

**E-COMMERCE WEBSITE FOR REAL ESTATE AGENCY
INTEGRATED WITH VIRTUAL REALITY**

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the requirements for the
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CERTIFICATION OF APPROVAL

E-Commerce Website for Real Estate Agency Integrated With Virtual Reality

By

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UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
June 2004

CERTIFICATION OF ORIGINALITY

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



SHARIFAH SHAHRIZAD SYED MUSTAFFA

ABSTRACT

The birth of Internet can be said as the most important technological innovation to impact every aspect of our lives since the invention of the automobile and the elevator. It created a borderless world for people to communicate and seek for information and new knowledge.

The project is about developing a web site for a real estate agency that provides information on property available for sale and rent. The reason for this project is to encourage more Malaysians to use Internet as a medium for online shopping, to increase the rate of Internet usage in Malaysia, and to provide a real estate service for people in the Ipoh region as there is no company that focus its operations for the Ipoh market.

The objective of the project is to design a website for real estate industry, to analyze the potential and suitability of E-Commerce in the real estate industry, and to evaluate the potential of E-Commerce in the real estate industry.

The website is developed based on the System Development Life Cycle (SDLC). It consists of four phases; analysis phase, design phase, development phase, and evaluation phase. The methodology is used to plan the development of the project.

To evaluate the efficiency of the website in overcoming the problems, a test has been conducted. From the test, it seems that the participants are willing to try this kind of service and agree that real estate industry can gain benefits from the Internet. As to conclude, we must firstly understand the drivers of the technology innovation. Malaysia has a huge potential for Internet procurement and we shall not wasting the advantage that we have.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

The project is about developing an E-Commerce website for the real estate industry. This project is to encourage the internet users to make full use of the E-Commerce. Potential customers who wanted to buy or sell and even rent a house can interact with the real estate agent through the website. The real estate agent can advertise available homes in the website. The homebuyers may seek the information regarding the prices and the neighborhoods. Meanwhile, users can view the pictures of the existing houses available for rent and sale.

The project will allow the users to take advantage of the web features to enable collaboration among the users, which are the customers and the real estate agency. The Internet provides efficient marketing capabilities of the web, low transaction costs and also customer contact and support. The website will also provides graphic and virtual reality capabilities so that the users will have better experience on finding the right homes for them over the web.

Currently, there are no real estate agencies in Malaysia that implement virtual reality features into their website. Mostly, they only put description of the property without any pictures. Because of this, the customers cannot have a look at the property. The owner of the website does not fully utilizing the graphic capabilities of the Internet in marketing their products. Not only have that, Internet provided a way for customers to experience the product without actually going out.

There are several features that distinguish e-commerce and the Internet from real estate business operations. It provides a new form of communication between customers and sellers by making worldwide communication possible at any time at very low price.

It is a new means of disseminating information with the change from present media to the use of World Wide Web (WWW) equivalent to the change from newspapers to radio and from radio to television. Information reach is a key factor of the WWW, but the greater importance is the interactive nature of the information provider.

Real estate business may have the advantage of facilitating its role of a firm as customer as well as a producer of its services. Network linkages offer the possibility of new forms of inventory control and ultimately new approaches to production and service provision.

Not only that, it will deliver large economies of scale with heavy introductory costs but very low marginal costs once the system is up and running.

1.2 Problem Statement

Based from a study done by Taylor Nelson Sofres Interactive (2000), one of the world's leading market information groups, the percentage of Internet users in Malaysia are 25% of the total population in 2000. The number decreased in 2001 as the percentage falls to 24% of the total population. And the number decreased again in 2002 as the percentage falls to 21%. The numbers of people who are using online shopping services are only 1% from the total population, which is 3% of the Internet users. The people who were involved with the survey stated that the main reason why they are reluctant to do online shopping is because of the insecurity of giving their financial details over in the Internet. For them, it is much safer to buy things the conventional way.

From the result of the study, we can see that the number of online shoppers is only 1% from the total number of the Internet users in Malaysia. Therefore, lots of actions need to be taken in order to encourage people to use Internet as a medium for shopping. The project is a method to promote the full usage of the Internet and hopefully, to increase the statistics given before.

Meanwhile, the total number of Internet users in Malaysia is 2.73 million. The latest count was presented by Parliamentary Secretary of the Ministry of Energy, Communications and Multimedia, Mr. Chia Kwang Chye, (Harian Metro, January 19, 2004). The total number of Malaysia residents is 22 million, which means that the percentage of the Internet users is about 12% from the total number of the population

Most of the websites available in Malaysia offer the services for areas in the Klang Valley such as in Kuala Lumpur, Petaling Jaya, Klang and Shah Alam. Some of the website also offers services in Johor and Penang. But up till today, there is no website that offers such services for Ipoh area. Therefore, this website may help to encourage the growth of the real estate industry in Ipoh and may boost the industry.

1.3 Objectives and Scope of Study

1.3.1 Objectives

- To design a website for real estate industry
- To analyze the potential and suitability of E-Commerce in the real estate industry
- Evaluating the potential of E-Commerce in the real estate industry.

1.3.2 Scope of Study:

The study will only be within the region of Ipoh, Perak as there are no such services available in this region. It will offer information on houses available for sale and rental around Ipoh town. Through this website, users can search for houses suitable for them by specifying the characteristics that they are looking for in a house. Examples of characteristics such as the price range, numbers of bedrooms, or the type of the house.

CHAPTER 2

LITERATURE REVIEW

2.1 History of the Internet

It all started in late 1960s in United States of America. ARPA – the Advanced Research Projects Agency of the Department of Defense sponsored a conference attended by several dozen of ARPA-funded graduate student at the University of Illinois at Urbana-Champaign. During the conference, ARPA presented the blueprints for networking the main computers at about a dozen of ARPA – funded universities and research institutions. The idea proposal was to connect all the main computers through communication lines operating at 56KB. During that time, most people were connecting over telephone lines to computers at the rate of 110 bits per second. Later on, ARPA continued to implement the above plan which was called *ARPAnet*, the grandparent of today's Internet.

One of ARPA's primary goals for the network was to enable many users to send and receive information at the same time over the same communication network. The network is being operated with a technique called *packet switching* where digital data was sent in small packages called *packets*. The network was designed without the need for centralized control. The protocol for communicating over the ARPAnet is known as TCP – *the Transmission Control Protocol*. TCP ensured that messages were properly routed from sender to receiver and the messages will remain intact. With the evolvement of the Internet, organizations worldwide were implementing their own networks for both internal and external communication. A huge variety of networking hardware and software appeared. The main challenge is to let all the software and hardware working together. Thus, ARPA developed *IP* – the *Internetworking Protocol*, and created a network of networks, the current architecture of the Internet. The combined of protocols is now commonly known as *TCP/IP*.

2.2 History of the World Wide Web

Although Internet was introduced more than three decades ago, the development of the *World Wide Web* was a quite a new event. Tim Berners-Lee of CERN (the European Laboratory for Particle Physics) developed the World Wide Web and a few communication protocols that form the backbone of the World Wide Web.

2.3 Internet in Malaysia

Internet age in Malaysia started way back in 1995. The growth in the number of Internet hosts in Malaysia began around 1996. Based on the first Malaysia Internet survey conducted from October to November 1995 by MIMOS and Beta Interactive Services, one out of every thousand Malaysians had access to the Internet, which is 20,000 Internet users out of a population of 20 million. The number grew to 2.6% of the population in 1998. The total number of computer units sold showed an increasing growth, whereby a total number of 467,000 units in 1998 and 701,000 units in 2000 of computers are sold. In a survey conducted by the Energy, Communication and Multimedia Industry in 2000, it was reported that 7% of the total population registered as Internet users compared to the previous years which was 2.6%. The level of internet penetration is still low which 10% of total population is. Number is estimated to growth to 3.91 million in 2004 (International Data Corporation (IDC) Malaysia, 2000).although Internet penetration remains unchanged over the years; higher incidence is noted among males and younger segments, which is below 30 years of age.

2.4 What is E-Commerce?

According to Andrew Bartel, vice president and research leader of e-commerce trends at Giga Information Group, Inc., e-commerce involves exchanges among customers, business partners and vendors. For example, a supplier interacts with a manufacturer and customers interact with sellers.

E-commerce, ecommerce, or electronic commerce can be defined as the conduct of financial transactions by electronic means. With the growth of commerce over the

Internet and the Web, ecommerce often refers to purchases from online stores on the Web, known as e-commerce Web sites. They may also be referred to as "virtual-stores" or Cyber stores. As the transaction goes through the Internet and the Web, some have suggested another term: I-commerce (Internet commerce), or icommerce. Few have referred to it as Web-commerce. E-commerce can be business to business (B2B) or business to consumer (B2C).

2.4.1 E-Commerce in Malaysia

The term e-commerce came into the picture in Malaysia as the Internet emerged as a viable and likely medium to conduct trade. It started to occur over the past 11 years due to the increasing popularity of the Internet. Internet brought a new horizon to the way people conduct their business nowadays. This is because Internet introduced interactive communication for everyone by placing advantage firmly in the hands of buyer. Thus, communication providers must now satisfy the requirements of the market and vice versa.

2.5 Online Shopping

Internet has becoming popular each day in Malaysia, as it serves as a virtual place where people can share ideas, build communities, shape the future of communicating, and promote new ways of doing businesses. It is the world's biggest shopping mall that enables organizations to do their business with only small amount of costs involved, yet manages to cover global market. According to a research done by Thailand Development Research Institute, e-commerce in the United States captures 70 per cent of the world market value, followed by Europe with 14 per cent, and Canada 8 per cent. Meanwhile, the Asia Pacific region only captures 5 per cent of the total market value.

E-commerce has the potential to have continuously growth in today's market. A whole new technology as well as mechanism and media for purchasing goods and services will soon be replacing the traditional boundaries. There are several features of e-commerce than makes it possible to penetrate into the global market faster and easier compared to the conventional way. The electronic payment system used in doing transaction provides

opportunities for new global and national trading relationships. The online transaction will bring many benefits for both companies and customers. This will help to eliminate the traditional purchase approach, which is time consuming and labor intensive. These, along with issuing purchase orders, obtaining multilevel approvals and tracing invoices can lead to high transaction cost. Internet procurement automates the above processes, thus helps the companies increasing the speed and reduces the cost of purchasing transactions. Orders can be made electronically and the product will be produced and shipped without incurring the cost of middlemen. Cyber space can be an exceptional way to nurture the business revenue base. Customers can get to the company through the Internet globally for 24 hours. This shall create new markets and segments, allowing customers to make wise purchasing decisions and increasing business competitiveness. Selling online could help newly established companies as it would eliminate the costs involved in rental or buying a business space or building. Virtual server space can be the substitute for the costs of ideally located shop lots.

There are several benefits that e-commerce offers compared to the brick-and mortar practices. It provides interactive communication, fast delivery and more customization that would only be available for consumers via online shopping. Product information available over the Internet is more compact and it ranges from various sites, not only from one site. As a result, users shall have more opportunity to choose and compare products they want to purchase or easily find and select specialized products. It offers an open market place where it shall increase competition and provides benefits for industrial buyers as it promote better quality and variety of goods.

2.5.1 Online Shopping in Malaysia

Online shopping in Malaysia is still at its early stage. Malaysia can be considered as late starter based on the recent spate of Internet interest. Malaysians thought of Internet as a medium for communications and entertainment, not as a medium of commerce although it has been almost a decade of the Internet commercialization. Compared to western countries, doing a transaction online is popular here in Malaysia. Almost every Internet

users surveyed said in general they like the idea of doing shopping on the Internet, but only a small amount of Malaysians actually buy online (Taylor Nelson Sofres Interactive, 2000). Approximately 96 per cent of urban adults in Peninsular Malaysia never bought anything through the Internet and only about 4 per cent had done so. Malaysians are not comfortable to use Internet for doing their business transactions, such as online shopping and online banking. Therefore, it is important to change the way Malaysians' use the Internet and making it as a way of life.

The proportion of Malaysia's online shoppers in 2002 has not changed compared to the previous year. The penetration of online shopping remains at 1%, which means that one per cent of the total adult population in urban Peninsular Malaysia have bought or ordered goods or services online during the past month, or 3 per cent of Internet users during this period. Concern about security is still the main factor why Internet users are reluctant to shop online. 38 per cent of Internet users feel more secure buying goods and services in a store. 36 per cent of Internet users don't want to give out their credit card (Taylor Nelson Sofres Interactive, 2002)

2.5.2 Barriers to Adoption

Malaysians are very curious about online shopping but many are reluctant to use the service due to the lack of product awareness, value awareness and concerns regarding credit card security. Below are some of the issues that become the hindrances in adopting internet shopping in Malaysia.

- **Security Issues**

This is the major concern of online shoppers when doing their transaction. It is not only worried shoppers in Malaysia, but also of users worldwide. Regardless of the reason, it will create anxiety for many businesses and consumers. Both online buyers and non-buyers said that they would shop more online if they could be assured that a company on the Web was reputable and if they were confident with the payment system security. Those who never make any purchase online are worried about the

safety of submitting personal billing information through the Internet. Many companies are reluctant to join in the e-business scene as most customers do not have the trust to do their shopping online.

