB recommended)
- VGA/SVGA monitor
- Graphic Card
- Keyboard
- Mouse
- CD-ROM drive
- Floppy drive
- Printer

4.2.6 Software Requirement

Nowadays in system developing, GUI (Graphic User Interface) is no longer a new thing that uses to build an attractive websites. That's why we need a lot authoring tools to create either static or dynamic web contents.

Authoring Tools

Notepad

Notepad is the world's most versatile HTML editing tool absolutely free when purchase this software: Windows version 2.0 and above.

Notepad has one of the simplest user interfaces of any Internet Web authoring tools. The menus are logically laid out, conforming to all standards in design, so users can understand them before use Notepad.

Notepad has the same interface for all versions of Windows, so moving over to the latest version of Windows should not hamper HTML code creation. The Notepad web-authoring tool is compatible with every single standard of Internet presentation medium yet devised. Notepad was designed to have a very small application footprint, taking up as little space as possible in computer's memory, and a minimum of disk space.

Notepad gives clear, easy to read and full HTML. There is no code hidden, and users have control over all parts of the HTML code. JavaScript is also fully supported by Notepad. All parts of the JavaScript are fully available through Notepad, without the need of complex tools.

Microsoft Visual InterDev

Microsoft Visual InterDev is a Web development tool designed for programmers to create an interactive Web page with data is as simple as dragging and dropping, setting some properties, and saving the page. No coding is required in using Visual InterDev.

Visual InterDev includes site design tools that help user easily plan pages, organize their links, and apply a consistent theme to your Web site. Visual InterDev includes three ways to view your HTML and ASP pages.

These three views are the cornerstone of Visual InterDev. They replace the simple source code editor included with Visual InterDev 1.0 and supports design-time controls (DTCs), debugging, statement completion, and object browsing.

The new data environment provides easy commands for making Web application data-driven. Instead of burying complex SQL statements deep within an .asp file, the statements are now exposed, maintained, and reused at the application level through the data environment under the Global asp file. Instead of modifying the query within each page, developers can modify the data command and changes are incorporated into files that reference that data command. Developers also can drag fields from the command directly onto HTML or ASP page.

However, for those so inclined, Visual InterDev exposes a full object model that allows developers to fine-tune their application, perform client validation, and have full control of Web application. Visual InterDev supports not only full-reach applications, using the ASP engine to produce simple HTML pages for the client, but also DHTML and Microsoft Internet Explorer 4.0 data binding for a richer client experience.

Macromedia Dreamweaver MX

Macromedia Dreamweaver MX combines its renowned visual layout tools with the rapid web application development features of Dreamweaver UltraDev and the extensive code-editing support of Macromedia HomeSite. So the world's best way to create professional websites is now the easiest way to build powerful Internet applications. Here are some of the main features:

- Easy - Achieve complete control over code and design. Build the site the way you want it, using the visual layout tools of Dreamweaver combined with the code-editing tools of HomeSite.
- Powerful - Rapidly develop Internet applications for the latest server technologies. Drag-and-drop visual tools and robust code-editing support make it easy to develop for any popular server technology.
- Open - Unlock the benefits of emerging standards and new web technologies, including XML, web services, XHTML, and accessibility compliance. Retrofit existing sites or build next-generation applications.

Dreamweaver's new integration with UltraDev lets us create dynamic, database-driven Web applications. In addition, Dreamweaver's thorough ColdFusion, ASP, and JSP support gives it a slight edge over our former favorite, Adobe GoLive.

Dreamweaver's sheer firepower makes up for its interface. Version MX combines the functionality of three powerful Macromedia packages: we get the most popular bits from the HomeSite HTML editor and ColdFusion Studio 5, plus all the functionality of

the UltraDev application developer. From HomeSite, Dreamweaver borrows effort-saving editing tools such as Code Hints, the Snippets Panel, and Tag Choosers, each of which speeds up the coding process. As we enter code, pop-up Code Hints suggest various tags or attributes. The Snippets Panel lets us save frequently used bits of code, so we needn't retype them repeatedly. Tag Choosers (for HTML, CFML, ASP.net, JSP, and other languages) add tags to our document with just a few clicks. And Dreamweaver's ColdFusion integration lets us build powerful Internet applications and make our Web site exchange information with a server-side database.

Due to the new UltraDev integration, Dreamweaver lets us create interactive, data-driven Web applications in ASP, JSP, and ColdFusion. This comes in handy if we run, for instance, an online store that processes forms or takes shopping orders. MX also helps us build powerful interactive elements, such as database query and result pages, which let customers search for specific products.

Adobe Photoshop

Adobe Photoshop is the most popular image editing tools available for Macintosh and Windows-based computers. It is used as drawing, painting and designing purposes. Users can retouch an image, apply special effects, swap details between photos, introduce text and logos, adjust color balance, and even add color to a grayscale scan. All these functions are included under a set of user-friendly editing tools in Adobe Photoshop. It contains graphical icons to represent every functions of each button. Besides that, it also provides many shortcut keys that is easier and save time for users and for those who do not like to use mouse.

Macromedia Flash

Macromedia's Flash format is currently the most widely used vector graphics and animation format on the web today. The recent additions of non-proprietary formats such as SVG may, in time, give web designers a choice of vector graphics and movie formats.

Flash movies are distributed as SWF files, a compact binary file format that requires an additional browser plug-in to be available in order for the movie to be viewed. SVG is an XML-compliant open standard, aimed at the same market.

A document briefly describing the semantics of the SWF file format and its relationship to SVG can be found in the format comparison document.

3D Studio Max 5

3ds max, the world's most widely-used 3D modeling, animation, and rendering software, contains the essential high-productivity tools required for creating eye-catching animation, cutting-edge games, and distinct design visualizations. Version 5 raises the bar with some great new features and highly optimized workflows that will enable us to be highly competitive and get the work done on time, within budget.

Realism has never been higher or easier to obtain whether we're outputting hyper-realistic images to film, cutting-edge interactive environments, or perfecting the lighting

of a previsualized set or architectural design. Two methods for global illumination combine with exposure control, photometric lights, and new shaders to afford us total control over visual realism – and new Interactive Physics brings realism to our animations. 3ds max 5 also has the best Direct 3D workflow available (it's already DirectX 9 enabled), allowing us to easily add custom hardware Shaders that reflect the world we need to simulate in real time. And we can easily export the visual realism we create to real time 3D environments with Render-to-Texture, Normal Maps, Light Maps, and support for Vertex Color Baking of Radiosity solutions.

Due to some new highly tuned animation tools, Track View has evolved into an intuitive Curve and Dope Sheet Editor with easily controlled rotations, Draw Curves, and Soft Key Selections for careful animation management. Enhanced function curves combine with a new Set Key system (in addition to our classic Auto Key mode) to streamline pose-to-pose animation techniques. These general animation advances combine with character specific items like Spline IK for one-step manipulation over complex items like spines and tails, Skin Weight Tables for optimum control, and Merge Animation re-purpose animation between scenes and characters.

3ds max's legacy as a production workhorse is made even stronger with careful attention to the most commonly used functions to make us faster, more efficient, and able to further stretch the limits of high-volume, high-quality production. The power behind UVW Unwrap has been unleashed to give artists ultimate control over their mapping coordinates, and Polygon Modeling has evolved to make 3ds max 5 the most

comprehensive modeler on the market. Discreet's reliable, extensible, and best of all FREE network rendering and management utility backburner™ gives us control over both 3ds max and combustion render farms without the need for costly custom solutions.

Sound Forge 6.0

Sound Forge is an award-winning digital audio editor that includes a powerful set of audio processes, tools, and effects for recording and manipulating audio. This industry-standard application is perfect for audio editing, audio recording, effects processing, and rich media encoding. Version 6.0 continues to improve on its decade-long legacy by adding features that make it faster and more powerful than ever. Edit files nondestructively down to the sample level with extreme speed and accuracy. Choose from over 35 real-time audio effects and processes with more than 200 presets. Sound Forge 6.0 puts the power of an audio production studio on our PC.

Sound Forge gives us the power and flexibility we need to create a clean, professional final product with lightning-fast precision. It also provides a powerful and efficient multitask environment - saving us valuable production time. Sound Forge 6.0 has a zoom ratio greater than 1:1 (24:1), allowing us to perform more precise, sample accurate editing. Sound Forge gives us more control over our audio editing than ever before. Sound Forge also provides simple drag-and-drop operations and a fully customizable interface, allowing us to build projects the way we want. It supports standard Windows® keyboard commands and mouse shortcuts. Besides that, it includes crash recovery tools, which allow us to recover lost work after a power failure or system

crash. Sound Forge includes a powerful undo/redo history feature, which allows us to see our entire work history at a glance and undo edits.

Sound Forge 6.0 supports full resolution 32-bit files for pristine audio quality. It provides the ultimate in audio fidelity. Sound Forge 6.0 combines fast and powerful nondestructive editing with simple drag and drop operations, allowing us to focus on our project and not time. Sound Forge also supports a wide range of audio formats, including 15 import formats and 17 export formats, such as WAV, Windows Media™ Audio and Video, MPEG-1&2*, RealAudio® and MP3. it provides us with the tools we need to create high-quality audio masters. Sound Forge 6.0 has new video render options including, fast video resizing, source video resampling, and video stretching. With external monitor previewing through IEEE-1394 devices and more render options than ever, Sound Forge is the perfect companion to your favorite video editor.

4.3 Chosen Tools

The list below shows the authoring tools that have been chosen for Virtual KLIA system developing:

- Macromedia Dream Weaver And Microsoft Visual InterDev

  To create and design HTML page.

- Macromedia Flash MX

  To generate animations and flash movies.

- Adobe Photoshop 7.0

  To create and edit images.

- 3D Studio Max 5.0

  To create 3D object and environment for departure level virtual tour.

4.4 Summary Of Chapter 4

This chapter talks about the method to collect information and activities to determine the system requirement need to develop system which are functional requirement and non-functional requirement, tools requirement. When all the system requirement has already determine, the next development will be continuing, which is System Design phase.

Chapter 5: System Design

5.1 Introduction

Development phase start with design and this phase are more creating the interface. To create a system interface need the designers to be creative so that the output that come out will attract use to use the certain system. This is also a creative process that changes the problems into solutions. Besides that, designers need to have knowledge and experiences in the area. To gain experiences and knowledge in this area, designers need to always analyze existing system.

Besides designer skills, selected software for the purpose of system developing also play an important role. With the help of convenient tools, clear and sharp element can be created and designed.

This chapter will show about the system that going to develop. System design includes the following issues:

- System Functionality Design
- User Interface Design

5.2 System Functionality Design

Virtual KLIA (Kuala Lumpur International Airport) designed to meet the need of user to get more information about KLIA. The system will design according to the need of all age users. No matter who also can use and access this page easily. Besides that, this site will be design to be attractive, user-friendly and also interactively.

This system will have following module:

- **Home module**
- **About KLIA Module**
- **KLIA Floor Map Module**
- **Virtual Tour Module**
- **Getting There Module**
- **Enquiry/Contact Us module**
- **Link module**

Within this module, multimedia applications will be using but not all the time. This is because unlimited using of multimedia will affect the efficiency and cause the downloading time to become very slow.

The figure below shows the System Functionality Design of Virtual KLIA.

