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A Proposed Implementation and Design of Web-Based Property Information System for Malaysian Market

Mustaffa Kamal Mohd Nor
Mohamad Nizam Ayub
Foo Yuke Shean

ABSTRACT

Currently, some people are consuming a lot of time, cost and effort in seeking and buying a property for example a house. Potential house buyers usually approach the housing developers by visiting the sales offices to look for suitable house for their needs. But, it is not always easy. Looking and searching for information sometimes may be so tedious and difficult. Having the Internet available at our fingertips can provides the house buyers the convenience and more importantly can save time and their money. Therefore, this paper will discuss a web- based property Information System called Web House. This Web House is a Web-based housing Information system that provides information about new residential and housing projects. This information system is a database-driven computerized and Web-enabled system that provides information about housing projects such as house models, price ranges, specifications and descriptions of each house, etc. Web House applies the client-server architecture. The overall system development strategy of Web House is using the Waterfall Development Life Cycle Model with prototyping. The Web server of Web House is the Internet Information Server (IIS) running under the Window NT 4 Server operating system, whereas the database server is the SQL server. Active Server Pages (ASP) is the main programming language technology to develop the system based on the system requirements.

Keywords: *Web-based, Information System, Web House, Property*

Introduction

This information system (WebHouse) is a database-driven computerized and Web-enabled system that provides information about housing project, such as house models, price range, locations, specifications and descriptions of each house, details regarding the housing developer etc. throughout our country. The focus is put on the market of the new launched and upcoming housing projects and properties. Besides that, other housing-related information are published and provided. The main purposes of WebHouse are: first, it serves as a marketing and administration tool for housing developers, and second, it serves as a one-stop information site that provides housing information for potential house buyers. Housing developers provide the information, either directly or through the system administrator. WebHouse gathers a number of housing developers and they are called the 'associate housing developers', which are the main business partner of WebHouse. A Web-based housing information system would be a good marketing and administration tool for housing developers to improve their business. This one-stop site would provide a lot of competitive advantages to housing developers and potential house buyers. Currently, people are consuming a lot of time and effort in seeking and buying a new house. Potential house buyers usually approach the housing developers by visiting the sales office. Recently during the launch of new housing scheme in Ara Damansara (Subang), purchasers started lining up at the UEP head office in Taipan USJ for a few days before the launch to snap up unit, but at last a lot did not get any. The rational behind the development is to cater the needs of house hunters in searching and buying a suitable new house, assist the housing developers to advertise and to market residential property on Web and to conquer the inadequacy of one-stop housing site.

How would this system help to cope with the current problem context? This web-based information system invites and assembles housing developers throughout our country to provide the latest information to the system. WebHouse provides a search engine for house hunters to seek for their suitable houses. The search results show all the matched records clearly and there are links to give further information about each house. All related information about a house including pictures, floor plans and 3D view, and also information regarding the housing developer are published in details. Potential buyers have the opportunity to make detailed comparative study of the houses. They can make comparisons of the houses to buy based on categories, locations, prices, designs, developers and also their own level of affordability.

Those who are really interested or plan to buy a house soon can register online as a member of WebHouse, so they can make preview of the latest suitable properties available through the column of 'new house alert'. What they need to

do is just filling up online forms to register and to input the criteria of their choice of new house. Consequently, the column of 'new house alert' would always publish the suitable new properties based on the choice of customers, and these registered customers' email addresses are going into all developers' mailing list. Housing developers and system administrator keep record of these registered potential buyer and they can use the mailto-based links provided to contact the potential house buyers if there is any new launched or new housing project coming up. The emailing service links maintain and manage the bi-directional interaction between registered potential house buyers, authorized housing developers and the system administrator. Visitors of WebHouse register in two modes: first, register as an organization, which is for those invited housing developers, and second, register as an individual, which is for the potential house buyers. For authorized housing developers, they play important roles as the main business partner to submit new project and property into the system to be published and update records. Therefore, they are the main information provider besides the system administrators.