- **Vendor Reputation**

One of the key concerns for online customers is the reliability of business on the web. The numbers of users that are concerned about dealing with dishonest or disreputable vendors while shopping online are increasing. Therefore, it has become the responsibility of the e-business websites to gain users' trust. Several reasons contributed to the above matter. Among the reasons are the company is a new company and are not good at making the shopping experience easy and reliable for the consumers. Examples of issues faced by the users are lack of privacy statement, difficult navigation, poor product declarations, slow delivery of goods, limited price discounts, uncertainty about security and unclear redemption policies. Users would choose to make their purchase at well-known and major sites. Both buyers and non-buyers are looking for cues that shall indicate the reputation of a company on the web.

- **Attitude Problems**

Globally, there are only a few websites that offer delivery service to Malaysia. In 2000, there were hardly one percent of retailers in Malaysia that are involved in e-commerce. The reason for this is mainly caused by the enterprise attitude. Malaysians are tending to be followers. Not many are brave enough to be the pioneers or first movers in creating intellectual property. This is the critical challenge for the society in moving towards knowledge-economy (K-Economy). Malaysia's culture is to 'let play it safe', by letting others to test the water first and would only follow or move to kick start a new type of business if the latter were to succeed. Most retailers see e-commerce as an experiment rather than an investment. The governments are not offering any incentives in promoting merchants to move into e-commerce. As for the retailers, there are several reasons why they are refusing to venture into the industry; high cost, leased lines, merchant software, digital SET ids, commissions payable, merchant discount rate by bank, and payment gateway surcharge. Another problem is

caused by the local consumer attitude. In every 10 orders, there will be two false orders. This clearly showed the problems caused the local users. Malaysia companies are also lack of innovation. Most of them are afraid of failure and are not dare enough to take the challenge to step into the Internet economy because it is an unknown space.

▪ **The Preference to Examine Products**

Brick and mortal shopping allows the buyer to physically examine the product prior to purchase by looking, touching and testing. This is what online shopping cannot offer. The best it can offer is a virtual tour. Eventually, if a buyer has seen the product beforehand, buying via the Internet is actually convenient and can save a lot of time.

▪ **IT Knowledge**

The online population in Malaysia can be considered as infants. As a result, the Internet knowledge level among them is shallow if compared to developed countries. In order to achieve an informed and computer literate society, IT and Internet access has to be available to everybody. But, Internet in Malaysia is enjoying a continuous growth. Thus, people's perception is starting to change and fears will begin to subside as they gain better understanding of the technology and how to use it. The IT knowledge and ownership of computers is very much focused in the cities. Several communities living in better developed towns are exposed to the Internet. Out of total 2.5 million PCs owned in Malaysia, 65% of them are located in three of the thirteen states, Selangor, Wilayah Persekutuan and Pulau Pinang. A possible profile of potential online shoppers would be young, highly educated, high income, likely to be single and living in the city.

▪ **Payment Options**

Credit card is the most offered payment methods available in the Internet. In order to encourage more people to shop online, a variety of payment options should be made available. Examples like debit card. Banks can also play a vital role by promoting more applications to Malaysian communities and this will benefits both the banks and the communities.

- **Personal Computer Cost**

The price of a personal computer in Malaysia is relatively high. To have a computer installed at home would at least cost RM 2,000. This may be a burden for some families, especially to those who comes from medium to low income family as it may take two months salary to get a PC.

2.6 The Impact of Technology and Internet to Real Estate

Perhaps, Internet revolution is the most important technological innovation to impact real estate since the invention of the automobile and the elevator. It provides four different product levels to the real estate market; provision of information, provision of analysis, facilitation of real estate transaction online and online real time auctions of real estate interests. Each of them has different degrees of influence.

2.6.1 Provision of information

This is the most basic level of production for the Internet. It makes up virtually all the essence of individual company web sites, and market data provision over the web has become an essential product like for a whole host of online data providers, including consulting firms, trade associations and government agencies. Data provision is extremely important despite its basic nature. High level of competition exists among data providers which resulting in consolidation of the industry. Those with most frequently and updated product, easiest access, most capital expansion and acquisition of competitors and have broad infrastructure of relationships within the industry shall survive in the game.

2.6.2 Provision of analysis

This is the second level of product provision by the web. It includes everything from appraisal methodologies to asset and property management support, accounting, tax planning, construction management tools, and specialized software for statistical analysis. The player in the industry can make full advantage out of the above by providing value

added service to the most users, an adequately capitalized have the best infrastructure to have support for the product, which shall include a capable user support network.

2.6.3 Facilitation of real estate transaction online

This will not transform the marketplace of doing business, but actually transform the location where it will become virtual as opposed to physical. It could involve any process; from online completion of application forms and offering contracts to actual acceptance and transfer of ownership online.

2.6.4 Online real time auctions of real estate interests

By developing a real time online auction transaction mechanism, it shall be the fundamental transformation of the marketplace by dramatically changing the existing market roles.

2.7 What's New about E-Commerce and why does it Matter for Real Estate?

E-commerce provides several features that distinguish it from other aspects of business operations, specifically those that affect real estate. All of e-commerce activities and web usage stages have the significance effect to real estate firms, both as their operations are affected by the Internet, WWW, and e-commerce, and as providers of real estate services and products to other businesses. Real estate firms have quickly implemented several aspects of e-commerce into their own operations. The US Department of Commerce ranked real estate industry as one of the most highly information technology intensive sectors in its economy. It also ranks the above industry as among the top 10 sectors of the economy in terms of capital investment in information technology per employee.

Most major players in real estate industry have established their virtual presence through the World Wide Web and also make use of the Internet for internal and external communication. Many have dynamic sites that market products and provide information to a customer or client base. More and more of these sites are developing interactive

components, and some are also serving as the centers of broader networks of companies. At the same time, companies involved in real estate products are carefully watching the development of e-commerce to determine how these can affect the demand for their products.

There are some important common features to real estate that have also resorted the Internet. The web efficient marketing capabilities, low transaction costs, customer contact and support are among the top important features. Internet also contains features that are important to the real estate industry. Real estate is bound to its local environment, community and economy by its nature, but the Internet can extend its geographic reach. Now, it is possible for us to research properties situated at the other part of the globe whether for the purpose of relocation or investment. For example, customers in Alaska can do a property research in Fiji. Another important feature of the web is its graphic capability whereby the real estate can exploit to great advantage, particularly with the latest advancement that includes virtual tour of hotels, homes and convention centers.

Technology can influence real estate via three different routes:

- By affecting the production function for the inputs to the production of real estate stock and services
- By affecting the production function for real estate product itself
- By affecting the production functions associated with the tenants of the real estate product and with unrelated firms.

Internet and WWW characteristics may affect real estate firms both in their internal operations and structure, and in demand for the product or service they provide. Many different types of real estate related businesses are taking advantage of the opportunities provided by the Web, while at the same time face some challenges brought about by the Internet-generated transformations of the rest of the economy. (Please refer to Appendix 2-1).

CHAPTER 3

METHODOLOGY

Methodology is the methods and principles used for developing a project. It encompasses a wide array of tasks that makes the lifecycles of the system development methodology, which includes analysis, design, development, evaluation and testing. The system development lifecycles are 'process' models; they outline recognized steps for successfully completing complex tasks. It is a guideline that helps system developer to deliver the project. System development methodology refers to the framework that is used to structure, plan, and control the process of developing a system.

There are many system development methodologies that are being used in developing a system. In this project, we use a standard based on the System Development Life Cycle (SDLC). SDLC methodology may be consisted of activities that are appropriate for a particular project. It can be implemented for either automated or manual system, or either new system or enhancement to an existing system. The SDLC is based upon two principles: dividing projects into phases, and using written documentation and approvals to maintain control. The actual phases in the cycle differ from one author or organization. In this project, the author develop its own methodology based from the common phases in a SDLC, which are initial investigation, conception or feasibility study; requirements definition; system design; coding, unit testing, integration and system testing and implementation.

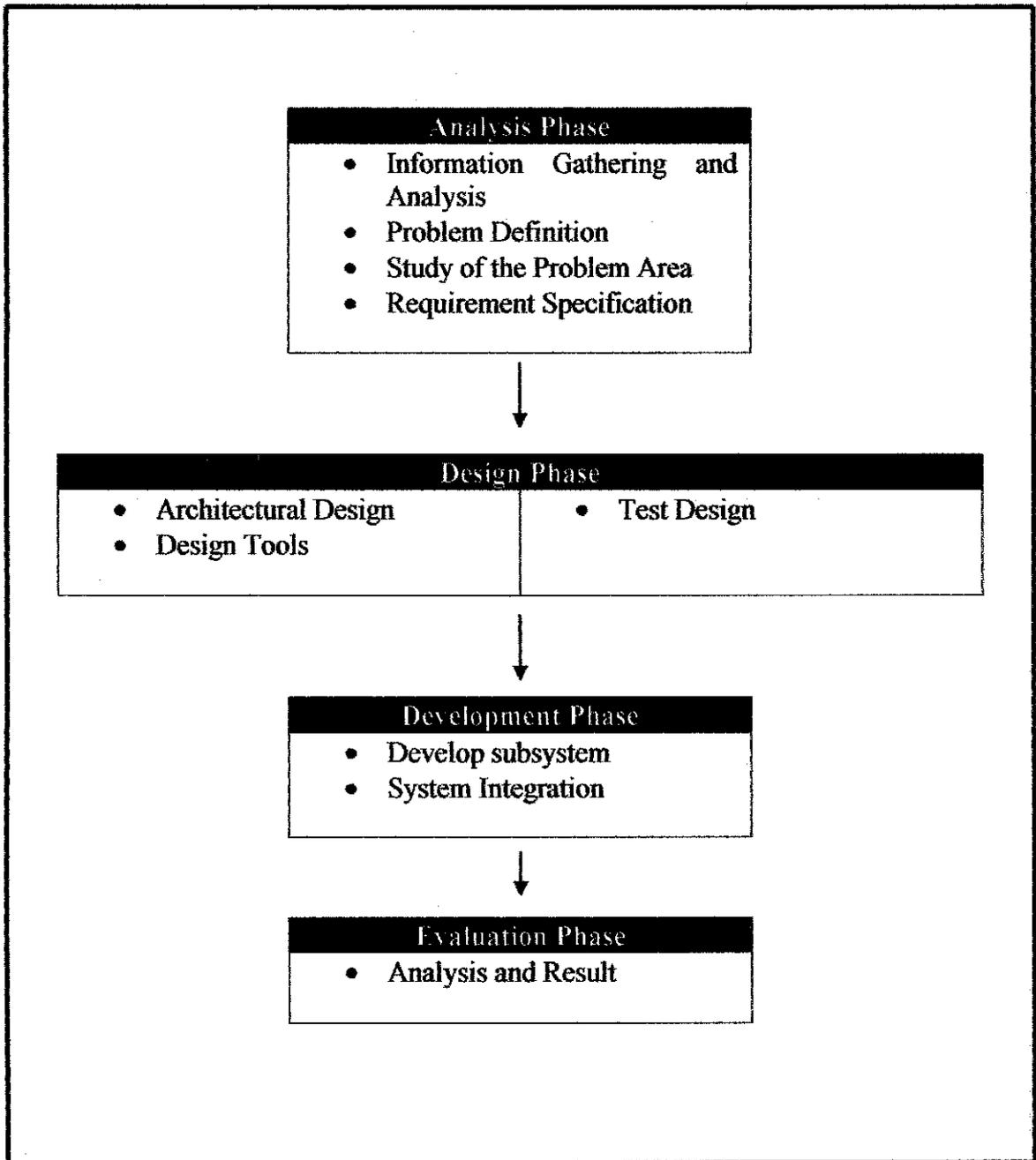


Figure 3.1: System Development Methodology

3.1 Analysis Phase

This phase deals with identifying and analyzing the problems and requirements of the project. During this phase, several methods are use to perform the above tasks.

3.1.1 Information Gathering and Analysis

To get the information on the e-commerce and real estate scenario in Malaysia, we did a research over the internet. Although there are not many research on the internet, e-commerce and real estate industry in Malaysia, but the information available is crucial in identifying and analyzing the current problems regarding the project title. Questionnaires are also distributed to get direct feedback from a group of respondents who are Internet users to identify the situation of e-commerce usage.

3.1.2 Problem Definition

From the information gathered in the above task, we define what are the major problems regarding the project. The problems are identified from the findings of the research done over the internet and from the questionnaires distributed.

3.1.3 Study of the Problem Area

After the problems are defined, a study is done on the problems to find the most suitable solution. This are done by analyzing the cause of the problems, identify ways to solve the problem and how to implement it.

3.1.4 Requirement Specification

The purpose of the requirement's specification is to provide a firm foundation for the technical solution to the problem area. It consists of a complete set of requirements, which will then used to develop a technical solution. During this task, the functional test strategy will be developed to ensure that the system requirements are met.

3.2 Design Phase

Design phase goal is to translate project requirements into visual and functional reality. The design of the project is divided into two parts. First part is designing the conceptual and architectural design and what are the tools used in design. Second part deals with testing the design and doing a hypothesis on the design.

