

The Development of Online House Rental and Advertising System

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ABSTRACT

Online House Rental Advertising System or OHRAS is an online system where house owner can post the advertisement of their house and house seeker can search for the house that meet their requirement. In a conventional method, house seeker has to advertise their house using newspapers. In this OHRAS, house owner can post their house advertisement via online. This project focuses on managing the advertising for house in Malaysia only. It is develop to solve the problems that arise from the traditional method of house advertising. OHRAS enable users to search a house that meet their requirement in various manners; by state or city, by rental rate or by types of house and other. It makes the searching process easier and flexible with three methods of searching; by browsing by state and city/district, quick search and advanced search. OHRAS has been developed using Cold Fusion as server-side programming language and Microsoft SQL Server 7 as for database management system. Using OHRAS, it makes out searching time more efficient and easier for us. It has been tested and being modified to get further enhancement.

1.0 INTRODUCTION

Since the advent of the world wide web, it provides users with services such as email, document transfer, mailing list, newsgroup, online shopping, research, instant messaging, music, video and news. The internet has made the world borderless because it creates a communication infrastructure that provide access to billions of web pages or documents that contains a wide variety of information. The internet also becomes an important commercial environment that provides services with charges and offer online shopping. This is what we call e-commerce which utilizing the internet and World Wide Web to transact business. There is a drastic change where lots of company have changed their types of marketing, promoting, and transaction products and services with consumer. Based on [1], the definition of e-commerce is the buying and selling of products and services by businesses and consumers over the internet. It is subdivided into three categories: business to business or B2B, business to consumer or B2C and consumer to consumer or C2C. It is also called electronic commerce. There has been a phenomenal growth in B2C electronic commerce since the commercialization of the internet in early 1990s. Based on [1], B2C is a transaction that occurs between a company and a consumer, as opposed, to a transaction between companies (called B2B). B2B is a transaction that occurs between a company and another company, as opposed to a transaction involving a consumer.

Online House Rental Advertising System (OHRAS) is one of B2C e-commerce where the development of OHRAS is to make the business transaction between company and consumer is easier, attractive and simple. The purpose of this project is to develop a web based system to provide house rental advertising through the online medium. In this paper, house owner is refer to somebody that wants to advertise their house meanwhile house seeker is somebody that search a house that meet their requirements. OHRAS is online system where house owner can post their house for the advertisement, meanwhile house seeker can search their desired house that meets their requirement. The process are systematic rather than conventional method.

2.0 CONVENTIONAL METHOD VERSUS OHRAS

Traditionally, the house owners would place their rental advertisement on the newspaper. In order to submit advertisement, the house owners have to drive and battle with the traffic, noise and queues to get into advertising department in newspaper publisher. Then, they need to request a form and fill up the advertisement content. Finally they have to pay money for the advertisement. All the advertisements need to be edited and organized manually before being sent to the printing department. Beside that, house seekers will go through one by one advertisement in the newspaper for search house that meets their requirements. A long and small piece of advertisement is difficult to search. Besides that, house seekers have to go through one by one advertisement; one by one page from the advertisement column in a newspaper. Basically, some newspaper only categorized the advertisement based on the category such as type of property.

By utilizing technology, a development of a web site which able to handle advertisement submission and online fee transaction. Therefore, the house owners can stay at home to submit their advertisement to the web site anywhere and anytime as long as they have internet access. On the other hand, all the advertisements submitted to the website form a large database that provides very useful information to help the house seeker to find a suitable rental property. The system provides searchable database enhanced by efficient searching method to assist the users searching for houses that suites their requirements. So the users do not have to waste their time browsing the site page by page. The system also allows the house seeker to join rental alerts list in order to receive rental alerts from the administrators. The users can

specify the criteria of the house they are seeking for such as type of house, rental fee, gross area, number of rooms and so on. When house that suit their requirements available in the advertisement database, an email will be sent to the house seekers to notice them. Hence, this system has the feature to remind house seekers that the house they are looking for is available. They do not have to spend time to keep track the required house continuously by themselves.

3.0 PROBLEM DEFINITION

As discussed earlier in the previous section, there are several problem occurred in the traditional approach of house rental and advertising. Based on survey and observations that has been made, the problems are:

Advertising process

In traditional method, house owner has to fulfil the form to advertise their house. All the process will take a time for the management to process for checking error and other before advertise the advertising in the newspaper. It make take a long duration which is wasting the time and cost.