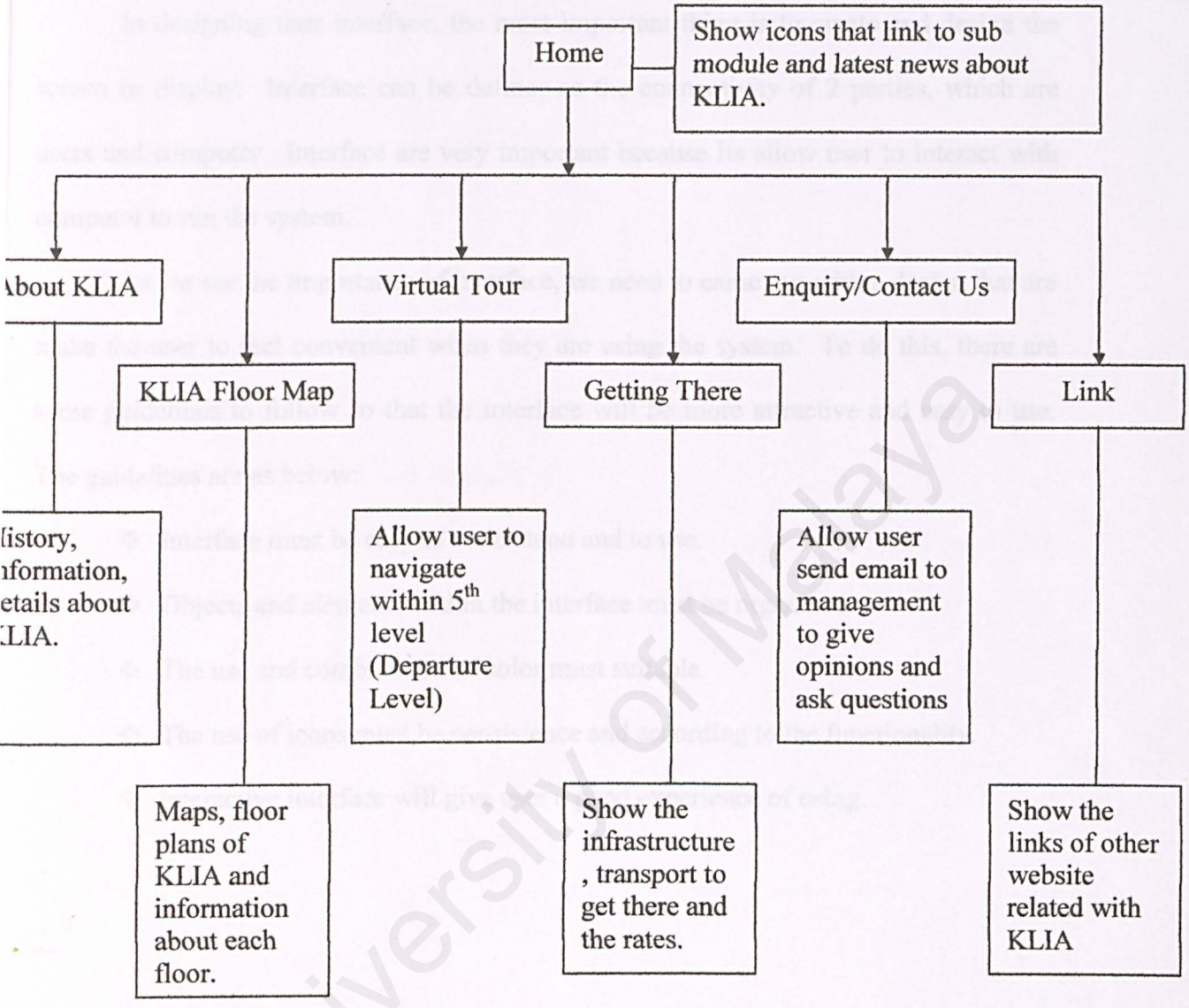

Figure 5.1: System Functionality Design of Virtual KLIA

5.3 User Interface Design

In designing user interface, the most important thing is to create and design the screen or display. Interface can be defines as the connectivity of 2 parties, which are users and computer. Interface are very important because its allow user to interact with computer to run the system.

As we see the importance of interface, we need to came out with a design that are make the user to feel convenient when they are using the system. To do this, there are some guidelines to follow so that the interface will be more attractive and easy to use. The guidelines are as below:

- Interface must be easy to understand and to use.
- Objects and elements within the interface must be organized.
- The use and combination of color must suitable.
- The use of icons must be consistence and according to the functionality.
- Interactive interface will give user a good experience of using.

5.3.1 Interface design for "Home"

This is actually the most important module compare to others because this will be the first page use start accessing. It will give user the first impression for the whole system when use look at it. User will decide weather to continue using your system or not by this first impression.

To make it more attractive, I will add a flash animation as an introduction for the whole system. Anyway, user are allow skip the animation by click on the "Skip Video" icons. This flash animation is actually a simple and short so that it won't take to long time to load and make user to wait for so long.

After the animation, user will directly go into the "Home" page. In this page, user are allow to chose where they wish to visit. As I descript before, there are 6 other module for user to visit.

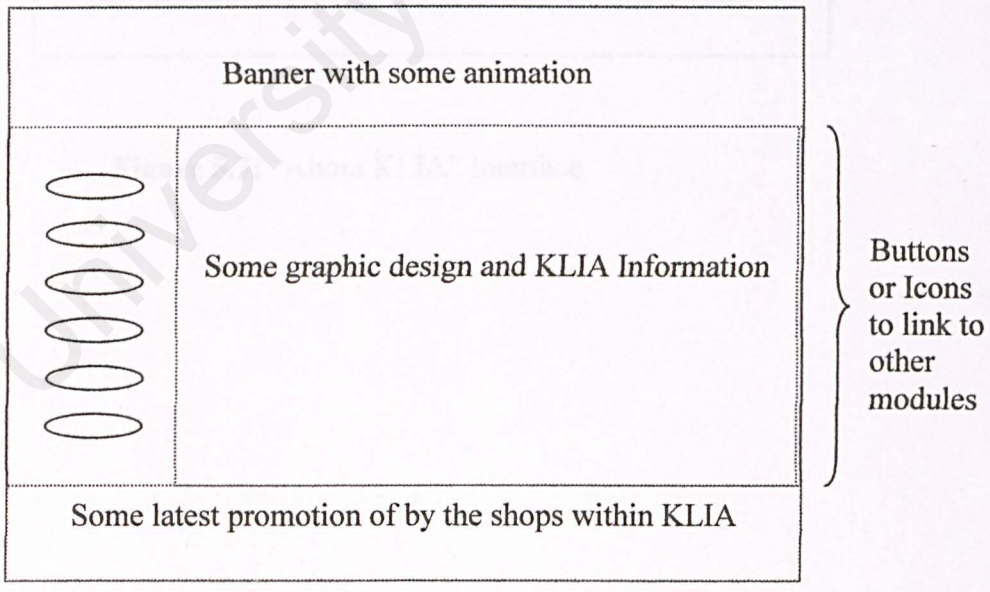

Figure 5.2: "Home" Interface

5.3.2 Interface Design for "About KLIA"

This module will show user all kind of KLIA information such as, details, history, development planning, picture and maybe some audio or video clips.

For each picture that shows in this module, there will be description about it. Below is the simple interface dummy for this module.

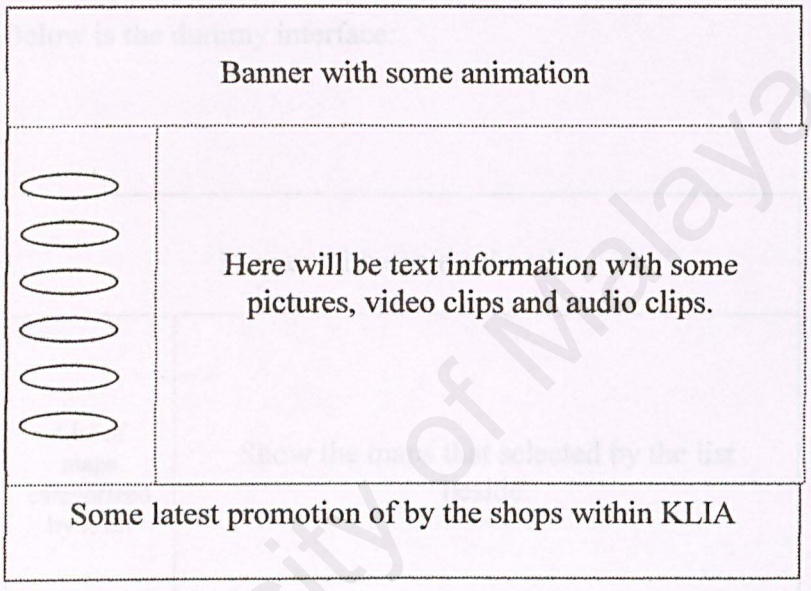

Figure 5.3: "About KLIA" Interface

5.3.3 Interface design for "KLIA Structure"

This module will show user the maps and plans for each floor in KLIA. From here, user can get simple concept about KLIA. User also can know what facilities and infrastructure that provided by KLIA. Besides that, user also can get to know the location of their destination such as restaurants, shop, washroom counters and so on. At the same time, user can get some simple information about the shops, restaurants and facilities that exist. Below is the dummy interface:

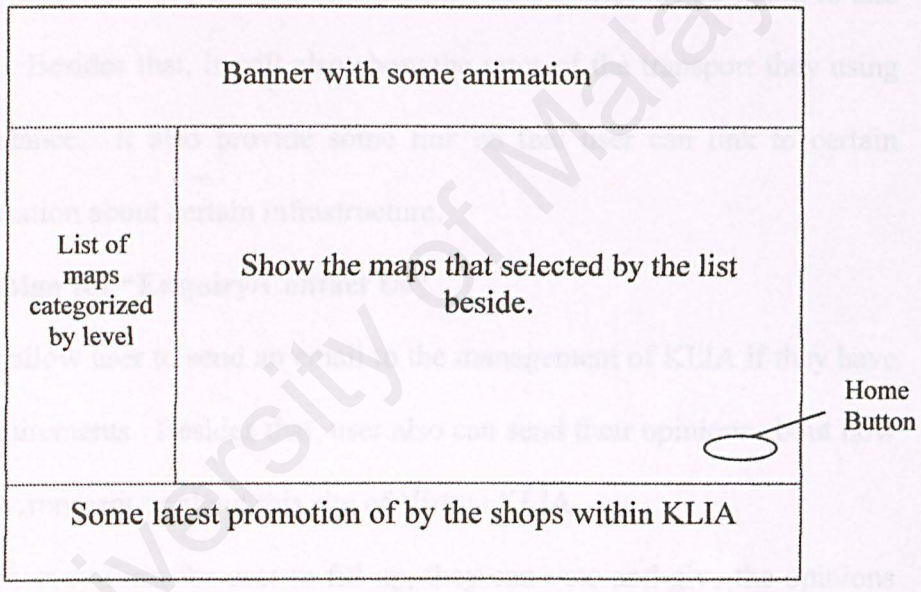

Figure 5.3: "KLIA Structure" Interface

5.3.4 Interface Design for "Virtual Tour"

For this module, its actually not involving a lot interface design because the module will more emphasize on VRML virtual reality world. This module going to bring user to navigate along the 5th floor, which is the "Departure Level" of KLIA. This page will present 5th floor of KLIA in a 3D interactive way to user so that use can go to any where within this floor.

5.3.5 Interface Design for "Getting There"

This module will show the use the infrastructure and transport that going to and leaving from KLIA. Besides that, it will also show the rates of the transport they using with the chosen distance. It also provide some link so that user can link to certain website to get information about certain infrastructure.

5.3.6 Interface Design for "Enquiry/Contact Us"

This module allow user to send an email to the management of KLIA if they have any problems or acquirements. Besides that, user also can send their opinions about how to improve KLIA environment or about this site of Virtual KLIA.

There also a survey form for user to fill up, they can vote and give the opinions against KLIA and this system, Virtual KLIA as well.

5.3.7 Interface Design for "Links"

For this module, it will show some information and link to other website that related to KLIA such as "Cuti-cuti Malaysia", "Putra LRT".

The purpose of this module is to provide more information to user besides than KLIA.

5.4 Summary of Chapter 5

This chapter discusses about system design interface generally. Besides that, this chapter also discusses about the features of the modules in Virtual Kuala Lumpur International Airport.

Chapter 6: System Implementation

6.1 Introduction

System implementation is a process to change the system requirement and system design into program code. In the process of a software project, there are actually no clear boundary between the phases of requirement analysis, system design and system implementation. Each of every one of these phases is actually overlap all together. Any changes have made in a certain phase will need to change the previous phase as well.

Virtual Kuala Lumpur International KLIA is developed by module method and top-down approach.

6.2 Development Environment

Development Environment will give effect to user system environment. So, to chose a correct development will make the process of development become faster. That's mean that will increase the realiabity of the system. All the software and hardware used are listed as below:

6.3 Hardware Requirement

Hardware used to develop the system is an IBM with the specification as below:

- 1Ghz Intel Pentium 4 processor
- 256 MB of free available system RAM
- 20 Gigabytes Hard Disk
- Graphic Card
- Keyboard
- Mouse
- CD-ROM drive
- Floppy drive
- Printer

6.4 Software Requirement

There are actually a few numbers of software development tools been use to develop this system. Those software can divide into a few categories such as design software, system development software, operating system software and documentation software.

Figure below show the software that been using to develop Virtual Kuala Lumpur International Airport.

Software	Purpose	Description
Microsoft Windows Millenium	Software Requirement	Operating System
Macromedia Dream Weaver	System Development	Coding
VRML	System Development	Coding
Internet Explore 5.0	System Development	Coding
3D Studio Max 5	Interface Design	3D Model Design
Adobe Photoshop 7	Interface Design	Image Design
Microsoft Word 2000	Documentation	Design and write report

Table 6.1: Software uses to develop Virtual Kuala Lumpur International Airport

6.4.1 System Development Software

Macromedia Dream Weaver MX

This software uses to design and develop the web pages. Images and graphics are integrated with text information easily without the need of professional HTML skills. Links between web pages can be generated easily.

VRML

VRML is a coding language use to design and integrate 3D objects. **VRML** code can be write by using text editor, Notepad. Programmer can use text editor special for VRML, which is VRML Pad to write VRML program.

Objects created can view by using Internet Explore. To write a VRML file, there need a header for each VRML file, like this:

#VRML V2.0 utf8

VRML file structure are created base on nodes which are all kinds of objects, likes sphere, cube, cone, cylinder and so on. Attributes for objects need to be added likes size and color. Below show how's the structure of VRML file:

```
#VRML V2.0 utf8
shape{
    appearance Appearamce{
        material Material{
        }
    }
    geometry Sphere{
        radius 5
    }
}
```

Each files are save as a file name of *.wrl. The output of VRML file can be view by web browser such as Internet Explore or Netscape Navigator. But before that, a special plug-in needs to be install. Either Cortona VRML Client or Cosmo Player is the plug-in can download free from Internet.