3.2.1 Architectural Design

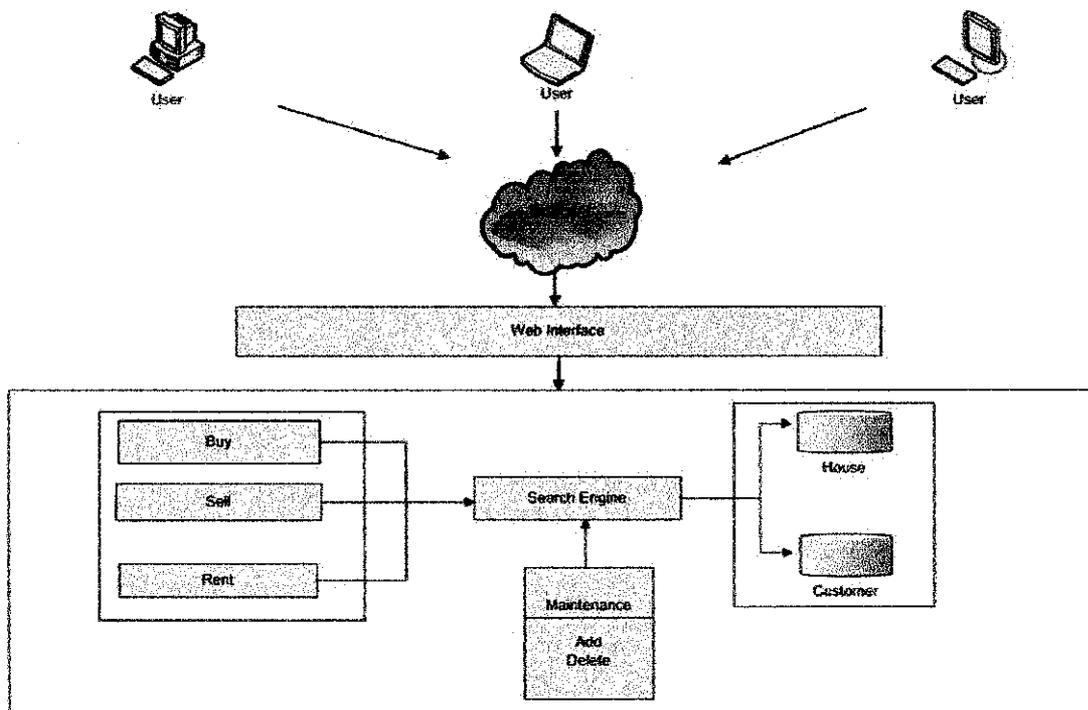


Figure 3.2: Architectural Design

The architectural design consists of the web interface, the search engine, maintenance and the database. The web interface shall provide mechanisms for users to buy sell and rent their property. Users can search for the available houses according to these category; buy, sell and rent. There shall be an administrator who is responsible for the maintenance of the website. Any changes to the website will be updated quickly to provide latest information to the users. Two databases will be used containing information on the customers and houses available on the website.

3.2.2 Design Tools

The design tools are the tools use to create the design of the project. This includes the software and hardware needed for the above task.

Below is the list of software used to develop the interface of the project:

Software	Functions
Macromedia Cold Fusion	Create dynamic web pages
Macromedia Dreamweaver MX	Building the user interface, Cold Fusion and HTML Coding
Microsoft Access	Store database
Xara Webstyle 3.0	Building the user interface
Internet Explorer 5.5 and above	To display the user interface

Table 3.1: Software Requirements

The list of minimum hardware requirements are as follows:

- Intel Pentium III 266MHz
- 64 MB of memory (128 MB recommended)
- 150 MB of available disk space

3.2.3 Test Design

The methods by which the test will be conducted are determined at this stage. A design hypothesis will be conducted. Methods and tools to be used in the test are by using questionnaires, evaluation form and interview session to get users' feedback and for evaluation purposes. The participants will be picked randomly. After the test has been performed, the results will be analyzed.

3.3 Development Phase

This phase will enter us into the production mode, whereby the application's architecture and interfaces are being developed.

3.3.1 Develop subsystem

The project is developed part by part. This will allow the developer to focus on each part of the system thoroughly. The part is divided according to the different functions that it serve, such as for selling a house and buying a house.

3.3.2 System Integration

All the subsystem is being integrated to create one whole system. The website will be integrated with the virtual reality (VR) components.

3.4 Evaluation Phase

This will be the final phase whereby the system will be run and a user usability test will be conducted to get users' evaluation.

3.4.1 Analysis and Result

In order to ensure that the project is complying with the users' requirements, a system testing is conducted by giving the user the opportunity to experience the system themselves. A group of users are chosen and the feedback will be used to determine the acceptance of the users.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Pre – Test Users Evaluation

Questionnaires are used to get users' feedback regarding the usage of Internet as a medium for doing business operation in real estate. 10 respondents have been chosen to answer a set of questions in the questionnaires (Appendix 4-1). The result of the questionnaires is presented in Figure 4.1.

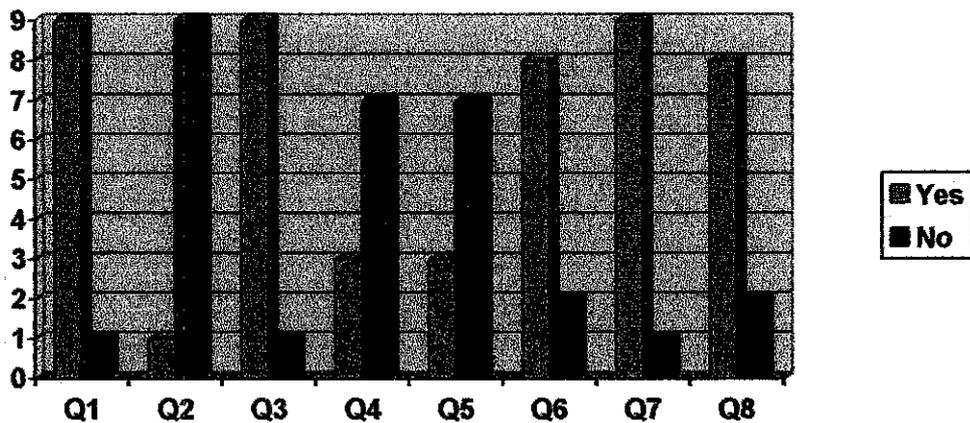


Figure 4.1: Pre Test Result

The graph clearly indicates the acceptance of users on using Internet as a medium to do their shopping, specifically in getting a property. Q1, Q2, Q3, Q4, Q5, Q6, Q7 and Q8 refer to the questions that need to be answered from the questionnaire.

Q1 asked users whether have ever use Internet to survey a product before doing their purchase. 90% of the respondent answered “Yes” and only 10% answered “No”. This clearly showed that users are already using Internet as a tool for information gathering.

Q2 asked whether the users have ever tried to purchase a product on the Internet. Only 1 respondent answered “Yes” while the rest have never tried to do so. This has something to do with the acceptance of users on online shopping as a way of life.

Another issue here is that almost the entire respondent who answered “Yes” said that they do not own a credit card. As many e-commerce website requires credit card for doing transaction, not all users have the opportunity to do their shopping online.

Q3 asked the users opinion on is Internet an effective medium to market a product. 90% agreed with the statement.

Q4 asked users if they have ever come across website with VR capability in Malaysia. Only three respondents answered “Yes”. This showed that Malaysia’s website is not fully optimizing the capabilities of the Internet.

Q5 asked users if they have ever come across a real estate company that provides it services online. Only three respondents have ever come across such service. This signifies that real estate industry is slowly evolving into e-commerce and not many are brave enough to be the player in the scene.

Q6 asked users if they are willing to consider selling or buying their house online. 80% are willing to consider the option. This showed that the respondents are open to the concept of e-commerce and willing to involve in it.

Q7 asked users’ opinions on will the online real estate website can take full advantage of Internet capabilities. 90% of the respondents agree that real estate agency can gain advantage by implementing e-commerce.

Finally, Q8 asked whether users are willing to consider such service. 80% are willing to try. 20% are not willing to try such service by saying that they are not being online all the time and this could cause trouble for them to access the website.

4.2 Coding for Single Search

In developing the dynamic web page for the single search method, the author chose to use Cold Fusion as the programming language. Figure 4 is the coding used for that particular purpose.

```
<cfparam name="FORM.Type" default="1">
<cfquery name="testid" datasource="homesweethome">
SELECT Type, Price, Bedroom, MoreInfo FROM house WHERE Type LIKE '#FORM.Type#%'
</cfquery>
<cfparam name="PageNum_testid" default="1">
<cfset MaxRows_testid=10>
<cfset StartRow_testid=Min((PageNum_testid-1)*MaxRows_testid+1,Max(testid.RecordCount,1))>
<cfset EndRow_testid=Min(StartRow_testid+MaxRows_testid-1,testid.RecordCount)>
<cfset TotalPages_testid=Ceiling(testid.RecordCount/MaxRows_testid)>
<p>Your search result generate:</p>
<p>&nbsp;</p>

<table border="1">
<tr>
<td>Type</td>
<td>Price</td>
<td>Bedroom</td>
<td>MoreInfo</td>
</tr>
<cfoutput query="testid" startRow="#StartRow_testid#" maxRows="#MaxRows_testid#">
<tr>
<td>#testid.Type#</td>
<td>#testid.Price#</td>
<td>#testid.Bedroom#</td>
<td><a href="#testid.MoreInfo#">#testid.MoreInfo#</a></td>
</tr>
</cfoutput>
</table>
```

Figure 4.2: Cold Fusion Coding for Single Search

4.3 Layout Design

The layout result showed the important part of the website, which as follows:

- Main Page
- Buy Page and Rent Page
- Sell and Rent Form
- Search Page
- Search Result Page
- Confirmation of Submitted Page
- Virtual Home Page
- Booking Pages

In this part, the author will give an explanation on how the website works and interact with users.

I. Main Page

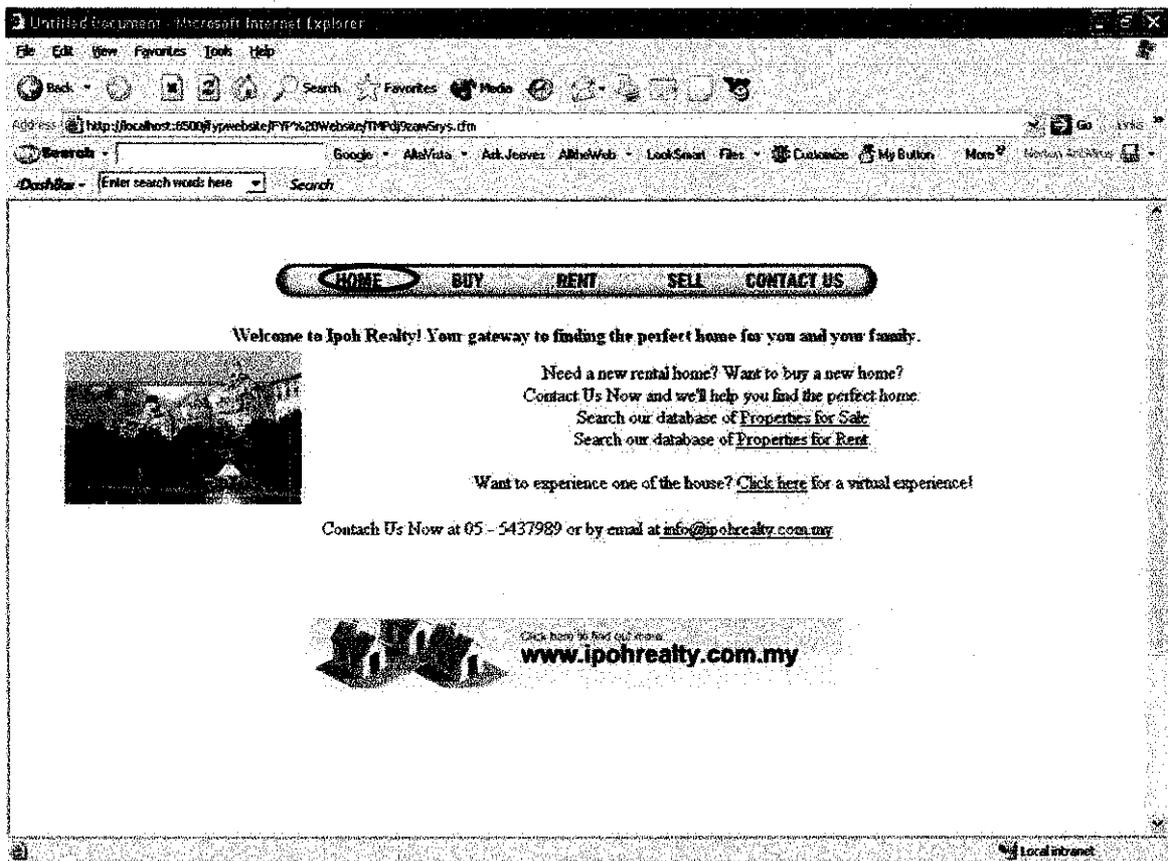


Figure 4.3: Main Page

There is a main menu at the top of the page that will direct users to the main page, the search page for buying and renting property, the page for selling property and how to contact the real estate agency. The aim of the website is to provide users with the information of houses available for sale and rent around Ipoh town. When a user clicks on the "HOME" button, it will bring user back to the main page.