Besides that, the system provides housing-related information and guidance like housing loan, legal service, guidance to buy a house and so on. Online loan calculator, which is called the Mortgage Amortization, is provided too. WebHouse publishes the name, link and description of all the property-related resources and services such as the related governmental and private organization in an organized index. Directory search for housing-related resources and services are included. All these facilities help house hunters to find out more to buy a new house. If they have any ambiguity or question about any housing issues, they can browse through the Ask-and-Answer section to look for available solution. Those registered member of WebHouse can be able to post new questions in the Ask-and-Answer section for further discussion. A special section or 'corridor' publishing the latest launched and upcoming projects and properties is prepared. The section of news and events is provided to inform all the house hunters of the latest 'hot stuff' and the classifieds are the most interesting part because it gives a clear view of the available developers, the category of available houses and the locality of the available projects in the business of WebHouse.

The most sophisticated and enhancing feature of WebHouse is the virtual walk-through (3D view) of the house in the form of movie. This feature is not yet appeared in other existing sites. The success of this module is important because it would enable the visitor to view the different perspectives of a house and have a clear picture of how exactly the house is like.

Objectives

- i. The main objective of this web-based housing information system is to assist people looking for their ideal new home and have the opportunity to take detailed comparative study between houses without having the trouble of traveling from one location to another.
- ii. Accomplishes the ability to accommodate the virtual 3D view of a house model, so that all visitors of the site are able to view different perspectives of a house, just like looking at a real unit. This futuristic feature totally reduces lots of time and energy. Clear picture and floor plan of a house are included because the house design and layout is always one of the main considerations of the house hunters. Even recently, Malaysian Institute of Architects (PAM) president Prof Datuk Parid Wardi Sudin claimed that many purchasers nowadays are swept away by the aesthetic appeal of a house if the house falls within their budget.
- iii. Maintains online registration and emailing service links to help the housing developers to streamline their operations and enable them to speed up their communications with the registered potential buyers, and to keep the potential house purchasers informed of any latest development or new launched housing project.
- iv. Provides guides and information regarding to housing, such as bank loans, insurance etc., so that potential house buyers have enough information before determine to purchase a house. A section of 'Ask-and-Answer' is provided to deliver online help regarding housing.

Scope of Project

Basically, the scope is divided into two sections: first, the client section, and second, the server section. The client section encompasses three modules, which are visitors' module, registered potential house purchasers' module and registered housing developers' module. The server section is the WebHouse administrator's module.

Visitors' module

The basic functions of this module include:

- i. Search for house using the residential property search including simple, advanced and specification search.
- ii. Browse through housing-related information like the bank loan, legal advice etc., and also news and events.
- iii. Use the loan calculator (mortgage amortization) provided online.
- iv. Use the directory search to seek for housing-related resources and services.
- v. View pictures, floor plans and virtual walk-through of a house (3- dimensional view).
- vi. For individual visitors, they can make online registration to become registered potential house buyers of WebHouse. For organizational visitor (housing developers), they can make online registration after being invited to become the authorized associate housing developers.

Registered potential house buyers' module

A registered potential house buyer or purchaser is also a visitor of WebHouse. Therefore, he/she could use all the functions and features provided to a usual visitor. The difference is this group of users or customers are able to use some extra functions. Extra functions for those registered potential buyers:

- i. Their email addresses are going into all developers' and administrators' mailing list. They can be informed if there are any new launched or upcoming housing projects.
- ii. Update own profiles, including enter criteria of their dream house in the section of 'Choice of House'.
- iii. Make preview of the 'new house alert' to get the latest information of any suitable new house available. The 'new house alert' section provides information based on the criteria in the customer's profile.

Registered housing developers' module

By default, all the housing developers assembled in WebHouse and provide information for WebHouse are registered housing developers. They are called the 'associate housing developers' or the main business partner of WebHouse. For those housing developers that have received invitation but not yet signed up, they can make online registration to become registered housing developers. For each registered housing developer, a negotiator or staffs representing the company will use and manage all the functions in this module.