Microsoft Internet Explorer 5.0

Web browser Internet Explorer use to view all the system web pages of Virtual Kuala Lumpur International Airport.

6.4.2 Design Software

3D Studio Max 5

This software use to design the complicated 3D objects that difficult to created by VRML coding. Can be say that most of the objects in this system are created by 3D Studio Max. With the help of 3D Studio Max, programmer no need to create 3D objects writing the programming code using drag and drop method. After the object been created, the file can be export to become VRML files.

Adobe Photoshop 7

Adobe Photoshop is a graphic editor use to create static and 2D images for Virtual Kuala Lumpur International Airport.

Adobe Photoshop allow all kinds of graphic modifying such as resize, rotate, skew, sharpen, drop pixels, color changing and so on. This allows programmer to create and design more images that meet the requirement of system.

6.5 Summary of Chapter 6

Choosing the correct software tools according to the requirement of system development is very important. With the correct tools, the work of development can be done smoothly. That's why development environment is very important to make sure the implementation process can be done completely.

Chapter 7: System Testing

7.1 Introduction

System testing is to make sure the quality of the system of Virtual Kuala Lumpur International Airport. The main purpose of this process is to make sure the system meet the standard requirement and running without error. It is also to detect the errors that have not yet discovered.

In software testing, there are some principals based one the testing objective. The principals are listed as below:

- Testing is a process with the purpose to find possible errors.
- A good testing can find the errors that not yet discovered.
- A successful testing is a process that found new errors in the software.
- A test should be planned long before testing begins.

7.2 Types of Error

Testing process make sure each of every function that implement within a software run correctly. It is very important to detect all kinds of possible faults that cause the errors while the program is running. Those errors that might happen are:

- Assembly Error
- Running Error
- Logic Error

7.2.1 Assembly Error

In VRML, the program is actually **"Encapsulated"** type. The wrong using of VRML code or formula will cause the assembly error while the file is running. This problem can solve if we are using **VRML Pad** as the code editor because this editor can detect the code and formula error.

7.2.2 Running Error

This error happens when the operating system try to execute an operation that cannot be run under the system.

7.2.3 Logic Error

This error happens when the application didn't give the output expected. This situation happens even the wrong code are operate by the operating system.

7.3 Testing Organization

Generally, testing are involves several stages. There are actually 4 stages of testing to by gone through. The 4 stages are Unit Test, Module Test, Integration Test and System Test.

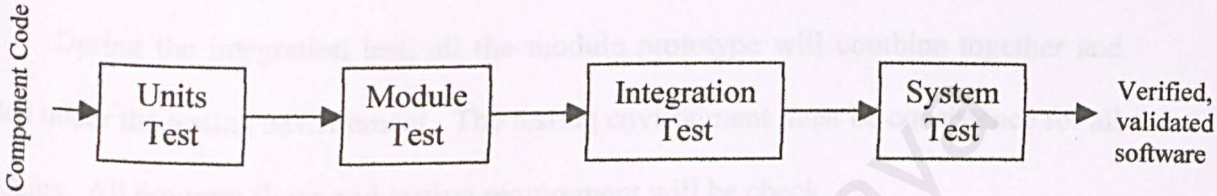

Figure 7.1: Testing Steps

7.3.1 Unit Test

Unit test are very important to make sure the software can be correct without cause any side effect to the system. Unit test also make sure each of every sub-module can be execute without error. Each program unit will be tested to make sure the correctness and able to run without error. Unit test is done under a controlled environment whenever possible.

7.3.2 Module Test

Module test will be apply when all module are done. This is to make sure all codes within a function can function well and correctly when the codes are integrated together. Before the modules are integrated, there are a few value cannot be manipulate correctly. That's why the correct values need to put in to run the testing process. After that, each module will be examine and if there is any error appears, the part of module are determine and unit test will go through again to detect the error.

7.3.3 Integration Test

Integration test is to test whether the whole software can be execute as a program. This is also to make sure all the module can be function with each others. When all the modules are meet the requirement, they will be integrated as a system. During the integration process, testing will be gone through to detect the faults and errors that cause by the process of integration.

During the integration test, all the module prototype will combine together and tested under the testing environment. The testing environment must be consistence for all modules. All program flows and testing requirement will be check.

At the end, other users will test the system to get the feedback and comment about the develop system.

7.3.4 System Test

System test is very important to make sure the whole system can run same as before the modules are combine. This actually involves several steps, we start with test the function performed by the system. Begin with a set of components that were tested individually and then together. A function test checks that the integrated system performs its function as specified in the requirement. After we have convinced that the function work as specified, the performance test compares the integrated components with the nonfunctional system requirement. If we are satisfied that the system we have built meets the requirement, then we have a validated system. That's mean we have verified that the requirement have been meet.

7.4 Test Planning

Careful test planning helps us to design an organized test. We use test plan to organize testing activities. The test plan takes into account the test objectives and incorporates any scheduling mandated by the test strategy or the project deadlines. The system development cycle requires several level of tests, begin with unit test than module test, integration test than system test. The plan will be the guide to the entire testing activities.

7.5 Maintenance

Any change have made to the system is in operation is considered as maintenance. Maintenance is to ensure the system can support the changes that made to the modules or functions. Maintenance has a broader scope compared to development process, with more track and control.

Maintenance of the system performance focus on 4 major aspects:

- Maintaining control over the system's functions day to day.
- Maintaining control over the system modification means that any changes has made to the system need to be maintain.
- Ensure the acceptable functions are perfect and complete.
- Maintain the consistence system performance.

There are 2 types of maintenance method used the system Virtual Kuala Lumpur International Airport.

- Corrective Maintenance

  To control a day to day system function, we responds to problems resulting from faults. As failure occurs, we find the failure's cause and make corrections and changes to requirements, designs, codes, test suites and documentation as necessary.

- Perfective Maintenance

  Making changes to improve some aspects of the system, even there are no any errors happen upon the system.

7.6 Summary of Chapter 7

Testing is an important phase in developing a system. This is for the purpose to meet the early requirement of system and stick to customer desire. Besides, this is also a process to ensure the quality of product.

Chapter 8: System Review

Along the system development process of Virtual Kuala Lumpur International Aiport, there are actually a few problems that I face that affect the process of development. All these problem involves in every development phases and need a good and suitaable solutions tosolve it and ensure the development process can continue smoothly.

8.1 Problems And Solutions

8.1.1 Limited System Development Time

The time for system development are too short. It is very difficult me to use the limited time to do study and learn the skills of development software. Thus, there are actually some part that couldn't complete perfectly.

Soluutions:

Management of time are very important to ensure the work can finish according to the schedule. Works are done according to stages and systematicaly to ensure there are no work left behind.

8.1.2 Problem in Choosing the Right Authoring Tools

The lack of experience make me use up a lot of time to learn and study the existing web pages authoring tools in the early stages of project. This is because the right authoring tools will determine the progress of the project.

Solutions:

Consult lecturers or experiened individual to gain knowlegde before make decision to choose the authoring tools.

8.1.3 Lack of Knowledge in VRML

VRML is a dynamic 3 Dimentional Modeling language. In order to use it, it requires a good skills and understanding. To equip with VRML skills, it's really need a lot of time. Due to the limited development time, it is very difficult for me to handle fully with this skills.

Solutions:

In order to solve this problem, help from internet, reference books and experienced individuals are needed. This can save a lot time of learning. Besides, by observing the existing system also helps me to understand more about VRML.

8.1.4 Lack of Reference

No only lack of reference books but also lack of experienced individuals especially in Malaysia. Not much individuals really understand fully and experience in VRML or 3D Studio Max 5. Besides, the lack of refence books become on of the main factor that slows down the process of system development.

Solutions:

Guide and help from internet will always be the first choice whenever facing the problems of high technologies. Conference with forigne programm also another way of solution.

8.2 Advantages Of Virtual Kuala Lumpur International Airport

8.2.1 Easy To Use

This system is easy to use, it doesn't require and special skills to handle the system because is web based. All the interface are design in simple way so that it can suit to all types of user.

8.2.2 The Information Contained

The system contains all the information about KLIA including the map of KLIA, way to get there, details about KLIA and so on. All these information help user to know more about KLIA. The information contained not only in text but also with images to give futher information.

8.2.3 Suits to All Ages

The system is easy to use, means that this system is suits to all age as long as they know how to handle computer with mouse.

8.3 System Constraints

8.3.1 Processing Time

It is really take time for the computer to translate the coding into visible 3 Dimentional objects. So, it is recommended the user to use the computer that meet the minimum hardware requirement for the purpose of viewing the 3D objects.

8.3.2 Plug-in Require

In order to view the 3D object, a special plug-in need to download and install into the client computer. This bring trouble to use in order to view the 3D objects.

8.4 Future Planning

In future, more information about KLIA will added unto this system. Besides, animation will also added unto the 3D object to make the Virtual Environment more natural and lifely. And also the 3D objects will become more similar to real world by addiing the level of details.

Adding the interactive function like allow user directly contact to the authority will made the system more intellegent and user-friendly.

8.5 Summary of Chapter 8

Virtual Kuala Lumpur International Airport is a web based system that give information about KLIA to user. Besides, the simple and easy way of displaying the information also made the system suits to all ages.

Hopefully the system will help user to know more about KLIA by the 3D technology.

Appendix A System Manual

A.1 Virtual Kuala Lumpur International Airport Introduction

Virtual KLIA is a web based system that gives the information about KLIA. The system main consists of 7 modules:

- Home module
- About KLIA module
- KLIA map module
- Virtual Tour module
- Getting There module
- Contact us module
- Link Module

The most interesting part of this system is that this system allows user to navigate around the Departure Level at the Virtual Tour module in virtual reality world.

A.2 The Home Page

This page consists of all links to other pages of Virtual KLIA. User can chose to enter any page of this system by just click on any buttons they like.

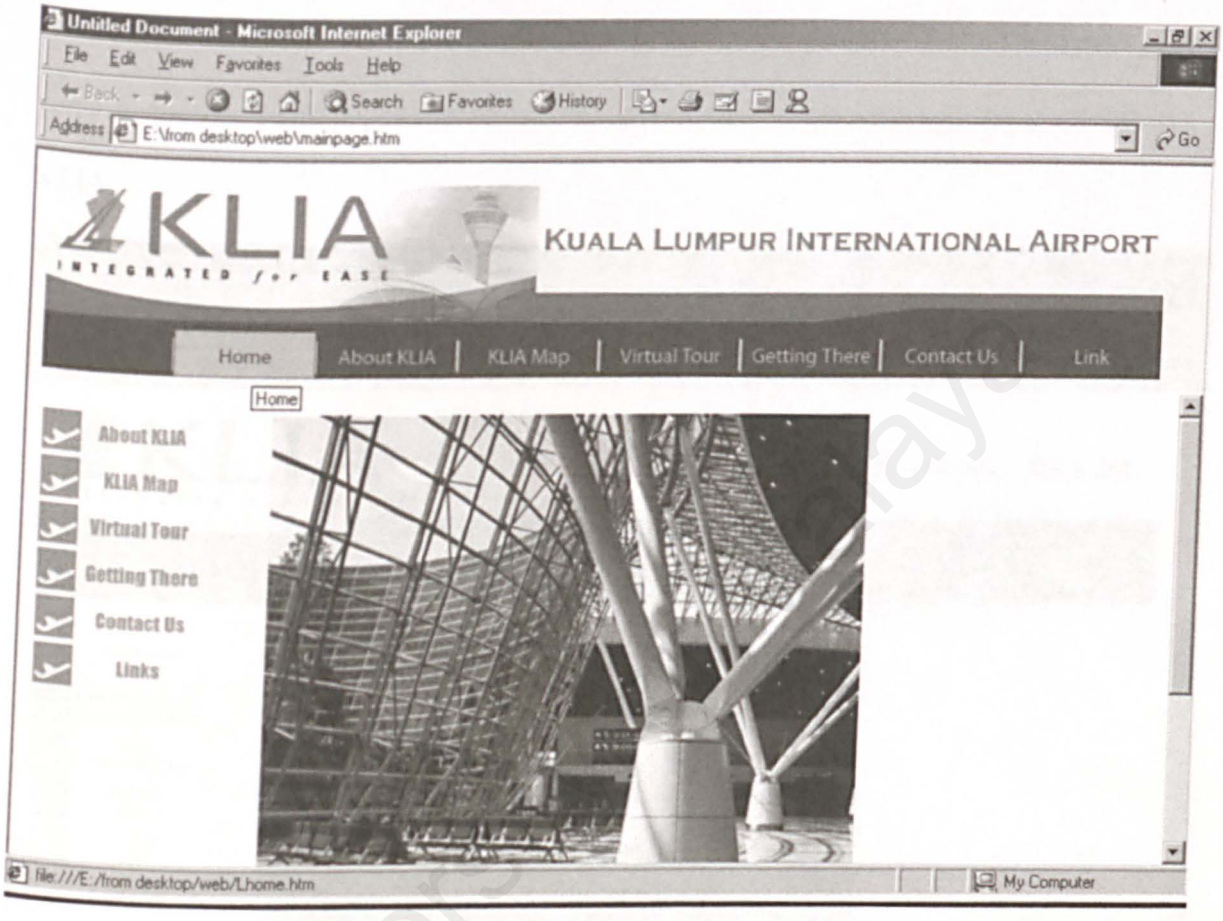

Figure A.1: System Home Page

A.3 The About KLIA Page

This page have 6 sub pages, which are "A Destination In Itself", "Airport in the forest, Forest in the Airport", "Main Terminal Building", "Satellite Building", "Contact Pier" and "Facilities". All these pages show more details about KLIA. "Facilities" page consists another 5 sub pages that shows the information about the facilities available at KLIA.