II. Buy Page and Rent Page

From the main page, user can go into the “*buy page*” and the “*rent page*” to look for the property available for sale and rent. To go the pages, users can click on “BUY” button if they wish to search for houses available for sale, or click on “RENT” button if users wish to search for houses available for rent. The user will be linked to the respective website based on the button that they clicked.

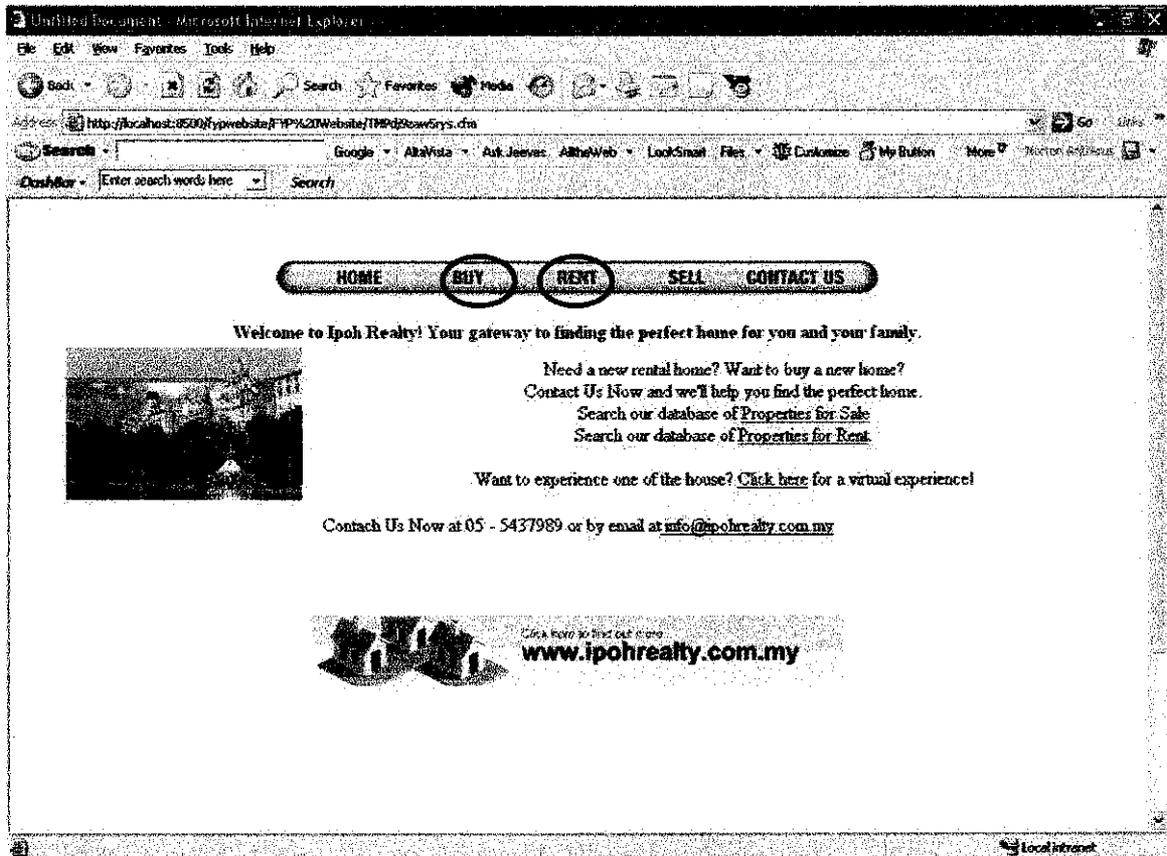


Figure 4.4: “BUY” and “RENT” button

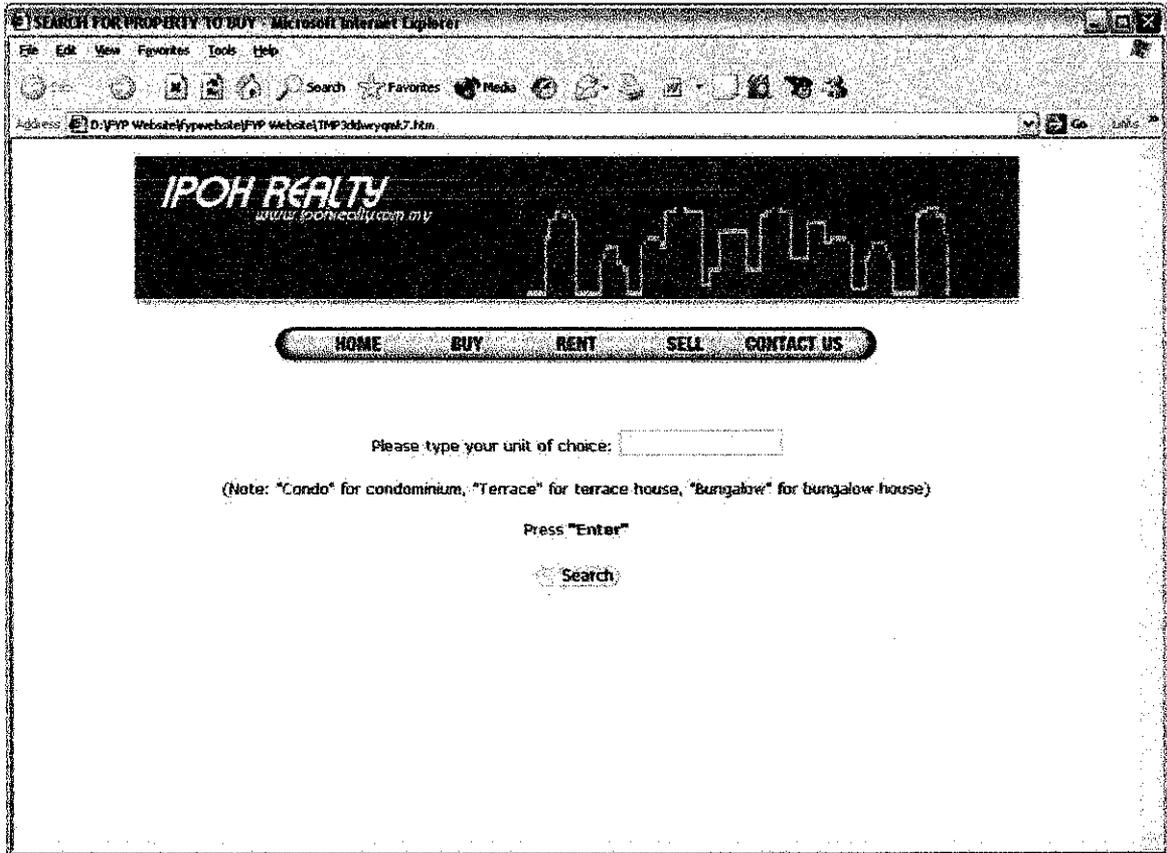


Figure 4.5: Search Page

This is the interface for the search page. Both “*BUY*” and “*RENT*” page have the same interface. Users need to type in the type of house that they wish to look for. In the interface above, the user typed in the word “terrace”. After that, the users need to press “*Enter*”. When users pressed “*Enter*”, the page will be directed to a new page where the results will be displayed. The interface of the result is shown at the next figure.

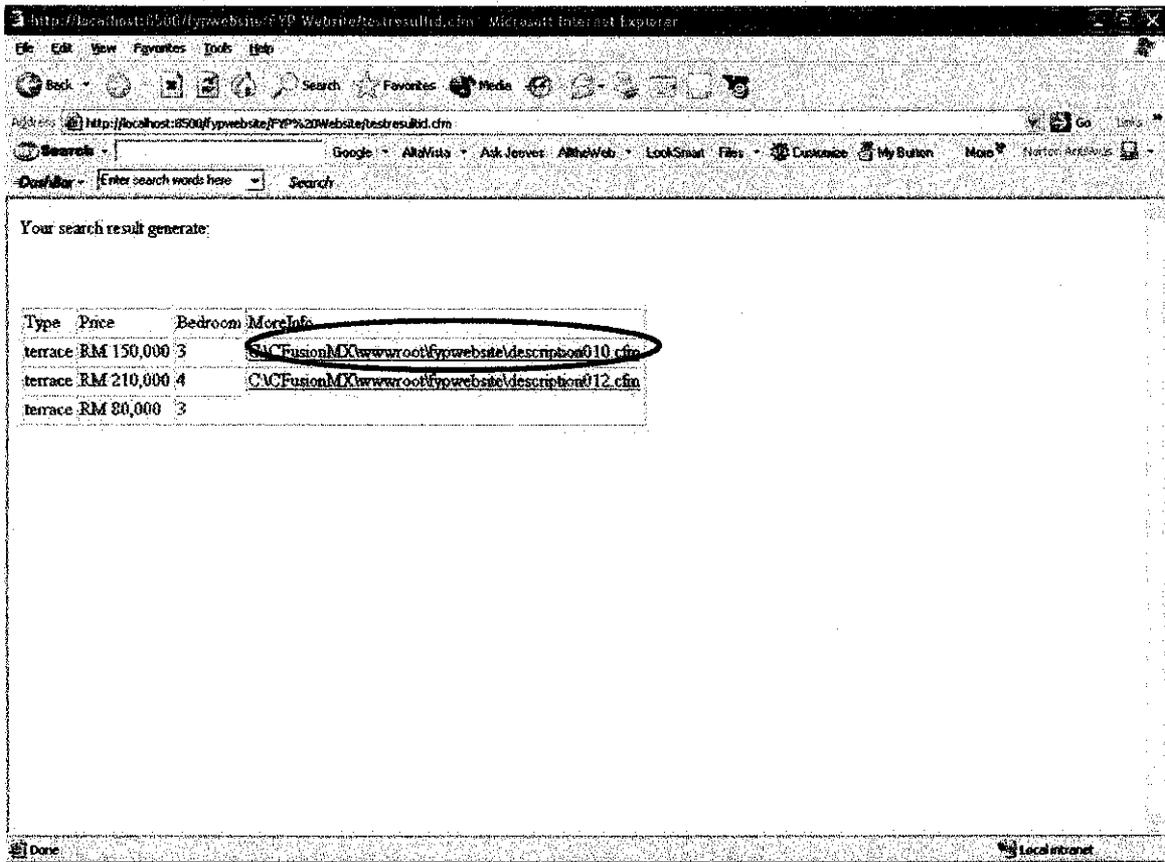


Figure 4.6: Result Page

As shown in the figure above, the result displayed the type, price, and number of bedrooms of the house available. For more description of the house, users need to click to the link provided under “MoreInfo” column. The user shall be linked to the web page of the respective house that contains further information about the property.

An example of the description is shown as below.

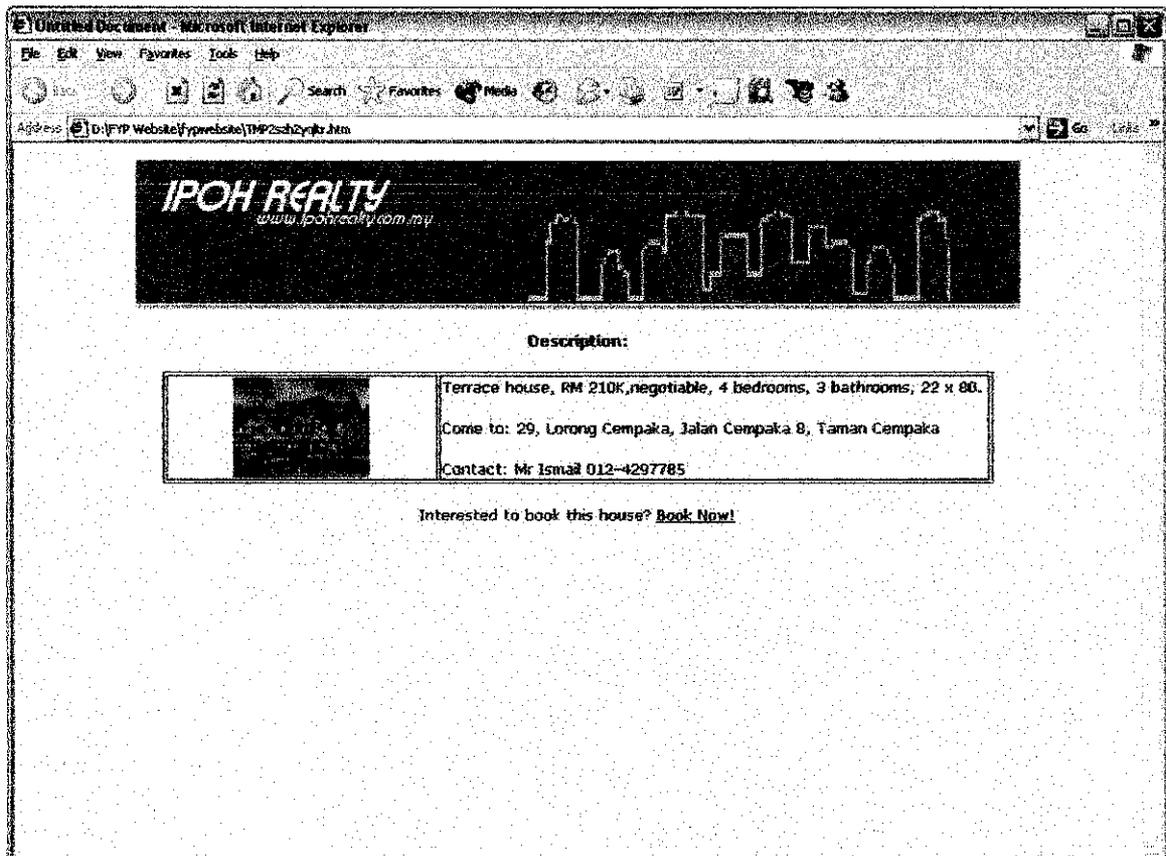


Figure 4.7: Description of the house

III. Sell Form Page

Although the main function of the website is to provide information on the houses available for sale and rent, it also accept request from users to sell and to rent their property. For users who wanted to sell their property, they can go to the “sell” page by clicking on the “Sell” button on the main menu.

