Palestine Polytechnic University

College of Administration Science and Technology

"Home Finder System Using Information Visualization"

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Dedication

To those taught us throughout life: our parents, families, teachers, and our colleagues.

To all of them say

"Thank You".

Acknowledgment

Completion of our project is the result of collective efforts of assorted individuals. My honest , thanks and gratitude to my supervisor Suzanne Sultan who is the best adviser and guider. I would like to thank Mr. Mahdi Atawneh and Mr. Anas Al sharabati for their kind support and assistance.

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Abstract

Searching for renting home is a difficult procedure that needs a lot of time and effort and the acquired information may be inadequate or not accurate. Besides, it's essential indispensable process for everyone. So, building web based home finder system using information visualization is required to facilitate searching home in a usable manner. By using home finder the home searcher can finds the available homes depending on entered home criteria. The system displays information in visual manner such as displaying homes on a map and using chart to help managers get specific information about homes. Home finer is built using Adobe Flex 4 and PHP scripting language.

الملخص

عملية البحث عن منازل للاستنجار هي عملية صعبة تحتاج إلى الكثير من الوقت والجهد. والمعلومات المكتسبة من الأشخاص قد تكون غير كافية أو غير دقيقة. إلى جانب ذلك ، فهي عملية مهمة للجميع لا غنى عنها. لذلك، من الضروري بناء مكتشف ويب للمنازل باستخدام تصوير المعلومات المرئية لتسهيل البحث في الصفحة الرئيسية بطريقة قابلة للاستخدام.

باستخدامها يمكن أن يجد المستخدم المنازل المتاحة اعتمادًا على المعايير التي يتم إدخالها من قبل المستخدم. ثم يعرض نظام المعلومات بطريقة مرئية المنازل التي تتوافق مع المعايير المدخلة على الخارطة واستخدام الرسم البياني لمساعدة المدير في الحصول على معلومات محددة حول المنازل. تم بناء الصفحة الرئيسية باستخدام Adobe Flex 4، ولغة البرمجة PHP.

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1.1 Introduction

Information Technology has had a great effect on the evolution in many fields such as, education, medical, industry, business and presenting services. Using computer technology to gain competitive advantage in the modern business and presenting services such as giving information about renting homes.

This chapter will be about the problem statement, which explains the problem of the routine searching for homes. Second, the system objectives, which are about the main goal of the system. Third, the project scope, which shows the homes, will cover in which domain. Fourth, the project importance, which explain that benefits that we get from the home finder system. Finally, we put table of tasks that contains each task we did in an expected time.

1.2 Problem statement

Usually when we need home for renting we ask our neighbors, friends and others. Did they give us exact information about it? We don't know, but usually this information is not reliable and accurate, did they give us the exact price, site, room number and its difficult to imagine it from oral description? So that makes the customer more confused, where I go? How I know where is the home? Who's the renter? And how can I see it? All of that takes from us effort and searching time.

1.3 Objectives

The main goal is to create free automatic interactive service system using information visualization such as maps ,charts and images, which helps people to find homes for renting according to specific criteria, like room number, price, address (location) and others. Also the system aims to display home video.

1.4 Project domain

The system will serve the people to find homes for renting in Hebron city only. The homes classified according to some criteria's the user choose it.

1.5 Project importance

The importance of the project appears in following points:

- Saving time and effort, in the search process for a variety and different houses.
- Using interactive and reliable system.
- learn ability (easy to learn):
    - By using clear navigation.
    - Achieve usability system by following usability guidelines in developing system, such as designing usable interface.
    - Our system contains images, which are easier to grasp and understanding rather than texts.

1.6 System development stages

Every project needs a set of tasks carried out in stages .we will display the stages using textual description, table based and chart based (Gantt chart)

1. Collecting information and planning :

Collect information about the Topic, so we read some books such as" Information Visualization Perception for Design", and "Introduction to Information Visualization" book. Also we read papers such as information visualization for Chen, 2002. Moreover we conduct research on the Internet such as www.cs.umd.edu/hcil/research/visualisation.shtml.

2. System requirement:

Determine the functional and non-functional requirements for the system in abstract manner, and find alternative systems and choose the best to be our project. We will also recall some of the risks that faced the systems developers.

3. requirement specification:

After we mentioned the system requirements, we will analyze the functional requirements and drawing models that depict the functional requirements by details, charts and diagrams.

4. System design:

In this stage, we will design the system element and database that will be used .

5. System implementation :

After the design process we will program the system.

6. System testing:

In this stage, testing must be accompanying to system implementation to chick the units of the code or to chick the entities system.

7. system Documentation:

Documentation will be continued from the beginning to end of the system development.

tasks	Description	weeks
1st task	Collecting information and planning	4
2nd task	System requirement	4
3rd task	requirement specification	6
4th task	System design	2
5th task	System implementation	15
6th task	System testing	1
7th task	system Documentation	32

Table 1. 1: Time division task

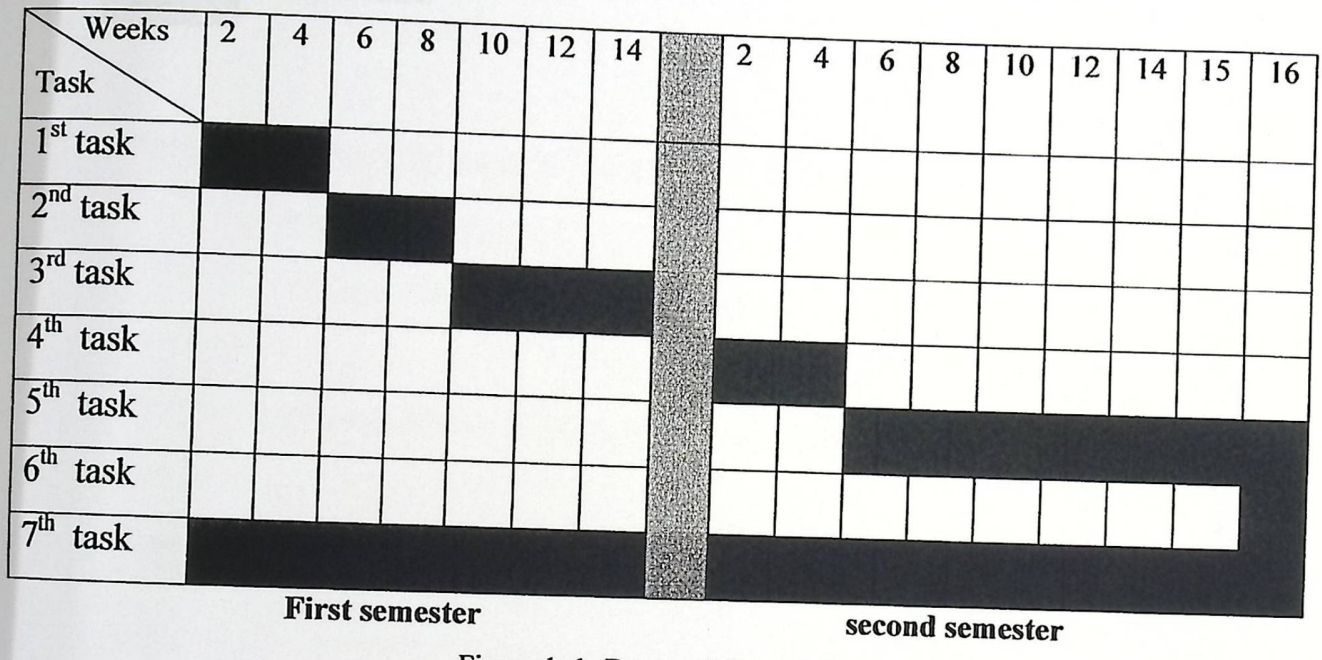


Figure 1. 1: Expected Gant Chart

Expected

Holyday

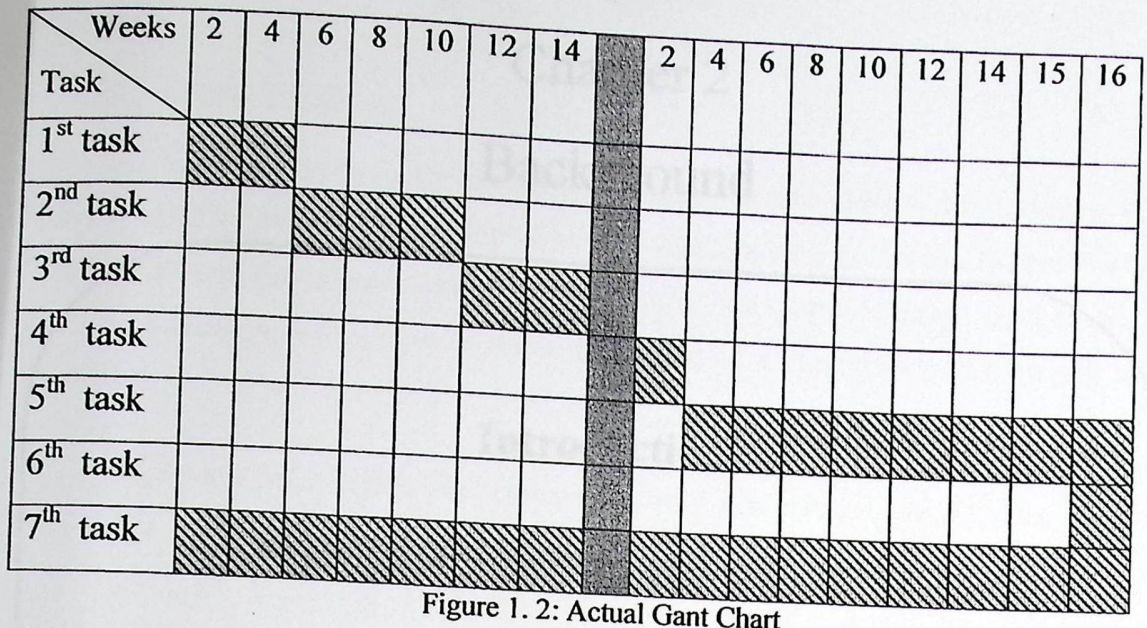


Figure 1. 2: Actual Gant Chart

Actual time.