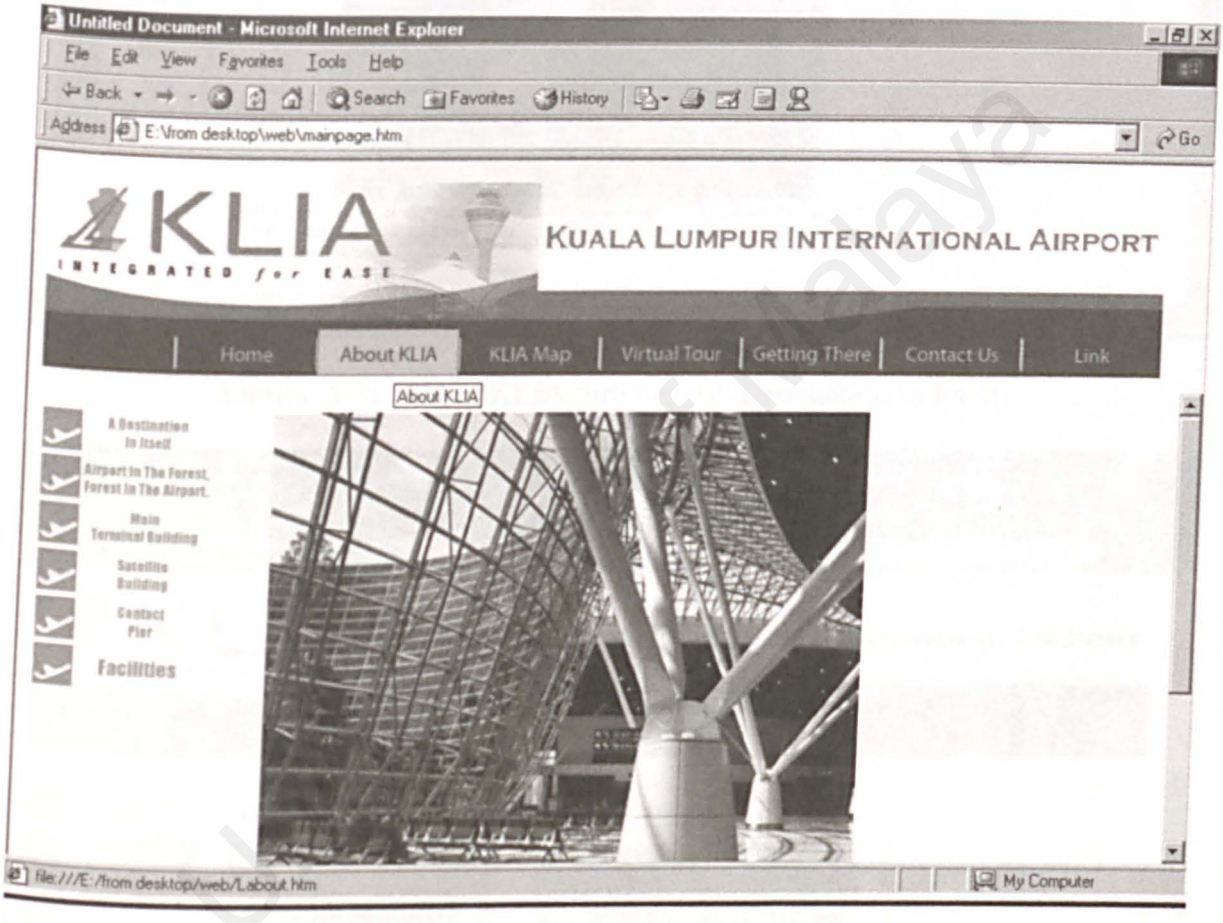

Figure A.2: System About KLIA page

Figure A.3: About KLIA Sub page(A Destination In Itself)

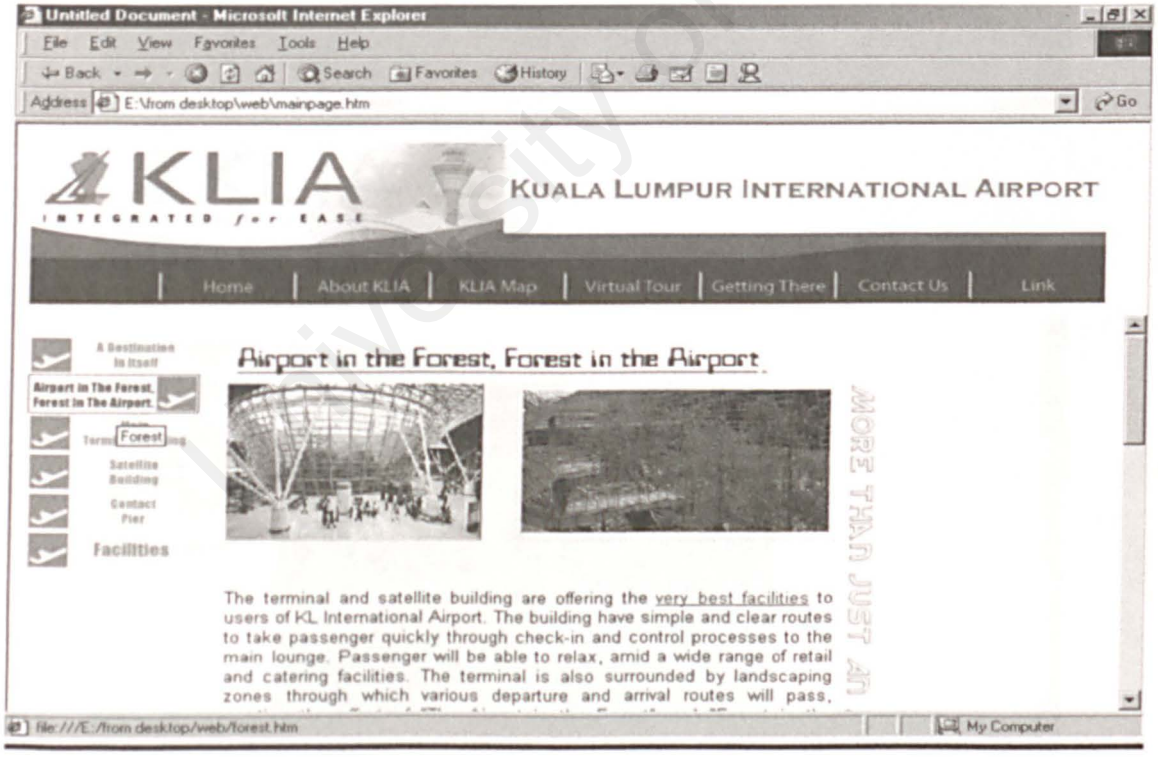

Figure A.4: About KLIA sub page(Airport In The Forest, Forest In The Airport)

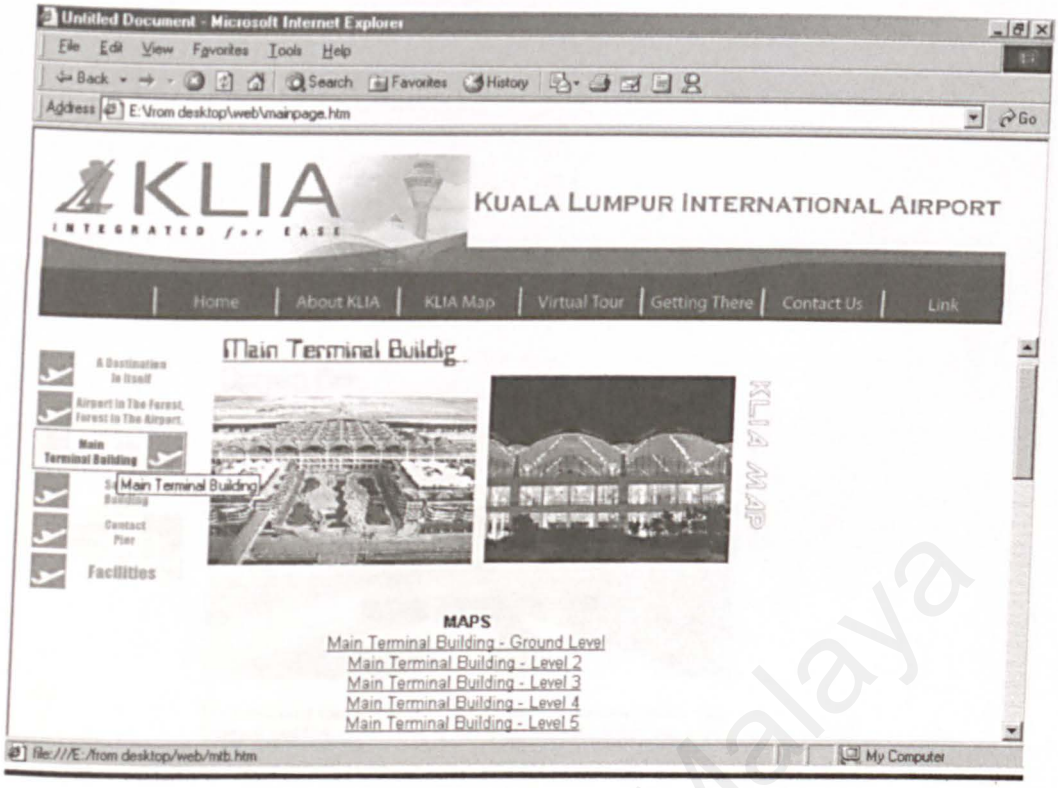

Figure A.5: About KLIA sub page (Main Terminal Building)

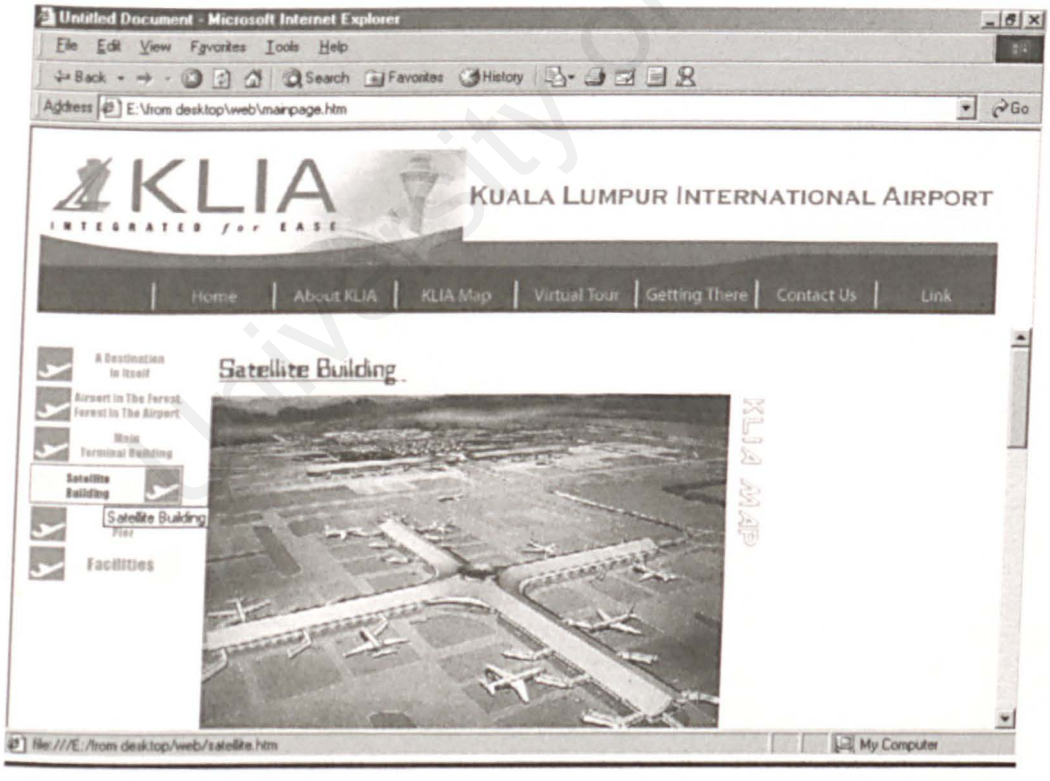

Figure A.6: About KLIA Sub page(Satellite Building)