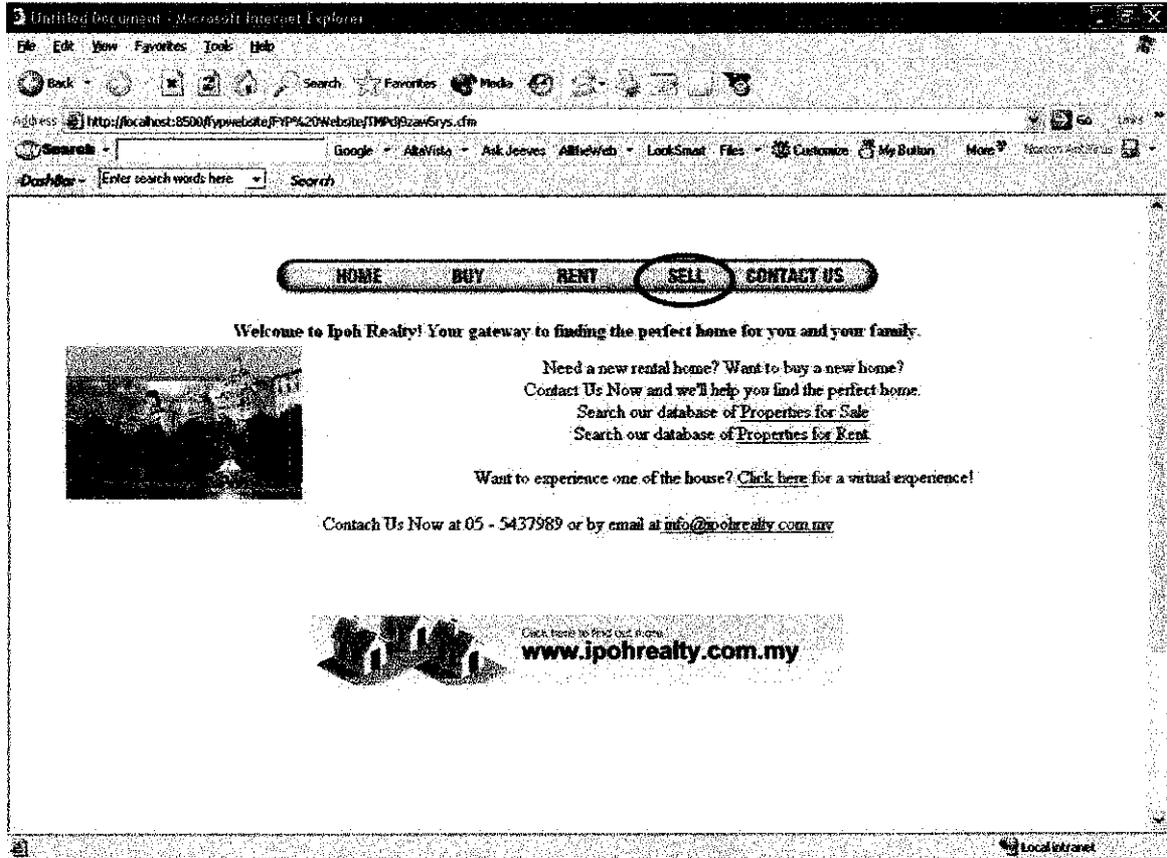


Figure 4.8: Sell Button

The sell page will display the form for users to complete about the details of the property that they want to sell. The information that need to be filled in is the address, unit type, number of bedrooms, number of bathrooms, approximated square footage, whether the unit is being furnished or not and is the unit currently being occupied or not. The user is asked to mention the price they want to set and some description about the property. Users are asked to enter their personal details for further contact by the company. The interface for this form is as follow:

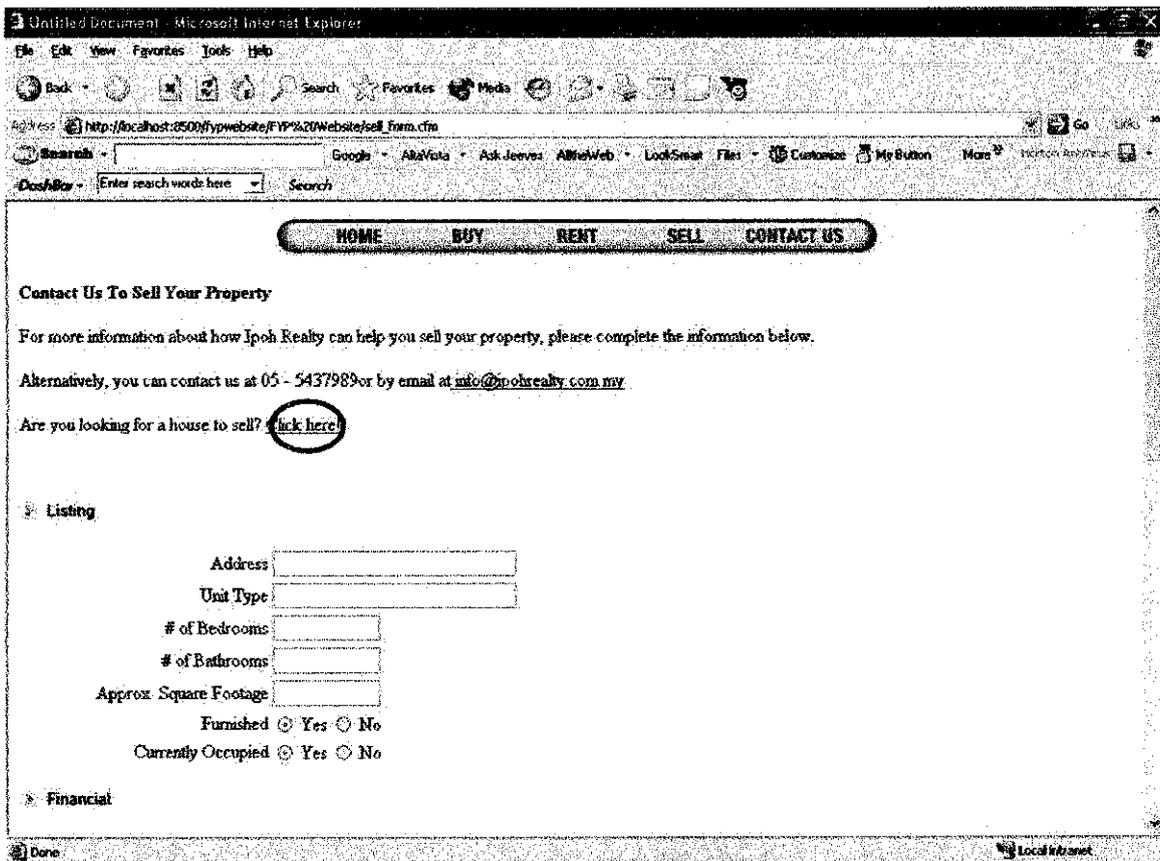


Figure 4.9: Sell Form

If users want to go to the buy search page, users can do so by clicking on the link marked above.

IV. Rent Form Page

For users who wish to rent their property, they will be directed to the rent form page from the rent search page. A link is provided at the later page. Users are not directly linked from the main menu at the top of the page is because the main purpose of the website is to provide information on the houses available for rent and sale. The form is used only to gain information from other users who want to rent their property. The information then will be processed and will be added to the database.

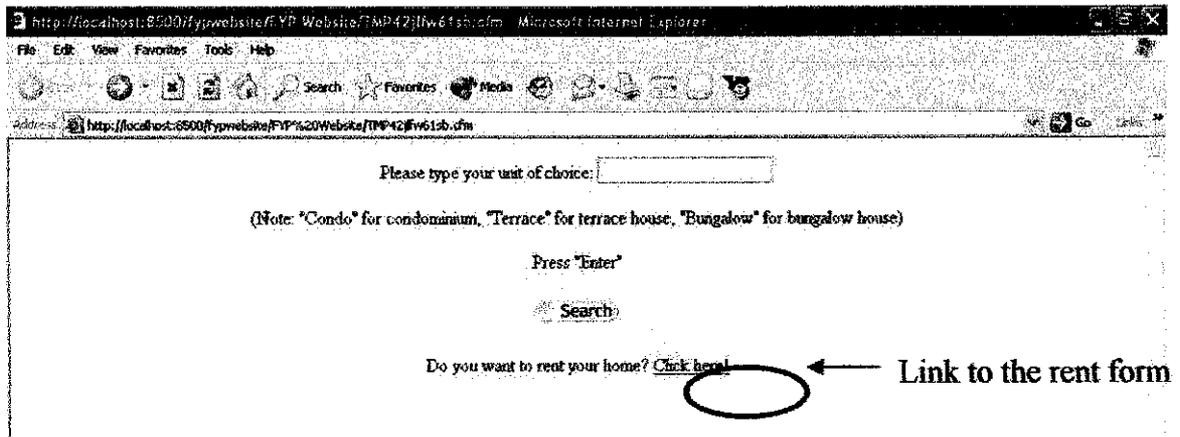


Figure 4.10: Link to the Rent Form

An example of the rent form is shown below. The particulars need to be filled is the same as in the sell form.

The image shows a screenshot of a Microsoft Internet Explorer browser window. The address bar displays a local file path: [D:\FVP Website\IMP7ckskw1et.htm]. The page content is as follows:

Contact Us To Rent Your Property

For more information about how Ipoh Realty can help you rent your property, please complete the information below.

Alternatively, you can contact us at 05 - 5437989 or by email at info@ipohrealty.com.my

Listing

Address:

Unit Type:

of Bedrooms:

of Bathrooms:

Approx. Square Footage:

Furnished Yes No

Currently Occupied Yes No

Financial

Asking Price:

Description And Comments

Figure 4.11: Rent Form

V. Confirmation of Submitted Page

When users submitted the sell and rent form, they will be directed to a new page that will tell the users that the form has been sent and will be processed. This is important as to ensure users that they have submitted the form correctly.

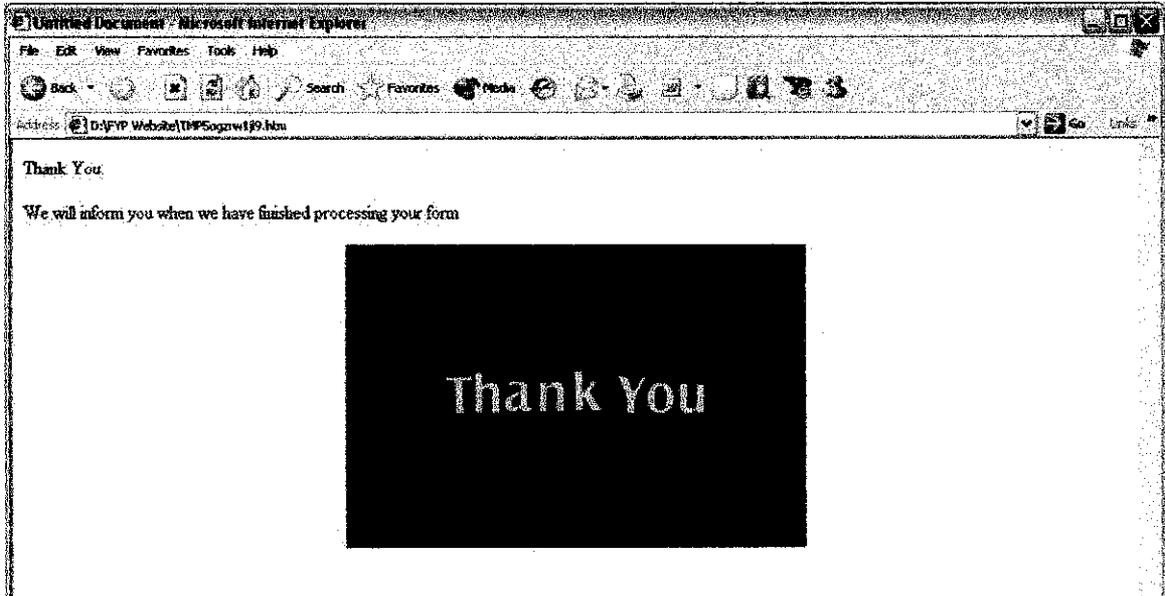


Figure 4.12: Confirmation of Submitted Page

VI. Virtual Home Tour

The website has a VR capability that provides a virtual walkthrough of a house. Users can go to the webpage by clicking on the link on the main as shown below.