Searching process

There are lots of advertisements in the newspaper which is categorized only by types of property. There is no categorization such as by location, rental rate and other. It is quite difficult for house seekers to search a house that meets their requirements. The house seeker has to go through one by one advertisement.

Less information

Traditional advertisement is less information. Basically, traditional advertisement is not come out with the details of the house such as full specifications of the house; including the picture or gross area of the house. It's only containing location, contact number and types of the house.

4.0 ONLINE HOUSE RENTAL ADVERTISING SYSTEM (OHRAS)

System Analysis

The purpose of requirement specifications is to produce a definition that can be used as the basis on which to implement a software system to deliver the features and functions required. Two requirements have been decided; functional requirement and non-functional requirement.

Functional Requirement

Functional requirements for a system describe the functionality or services that the system is expected to provide. Functional requirement must be complete, in all aspects of requirements are identified. The functional requirements for OHRAS are discussed in the section below and it can be divided into parts.

User Services Subsystem

1. **Searching Modules**
Provide various searching methods such as "Quick Search", "Advanced Search" and "Search by house ID" for the house seekers to search the Rental Advertisement that resides in the database. Besides that, house seekers can browse rental house by states.
2. **New Rentiers Registration, Login and Logout Modules**
Prompt the house rentiers (property owner) to register an account before they are allowed to place rental house's advertisement. The registration forms will capture contact information, credit card information and the chosen username and password for future login. The registration procedure is broken up into different steps so that each piece of information is grouped logically. Login Module enables registered rentiers to login in order to carry out the tasks specified. Logout Module will terminate the login session and destroy session variables created in the login session.
3. **Place Rental Ads Module**
Allow registered rentiers to place rental house's advertisement. This module should capture information regarding the characteristics and descriptions of the rental house. It is also allows users to attach photo(s) of the rental house for public viewing.
4. **Editor Modules**
Allow registered rentiers to edit their contact information, credit card information or advertisement content if they found mistake in the pieces of those information.
5. **Terminate the Ads Module**
Enable the rentiers who has placed rental house Ads to terminate the advertisement from public viewing
6. **Error checks**
Error checks of data fields must be carried out when users submit a form to be inserted into the database. It includes all the forms in user section such as rentier registration forms, rental alerts subscription form and form to place rental ads.

Administrator Subsystem

1. **Administrator Login/Logout**
Login module enables Administrator to login in order to perform the tasks specified in user requirements. Logout module will terminate the login session.
2. **Process New Ads Module**
This module allows administrator to review newly posted Ads content and carry out online credit card transaction before activating the advertisement content for public viewing and to be search by house seekers
3. **Clearing the Expired Ads Module**
Allows administrator to clean up the expired advertisement records in the database
4. **Generate Revenue Report Module**

Allows administrator to generate monthly revenue report which summarizing the total income gained from rental house's advertising fee.

Non-Functional Requirement

Usability

Usability is defined by the effectiveness, efficiency, and user satisfaction with the system's task. The OHRAS must be usable in terms of easy to use, easy to remember how to use, reliable in that it works correctly and helps users performs tasks correctly and the user is generally satisfied using the system.

Speed/Response Time

The server should be able to quickly search the big rental ads database and response to house seekers that using the provided search engine to search rental house. The server processor must be powerful enough to handle simultaneously search request from multiple user.

Modularity

Modularity involves breaking the programming codes into logical, manageable functions or modules. Ideally, each individual module should be functionally cohesive, so that it is charged with accomplishing only one task.

Flexibility

As the system's implementation is based on web technologies, it is foreseeable to new technologies that can work with existing technologies and will have no problem integrating into the website.

Security Features

The system should ensure that only authorized administrators have access to the administrator subsystem and only registered house owners can login to use certain services and perform certain tasks

Robustness

Robustness refers to the system quality to be able to handle unexpected error and echo back with proper responses.

System Design

OHRAS Architecture Design

Online House Rental Advertising System is divided into two major components: User Section and Administration Section. Each of the section is further divided into many modules. User Section provides various services for the rentier (property owner) and the house seekers. In order to use the system, the rentier must register an account before they are allowed to use the services provided for them such as place rental ads, edit ads content and contact information, terminate their ads, etc. Each time a rentier logs on to the website, he/she must login first for identification to carry out these tasks. However, the house seekers can use various searching methods to search for a rental house without the need to register as a member.