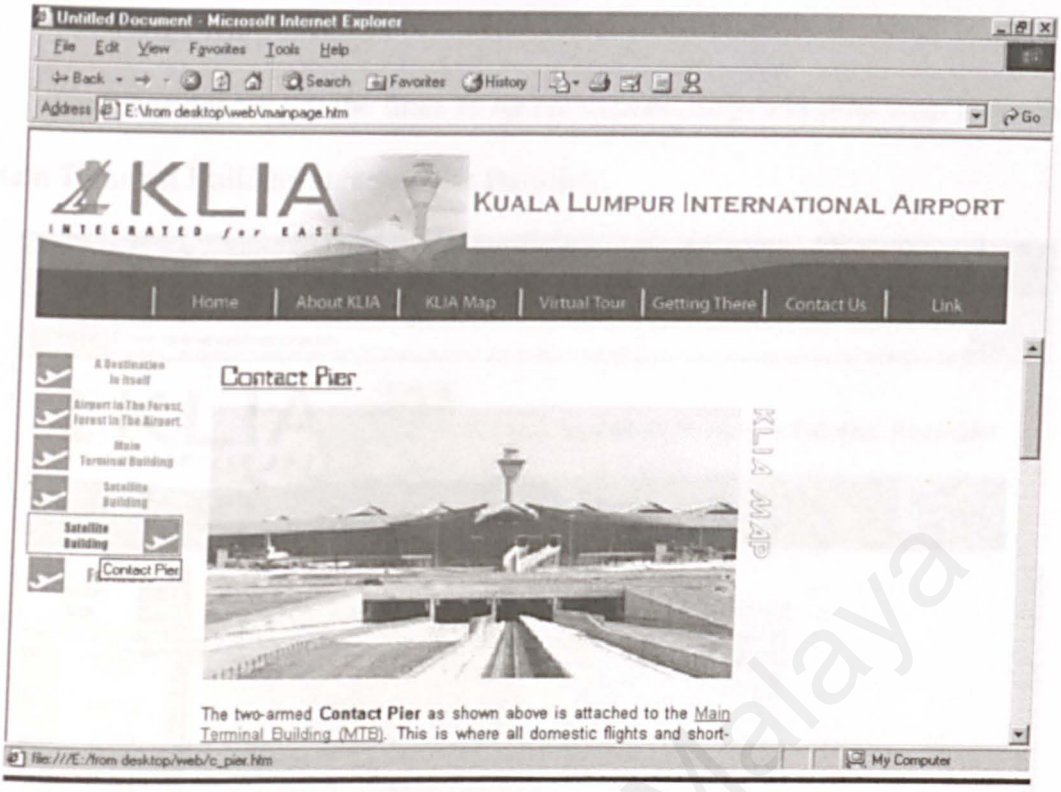

Figure A.7: About KLIA Sub page (Contact Pier)

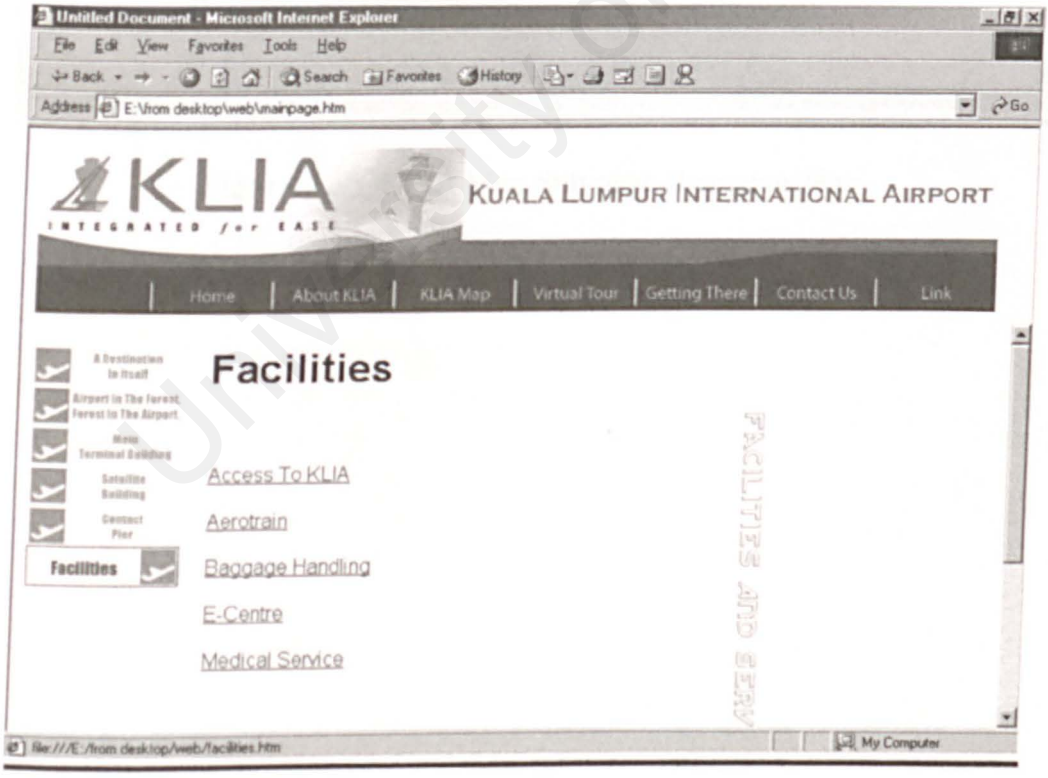

Figure A.8: About KLIA Sub page (Facilities)

A.4 The KLIA Map Module

This page consists of the links to KLIA location map, and floor map for each floor in Main Terminal Building and Satellite Building.

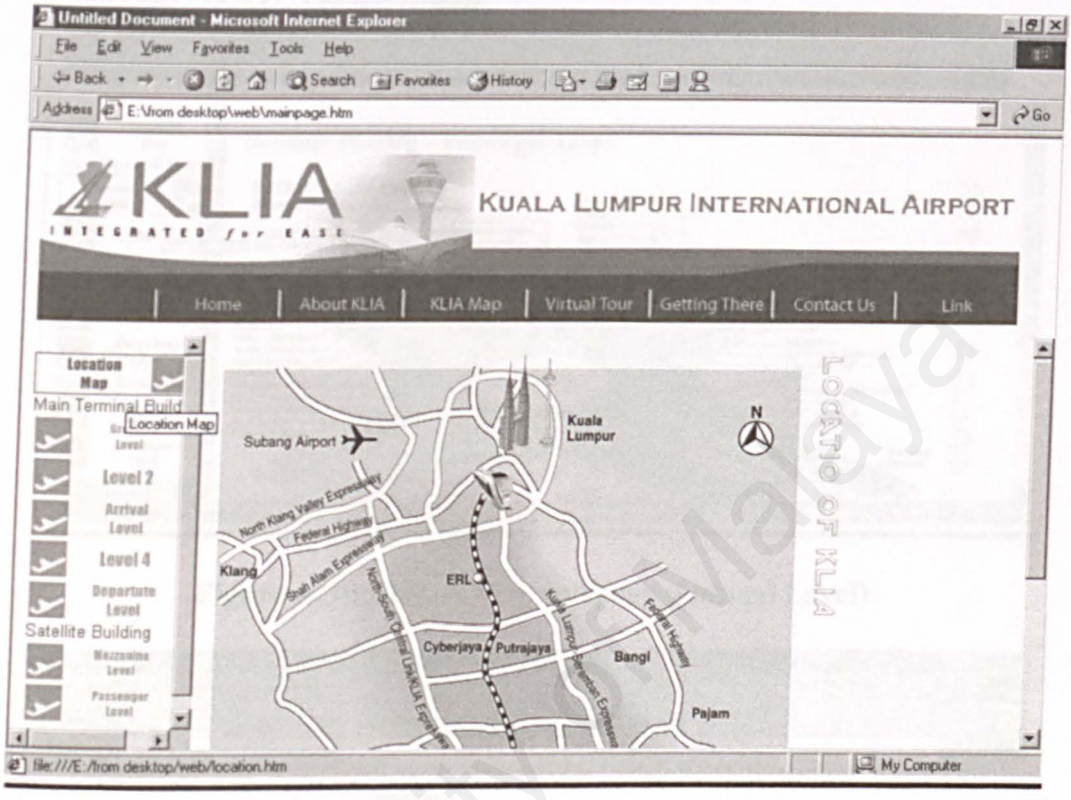

Figure A.9: KLIA Map Sub page (Location Map)

Figure A.10: KLIA Map sub page (Ground Level)

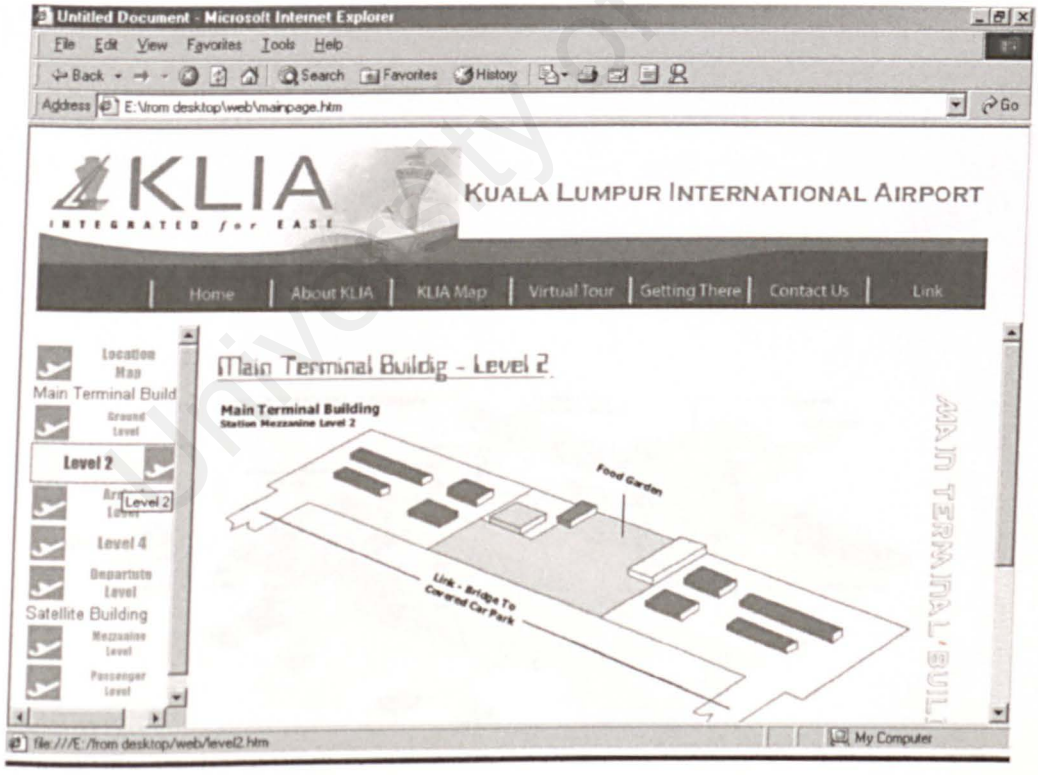

Figure A.11: KLIA MAP Sub Page (Level 2)

Figure A.12: KLIA Map Sub page (Arrival Level)

Figure A.13: KLIA Map Sub Page (Level 4)

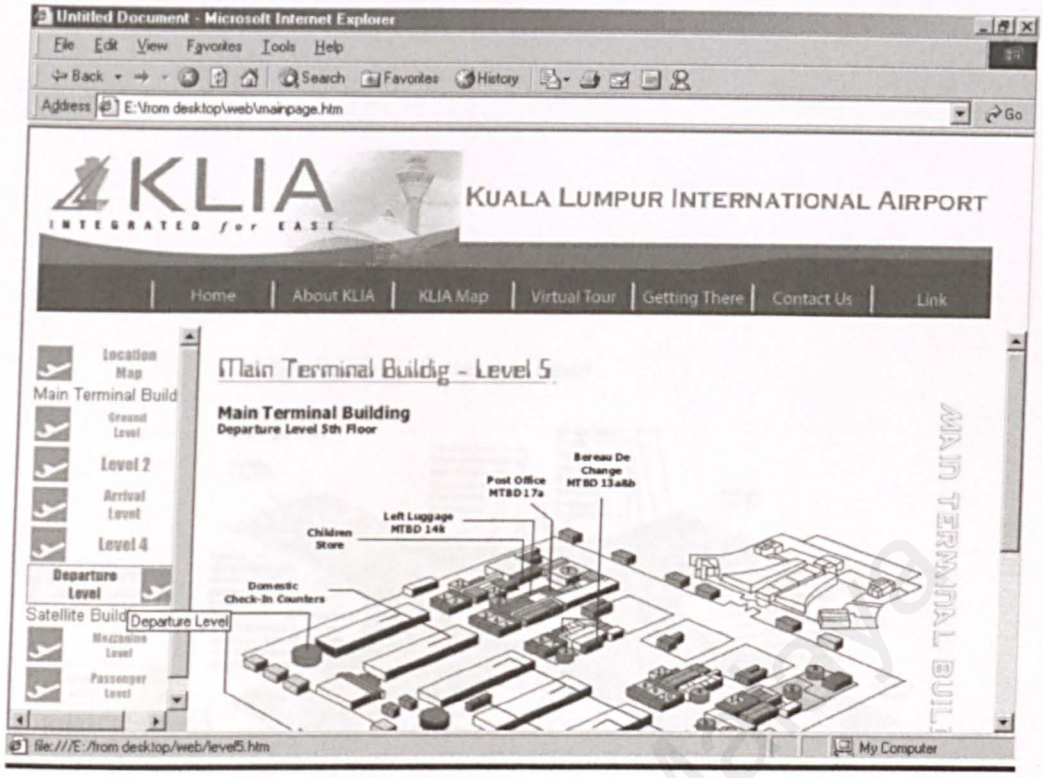

Figure A.14: KLIA Map Sub Page (Departure Level)