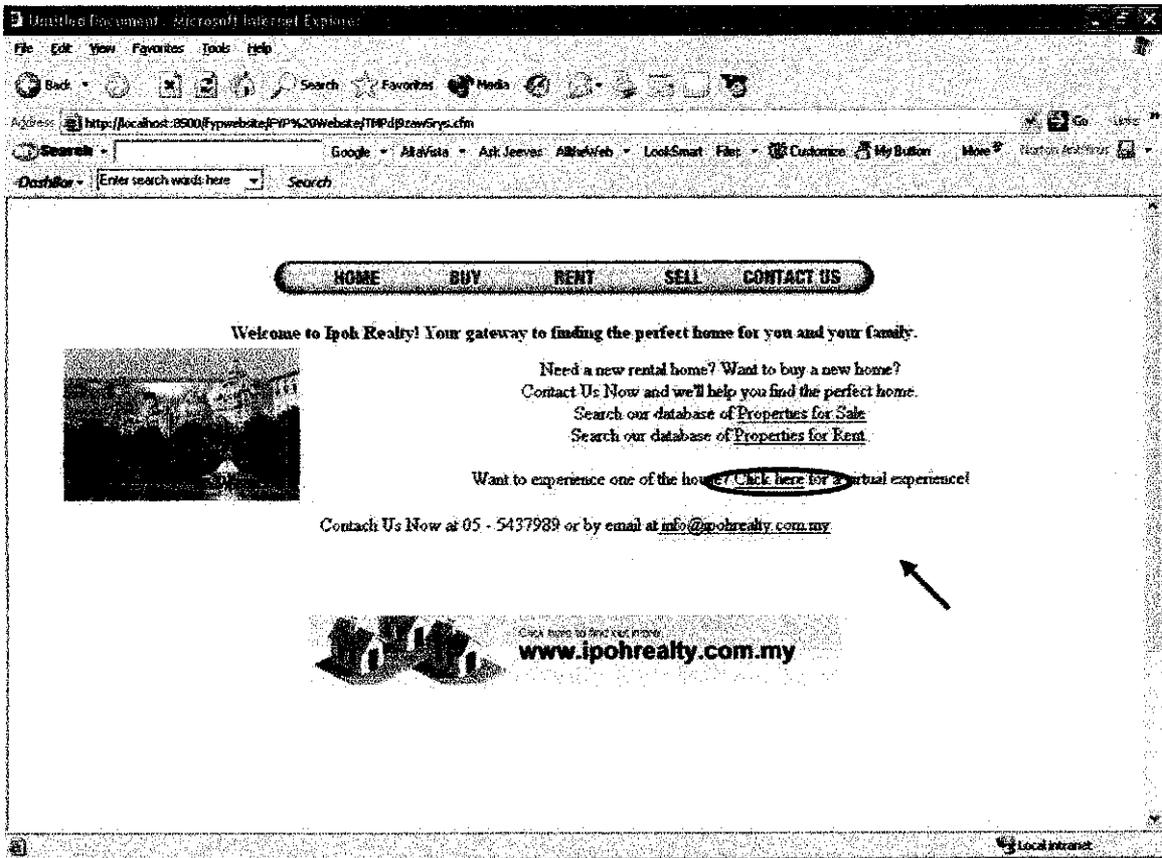


Figure 4.13: Link to the Virtual Tour

Or users can also experience a sample of a virtual show house from one of the house details' page. To do this, user needs to click on the link as below.

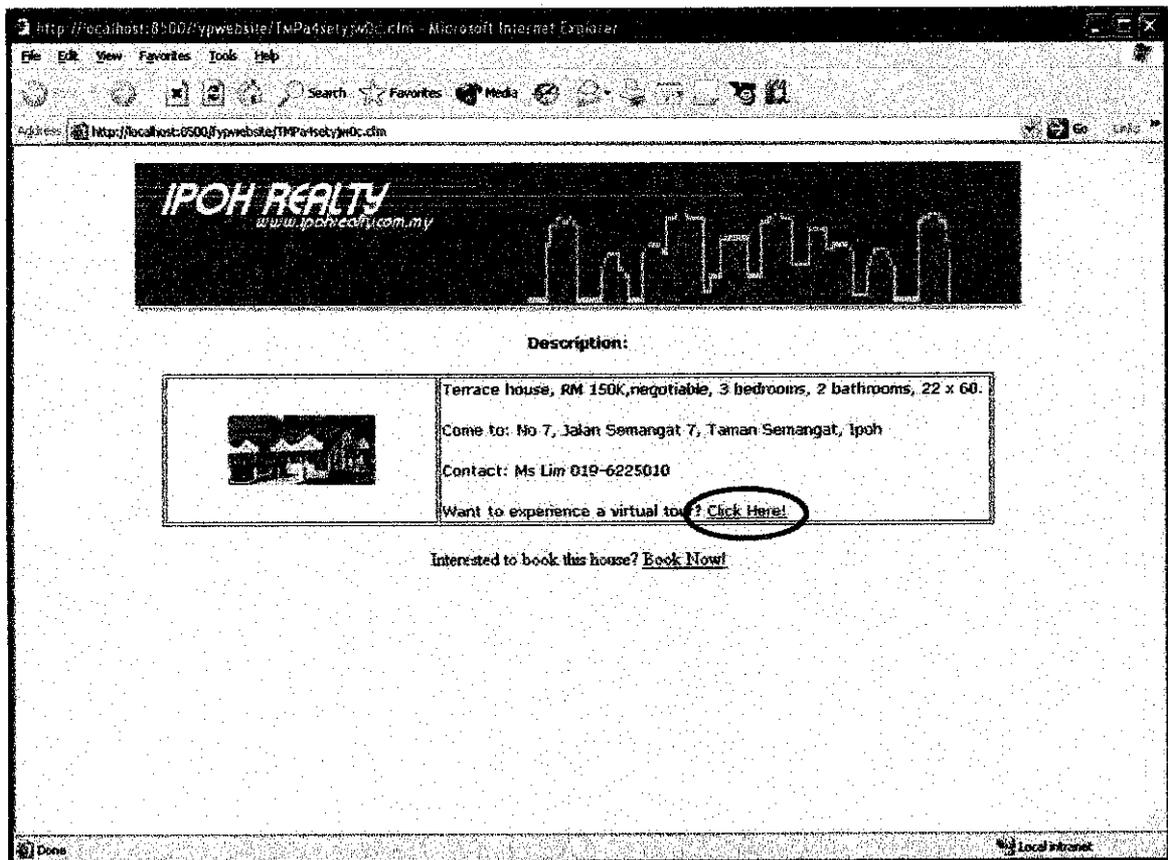


Figure 4.14: Link to Virtual Tour from a House's Description Page

After clicking on the link, a new window will appear. The virtual house will be showed inside the new web browser. Users can navigate through the house by clicking on the button the left hand side of the browser.