Chapter 2

Background

Introduction

Definition of Information Visualization

Information Visualization Advantages

Information Visualization Applications

Information Visualization Techniques

Information Visualization Environments

2.1 Introduction

As time goes by, a lot of incidents is going to take place within our daily life but there is a station we must stop at to have it all considered like emails, credit card information and movement and other information. We cannot absorb it at all nor save it in our mind for a long time. Because of that we used visualization that we will talk about and explained through this chapter.

The field of information visualization is a very new science. Since the beginnings of 1980s. The modern study of visualization started with computer graphics, which has from its beginning been used to study scientific problems. Information visualization presumes that visual representations and interaction techniques take advantage of the human eye's broad bandwidth pathway into the mind to allow users to see, explore, and understand large amounts of information at once. Information visualization focused on the creation of approaches for conveying abstract information in intuitive ways.

2.2 The definition of information visualization:

Visualization: is constructing a visual image in mind, it's more like to a graphical representation of data or concept on your mind. (Oxford English dictionary.1989)

Information visualization: "is the use of computer-supported system, to visualize the Representations of abstract data to simplify cognition, and interacting with it." (Information visualization introduction to design, 2007)

Other definitions that may be more user-friendly include: "the process of analyzing and transforming non-spatial data into an effective visual form. The transformation of abstract data to a visual representation, which is rapidly understood by the user; and the visual appearance of data objects and their relationships". (Information visualization introduction to design, 2007)

2.3 Information visualization advantage:

Information visualization has many advantages such as:

- Visualization provides the ability to comprehend huge amounts of data by a human observer very easily and very quickly. So the important information is immediately available from more than one million measurements.

- Visualization allows the perception of emergent properties that were not expected.

- Visualization also facilitates understanding of both large-scale and small-scale data features.

- Visualization frequently enables problems with the data itself to become immediately obvious. Visualization usually reveals things not only about the data itself, but about the way it is collected. With an appropriate visualization, errors in the data often jump out at you. For this reason, visualizations can be very useful in quality control.

2.4 Information visualization Applications

Information visualization application areas: (Bin. Z & Chen.H(2004). Information Visualization .Boston University, MA, USA)

1. **Visual Data Mining**

Information visualization techniques can influence the data mining process By providing a platform for understanding data, and generating hypotheses about the data. And that based on human capabilities such as domain knowledge, perception, and creativity. Here some benefits of using information visualization in data mining:

- Identifying patterns that a data mining algorithm might find difficult to locate.
- Supporting interaction between users and data.
- Supporting interaction with the analytical process and output of a data mining system.

2. Digital Library Visualization

❖ Browsing a Digital Library

It's used to retrieve information when a user does not have a specific goal, when he doesn't know he searching for what. Visualization supports browsing by providing an effective overview that summarizes the contents of a collection in a class. So there is two ways to browse for something:

- Browse by subject hierarchy:

  ✓ Cancer Map system: which it allows for users that they don't know what they want, to see any information they seek for it in a different blocks. In which it make the user recognizing what he wants very easy and very quickly.

- Browse by geographical locations :

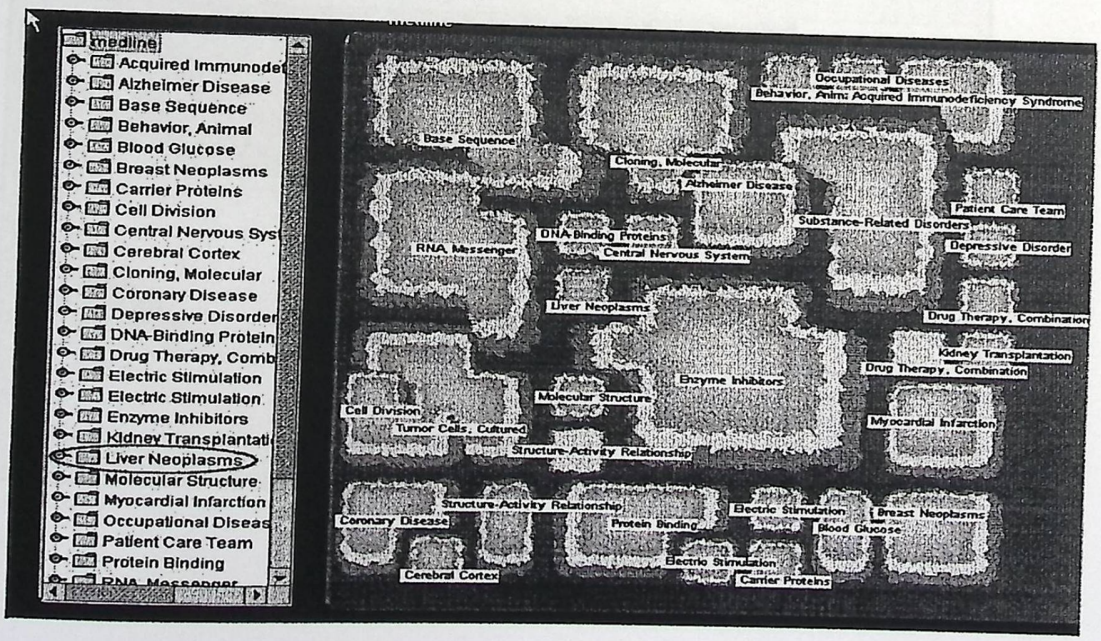


Figure 2. 1: Cancer Map

2.5 Information Visualization techniques

The following are examples of some common visualization techniques: (Bin. Z & Chen.H(2004). Information Visualization. Boston University, MA, USA).

1. **table, matrix**

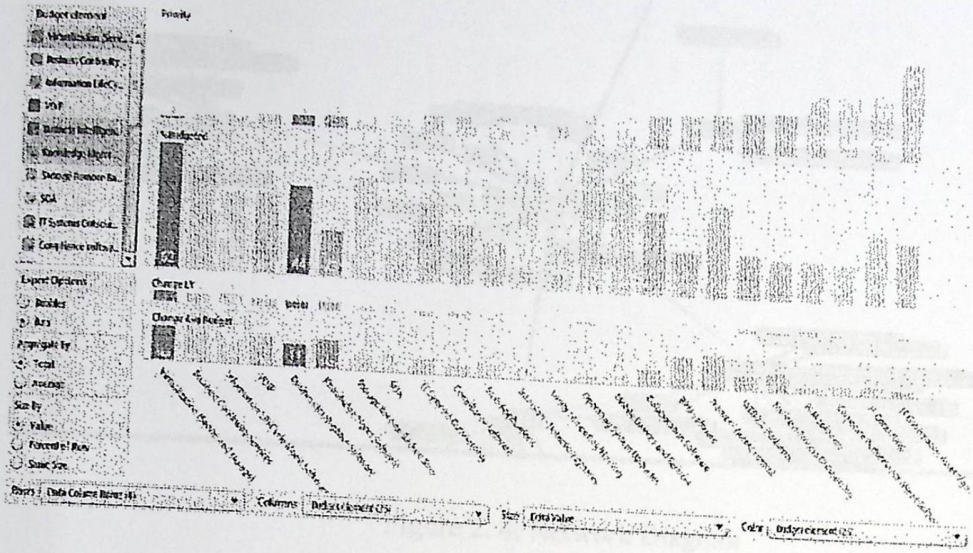


Figure 2. ٢:Table Visualization (Bin. Z & Chen.H(2004).