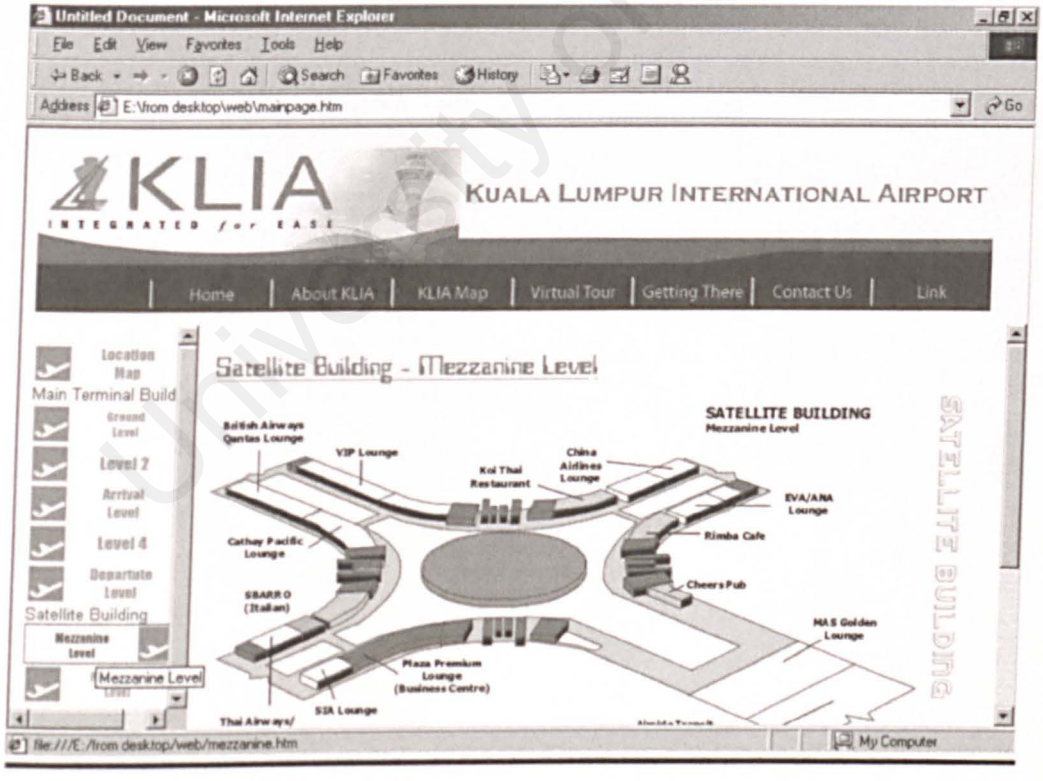

Figure A.15: KLIA Map Sub Page (Mezzanine Level)

Figure A.16: KLIA Map Sub Page(Passenger Level)

A.5 The Virtual Tour Page

This page consists the link to the 5th floor of Main Terminal Building (Departure Level) virtual tour. After user click on the virtual tour button, the page will direct user into VRML file.

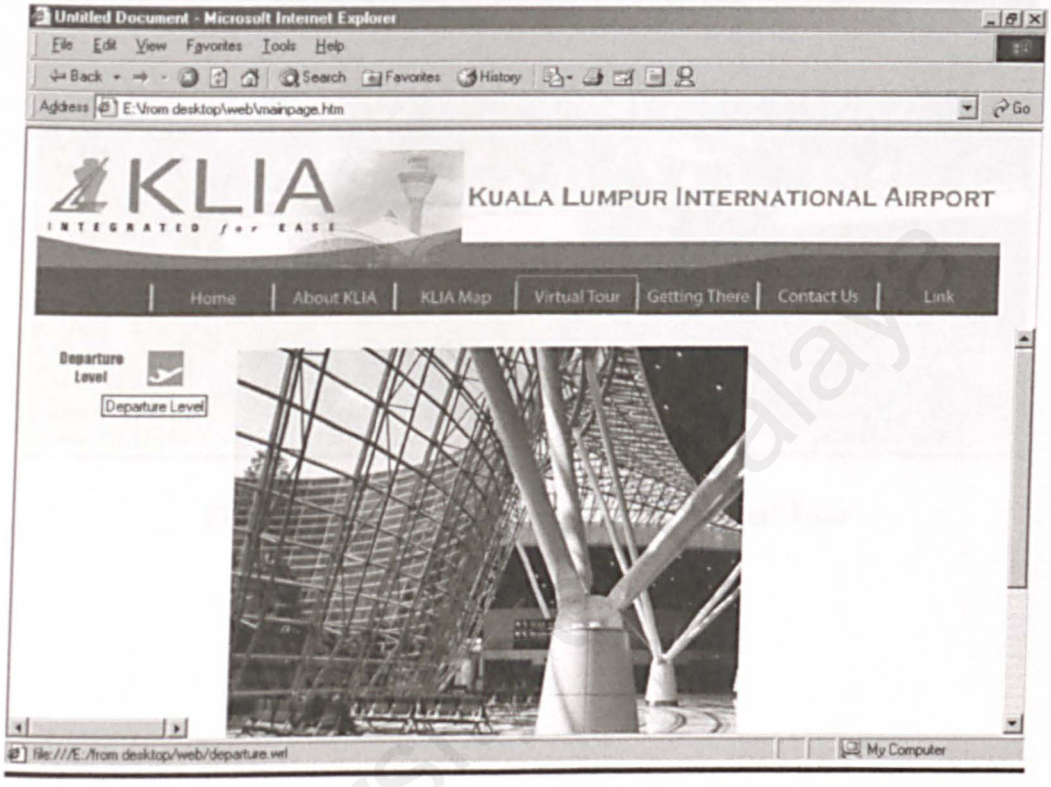

Figure A.17: Virtual Tour page

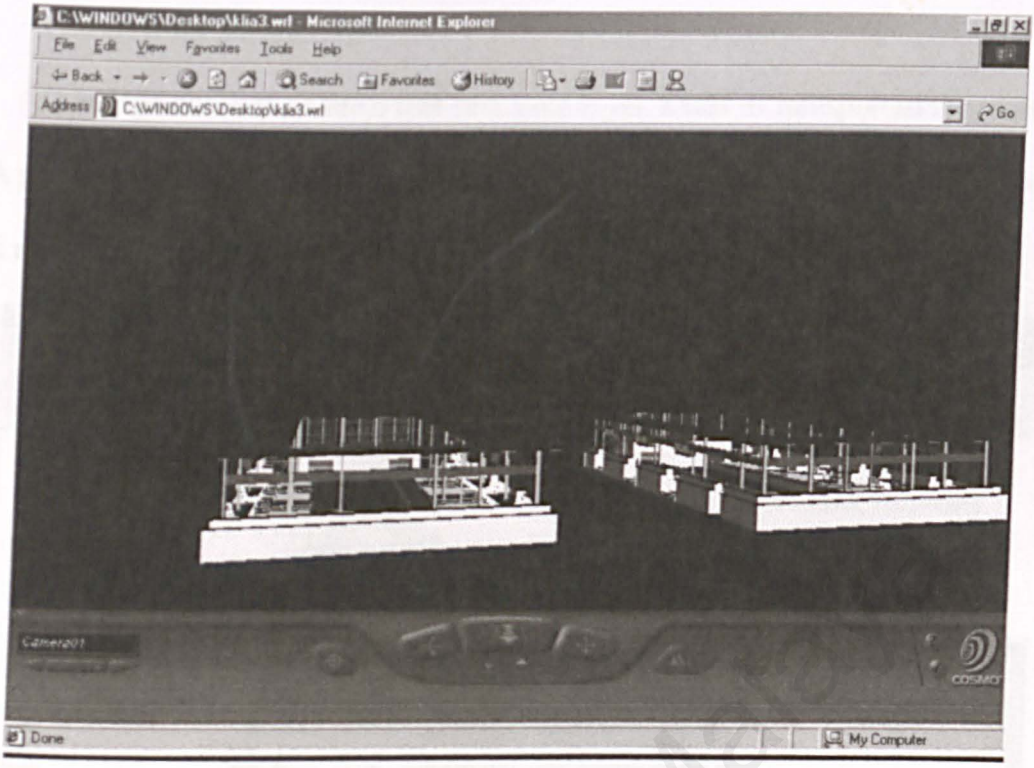

Figure A.18 : The Departure Level Virtual Tour

A.6 The Getting There Page

This page consists of links that link user to all kinds of transportation available in KLIA pages. There are 5 sub pages, which are : "Car Rental", "Buses", "KLIA Express", "Taxi and Limo" and "Car Park".

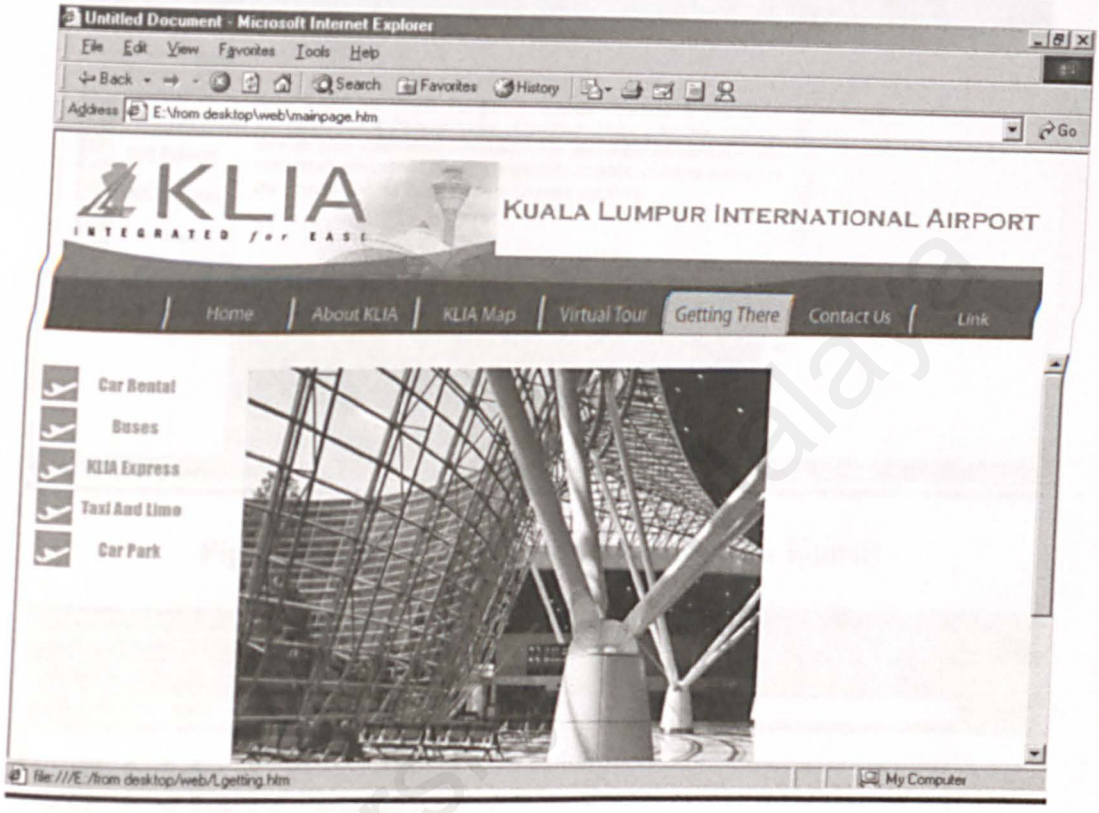

Figure A.19: The Getting There Page

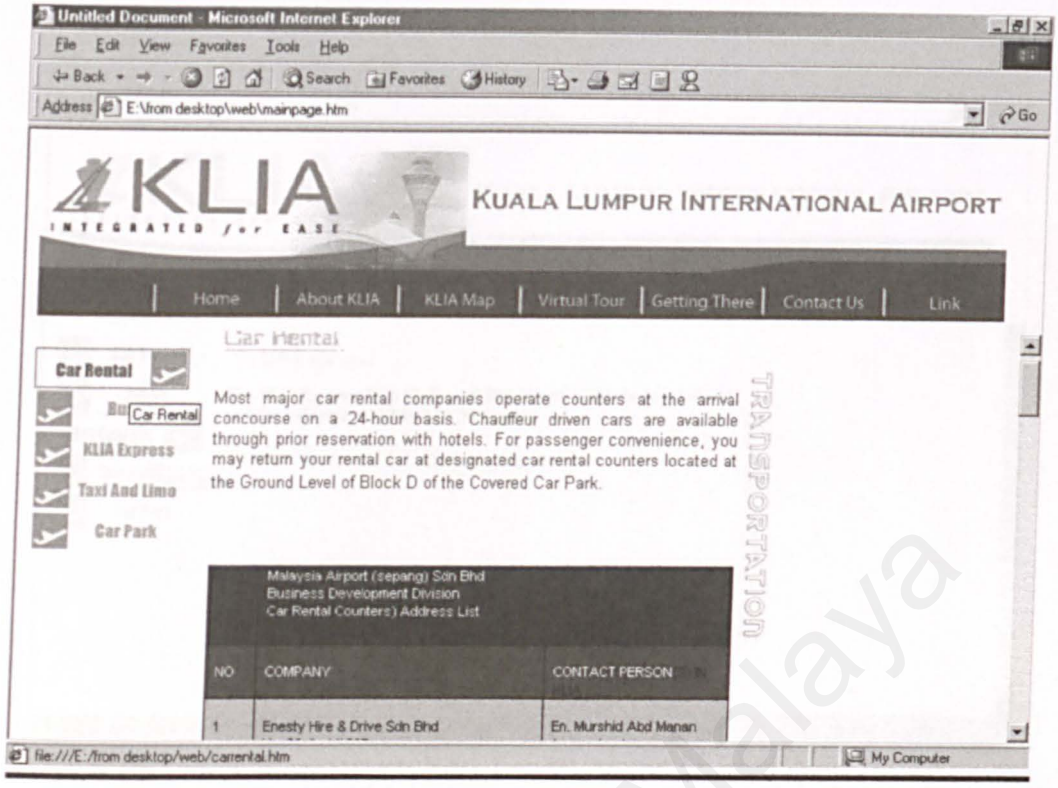

Figure A.20: Getting There Sub Page (Car Rental)