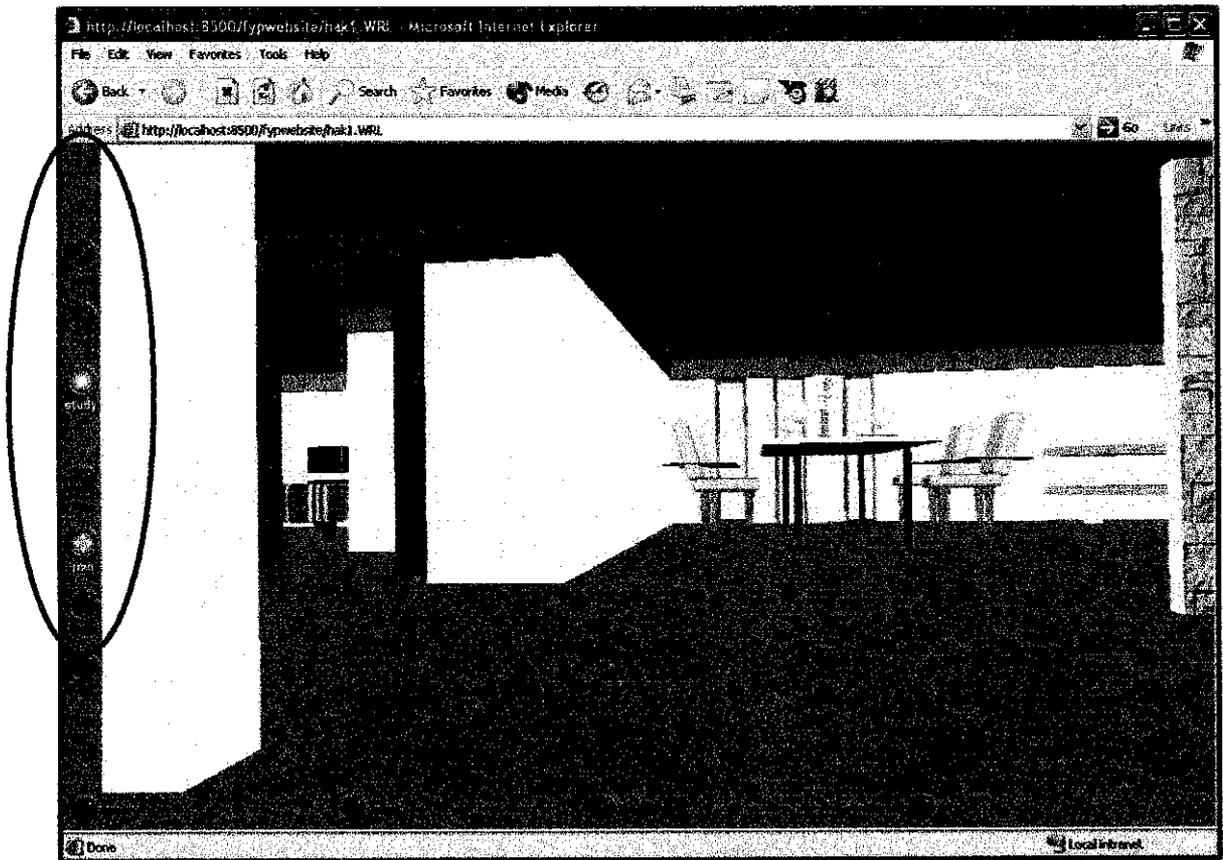


Figure 4.15: Virtual Show House Tour

VII. Book a House

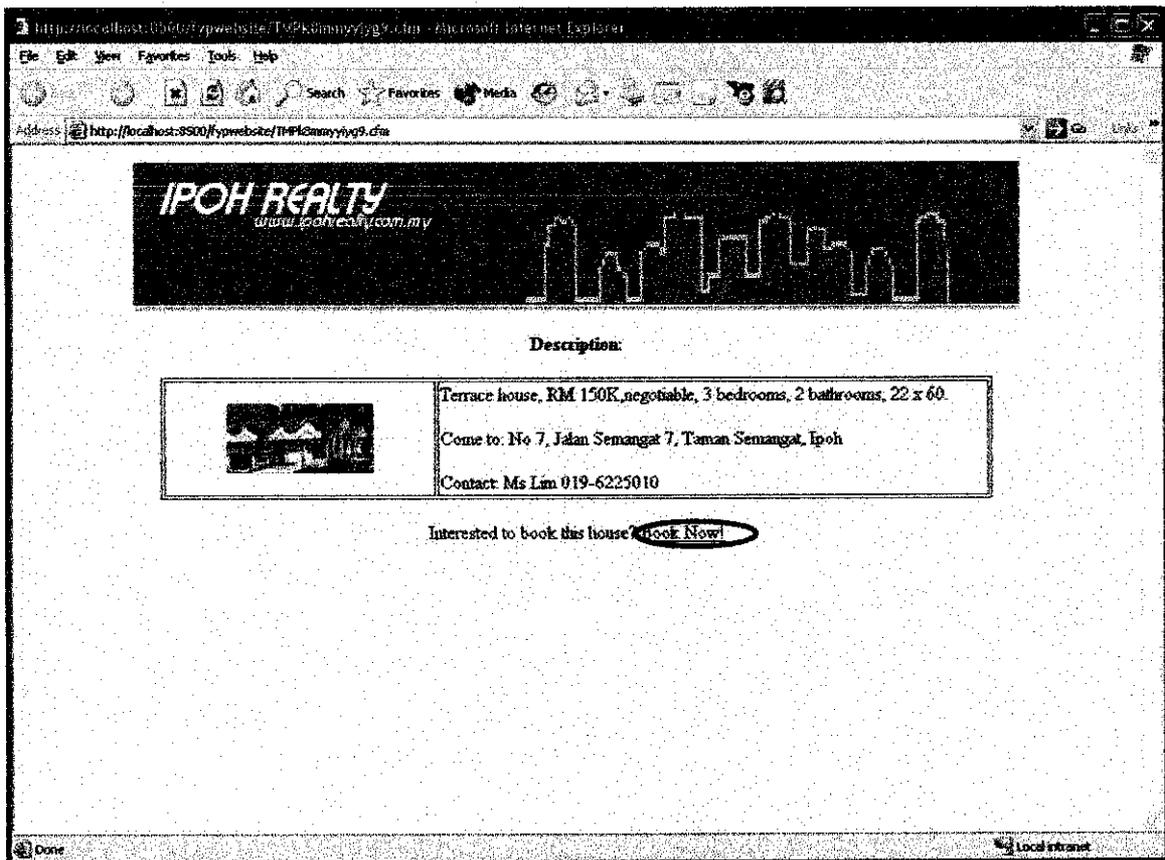
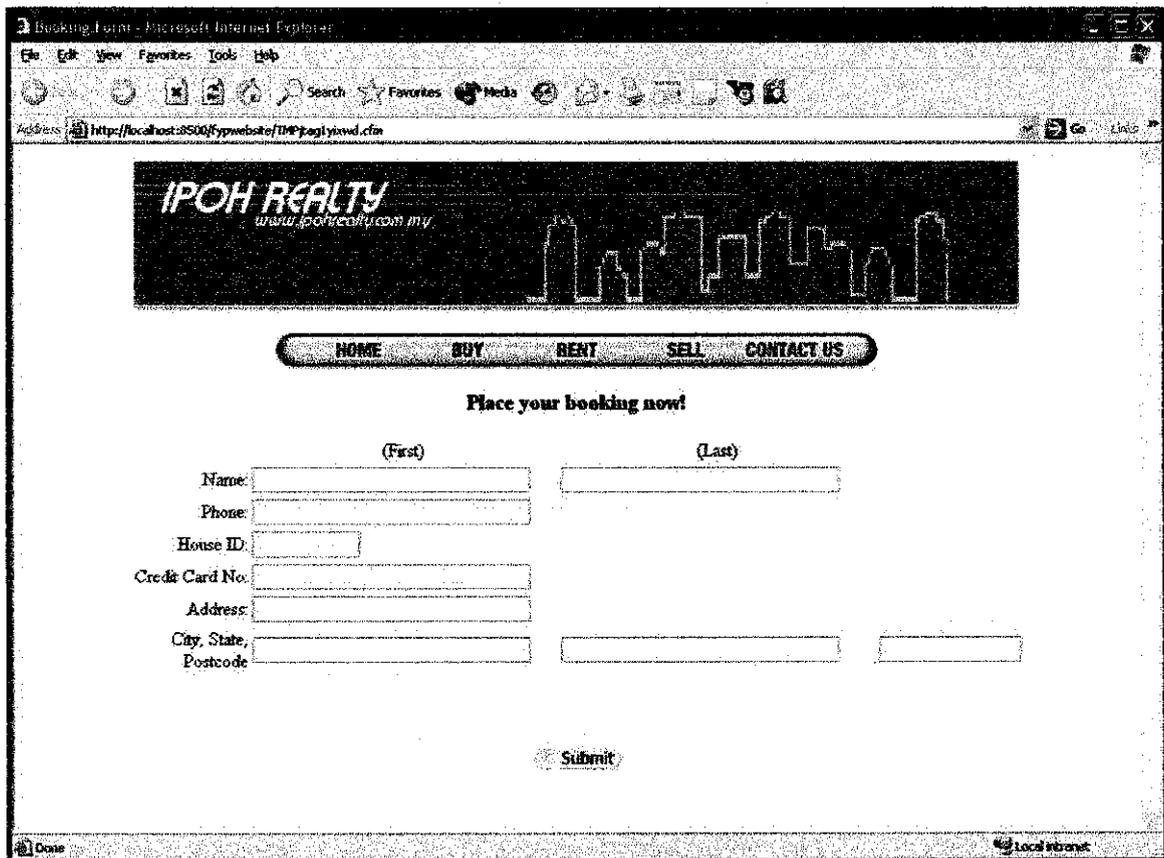


Figure 4.16: Link to Book a House

When user views a house description, they can opt to place their booking by clicking on the link “Book Now!” After user clicked on the link, user will be brought to a new page that requires users to fill in their details in the form provided.

VIII. Booking Form



The image shows a screenshot of a web browser displaying the IPOH REALTY website. The browser's address bar shows the URL: `http://localhost:8500/fypwebsta/IDP%20eglyswd.cfm`. The website header features the IPOH REALTY logo and the URL `www.ipohrealty.com.my`. Below the logo is a navigation menu with buttons for HOME, BUY, RENT, SELL, and CONTACT US. The main content area is titled "Place your booking now!" and contains a form with the following fields:

- Name: (First) (Last)
- Phone:
- House ID:
- Credit Card No.:
- Address:
- City, State, Postcode:

A "Submit" button is located at the bottom of the form. The browser's status bar at the bottom shows "Done" and "Local intranet".

Figure 4.17: Booking Form

Users are required to fill in their particulars in the form. After finish filling in the form, user needs to click on the “Submit” button.

IX. Check Details Entered

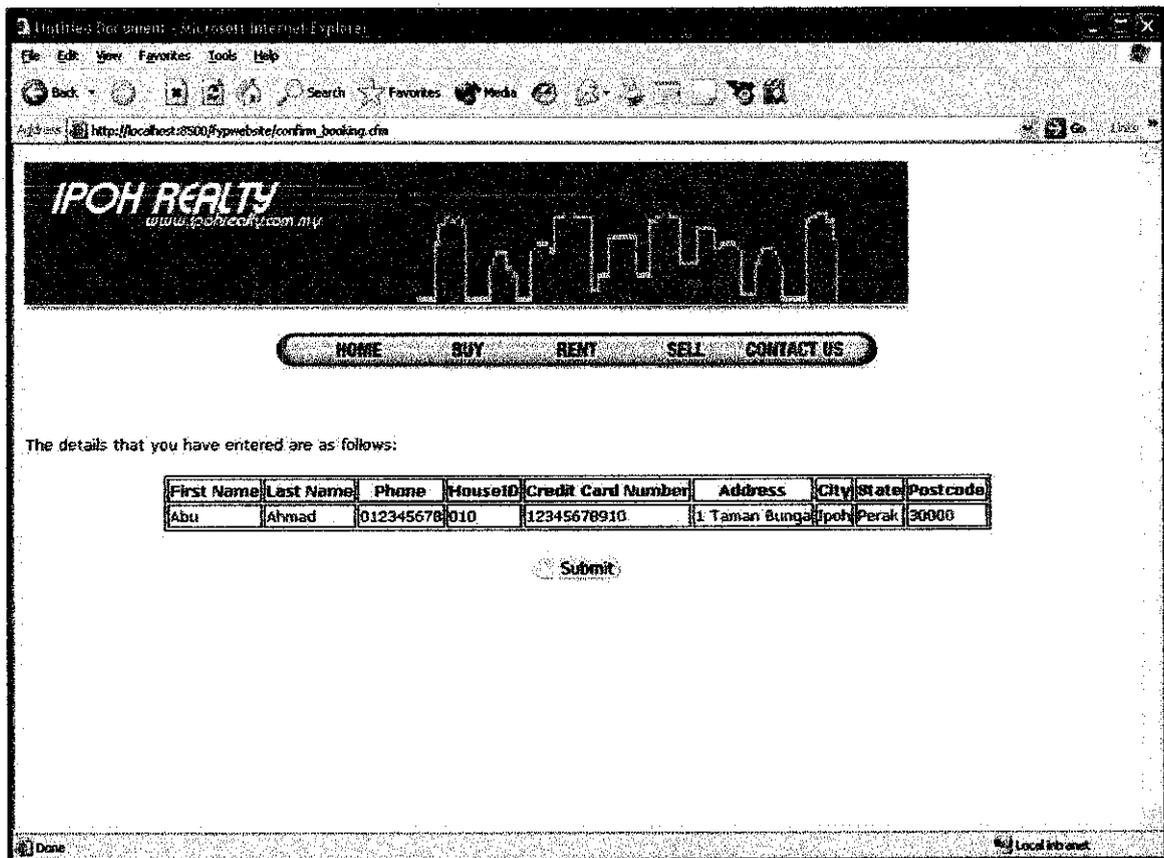


Figure 4.18: Check Booking Details Entered

The page will display the details that have been entered by users in the previous page. Users can check the correctness of the details. If there are any corrections need to be made, user can go back to the previous page by clicking on the browser's back button.

X. Submit Booking Form

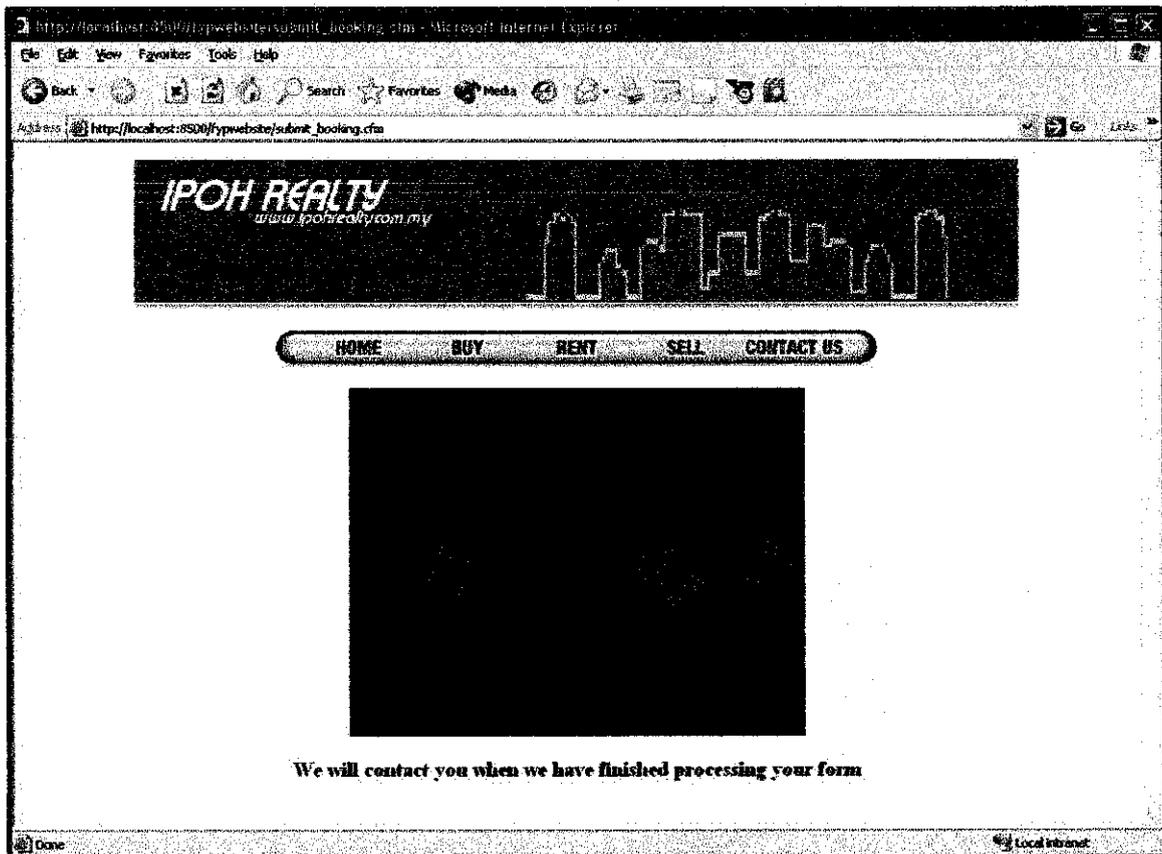


Figure 4.19: Confirmation of Submitting Booking Form

When users have confirmed the details by clicking the submit button in the previous page, they then will be directed to a new page that will tell the users that the company will contact the users when they have finished processing the form.

4.4 Post – Test Evaluation

A post test evaluation has been done to get the users' feedback on the interface. A sample of the evaluation form is available in Appendix 4-3.

The data that have been collected are then converted to statistical data and chart for easier interpretation and evaluation. This is the result for the post- test evaluation.

Attributes	N	Min	Max	Sum	Mean
1) Interface Comment	10	6	8	73	7.3
2) Linking Problem	10	9	10	94	9.4
3) Loading Time	10	6	8	80	8
4) Features	10	5	7	63	6.3
Valid N					10
Overall Mean					7.75
Range					3.1

Table 4.1: Post Test Result

The histogram for the result is shown in the figure below:

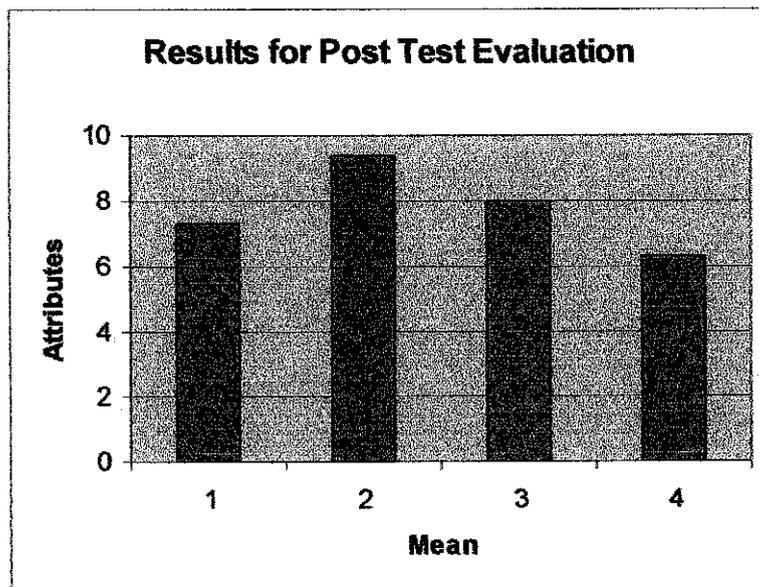


Figure 4.20: Post Test Evaluation Histogram

Hypothesis of the project:

The evaluation: Improvement on the features of the website

H₀: There are no improvements by providing additional features

H_A: Improvements by adding additional features

From Table 2, the minimum mean for the post – test evaluation is 6.3 while the maximum mean is 9.4. The range, R for the result is 3.1 and the overall mean, M is 7.75. The hypothesis can be accepted only if $R > M$. From the result, $M > R$. Thus, the hypothesis cannot be accepted.