2. Charts (pie chart, bar chart, histogram, function graph, scatter plot, etc.)

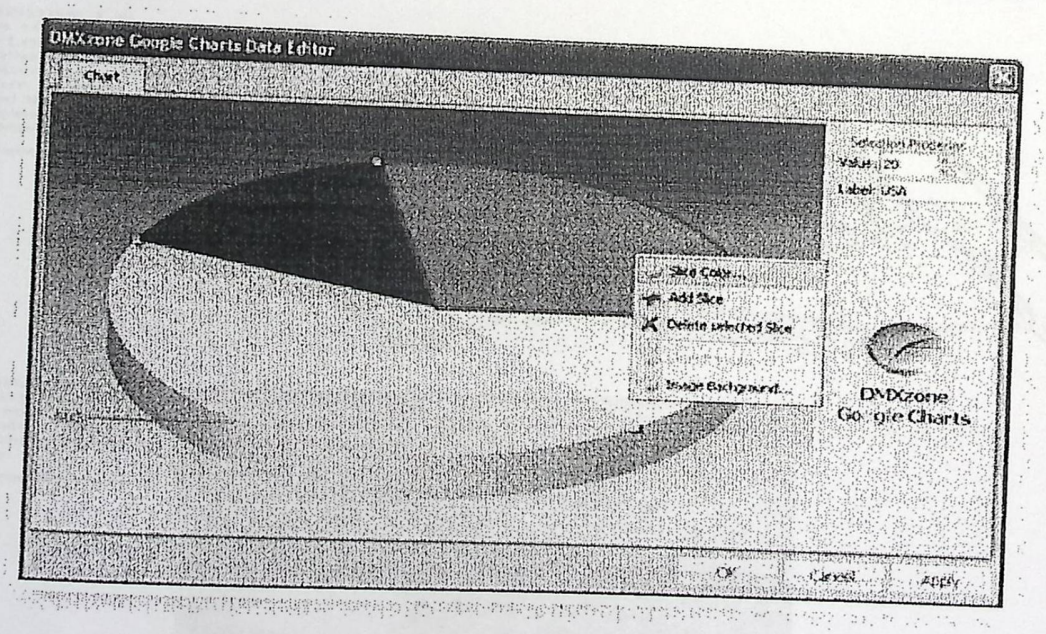


Figure 2. 3: Chart Visualization

3. **Graphs (tree diagram, network diagram, flowchart, existential graph, etc.)**

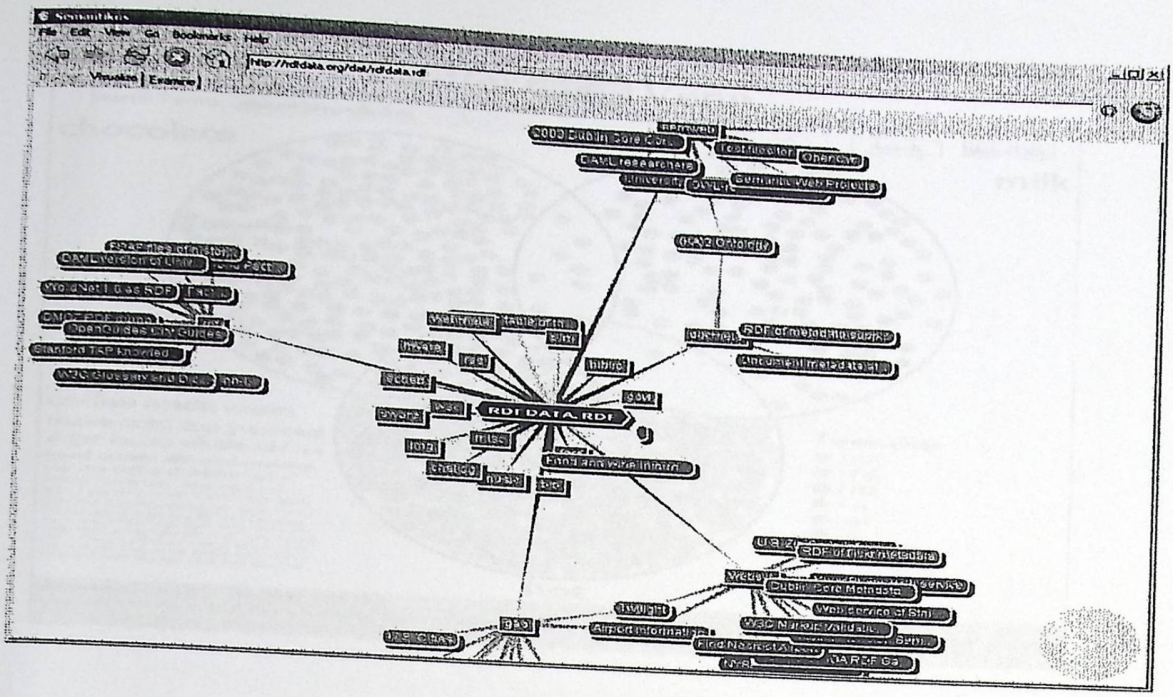


Figure 2. 4: Network Diagram

4. **Maps**

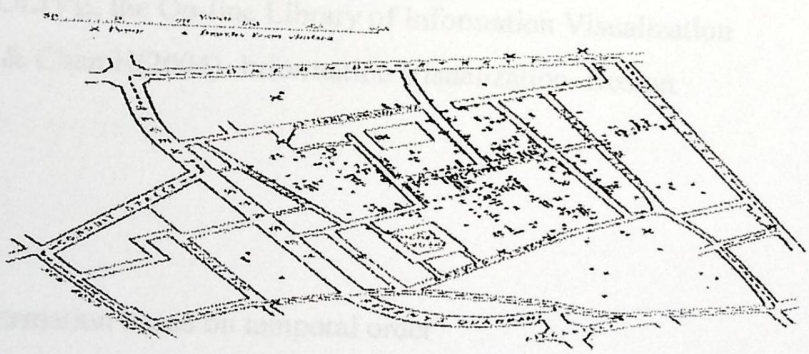


FIGURE 1.6
An 1845 map of London's Soho district, showing deaths from cholera and the locations of water pumps
Source: Tufte (1983)

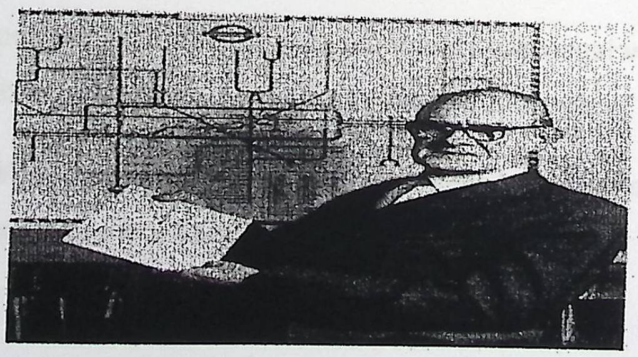


FIGURE 1.7
Harry Beck, creator of the familiar London Underground map
Source: Ken Garland

Figure 2. 5: Map Graph

5. Venn diagram

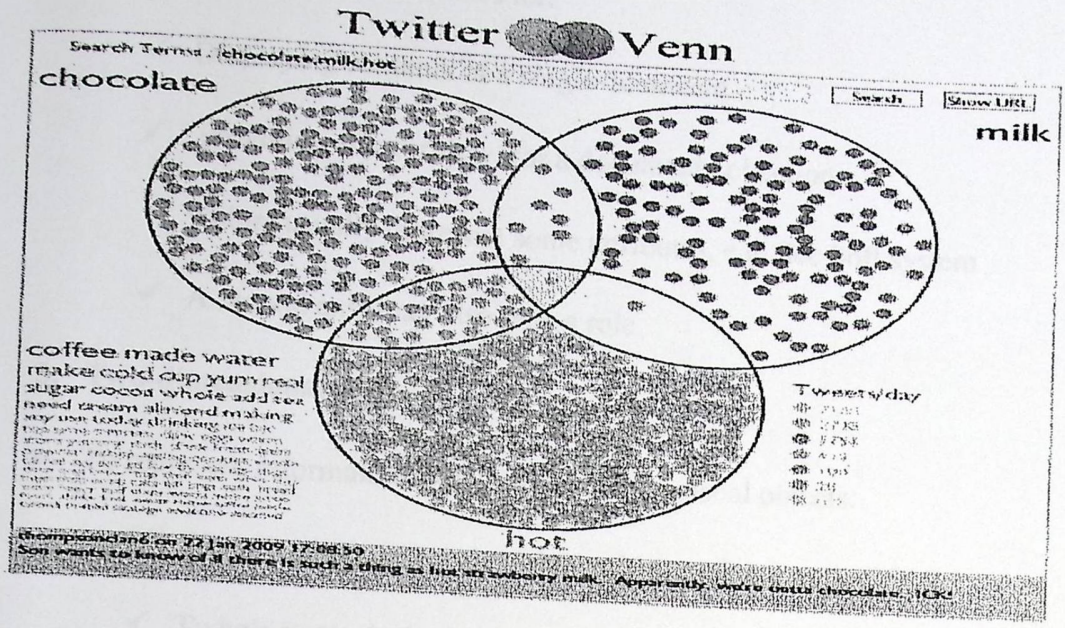


Figure 2. 6: Ven Graph

Information visualization environments:

There are eight dimensional data types associated with information visualization. These can be found at OLIVE, the On-line Library of Information Visualization Environments: (Bin. Z & Chen.H(2004). Information Visualization. Boston University, MA, USA).

1. Temporal

- To represent information based on temporal order
  - ✓ Location and animation are commonly use visual variables to reveal the temporal aspect of information ,for Example:

Perspective Wall lists objects along the x-axis based on time sequence and presents attributes along the y-axis.

2. **One-dimensional (1D)**

- To represent information as one-dimensional visual objects in a linear or a circular manner, which its uses for:
  - ✓ Displaying contents of a single document.
  - ✓ providing an overview for a document collection
  - ✓ Colors usually represent some attributes, e.g. See Soft system
  - ✓ A second axis may also play a role.

3. **Two-dimensional (2D)**

- To represent information as two-dimensional visual objects.
  - ✓ Visualization systems based on self-organizing map (SOM)
  - ✓ To help users deal with the large number of categories created for the mass textual data.

4. **Three-dimensional (3D)**

- To represent information as three-dimensional visual objects, for example:
  - ✓ Web Book system folds web pages into three-dimensional books
  - ✓ 3-D version of a tree or network.