Administration Section allows the administrator or support staff to process Rental Ads posted by registered rentier. This includes review Ads content, edit ads content, carry out online credit card transaction as the charge for the ads, and activate the ads content for public viewing. Beside that, the administration section also allows the administrator to perform other task such as send *Rental Alerts* email and clearing the expired rental ads.

System Structure Chart for OHRAS

The system structure chart is used to depict high level of a specified system. The system is structured into two several principle subsystem where a subsystem is an independent unit. Each identified subsystem is decomposed into modules. A module normally provides one or more services to other modules. The used of the system chart is to describe the interaction between independent modules of the system.

Context Diagram

Context diagram is the highest level for a data flow diagram. A context diagram presents the scope and boundaries for a system. This is the very first diagram that had to be drawn in the process of preparing data flow diagram for a system. See Figure 1 for OHRAS Context Diagram

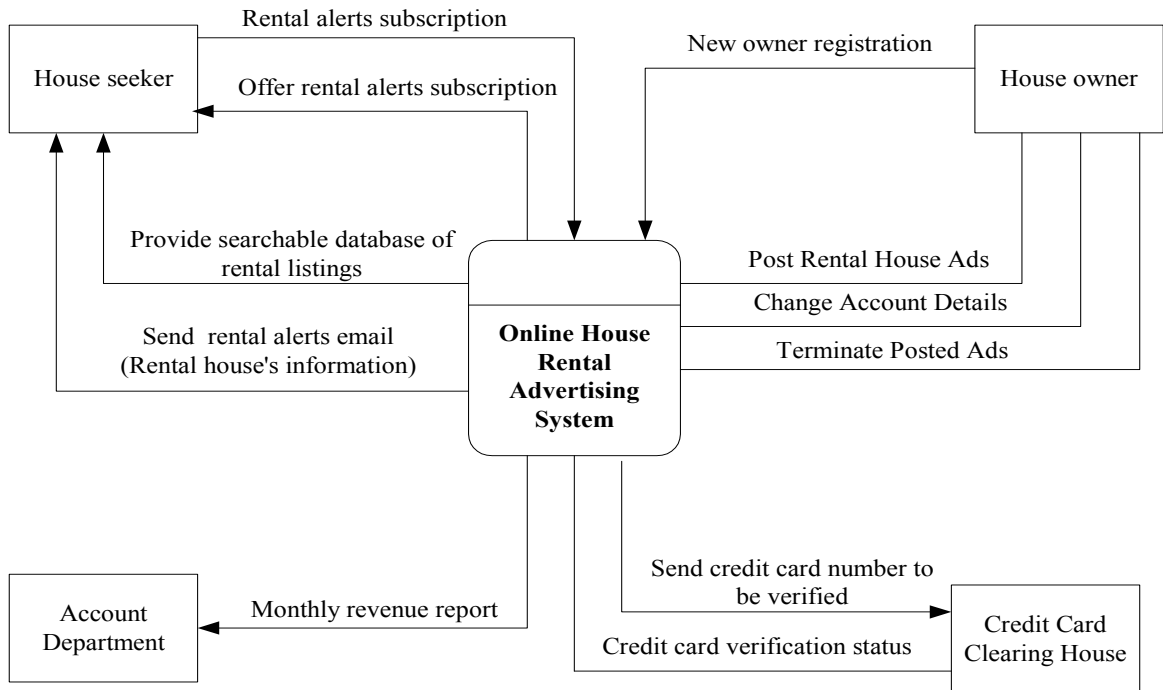


Figure 1: OHRAS Context Diagram

Flow Charts

Flow Chart is one of the most widely used graphical representations for procedural design of web application. A rectangle box is used to indicate a processing step. A diamond represents a logical condition, and an arrow shows the flow control.

Figure 4 shows one example of flow chart that has been used in the development of Online House Rental Advertising System (OHRAS). Each flow chart shows the procedures involved in each process shown in data flow diagram.