The functions of this module include:

- i. Preview record of the entire registered potential house buyers so that they can contact these customers easily if there is any new launched or upcoming projects using the standard Internet mail link and addressing provided. They keep the mailing list of all registered potential house buyers.
- ii. Submit information of new housing project, new properties in the property market into WebHouse to be published. They have full access to all the information of their projects and properties under the development of their firm. The full access includes add, delete and modify facilities.
- iii. Upload pictures, update the description of the pictures and delete old pictures in the developer's gallery, project's gallery and the property's gallery.
- iv. Make announcement in the News and Events column. Post corporate news, property news and events into this column but they are not allowed to make any modification or deletion.

Administrator's module

This module is specified for the administrator of the whole system at the server side.

Analysis and Design: Information Gathering

The system analysis process starts off with the step of information gathering. The methods used to find facts and gather information in the analysis process of WebHouse include:

- i. Reading and reviewing background materials
 - a. Research through newspapers, magazines, books and journals
 - b. Research via the Internet (online articles)
 - c. Study the existing related information system.
 - d. Review on the advertisements and brochures collected
- ii. Conducting user studies
 - e. Questionnaires
 - f. Informal interview or some short conversations with housing developers.

Questionnaires

The respondents identified for questionnaire survey are potential house buyers and housing developers. As there are a numbers of potential house buyers around and many housing developers scattered everywhere throughout our country, therefore questionnaires provide a good means of reaching these target group. Hence, gathering enough data to perform statistical analyses would be easier. The housing developers in Klang Valley, namely Selangor and Kuala Lumpur are focused for the development of WebHouse at the moment. Four important points to be considered in questionnaire design are:

- i. The need to make things easy for the subject.
- ii. The need for unambiguous questions.
- iii. The need to gather precise data.
- iv. The need to support intended analysis.

Based on these four criteria, two questionnaires have been created for potential house buyers and the housing developers. Different sets of questionnaires have been prepared for these two groups of users, as their requirements for this system would be different.

Questionnaires by electronic mails have been used especially conducting surveys on those housing developers in different areas. With the rapid spread of electronic mail, the questionnaires have been conducted more quickly and inexpensively. We have noted that an electronic-mail questionnaire is a bit different from usual questionnaire. Several points have been kept in mind while designing questionnaire for housing developers:

- i. Its brief, and attention-grabbing wording
- ii. Its design for ease of reply
- iii. Its reassurances about confidentiality of data because of the lack of subject anonymity

Results of the questionnaire survey

Results from housing developers

Question 1: How would you rate the current housing market in Klang Valley?

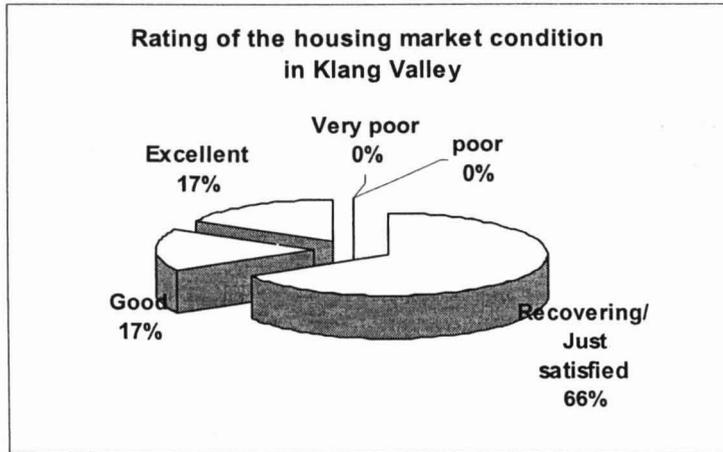


Fig. 1: Percentage for Rating of the Housing Market Condition in Klang Valley

Out of 6 developers, 4 of them claim that the housing market in Klang Valley is recovering, whereas others left claim the market is in good and excellent condition.