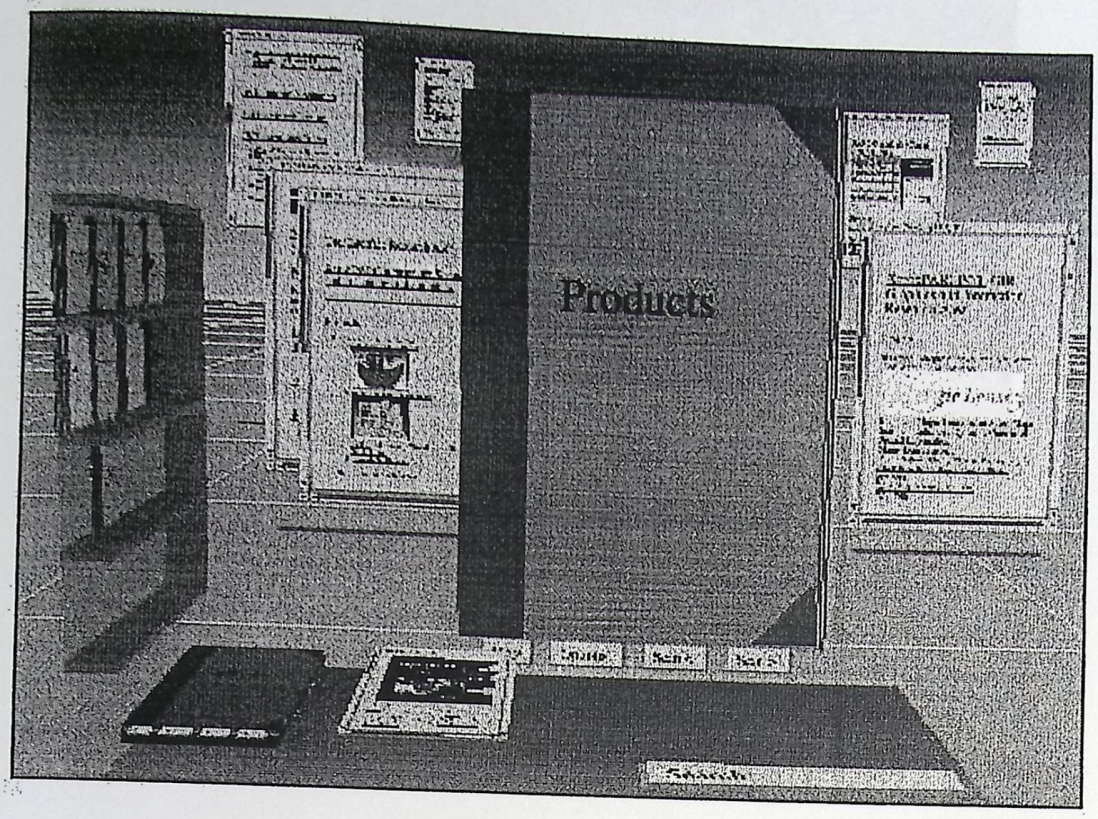


Figure 2. 7: 3D Environment

Multi-dimensional (MultiD)

- To represent information as multidimensional objects and projects them into a three-dimensional or a two-dimensional space, we need for Dimensionality reduction algorithm.

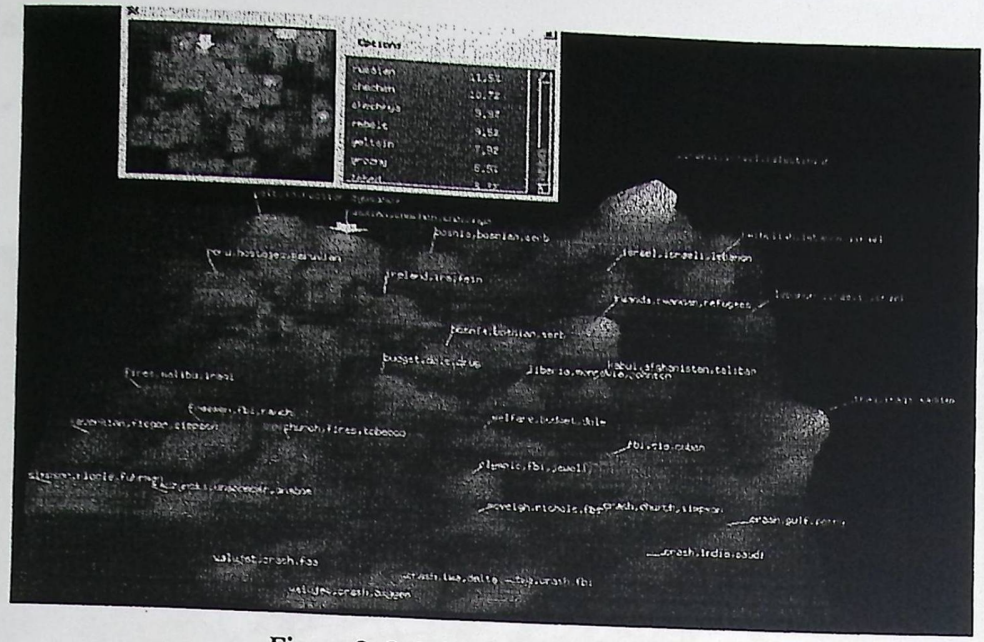


Figure 2. 8: Milti Model Environment

5. Trees

- Used to represent hierarchical relationship
  - Examples
    - Tree-Map allocates space according to attributes of nodes

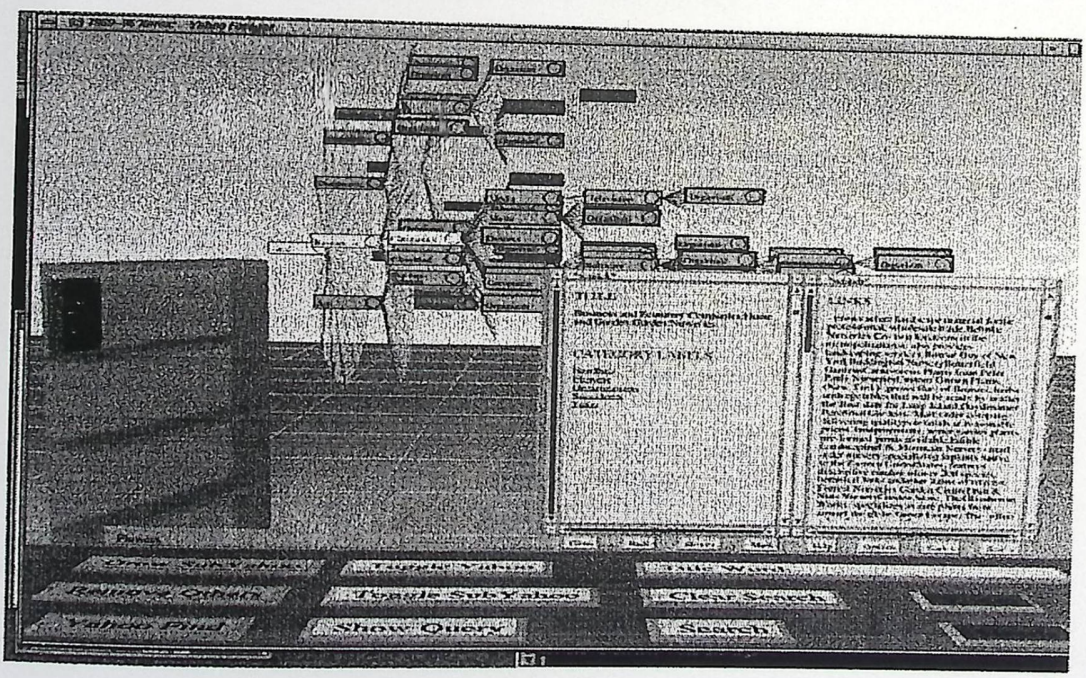


Figure 2. 9: Tree Envitonment

6. Network

- To represent complex relationships that a simple tree structure is insufficient to represent. Like Documents that linked by the internet.