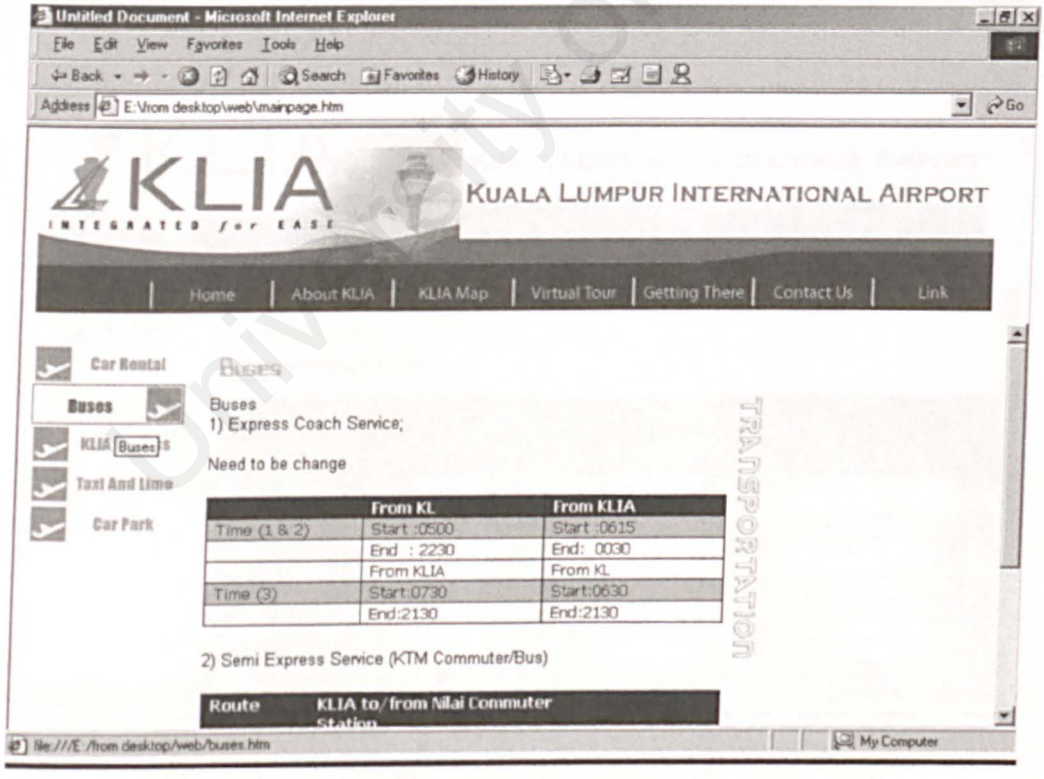

Figure A.21: Getting There Sub Page (Buses)

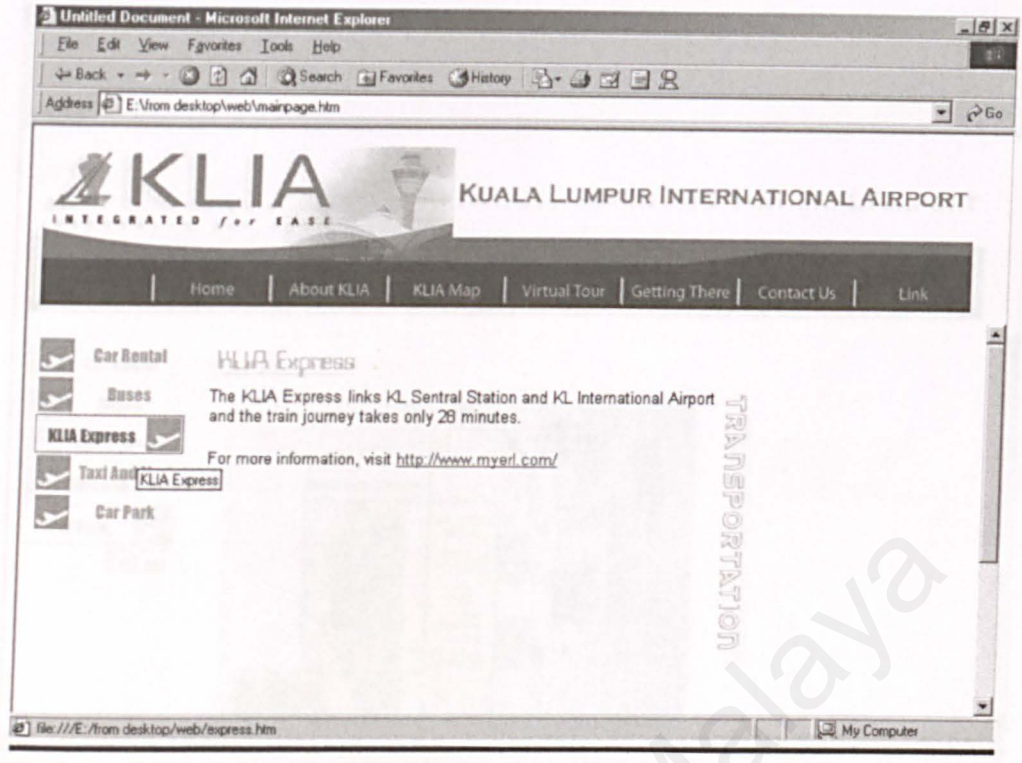

Figure A.22: Getting There Sub Page (KLIA Express)

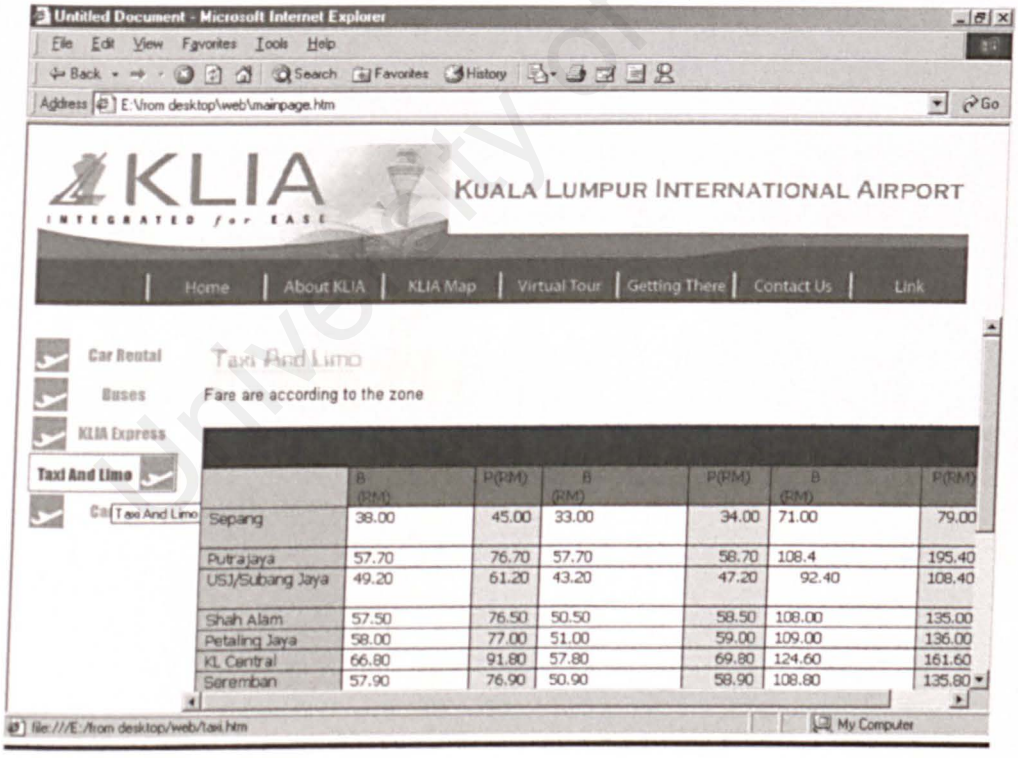

Figure A.23: Getting There Sub Page (Taxi And Limo)

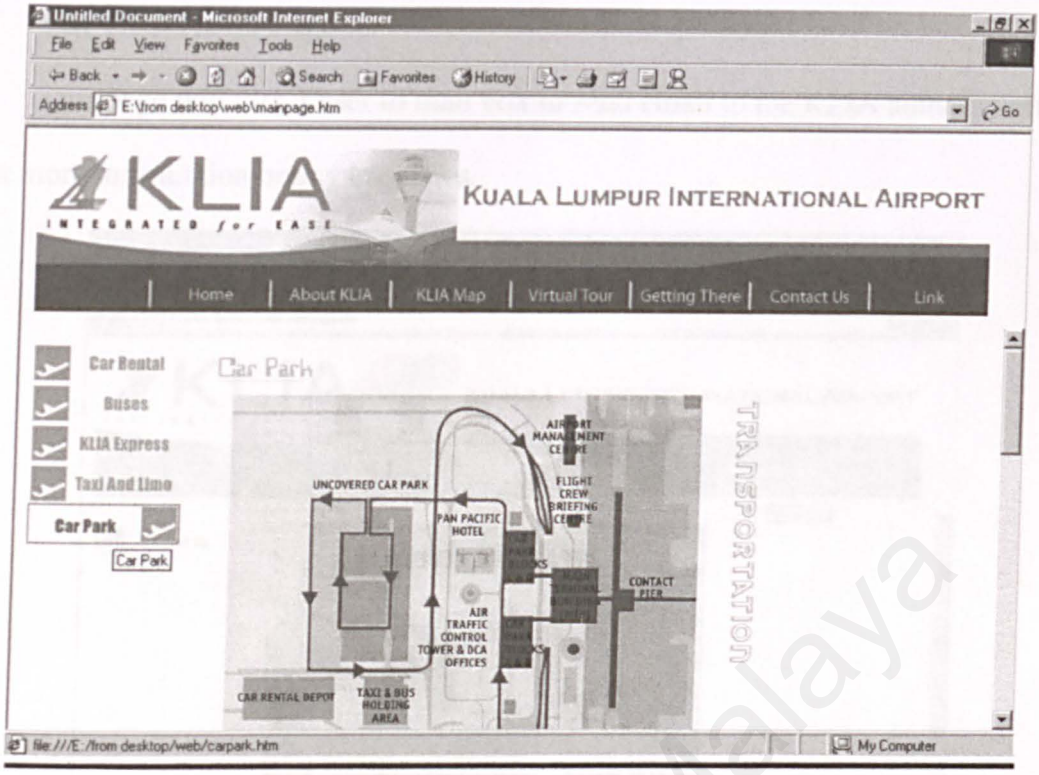

Figure A.24: Getting There Sub Page (Car Park)

A.7 The Contact Us Page

This page will direct user to mail box to send email to the KLIA authority either to get more information or any enquiries.