Question 2: Popularity focuses most on which type of residential property? (Choose more than 1 option)

Table 1: Popularity of Types of Residential Property according to Developers

Types	QTY	%
Bungalow	1	16.7
Single-storey terrace units	6	100.0
Double-storey terrace units	6	100.0
Town house	0	0.0
Semi-detached	1	16.7
Apartment	2	33.3
Condominium	2	33.3
Others	0	0.0

All of the housing developers claim that the most popular residential properties in Klang Valley are the single and double-storey terrace units.

Question 3: What is the affordable level in Klang Valley of most potential house purchasers?

Table 2: The Affordable Level of House buyers in Klang Valley according to Developers

Affordable level (RM)	QTY	%
< 150K	2	33.3
150K – 250K	3	50.0
250K – 350K	1	16.7
350K – 450K	0	0.0
450K – 600K	0	0.0
> 600K	0	0.0

According to developers, the affordable level of most of the buyers in Klang Valley less than RM150000, between RM150000 and RM250000, and between RM250000 and RM350000.

Question 4: What are the method(s) do your esteemed company usually practises to launch and market a new housing project?

Table 3: Methods used by Developers to Market a New Housing Project

Method	QTY	%
Through the company's official Web site	3	50.0
Home Ownership Campaign	3	50.0
Advertisement in newspaper	6	100.0
Advertise via existing real estate system on the Web	2	33.3
Launching at the sales office	6	100.0
Others	0	0.0

Various kinds of methods are used. The most popular methods are through the advertisement in newspaper and launching at the sales office, with the full score respectively. 3 out of 6 developers have their own official Web site. 3 developers also market their housing projects through the home ownership campaign.

Question 5: How does your company currently keep track of the daily sales transaction of housing projects?

All the 6 developers use the method of recording in a computerized internal database system. Besides that, 2 out of 6 developers also use the manual method by keeping their record in a sales record book or other document (paperwork).

Question 6: What are the features required in a computerized housing site or a housing information system on the Web?

Out of 6 developers, 4 claim that all the options of the features listed are required in a Web-based housing information system. Another 2 developers agree with all the options except the Option 7 – Housing developer is able to update the results of sales transactions for a housing project. They do not want to publish the sales records on Web.

Results from Potential House Buyers

Section 1: Respondent's Background Information

There are 50 respondents in this survey. The respondents consist of about 60% male and 40% female, 50% single and 50% married. From the aspect of ethnic, most of the respondents are Chinese (55%). This is followed by about 25% Malay, about 15% Indian and others left are from other race.

Section 2: Housing Market in Klang Valley

Most of them think that it is a suitable time to invest in housing. The result is about 66% out of the 50 respondents. The following table shows the results from Question 5, regarding the main factors for the justification on Question 4.

Table 4: Main Factors for the Respondents' Justification on Question 4

Factor	QTY	%
A good domestic economy	30	60.0
Easy access to high-end financing	45	90.0
A low interest rate environment	48	96.0
Business confidence	3	6.0
Higher quality of the houses provided by developers	16	32.0
Encouragement from the government	5	10.0
Others	0	0.0

For the 50 respondents, most of them do not have specific preference for housing developer. For the level of respondents' affordability to buy a new house, 30 respondents have the affordability level ranged from RM150000 to RM250000. 12 have the affordability less than RM150000, 7 have the affordability between RM250000 and RM350000 and only 1 respondent has the affordability more than RM350000.

Section 3: Methods looking for new house

Table 5: Methods seeking for New House

Method	QTY	%
Visit the housing developer's official Web site	20	40.0
Through the Home Ownership Campaign	20	40.0
Visit the existing real estate information system on the Web	15	30.0
Attend launching of new housing projects at the developer's sales office	45	90.0
Through the advertisement in newspaper	50	100.0
Visit the show villages/mock-up units built by developers	18	36.0
Others	0	0.0

From the results shown above, the most popular methods are through the advertisements in newspaper and visiting the sales office. The methods of seeking through the Internet to look for new houses are still considered low relatively in our community, but the figures shown most probably are much higher if compared to figures in few years ago.