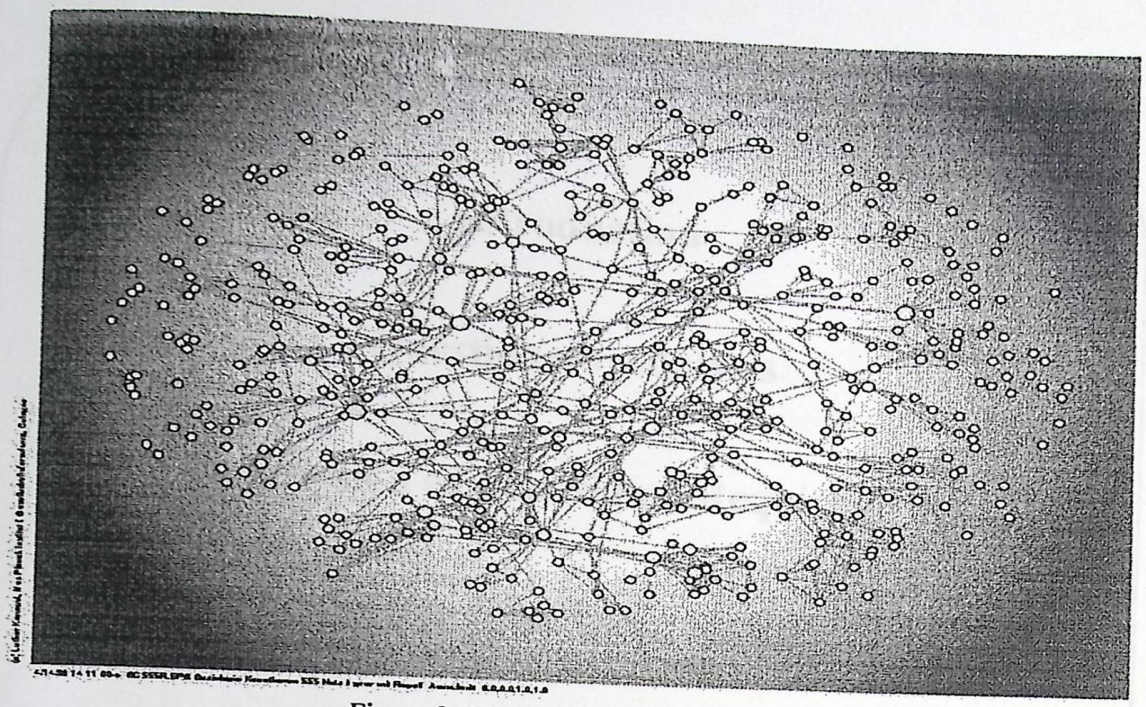


Figure 2. 10: Network Environment

Chapter 3

System Requirements

Introduction

Questioners Analysis

Description of Functional Requirement

Use Case Diagram

Sequence Diagram

3.1 Introduction

In order to solve the problem statement that is talked about in the first chapter, several alternatives will be discussed in this chapter. Indeed, we judge against different alternatives to get optimal solution. Finally, we will argue the system requirements of the proposed system. System requirements are divided into two portions: functional and nonfunctional requirements.

3.2 Alternatives

Our system approach is to convert the manual searching for homes into electronic system. In order to facilitate the searching operation for home, there are four alternatives.

3.2.1 Desktop using textual representation system

This system is used in the real estate desktop office, where the customer come to the office, to find homes for renting ,but this system shows the information in textual representation (words, table) .

3.2.2 Desktop with visual representation

As before the system is used in the real estate office, where the customer come to the office, to find homes for renting, but this system shows the information in a visual way.

3.2.3 Web with textual representation

This system is a web application designing for home renting. The user can find home for renting through choosing some criteria. All user can deal with the system remotely, but this system shows the information in text or tables.

3.2.4 Web with visualization

As in previous system it is a web application system, which is designed for home renting. The user can find home for renting through choosing some criteria. The system shows the information in a visual representation.

3.3 Alternative Advantages and Disadvantages

In order to choose the best solution, we mentioned in the table below the advantage and disadvantage for each alternative.

Alternatives	Advantages	Disadvantages
Desktop using textual representation system	1. Easy to develop and build. 2. Centralized data. This mean it's restructured from one place and one person. So that makes it more secure and easy to backup.	1. If the data is overcrowded and illustrated in one screen will makes the user more confused, so he cannot perceive it and can't compare it. 2. It's difficult to pick the needed information from dense information, because the displayed information using test or tables.
Desktop with visual representation	1. The displaying result is easy to be perceived by using information visualization in spite of the dense of textual representation.	1. Take time to develop because of using visualization.

Desktop with visual representation	2. Centralized data. This mean it's restructured from one place and one person. So that make more secure and easy to backup. 3. Easy to learn, using information visualization. 4. Attractive to be used, by using intuitive interface that resemble maps.	2. Difficult to accurately determine the coordinates of the houses.
Web with textual representation	1. Available 24 hours a day, 7 days a week. 2. Updates can be made quickly and easily.	1. If the data is overcrowded and illustrated in one screen will makes the user more confusing, so he cannot perceive it and compare it with the other information

In this section, we will discuss several costing in order as follow:

- Development cost
- Operational cost

Each cost includes hardware cost, software cost and human resource cost and another cost.

3.3.1 The first alternative: Desktop with textual representation

✓ **Development cost:**

Which include hardware cost, software cost, human cost and others costs.

1. **Hardware cost:**

The table below illustrates the cost of hardware resource for the system development:

Element	units number	Unit cost	Total cost
Computer	1	600$	600$
Printer	1	400$	400$
Flash memory(4GB)	1	10$	10$
Total			1010$

Table 3. 2:Hardware Costs of System Development (www.amazon.com)

2. **Software cost:**

The table below shows the software costs of the system development:

Element	Units number	Unit cost	Total cost
Microsoft windows 7 ultimate	1	200$	200$
Microsoft office professional 2007	1	150$	499.95$
Visual Studio 2005	1	200$	744$
Photoshop	1	100$	100$
dopica	1	Free	Free
Total			1543.95$

Table 3. 3:Software Cost of System Development

3. Human resource cost:

The team project consists of three members that exchange their roles to implement this project. The table below shows the human cost for the system development:

Name	Week/hour	Cost/hour	Total/month
Developer 1	30	10$	1200$
Developer 2	30	10$	1200$
Developer 3	30	10$	1200$
Total			3600$

Table 3. 4: Human Cost of System Development.

4. Another costs:

There are extra costs are needed such as (transportations, papers, printing and pens, consultation….etc) there is 200$ needed to cover it.

✓ Operational cost:

1. Hardware cost:

The following table lists the costs for the hardware required to operate this project:

Element	Unit number	Unit cost	Total cost
computer	2	600$	1200$
Total			1200$

Table 3. 5: Hardware Cost of Operating System.(www.amazon.com)

2. Software cost:

The table below shows the cost of software resources:

Element	Unit number	License number	License cost	Total cost
Microsoft windows 7 ultimate	1	3	200$	600$
Visual Studio 2005	1	3	391$	1173$
Total				1773$

Table 3. 6: Software Costs of Operating System (www.amazon.com)

3. Human resource cost:

The human resources include the following person in order to operate the system.

Total human cost for administrator 250$.

4. Other costs:

Other cost that needed to operate the system, there is another 0.5$ to cover the CD's cost.

Total costs of system development for the first alternative:

Resources	Costs
Hardware resources development cost	1010$
Software resources development cost	1543.95$
Human resources cost	3600$
Other resources cost	200$
Total	6353.95$

Table 3. 7: Total Development System Cost

Total cost for operational system:

Resource	Cost
Hardware resources operational cost	1200$
Software resources operational cost	1773$
Human resources cost	250$
Other resource cost	10$
Total	3233$

Table 3. 8: Total Operating System Cost.

We summarized the cost for the first alternative:

Resource	Development cost	Operational cost
Hardware resource	1010$	1200$
Software resource	1543.95$	1773$
Human resource	3600$	250$
Other resource	200$	10$
Total	6353.95$	3233$

Table 3. 9: Total Cost for the 1st alternative.

3.3.2 The second alternative: Desktop with visualization representation

✓ **Development cost:**

Which include hardware cost, software cost, human cost and others costs.

1. **Hardware cost:**

The table below illustrates the cost of hardware resource for the system development:

Element	units number	Unit cost	Total cost
Computer	1	600$	600$
Printer	1	400$	400$
Flash memory(4GB)	1	10$	10$
Total			1010$

Table 3. 10: Hardware Costs Of System Development

2. **Software costs:**

The table below shows the software costs of the system development:

Element	Units number	Unit cost	Total cost
Microsoft windows 7 ultimate	1	200$	200$
Microsoft office professional 2007	1	150$	499.95$
Adobe flex	1	200$	31.49$
Visual Studio 2005	1	200$	744$
Photoshop	1	100$	100$
dopica	1	Free	Free
Total			1575.44$

Table 3. 11: Software Cost of System Development.

3. **Human resource cost:**

The team project consists of three members that exchange their roles to implement this project. The table below shows the human cost for the system development:

Name	Week/hour	Cost/hour	Total/month
Developer 1	30	10$	1200$
Developer 2	30	10$	1200$
Developer 3	30	10$	1200$
Total			3600$

Table 3. 12: Software Cost of System Development.

4. **Another costs:**

There are extra costs are needed such as (transportations, papers, printing and pensile, consultation….etc) there is 200$ needed to cover it.

✓ **Operational cost:**

1. **Hardware cost:**

The following table lists the costs for the hardware required to operate this system:

Element	Unit number	Unit cost	Total cost
computer	2	600$	1200$
Total			1200$

Table 3. 13: Hardware Cost of Operating System.

Software cost:

The table below shows the cost of software resources:

Element	Unit number	License number	License cost	Total cost
Microsoft windows 7 ultimate	1	3	200$	600$
Visual Studio 2005	1	3	391$	1173$
Total				1773$

Table 3. 14: Software Costs for Operating System

2. **Human resource cost:**

The human resources include the following person in order to operate the system:

Total human cost for administrator 250$.

3. **Other costs:**

Other costs that needed to operate the system, there is another 0.5$ to cover the CD's cost.

Total costs of system development for the second alternative:

Resources	Costs
Costs of hardware resources development	1010$
Costs of software resources development	1575.44$
Costs of human resources development	3600$
Costs of other resources	200$
Total	6385.44$

Table 3. 15: Total Development System Cost.

Total cost for operating system:

Resource	Cost
Hardware resources operational cost	1200$
Software resources operational cost	1773$
Human resource cost	250$
Other resource cost	50$
Total	3273$

Table 3. 16: Total Operating System Cost.