Form the result, the hypothesis (*H_A: Improvements by adding additional features*) can be said as false. 7 out of 10 evaluators said that the website needs additional features so that it can help to provide better services to its users. 4 of the evaluators said that the website should enable users to enter more than one search criteria. 80% of the evaluators feel that they would like to try kind of service.

An interview session has been conducted to ask for the evaluators on how the website offers better service. 4 out of 10 evaluators said that the website should have a link with the local bank in order to have information on the available loans and mortgage plan offered. The interaction with the virtual home should be expanded as this will allow the users to experience the home as it is real by using tracking equipment, for example using the Head Mounted Display (HMD).

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Summary

The project is about developing a real estate website that takes advantage of web capability whereby user has the opportunity to have a virtual tour of one of the show house. Users also can search for available homes available for sell and rent in the website. Those who wish to sell their property can do so by submitting the details of the property.

The project's objective is to design a website for real estate industry, to analyze the potential and suitability of E-Commerce in the real estate industry and to evaluate the potential of E-Commerce in the real estate industry. Real estate industry has high potential especially in Malaysia. With technological advancement, real estate agency can gain competitive advantage by moving their business operations online. There are several features that make e-commerce the latest buzz in the industry. It provides a new way of communication, new means of distributing information, enables information reach accessible from any part of the world, it facilitates the role of a firm as customer as well as a producer of retailer of goods and services, and its large economies of scale.

This will help not only the real estate agencies, but also Malaysian society as well. It can help to shift the way Malaysians' shop and promoting internet shopping as a way of life. Most Malaysians are still reluctant to do online shopping although many of them are interested in trying it. Several reasons contributed to this; security issues, vendor reputation, attitude problems, the preference to examine products, lack of IT knowledge, payment options available, and personal computer cost.

5.2 Recommendation

In order to make the website more interactive and provides better opportunities for the real estate agents and consumers, several advancements can be implemented. Among the enhancements that can done is providing online forum, real time auction, and enable online transactions.

- **Online forum**

An online forum will enable the real estate agents and users communicate effectively and in real time basis. To enable this, a messenger system can be developed. Users can do discussion on real estate issues and the agents can provide better services to customers by responding to their queries. This can provide interactions between the users and the agents are they can communicate on a real time basis.

- **Real time auction**

Through this auction sites, Internet users can assume the role of either a bidder or a seller. As a seller, user can post the item they wish to sell, set the minimum price required to sell the property and a deadline to close the auction. The forum should also enable the seller to add features such as a photograph and description of the property. As bidder, users may search for the potential property by joining the auction that currently taking place. They can view the bidding activity and place a bid. The website should apply a system where when users submit a maximum bidding price, an automated system will continue the bidding.

- **Develop multiple search method**

As the current website is only providing search method based on a single attribute, for future expansion the website should be able to provide search result based on multiple criteria. For example, users can key in the type of the house, price range, and the number of bedrooms. The database will generate the result based on the data key in by the users.

- **Enable online transactions**

The website can implement online transaction whereby users can do their transaction over the website. In order to make it a reality, several payment methods should be considered. Payment option that can be made available is Secure Electronic Transaction (SET). In 2000, a project called The MEPS Secure Electronic Transaction (SET) Payment Gateway was introduced. This was the first Malaysian experiment in a series of worldwide pilot projects planned to test out the SET protocol. The SET system was developed in collaboration with Visa International, MasterCard and other industry professionals. It provided an open, multi party payment mechanism for conducting secure bank/credit card transactions over open network. During that time, more than 20 merchants are currently involved with the SET payment gateway and 20,000 digital certificates were ready for immediate issues.

- **Mortgage and Home Financial Plan**

The company can also collaborate with banking institutions that offers mortgage and home financial plan. This can help the agency to add other services to its website. For example, the agency collaborates with Citibank to offer mortgage plan to users who are buying a property from the website. The website also can provide information on other mortgage plan and financial plan available in Malaysia to help users to look for the right plan for them.

- **Advertising Banner**

The website can add advertising banner to its website. This can help in terms of increasing customers' recognition of the company, exposure and revenues. The company can advertise related businesses in its website, like interior design service for example. Through this the company can generate more income to fund its operation by placing advertisement in its website.

- **Employ an Affiliate Program**

Affiliate program is a partnership whereby a company pays its affiliates (other companies or individuals) for pre-specified action taken by visitors who click through from an affiliate program to a merchant site. . It can help to extend sales force, acquiring more traffic to the website, awareness, leads and sales. The company can act as the merchant as put its banner advertisement on the affiliate's web site.

- **Link to Legal Websites**

The website should provide links to several legal websites that offers consultation service and information to the customers on the legal issues regarding real estate. From the links, users may seek for lawyers that can help them to deal with the real estate agents. To find information on the matters that need to be looked for in real estate, for example the legal issues that need to be taken care of in selling a house.

5.3 Conclusion

In order to make all these succeed, we must develop some understanding of what drives technological innovation in the first place. Technological is at its peak when consumers tastes for an improved quality of life outrun the existing capability of the economic system to provide it in an affordable way. Malaysia has a huge potential for Internet procurement. For Malaysians, it will be hard for them to adapt to online shopping due to security issue and cultural inertia. The important thing in e-commerce is to provide a secured transaction online. The attitude of Malaysia community need to be changed and this will be the critical challenge to all. The government is heavily promoting the importance of IT by making great strides in education and training. Various ways have been done by the government through one of its ministry, Ministry of Energy, Water and Communication, to bring closer the gap between he information rich and poor. The latest gesture made is developing a rural internet centre. Rural Internet Centre (RIC) was formed to make sure that the rural area will also get some exposure to the Internet. The introduction of lower price PC hopefully will enable more people to have a PC at their home.

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APPENDICES

APPENDIX 2-1

Major Internet and Web Characteristics and Implications for Real Estate Firms

Internet/Web Characteristics	Examples of Real Estate Firms	Advantages/Opportunities	Challenges to Existing Firms
Interactive Search Capability; Graphics Capability; Virtual Tours; Geographic Outreach	Listing Brokers, Vacation Rentals, Architects, Relocation Services	Improves communication within firms and with customers or clients. Expands geographic range within which a firm can operate	May reduce value-added of existing offices
Creation of Online Communities and Markets	Project Finance; Real Estate Investment; Brokerage	Increases market efficiency and depth; B2B coordination for new kinds of transactions	Low Barriers to Entry; Increase in competition; May be a challenge to intermediaries such as brokers
Online Tracking and Analysis	Consulting firms; Property Management	Product/service information can be provided at a depth and complexity that is not possible in other media (newspaper, tv)	Information providers such as real estate consultants may face competition from low cost Web services
Web-Based Interactive Transactions	Project Management; Developers; Property Management; Mortgage Firms	Speed, low marginal costs, and interactive component. Firm may be able to change staffing needs or the geographic location of staff	Gives customers more flexibility where to locate; Issues of security and privacy; May change location needs; Potential shift from retail to warehouse and from central to peripheral

APPENDIX 4-1

PRE TEST EVALUATION QUESTIONNAIRE

Please answer the following questions by checking the check box. Your cooperation is highly appreciated

1) Have you ever use internet to do a survey before you purchase a product?

Yes No

If no, why? _____

2) Have you ever tried to purchase a product on the Internet?

Yes No

If no, why? _____

3) Do you think Internet is an effective medium to market a product?

Yes No

If no, why? _____

4) Have you ever come across website with VR capability in Malaysia?

Yes No

5) Have you ever come across a real estate company that provides it services online?

Yes No

6) Will you consider selling or buying or renting a house via internet?

Yes No

If no, why? _____

7) Do you think that this kind of service will take full use of internet capabilities?

Yes No

If no, why? _____

8) Will you consider trying this kind of service?

Yes No

If no, why? _____

APPENDIX 4-2
PRE – TEST EVALUATION RAW DATA

1. Have used to do a product survey before purchasing a product

	Data
Evaluator 1	Yes
Evaluator 2	Yes
Evaluator 3	Yes
Evaluator 4	Yes
Evaluator 5	Yes
Evaluator 6	Yes
Evaluator 7	No
Evaluator 8	Yes
Evaluator 9	Yes
Evaluator 10	Yes

2. Have tried to purchase a product on the Internet

	Data
Evaluator 1	No
Evaluator 2	No
Evaluator 3	No
Evaluator 4	No
Evaluator 5	Yes
Evaluator 6	No
Evaluator 7	No
Evaluator 8	No
Evaluator 9	No
Evaluator 10	No

3. Agree that Internet is an effective medium to market a product

	Data
Evaluator 1	Yes
Evaluator 2	Yes
Evaluator 3	Yes
Evaluator 4	Yes
Evaluator 5	Yes
Evaluator 6	Yes
Evaluator 7	Yes
Evaluator 8	Yes
Evaluator 9	Yes
Evaluator 10	No

4. Have come across website with VR capability in Malaysia

	Data
Evaluator 1	No
Evaluator 2	No
Evaluator 3	Yes
Evaluator 4	No
Evaluator 5	No
Evaluator 6	Yes
Evaluator 7	No
Evaluator 8	No
Evaluator 9	Yes
Evaluator 10	No

5. Have come across a real estate company that offers online service

	Data
Evaluator 1	No
Evaluator 2	No
Evaluator 3	No
Evaluator 4	No
Evaluator 5	Yes
Evaluator 6	No
Evaluator 7	No
Evaluator 8	No
Evaluator 9	Yes
Evaluator 10	Yes

6. Willing to consider selling or buying or renting a house via Internet

	Data
Evaluator 1	Yes
Evaluator 2	Yes
Evaluator 3	Yes
Evaluator 4	Yes
Evaluator 5	Yes
Evaluator 6	Yes
Evaluator 7	No
Evaluator 8	Yes
Evaluator 9	No
Evaluator 10	Yes

7. Agree that online real estate service will take full use of Internet capabilities

	Data
Evaluator 1	Yes
Evaluator 2	Yes
Evaluator 3	Yes
Evaluator 4	No
Evaluator 5	Yes
Evaluator 6	Yes
Evaluator 7	No
Evaluator 8	Yes
Evaluator 9	Yes
Evaluator 10	Yes

8. Willing to try this kind of service

	Data
Evaluator 1	Yes
Evaluator 2	Yes
Evaluator 3	Yes
Evaluator 4	Yes
Evaluator 5	Yes
Evaluator 6	Yes
Evaluator 7	No
Evaluator 8	Yes
Evaluator 9	No
Evaluator 10	Yes

APPENDIX 4-3
POST TEST EVALUATION FORM

Evaluation Form										
Observer Name:	Sharifah Shahrizad Syed Mustaffa	Date:	9/4/2004							
Program Name : Ipoh Realty Website										
Instructions:	Please rate the interface by circling the number On rate 1 to 10, please rate the following area 1 = worst, 10 = Good									
Tester Name										
Interface Comment	1	2	3	4	5	6	7	8	9	10
Linking Problem	1	2	3	4	5	6	7	8	9	10
Loading Time	1	2	3	4	5	6	7	8	9	10
Features	1	2	3	4	5	6	7	8	9	10

Please give your suggestions to improve the website:

THANK YOU!

APPENDIX 4-4
POST TEST EVALUATION RAW DATA

1. Interface Comment

	Data
Evaluator 1	7
Evaluator 2	8
Evaluator 3	7
Evaluator 4	6
Evaluator 5	7
Evaluator 6	8
Evaluator 7	7
Evaluator 8	8
Evaluator 9	8
Evaluator 10	7
Sum	73
Mean	7.3

2. Linking Problem

	Data
Evaluator 1	9
Evaluator 2	9
Evaluator 3	9
Evaluator 4	10
Evaluator 5	10
Evaluator 6	9
Evaluator 7	10
Evaluator 8	9
Evaluator 9	10
Evaluator 10	9
Sum	94
Mean	9.4

3. Loading Time

	Data
Evaluator 1	7
Evaluator 2	8
Evaluator 3	7
Evaluator 4	7
Evaluator 5	8
Evaluator 6	6
Evaluator 7	7
Evaluator 8	8
Evaluator 9	7
Evaluator 10	8
Sum	80
Mean	8

4. Features

	Data
Evaluator 1	7
Evaluator 2	6
Evaluator 3	5
Evaluator 4	6
Evaluator 5	6
Evaluator 6	7
Evaluator 7	7
Evaluator 8	6
Evaluator 9	6
Evaluator 10	7
Sum	63
Mean	6.3