Section 4: Web Design

All of the respondents require various kinds of housing-related resources publishing at a housing site and most of them (about 76% respondents) prefer an interactive site. Some respondents do not fill in any answer for question 15, which means that they prefer neither an interactive nor a non-interactive site. It shows that some respondents do not even know the actual meaning of the word 'interactive'; therefore they could not tick the answer.

Table 6: Features required for a Web-based Housing Information System according to Respondents (Potential House Buyers)

Feature	QTY	%
Able to view the house model in a virtual 3D tour	32	64.0
Search engine with simple and advanced mode to search for houses	50	100.0
Maintain an emailing system to receive latest housing events	35	70.0
Clear and attractive pictures of the houses and floor plans	50	100.0
Log in/Log out facility for registered members	23	46.0
FAQ (Frequently Asked Questions) session or forum	28	56.0
Able to view the latest results of transactions	34	68.0
All the above	15	30.0
Others	0	0.0

All the respondents hope to use a search engine to seek for houses in a housing site and they wish to have clear pictures, graphics and floor plans of the house models and also descriptions of the house.

System Structure Design

System structure is used to depict high-level abstraction of a specified system. The use of this system structure chart is to describe the interaction between independent modules, between sub-modules within a single module and also between modules that are interrelated. Since WebHouse organize its information in a hierarchical or tree structure and apply the top-down design methodology, the system structure design in this context carries the meaning of generating the hierarchic task models. Hierarchic task models are valuable in dealing with the variability in task performance and in supporting different levels of detailed usability analysis. In these representations, the tasks (modules) are divided into sub-tasks (sub-modules), shorter sequences that serve an intermediate sub-goal along the way to achieving the overall goal of the task (each module). This structure design is depended and made reference during the designing of user interfaces, which means the Web sites.

Overall viewing, WebHouse is divided into four main modules, which are the public module, registered potential house buyer's module, registered housing developer's module and the administrator's module. The public visitor, the registered potential house buyers are the customer of WebHouse, whereas the main business partners are the registered housing developers. The administrator is at the administration section. However, all these modules can be accessed through the Web site of WebHouse although there are two distinct sections from the aspect of functionality. Besides that, system administrator can also manage and administer the system directly via the server machine, which means not using the online functional requirements of the Web site.

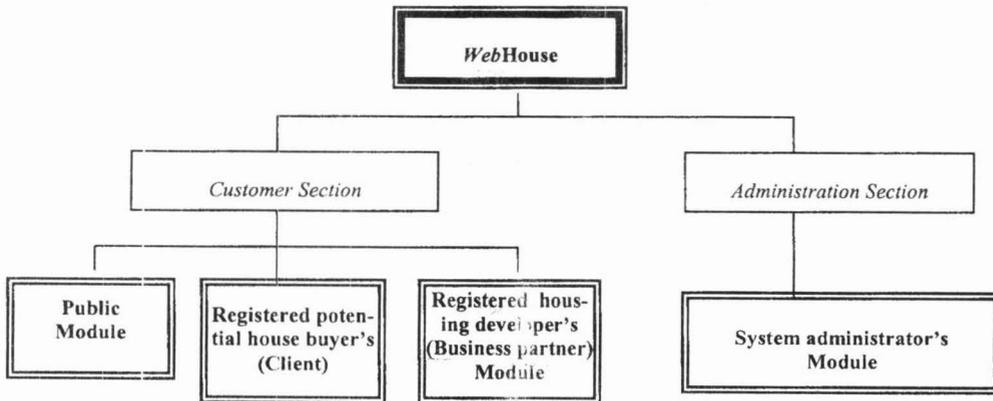


Fig.2: Structure Overview of WebHouse

Any visitor can access various distinct modules or main tasks, for instance residential property search, online registration, log in module, housing guides and information, news and events, directory search, index of services and resources, Ask-and-Answer, and corridor of new launched projects. Each of these modules has its own functions and it is an independent module from other modules, but all the modules can be accessed easily. The log in module is made to control the status of the visitor or which module the visitor should be in. The visitor's status would control the functions that could be used by the particular visitor. Every visitor of WebHouse is in public module by default, which means without logging in. There are three distinct modules for logging in, which are the registered potential house buyer's module, registered housing developer's module and the administrator's module.