We summarized the costing for the second alternatives:

Resource	Development cost	Operational cost
Hardware resource	1010$	1800$
Software resource	1575.44$	1773$
Human resource	3600$	250$
Other resource	200$	50$
Total	6385.44$	3273$

Table 3. 17: Total Cost for the 2nd alternative.

3.3.3 The third alternative: Web with textual representation

✓ **Development cost:**

Which include hardware cost, software cost, human cost and others cost.

1. **Hardware cost:**

The table below illustrates the cost of hardware resource for the system development:

Element	units number	Unit cost	Total cost
computer	1	600$	600$
Printer	1	400$	400$
Flash memory(4GB)	1	10$	10$
Total			1010$

Table 3. 18: Hardware Costs of System Development.

2. Software costs:

The table below shows the software costs of the system development:

Element	Units number	Unit cost	Total cost
Microsoft windows 7 ultimate	1	200$	200$
Microsoft office professional 2007	1	150$	499.95$
Visual Studio 2005	1	200$	744$
Photoshop	1	100$	100$
Hosting Cost	1	150$	150$
Domain Name Cost	1	150$	150$
ADSL Line	1	100$	100$
dopica	1	Free	Free
Total			1943.95$

Table 3. 19: Software Cost of System Development.

3. Human resource cost:

The team project consists of three members that exchange their roles to implement this project.

The table below shows the human cost for the system development:

Name	Week/hour	Cost/hour	Total/month
Developer 1	30	10$	1200$
Developer 2	30	10$	1200$
Developer 3	30	10$	1200$
Total			3600$

Table 3. 20: Human Cost of System Development.

4. Another cost:

There are extra costs are needed such as (transportations, papers, printing and pens, consultation….etc) there is 200$ needed to cover it.

✓ **Operation cost:**

1. Hardware cost:

The following table lists the costs for the hardware required to operate this system:

Element	Unit number	Unit cost	Total cost
computer	2	600$	1200$
Internet (DSL Modem)	1	100$	100$
Total			1300$

Table 3. 21: Hardware Cost of Operating System.

2. Software cost:

The table below shows the cost of software resources:

Element	Unit number	License number	License cost	Total cost
Microsoft windows 7 ultimate	1	3	200$	600$
Visual Studio2005	1	3	391$	1173$
Hosting Cost	1	1	150$	150$
Domain Name Cost	1	1	150$	150$
ADSL Line	1	1	100$	100$
Total				2173$

Table 3. 22: Software Costs for Operating System.

3. **Human resource cost:**

The human resources include the following person in order to operate the system:

Total human cost for administrator 250$.

4. **Other costs:**

Other costs that needed to operate the system programs, there is another 0.5$ to cover the CD's cost.

Total cost for operational system:

Resource	Cost
Hardware resources operational cost	1300$
Software resources operational cost	2173$
Human resource operational cost	250$
Other resource operational cost	50$
Total	3773$

Table 3. 23: Total Operating System Cost.

Total costs of system development for the third alternative:

Resources	Costs
Hardware resources development cost	1010$
Software resources development cost	1943.95$
Human resources development cost	3600$
Other resources cost	200$
Total	6753.95$

Table 3 .24: Total Development System Cost.

We summarized the cost for the third alternative:

Resource	Development cost	Operational cost
Hardware resource	1010$	1300$
Software resource	1943.95$	2173$
Human resource	3600$	250$
Other resource	200$	50$
Total	6753.95$	3773$

Table 3. 25: Total Cost for the 3rd alternative.

3.3.4 The forth alternative: Web with visual representation

✓ **Development cost:**

Which include hardware cost , software cost, human cost and others cost.

1. **Hardware cost:**

The table below illustrations hardware resources for system development:

Element	Number unit	Cost unit	Total cost
computer	1	600$	600$
printer	1	400$	400$
Flash memory(4GB)	1	10$	10$
Total			1010$

Table 3. ٢٦: Hardware Costs of System Development

2. **Software costs:**

The table below shows the software costs of the system development:

Element	Units number	Unit cost	Total cost
Microsoft windows 7 ultimate	1	200$	200$
Microsoft office professional 2007	1	150$	499.95$
Adobe flex	1	200$	31.49$
Visual Studio2005	1	200$	744$
Photo shop	1	100$	100$
Hosting Cost	1	150$	150$
Domain Name Cost	1	150$	150$

ADSL Line	1	100$	100$
adopica	1	Free	Free
Total			1975.44$

Table 3. 27: Software Cost of System Development.

3. Human resource cost:

The team project consists of three members that exchange their roles to implement this project. The table below shows the human cost for the system development:

Name	Week/hour	Cost/hour	Total/month
Developer 1	30	10$	1200$
Developer 2	30	10$	1200$
Developer 3	30	10$	1200$
Total			3600$

Table 3. 28: Human Cost of System Development.

4. Another cost:

There are extra costs are needed such as (transportations, papers, printing and pens, consultation….etc) there is 200$ needed to cover it.

Total costs of system development for the fourth alternative:

Resources	Costs
Hardware resources development cost	1010$
Software resources development cost	1975.44$
Human resources development cost	3600$
Other resources cost	200$
Total	6385.44$

Table 3. 29: Total Development System Cost.

✓ **Operation cost:**

5. Hardware cost:

The following table lists the costs for the hardware required to operate this system:

Element	Unit number	Unit cost	Total cost
computer	3	600$	1800$
Internet (DSL Modem)	1	100$	100$
Total			1900$

Table 3. 30: Hardware Cost of Operating System

6. Software cost:

The table below shows the cost of software resources:

Element	Unit number	License number	License cost	Total cost
Microsoft windows 7 ultimate	1	3	200$	600$
Visual Studio2005	1	3	391$	1173$
Hosting Cost	1	1	150$	150$
Domain Name Cost	1	1	150$	150$
ADSL Line	1	1	100$	100$
Total				2173$

Table 3. 31: Software Costs for Operating System

7. Human resource cost:

The human resources include the following person in order to operate the system:

Total human cost for administrator 250$.

8. Other cost:

Other cost that needed to operate the system programs, there is another 0.5$ to cover the CD's cost.

Total cost for operational system:

Resource	Cost
Hardware resources operational cost	1900$
Software resources operational cost	2173$
Human resource operational cost	250$
Other resource operational cost	50$
Total	4373$

Table 3. 32: Total Operating System Cost.

Total costs of system development for the fourth alternative:

Resources	Costs
Hardware resources development cost	1010$
Software resources development cost	1975.44$
Human resources development cost	3600$
Other resources cost	200$
Total	6785.44$

Table 3. 33: Total Development System Cost.

We summarized the cost for the forth alternative:

Resource	Development cost	Operational cost
Hardware resource	1010$	1900$
Software resource	1595.44$	2173$
Human resource	3600$	250$
Other resource	200$	50$
Total	6785.44$	4373$

Table 3. 34: Total Cost for the 4th alternative.

We summarized the cost for the all alternative:

All Alternatives	Development Cost	Operational Cost
Desktop with textual representation	6353.95$	3233$
Desktop with visualization representation	6385.44$	3273$
Web with textual representation	6753.95$	3773$
Web with visual representation	6785.44$	4373$

Table 3. 35: Total Cost for the all alternative.

Optimal solution:

After our study of each of the alternative systems in all respects. It's clear that the fourth alternative it's the more expensive but in order to meet the user need one we found the best to choose a web visualization system for the following reasons:

- Using the web will make the system available 24 hours, seven days a week.
- Using Information visualization focused on the creation of approaches for conveying abstract information in intuitive ways.
- Ability gives immediate feedback of the results.
- Increase effectively and decreasing time and effort

3.4 Functional requirements

Functional requirements determine what the system does? Or in other words it defines specific behavior or functions. the functional requirement of the proposed system done by three different categories of users:

- System administrator.
- Home owner.
- Renter users.

Requirements definition

- **System administrator requirements**

1. Check home information reliability manually
2. Make different operations in database related to home and user such as:
    a. Adding new home.
    b. Adding user.
    c. Updating user: enables in case of appearing a new obligation and new user information that needed to update.
    d. Updating Home: enables in case of appearing a new obligation and new home information that needed to update.
    e. Delete user: enabled in a case of user death.
    f. Delete home : enabled in case of demolishing the house .
3. Update his password.
4. Viewing a chart that defines some important data, which is one of the technique that is used to visualize information.

- **Home owner requirements**

1. Filling and sending the home information to the administrator.
2. Viewing charts that defines time of clicked for a specific houses.
3. Make different operations related to his home information and his information to the database:
    a. Update User: enables in case of appearing a new obligation and new user information that needed to update.
    b. Update Home: enables in case of appearing a new obligation and new home information that needed to update.

c. Delete Home: enabled in case of demolishing the house

- **Renter requirements**

1. Choosing the home criteria.
2. Display the home information and video, depending on a map. and this is one of the techniques used to visualize information.
3. Viewing a collection of photos for homes and displaying its information.
4. Displaying Hebron map to know more about the city areas in order to rent homes in area they prefers.

3.5 Nonfunctional requirements

Functional requirements define the behavior and the function of the system, whilst, the nonfunctional system specifies criteria that can be used to judge the operation of a system, rather than specific behaviors.

Which is a collection of known standards and by these standards we can develop the system, and develop some properties changed on the system.

- **Ease of usage**

Clear interfaces, expressive icons, ease navigation screens, and some visualization techniques ,assist people to help themselves to do what you want them to do. So in this way we will achieve ease if usage.