Searching Methods

Browsing Rental Listings by State and City/District

Browsing Rental Listings by State allows house seekers to search rental listings thoroughly by state and city/district. This type of searching requires the interaction between end-users and the system. Firstly, the end-user (probably the house seekers) has to select a state to browse, and then a dropdown list displays the city/district of the rental houses that are available in the state. When the house seeker selecting a city/district in the dropdown list, all the rental listings located in that particular city/state will be presented to the house seeker in a tabular format. Users can sort the results of the searching by ascending or descending order for a rental fee, gross area or number of bedroom for the house. It's easier for house seeker to search save their times.

Quick search

Quick search is an easy-to-use search engine that allows end-user to search for rental listing by specifying only the main criteria of intended rental house. The search for Quick Search are house category, state, city/district, rental fee, gross area, number of bedrooms and the number of bathrooms.

Like the Browsing Rental Listings by State and City/District methods, users can view and sort the results of the searching by ascending or descending order for a rental fee, gross area or number of bedroom for the house. It's easier for house seeker to search save their times.

Advanced search

Basically, Advanced Search using a same method as Quick Search uses in searching for rental listing records in the database. The difference between the two searching techniques is Advanced Search is able to search for every detailed criterion of the rental listings. The extra search criteria in Advanced Search are street address, features and amenities of rental house, date posted and the availability of rental house's photo. Another feature of Advanced Search is that it is able to implement free-text search in matching street address.

System Implementation

After studying the strengths, limitations and the constraints of various technologies, it is decided that the *Online House Rental Advertising System* to be developed will be using Cold Fusion as server-side programming language. Cold Fusion is utilizing Cold Fusion Mark Up Language (CFML) tags and code HTML directly. It is an easy-to-use yet robust programming tool. When running Intel-based hardware, there are several operating to choose from: Windows 95, Windows 98, and Windows NT, and Windows 2000 Professional. Windows 95 and Windows 98 are not suitable as the server platform for this project because they could be used for only small volume of website. Thus, Windows 2000 Professional (Windows NT Server version 5.0) is chosen. Moreover, Windows Professional 2000 come

with built in IIS web server which is an ideal web server for ColdFusion.

For the database management system, Microsoft SQL Server 7 is chosen. The database is accessed using ODBC. The communication between ColdFusion and the database takes place via a database interface called Open Database Connectivity, or ODBC. ODBC is a standard Application Programming Interface for accessing information from different database systems and different storage format.

Tool chosen for webpage authoring is Macromedia Dreamweaver. Dreamweaver is a powerful WYSIWYG (What-You-See-Is-What-You-Get) visual web authoring tool that especially for web developer community. Microsoft FrontPage 2000 will be used occasionally to create interesting layouts.

System Testing

Unit Testing

Unit testing is the initial and very important phase. Unit testing focuses on verification of the smallest unit of software components. Each component or module is treated as a stand-alone entity and tested individually. For OHRAS, unit testing is conducted immediately when every single unit software component is finished. For example, every single JavaScript function and ColdFusion Query is tested when they are constructed.

Functional Testing

Most functional tests are written as black box tests working off a functional specification. The numbers of test cases that are generated usually are variations on the input space coupled with visiting the output conditions. A *variation* refers to a specific combination of input conditions to yield a specific output condition. Writing down functional tests involves writing different variations to cover as much of the state space as one deems necessary for a program. The best practice involves understanding how to write variations and gain coverage which is adequate enough to thoroughly test the function. There are several test cases created for the functional blocks of OHRAS. The test cases are shown in section 4.2.

Integration Testing

The objective of integration testing is to test the integration and communication between components or modules. This is to ensure they can work together to perform a series of tasks in parallel. Additionally, it may include testing the integration of sub-systems or communication with external systems. For OHRAS the bottom-up approach is used, i.e. lower level modules are integrated and tested before higher level modules have been developed. When both the OHRAS sub-system (website) and the Admin sub-system are done, they are tested in parallel to uncover integration defects.

System Testing

The objectives of system testing are to find defects that are attributable to the behaviour of the system as a whole, rather than the behaviour of individual components, and to test that the software functions as a complete system. This level of testing is different from integration testing in that the tests are concerned with the entire system, not just the interactions between components. Other than system functionality and behaviour, system testing may include testing configuration, throughput, security, resource utilization, and performance.

5.0 STRENGTHS AND LIMITATIONS OF OHRAS

Upon the completion of system testing, project assessment can be carried out to evaluate the degree of success of the completed system. Through project assessment, system developers can better understand the strengths and limitations of the completed system. The results of project assessment can be summarized in the form of strengths and limitations.