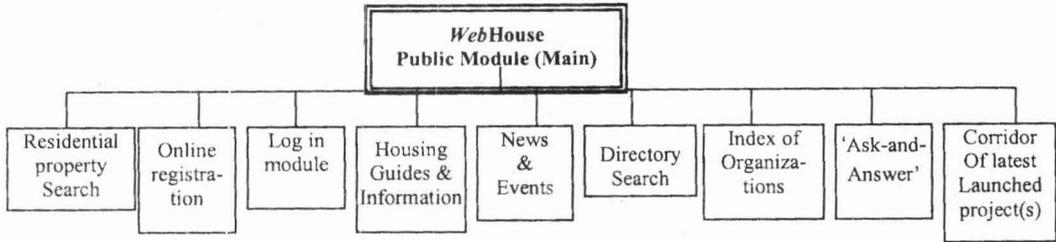


Fig. 3: The Main and Default Functional Modules of WebHouse

Under the registered potential house buyer's module, the registered potential house buyer enjoys some extra functions besides using all the main functions within the public module. The extra functions are update own profile and choice of a new house, post questions and replies into the Ask-and- answer module, and preview of the latest available house in the 'new house alert' section that matched the personal criteria input for the choice of new house. Besides that, these potential house buyers are provided the mailing lists of the associate developers and the administrator of WebHouse.

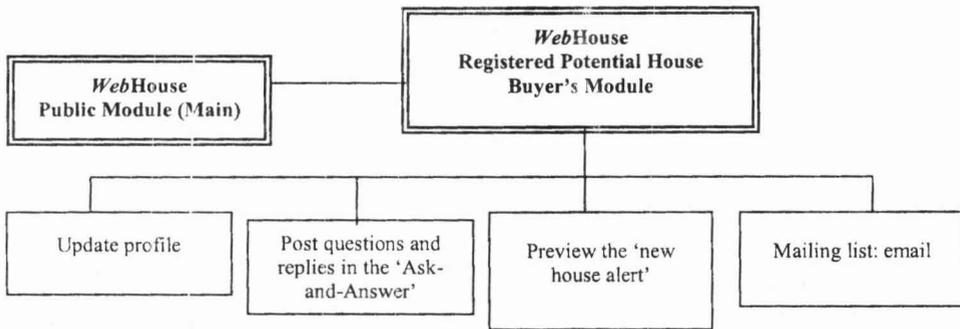


Fig. 4: Structure of Registered Potential House Buyer's Module

Under the registered housing developer's module, the associate housing developer would enjoy some advanced functions besides using all the functions in the public module. The advanced functions are update firm's profile, use the mailing list provided to contact their potential customers, post questions, replies and new forum, use the online editor to submit news and to make announcements and have full access to the information of their projects and properties.