- **Symmetry and harmony**

Symmetry is beautiful, and leaded to harmony. In order to achieve it we will

Use the same skin in all screens and the same button positions.

Our system will achieve accuracy, by checking the home and the owner information reliability and accuracy from Hebron City Hall.

3.6 Risks and risk analysis for the system

There is no system built without problems, even our system. So in this section we will take about the risks and limitation that faces the developer while developing it. Also we will take about some expected solution to solve these problems, which are mentioned in the tables bellow.

Limitation	Solution
1. Disagreement between team members. Also not finishing within the determined period.	• Distribute the tasks between the team. • Doing schedule to determine in it the date of finishing some tasks. • The period between each meeting not very long.
2. Analyzing the system is not sufficient, because of propping new requirement.	• Training continuously, and learning everything that the system need.
3. The budget will be exceeded than the determined.	• Planning the tasks within the budget.

Table 3. 36: limitation and solutions

Our system will achieve accuracy, by checking the home and the owner information reliability and accuracy from Hebron City Hall.

3.6 Risks and risk analysis for the system

There is no system built without problems, even our system. So in this section we will take about the risks and limitation that faces the developer while developing it. Also we will take about some expected solution to solve these problems, which are mentioned in the tables bellow.

Limitation	Solution
1. Disagreement between team members. Also not finishing within the determined period.	• Distribute the tasks between the team. • Doing schedule to determine in it the date of finishing some tasks. • The period between each meeting not very long.
2. Analyzing the system is not sufficient, because of propping new requirement.	• Training continuously, and learning everything that the system need.
3. The budget will be exceeded than the determined.	• Planning the tasks within the budget.

Table 3. 36: limitation and solutions

Risks	Solution
1. Power outages	Having UPS, or motor for providing electricity.
2. Losing or damaging the backup copy	Making more than one copy
3. Server shutdown	Making the system works automatically in another server.

Table 3. 37: risks and solutions

Chapter 4

Requirements specification

Introduction

Alternatives

Feasibility

Functional Requirements

Non Functional Requirements

Limitations and Risk Analysis for the System

4.1 Introduction

Collecting information is vital process to get clear understanding about the nature of proposed system. In order to get information about the most important home criteria that the user looks for, questionnaire is built and analyzed. In this chapter will include questionnaire analysis section, full detailed description of the system's functional requirements, which have been mentioned in the previous chapter. In addition this step is important to develop and complete the system. Second, we illustrate some model, which present the functionality provided by a system in terms of actors.

5.2 Questionnaire analyzing

The questionnaire has been done by the research team. Thirty subjects are participated from both genders. The subjects present all level of society, 10 students from both gender and 20 of other level of society.

The following table shows questionnaire analysis in percentage for each home criterion:

	نتائج تحليل الاستبيان: نص السؤال	النسبة المئوية				
		١	٢	٣	٤	٥
١	درجة الاهتمام بسعر المنزل	%٠	%٧	%٢٣	%٣٠	%٤٠
٢	درجة الاهتمام باستقلالية المنزل	%٣	%٣	%٣٠	%١٧	%٤٧
٣	درجة الاهتمام بالموقع	%٠	%٧	%٣	%٣٣	%٥٧
٤	درجة الاهتمام بمساحة البيت	%٣	%١٣	%٢٧	%٤٠	%١٧
٥	درجة الاهتمام بأن يتكون البيت من طابقين	%٣٠	%٤٠	%٢٧	%٣	%٠
٦	درجة الاهتمام بعدد غرف المنزل	%٠	%٢٠	%٤٣	%٣٤	%٣
٧	درجة الاهتمام ببيت مشمس	%٣	%٣	%١٣	%١٧	%٦٤
٨	درجة الاهتمام بأن يتوفر بالبيت تسهيلات(كالمصعد وحارس)	%٢٣	%٤٦	%١٥	%١٣	%٣
٩	درجة الاهتمام بأن يكون البيت بناؤه حديث	%١٠	%٢٠	%٢٧	%٣٠	%١٣
١٠	درجه الاهتمام بوجود حديقة	%٣	%٢٣	%٢٧	%٢٧	%٢٠
١١	درجة الاهتمام ببعده عن مكان محدد	%١٣	%٢٧	%٤٣	%١٠	%٧

Table 4. 1: Questioner Analysi

4.3 Description of functional requirements

Functional requirements determine what the system does? Or in other words it defines specific behavior or functions. The functional requirement of the proposed system done by three different categories of users:

- System administrator.
- Home owner.
- Renter users.

The description of their requirement done as follow.

4.3.1 System administrator requirement

a. Adding new home

Description	The administrator will be able to add new home and user's information.
Inputs	Entering the home and users information to the database.
Source	administrator
Outputs	New home and user's information will be added to the database.
Requirements	The information that related to a specific home must be accepted from the administrator

Table 4. 2: administrator requirements

b. Update some or all information's.

Description	The administrator can change and update the information about a specific home and users if there is changes come from the owner.
Inputs	The owner Id for home, first name for users
Source	administrator
Outputs	The information in the database is modified.
Requirements	The owner Id and first name that entered must exists in the database

Table 4. 3: administrator requirements

c. Delete

Description	The administrator will be able to delete any home and user from the database.
Inputs	Owner Id for home ,first name for user
Source	administrator
Outputs	Delete a particular house or user from the database
Requirements	The home No must exist in the database.

Table 4. 4: administrator requirements

1. Update his password

Description	The administrator can to change his password
Inputs	His new password
Source	administrator
Outputs	The new password
Requirements	He must enter as an administrator and enter his id

Table 4. 5: administrator requirements

Home Owner Requirements

1. Filling and sending the home information to the administrator.

Description	The home owner will fill information about his home in a form then send it to the administrator.
Input	data about the home
Source	The owner
Output	After the administrator accept the home the home can be viewed by the renter
Requirements	Open the form and fill it with the data

Table 4. 6: Home owner requirements

2. Make different operations related to his home information and his information to the database:

a. Update some data:

Description	The owner can change and update specific information about a his home and information
Inputs	The new data
Source	owner
Outputs	The information in the database is modified.
Requirements	OwnerId

Table 4. 7:Home owner requirements

b. Delete:

Description	The owner will be able to delete his home from the database.
Inputs	ownerId
Source	owner
Outputs	Delete his house from the database
Requirements	The ownerId must exists in the database.

Table 4. 8:Renter requirements

4.3.2 Renter Requirements

1. Choosing the home criteria

Description	The users have to choose the home properties that he would like to have it like choosing the most suitable price for him.
Input	Choosing the home properties.
Source	The renter
Output	The homes that related to the criteria that the user choose
Requirements	The homes should be in the database.

Table 4. 9: Renter requirements

2. display the home information and video

Description	The user can see the home information that related to the criteria that he choose it from the dynamic query .also can see the video to the home and that done by clicking on the points that on the map
Input	Choosing all the required criteria.
Source	The renter
Output	The homes that related to the criteria that the user choose
Requirements	Click on the mark that will appear in the map

Table 4. 10: Renter requirements

3. Viewing a collection of photos for homes and displaying its information.

Description	The user can navigate photos for homes within a gallery And read some information that related to specific home picture
Input	Let Mouse over the picture
Source	The renter
Output	The picture that will selected and it description
Requirements	Click the glary icon

Table 4. 11:Renter requirements

4. Displaying Hebron map.

Description	The user can Displaying Hebron map to know more about the city areas in order to rent homes in area they prefers.
Input	Drag and drop the map
Source	The renter
Output	Navigate the hole map
Requirements	Click Hebron city map link