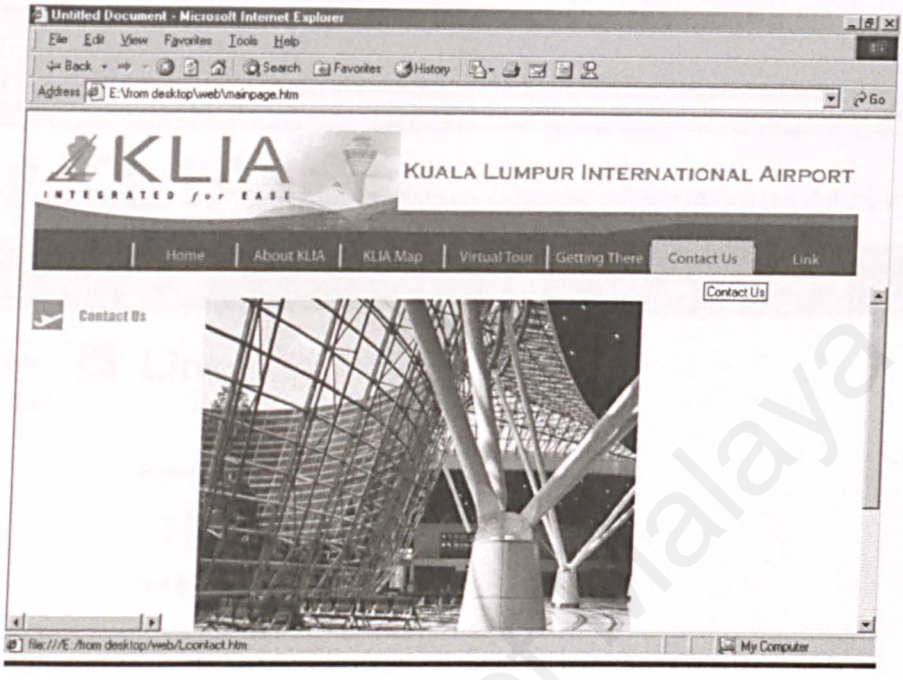

Figure A.25: The Contact Us page

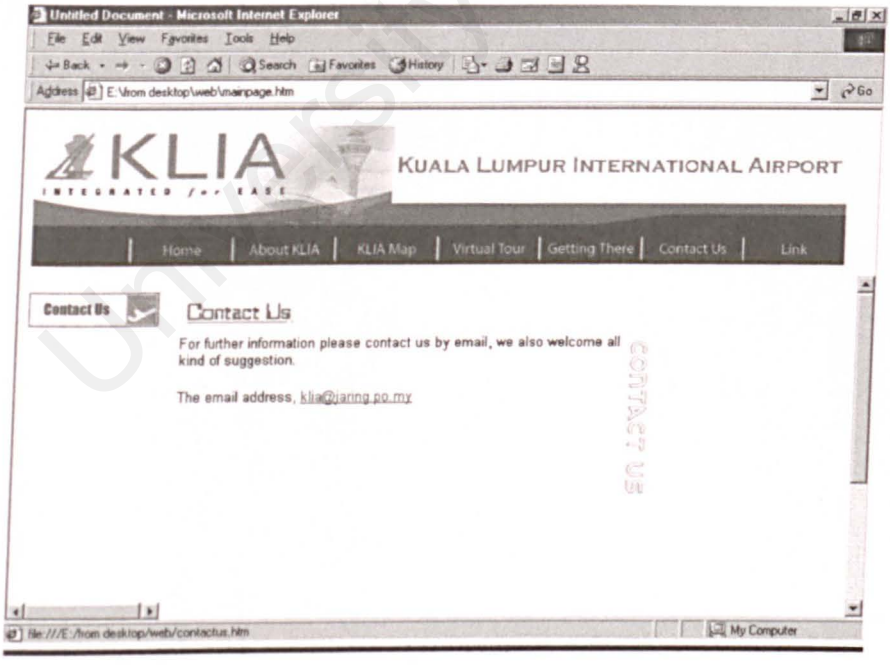

Figure A.26: Contact Us Sub Page

A.8 The Links Page

This page consist links to other related web site for user to get further information.

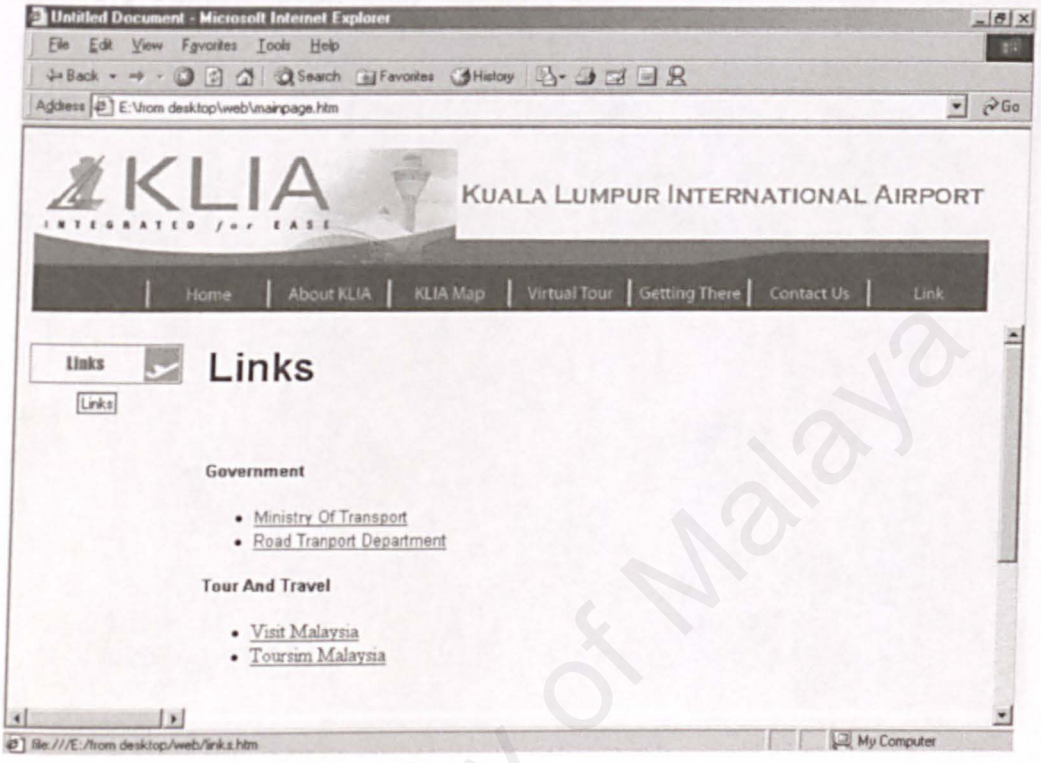

Figure A.27: The Links Page

Appendix B 3d Studio Max Example

Here are the example for one of the 3D object created by using 3ds max 5

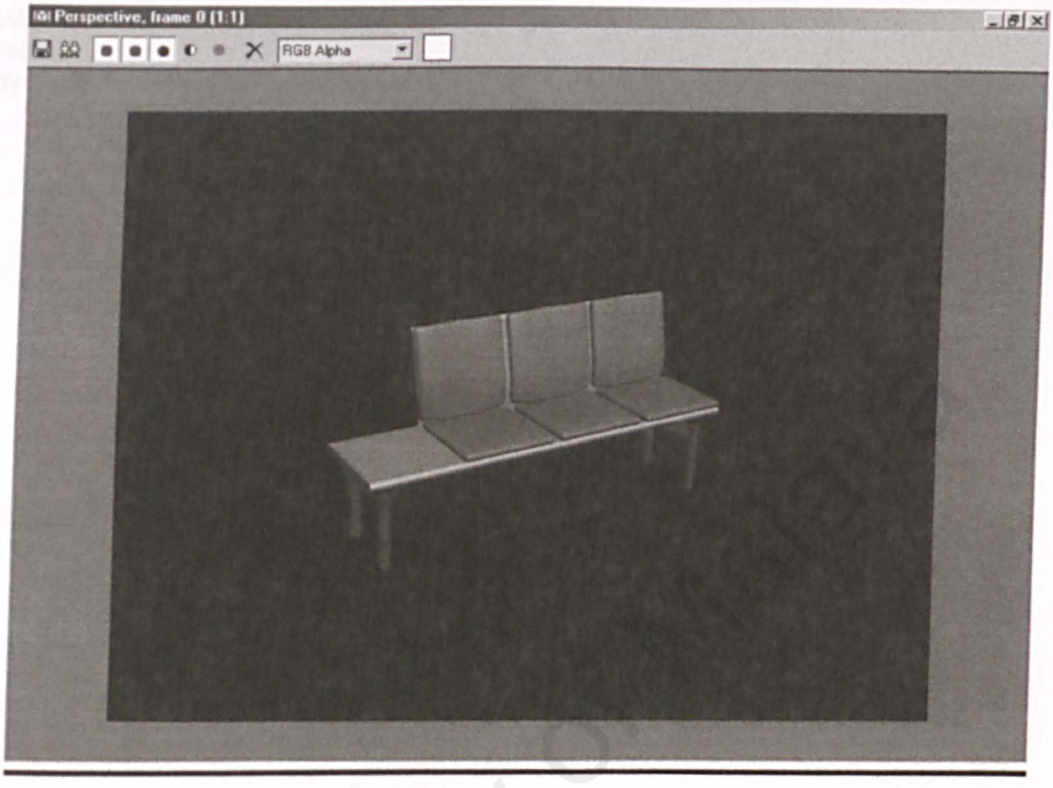

Figure B.1: 3ds max example

Appendix C VRML Sample

Here are some sample code of an VRML object:

```
#VRML V2.0 utf8
Transform {
#body
        scale 2.0 0.15 0.3
        children[
                Shape{
                        appearance Appearance {
                        material Material{}
                        }
                        geometry Sphere {
                                radius 4
                        }
                }
        ]
}

Transform {
#front wing
        rotation 0 0 1 1.571
        scale 0.1 1 3
        children[
                Shape{
                        appearance Appearance {
                        material Material{}
                        }
                        geometry Cone {
                                bottomRadius 2
                                height 2
                        }
                }
        ]
}

Transform {
#rear wing
        translation 7 0 0
        rotation 0 0 1 1.571
        scale 0.1 1 3
        children[
                Shape{
                        appearance Appearance {
                        material Material{}
                        }
                        geometry Cone {
                                bottomRadius 0.7
                                height 0.7
                        }
                }
        ]
}
```

```
    Transform {
    #strait wing
            translation 6.5 0.3 0
            rotation 1 0 0 1.571
            scale 2 1 1.1
            children[
                    Shape{
                            appearance Appearance {
                            material Material{}
                            }
                            geometry Cylinder {
                                    radius 0.5
                                    height 0.1
                            }
                    }
            ]
    }

    Transform {
    #left missle
            translation 0.5 0 3.5
            scale 1.0 0.25 0.25
            children[
                    Shape{
                            appearance Appearance {
                            material Material{}
                            }
                            geometry Sphere {
                                    radius 1
                            }
                    }
            ]
    }

    Transform {
    #right missle
            translation 0.5 0 -3.5
            scale 1.0 0.25 0.25
            children[
                    Shape{
                            appearance Appearance {
                            material Material{}
                            }
                            geometry Sphere {
                                    radius 1
                            }
                    }
            ]
}

Transform {
#seat
        translation 0.9 0.5 0
        scale 1.3 0.2 0.3
        children[
```

```
                Shape{
                    appearance Appearance {
                    material Material{transparency 0.2}
                    }
                    geometry Sphere {
                        radius 2.5
                    }
                }
        ]
    }

    Transform {
    #left rocket
        translation -2.8 0 1.1
        scale 2 0.25 0.25
        children[
            Shape{
                appearance Appearance {
                material Material{}
                }
                geometry Sphere {
                    radius 1
                }
            }
        ]
    }

    Transform {
    #right rocket
        translation -2.8 0 -1.1
        scale 2 0.25 0.25
        children[
            Shape{
                appearance Appearance {
                material Material{}
                }
                geometry Sphere {
                    radius 1
                }
            }
        ]
}

Transform {
#left engine
    translation 0.6 0 2.5
    rotation 0 0 1 1.571
    children[
        Shape{
            appearance Appearance {
            material Material{}
            }
            geometry Cylinder {
                radius 0.3
                height 1.1
            }
```

```
                }
                Shape{
                        appearance Appearance {
                        material Material{}
                        }
                        geometry Cylinder {
                                radius 0.25
                                height 1.3

                        }
                }
        ]
}

Transform {
#right engine
        translation 0.6 0 -2.5
        rotation 0 0 1 1.571
        children[
                Shape{
                        appearance Appearance {
                        material Material{}
                        }
                        geometry Cylinder {
                                radius 0.3
                                height 1.1
                        }
                }
                Shape{
                        appearance Appearance {
                        material Material{}
                        }
                        geometry Cylinder {
                                radius 0.25
                                height 1.3

                        }
                }
        ]
}
```

Reference

1. Information about KLIA at http://www.klia.com.my and http://metro.thestar.com.my/klia
2. The features of Mircosoft Visual InterDev at http://www.msdn.microsoft.com
3. The feature of VRML at http://www.vrml.org
4. The features of 3D Studio Max at http://www.3dmax.com
5. The features of Macromedia Dreamweaver MX at http://www.macromedia.com
6. The features of Adobe PhotoShop 7.0 at http://www.adobe.com
7. Help from forum at http://www.tek-tips.com
8. http://www.google.com
9. Ted Boardman,(2003) *3ds max 5 Fundamentals*, New Riders
10. P.Sellappan,(2000) Software Engineering: Management & Methods, 1st edition, Sarjana Publishing.