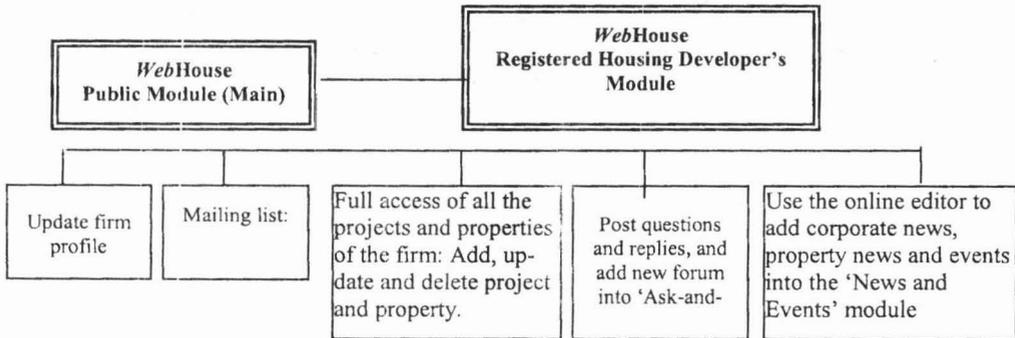


Fig. 5: Structure of Registered Housing Developer's Module

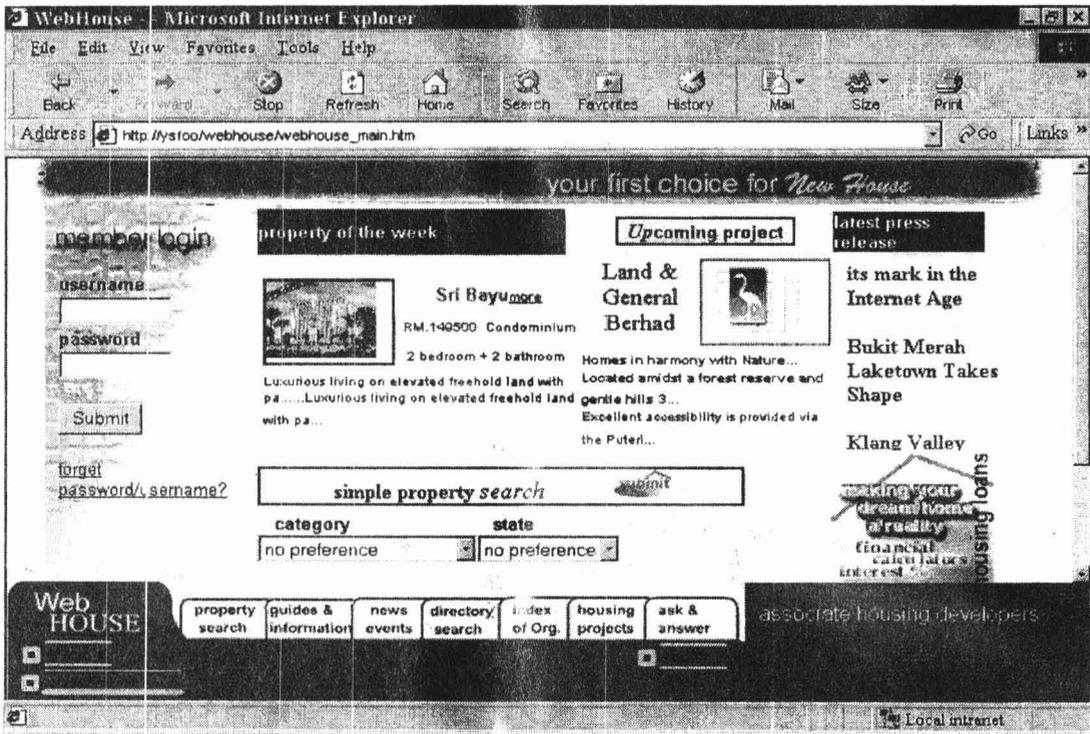


Fig. 6: User Interface - Home page

System Strengths

- i. Capability of displaying the virtual walk-through 3D house model. This feature gives a clear view of the entire house model and it enhances the attractiveness of WebHouse.
- ii. Flexible search engine is provided to search for new house available. There are three modes in this property search module for the user's selection.
- iii. Interactive sites are provided for the registered members. Therefore, it encourages visitors to make online registration. A lot of functional requirements like online forms are provided to add news and events, post questions etc. Besides that, the online calculator is provided for all visitors.
- iv. Administration sites are provided online. Therefore, the task of adding, updating and deleting can be done online conveniently through the browser.
- v. Dynamic and up-to-date Web pages are programmed. This means that the same web page provides different contents from time to time. This is a technique of SQL manipulating and the implementing of stored procedures and triggers.
- vi. User-friendly interface is prepared. Explanation of functions and links are provided. The visitor would not find difficulty to navigate through this system. The names of the links are easier understood. Besides that, online help is provided to members who forget their login password or username.
- vii. The log in module is separated from the public module and is protected by the valid username and password.
- viii. Effective error handling is added to the system. Input by users is validated to filter out erroneous data such as invalid data type. This is needed to ensure the data consistency and integrity for WebHouse.