Strengths

Searching Techniques

This OHRAS provides three types of searching techniques, Browsing Rental Listings by State and City/District, Quick Search and Advanced Search. Quick Search provides a very flexible and tolerance searching functionality because it does not require every search criteria to be filled up in order to perform searching. It can determine which criterion is used and which is left empty. Thus, unspecified criteria will not be considered to perform searching. The strengths of Advanced Search are that it can be used to search for rental houses in a very specific way. In addition, it has been implemented free-text search in matching street address specified by the house seekers.

Browsing Rental Listings by State and City/District is a complementary function to Quick Search and Advanced Search. When the house seekers failed to find any rental listing by using Quick Search and Advanced Search, they can turn to use this service by browsing through every city/district in a state to find rental house. Another advantage of browsing is that all the rental listings have a better chance to be retrieved from the database.

Server-side data validation

The system is implementing server-side data validation which is more secure than client-side data validation. The reason is that the JavaScript used in client-side data validation can be viewed and modified by the end-users.

Sorting Function

There are three sorting function provided in the Results Page of Browsing, Quick Search and Advanced Search. Users can sort the retrieved records by rental fee, gross area and bedroom numbers either

in ascending or descending order. These functions are particularly useful when the retrieved records are too long. By sorting into the intended order, it can save the user's time and effort to find the suitable rental house.

Automatic house owner updating

The system allows house renter to edit their contact information, credit card information and their Rental Ads. These editing functionalities are useful if they want to make changes to those data when they found mistakes in the data; their contact information has changed; or they want to add other features of the rental house. The system allows house owners to terminate the activated rental advertising from public viewing once they have let their rental house out. This functionality does not require human interception because the action will only change automatically.

Provide a Shopping Cart Module

OHRAS enable users to add the likely house into a shopping cart module. MyCheckList is intended for house seekers to jot down rental listings of interest while searching. After searching, house seekers can easily make comparison of rental listings that have been collected into MyCheckList. So, it is easier for house seekers to keep track their interest house.

Does not allow duplication of Login

The 'Create Login Account' module does not allow duplication of login ID (the same login ID used by more than one user). Duplication of login ID violates the authentication rules because there is a chance for the same login IDs to have to have the same passwords. Although the probability for this case happen is quite low, it is more secure to enforce that every login ID is unique.

Limitations

Does not utilize virus scanner

The upload photo (of rental house) module does not utilize virus scanner software to make sure the uploaded files are clean from virus. If virus is uploaded to the server, it can deface the website, such as erasing the source code or make the server script run incorrectly. More seriously, it can bring down the whole system

Not tolerable to spelling error

The city/district search criteria in Quick Search and Advanced Search does not tolerable to spelling error and the used of acronym for city/district. For example, if the end-users key-in 'Sri Kembangan' instead of 'Seri Kembangan', the system will not be able to view rental house located in 'Seri Kembangan'. In other case, if the end-users attempted to use acronym for city/district such as PJ instead of 'Petaling Jaya', they will not be able to retrieve rental listing records which their city/district is 'Petaling Jaya'.

Does not provide 'Search Within Results' function

The system does not provide 'Search Within Results' functionality. This service is particularly useful if the list of the retrieved record is too long or the searching scope used in Quick Search was too broad. By using this service, the end-users can narrow down their searching scope in order to retrieve better searching results in terms of relevance and accuracy.

Ranking Mechanism

Quick Search and Advanced Search functionalities do not have a mechanism to rank the retrieved rental listing records by considering every search criteria specified by the end-users.

6.0 CONCLUSIONS

On the whole, the final system of OHRAS has fulfils almost all of the user requirements and system requirements that has been specified. However, the system still can further improve. Some of the new functionalities elicited in system development phase have been eliminated. This is because the final system of OHRAS has to be delivered within a short duration. Here are some suggestions for further improvement:

- i. 'Search Within Result' functionality can be added to the Results page of searching to enhance the system's usability.
- ii. The searching module can adapt an algorithm that can rank the retrieved rental listing records by considering all the criteria used specified by the users.
- iii. The dropdown list of 'Rental Fee' and 'Gross Area' used in Quick Search and Advanced Search can be replaced with text box. This is because the end-users can key-in any value in the text box in more flexible manner.

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