Conclusion

In a nutshell, it can be said that WebHouse has achieved the expected outcome and objectives. Some of the proposed contents have been modified and new features have been added when necessary. There is much more room for

improvements. What we can describe is current successful development opens the first step towards the future enhancements and extensions into a larger and complex business information system for the benefit of the housing industry.

References

- Archibald, L. (2000, June 10). *Opting for Aesthetic Appeal Rather than Functional Aspects*. New Straits Times:Business.
- Ashenfelter, J. P. (1999). *Choosing a Database for your Web Site*. Wiley Computer Publishing.
- Bernstein, P. A. & Middleware. (1996, February). *A Model for Distributed Services*. Communications of the ACM, vol. 39, no. 2.
- Carriere, J. & Kazman, R. (1997). WebQuery: Searching and visualizing the Web through connectivity. In: *Proc. of the 6th International WW Conference*: pp.701-711.
- Cheah, S. C. (2000, March 6). *Supplementary packages add value to property buyers*. The Star Business.
- Corner, D. & Stevens, D. (1993). *Internetworking with TCP/IP Vol. III: Client-Server Programming and Applications BSD Socket Version*. New Jersey: Prentice-Hall Englewood Cliffs.
- Deep, J. & Holfelder, P. (1996). *Developing CGI Applications with Perl*. Wiley Computer Publishing.
- December, J. & Randall, N. (1994). *The World Wide Web Unleashed*. Sams Publishing, 1st ed. 1994
Parsons and Oja, New Perspectives on Computer Technology, Course Technology.
- Greenberg, A. D. & Greenberg, S. (1998). *Fundamental Photoshop 5*. 4th ed. Osborne: McGraw-Hill.
- Ein-Dor, Philip & Segev, Eli. (1998). Information Resources Management for End-User Computing: An Exploratory Study. *Information Resource Management Journal* 1.
- Feng, L. & Lu. H. (1998). Integrating Database and Web Technologies. *International Journal of World Wide Web*, Vol.1, No.2.
- Frey, A. (1996, Nov.). *Web-to-database communication with API based connectivity software*. Network Computing.
- Ho, C. S. (1997, April 30). *Multimedia super corridor (MSC in relation to Klang Valley and the real estate industry)*. In: Seminar on Multimedia Super Corridor, Kuala Lumpur.
- Kendall, K. E. & Kendall J. E. (1998). *Systems Analysis and Design*. 3rd ed. Prentice-Hall International Inc.
- Korfhage, R. R. (1997). *Information Storage and Retrieval*. Wiley Computer Publishing.
- Kroenke, D. M. (1998). *Database Processing: Fundamentals, Design, and Implementation*. 6th ed. Prentice-Hall International, Inc.
- Lazar, Z. P. & Holfelder, P. (1997). Web Database Connectivity with Scripting Languages. *Web Journal*, Vol.2, Issues 2.
- Lu, J., Zhao, W. G. & Glasson, B. C. (1998). Formal specifications of Web-to-database interfacing models. In *Proceedings of Asia Pacific Web Conference (APWeb98)*, International Academic Publishers: pp. 133-140.
- McNurlin, B. C. & Sprague, R. H. Jr. *Information Systems Management in Practice*. 4th ed. Prentice-Hall International Inc.
- Pfleeger, S. H. (1998). *Software Engineering: Theory and Practice*. Prentice-Hall International, Inc.

Powell, T. A. (1999). *HTML: The Complete Reference*. 2nd ed. Osborne: McGraw-Hill.

McLeod, R. Jr. (1998). *Management Information Systems*. 7th ed. Prentice-Hall International, Inc.

Swank, M. & Kittel, D. (1996). *World Wide Web Database Developer's Guide*. 1st ed. United States of America: Sams.net Publishing.

MUSTAFFA KAMAL MOHD NOR, MOHD NIZAM AYUB & FOO YUKE SHEAN, Faculty of Computer Science & Information Technology, University of Malaya.