Table 4. 12: Renter requirements

4.4 Use case diagram

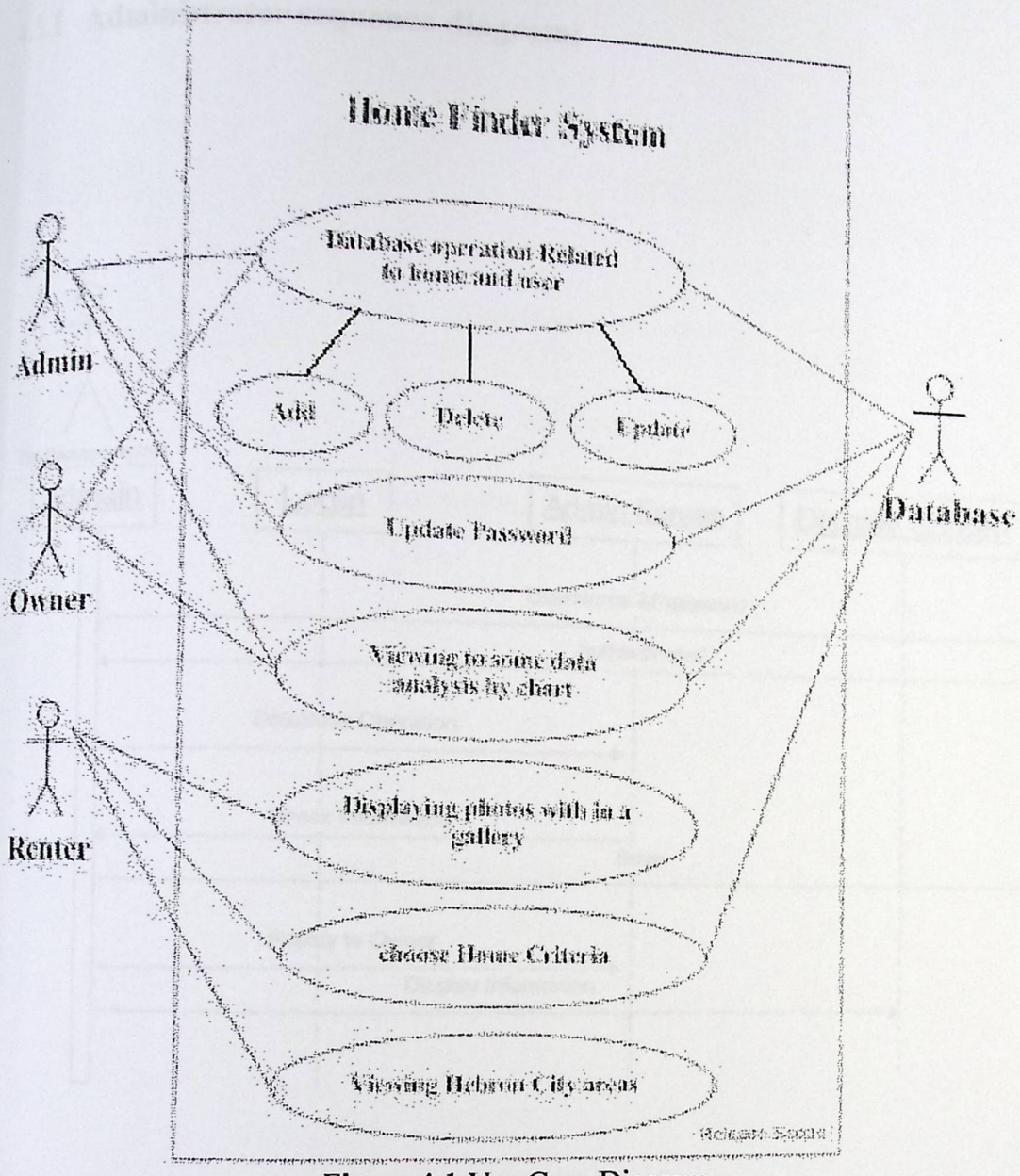


Figure 4.1 Use Case Diagram

4.5 Sequence diagram

4.5.1 Administrator sequence diagram:

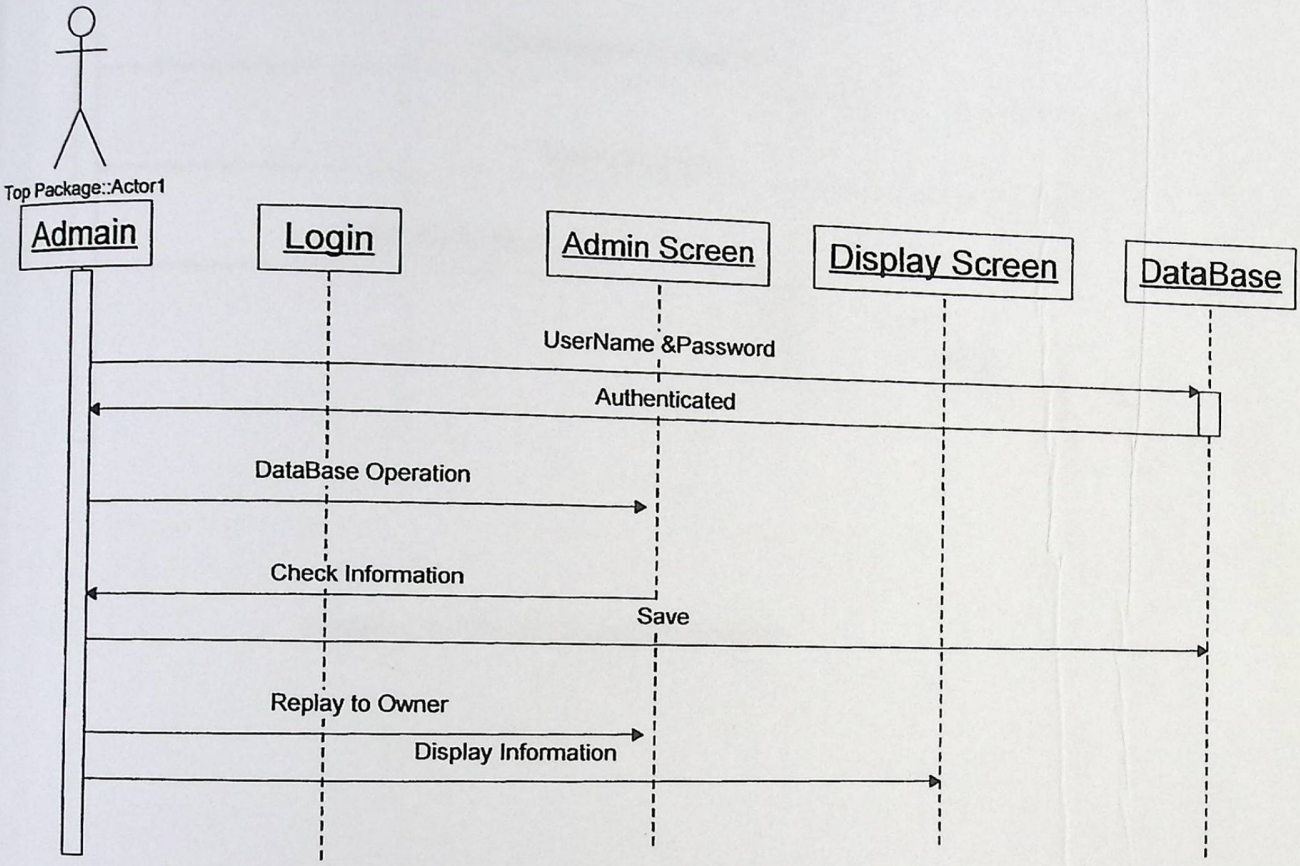


Figure 4. 1: Admin Sequence diagram

4.5.2 Home owner sequence diagram:

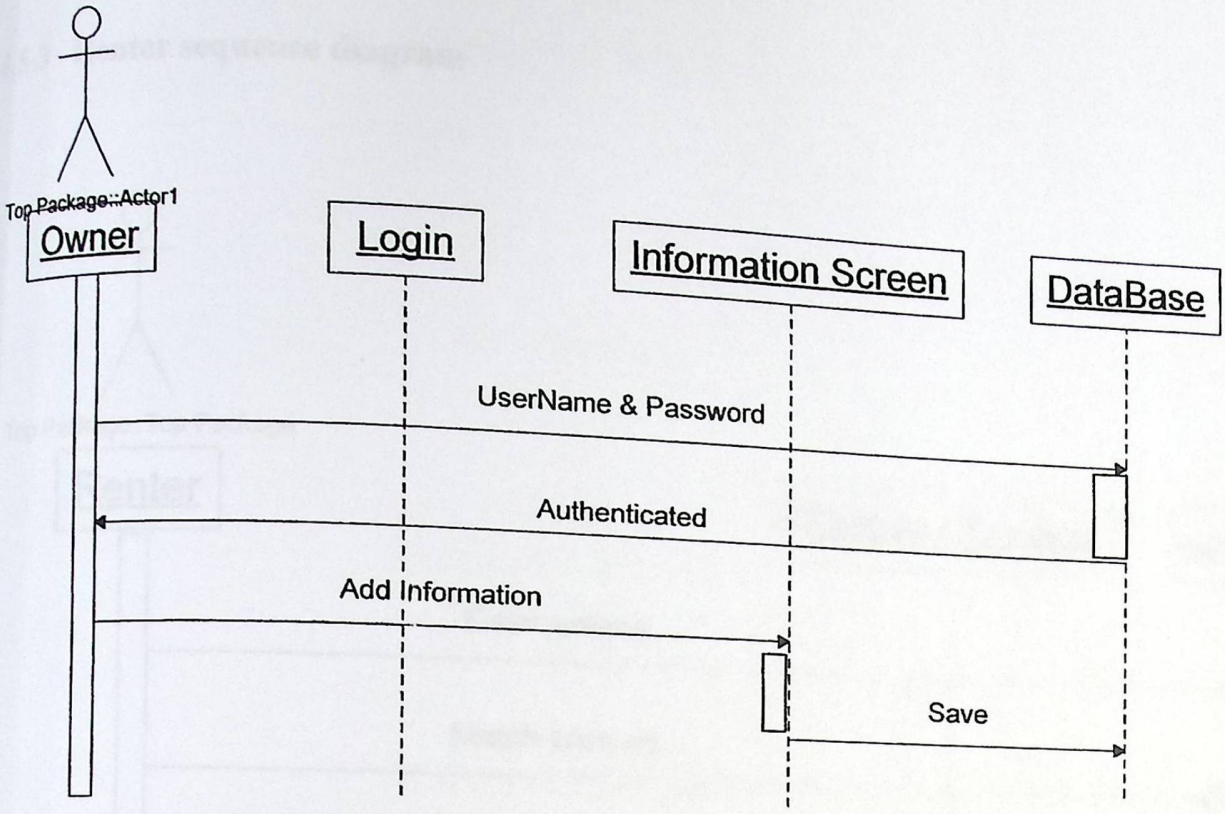


Figure 4. 2: Owner Sequence diagram

4.5.3 Renter sequence diagram

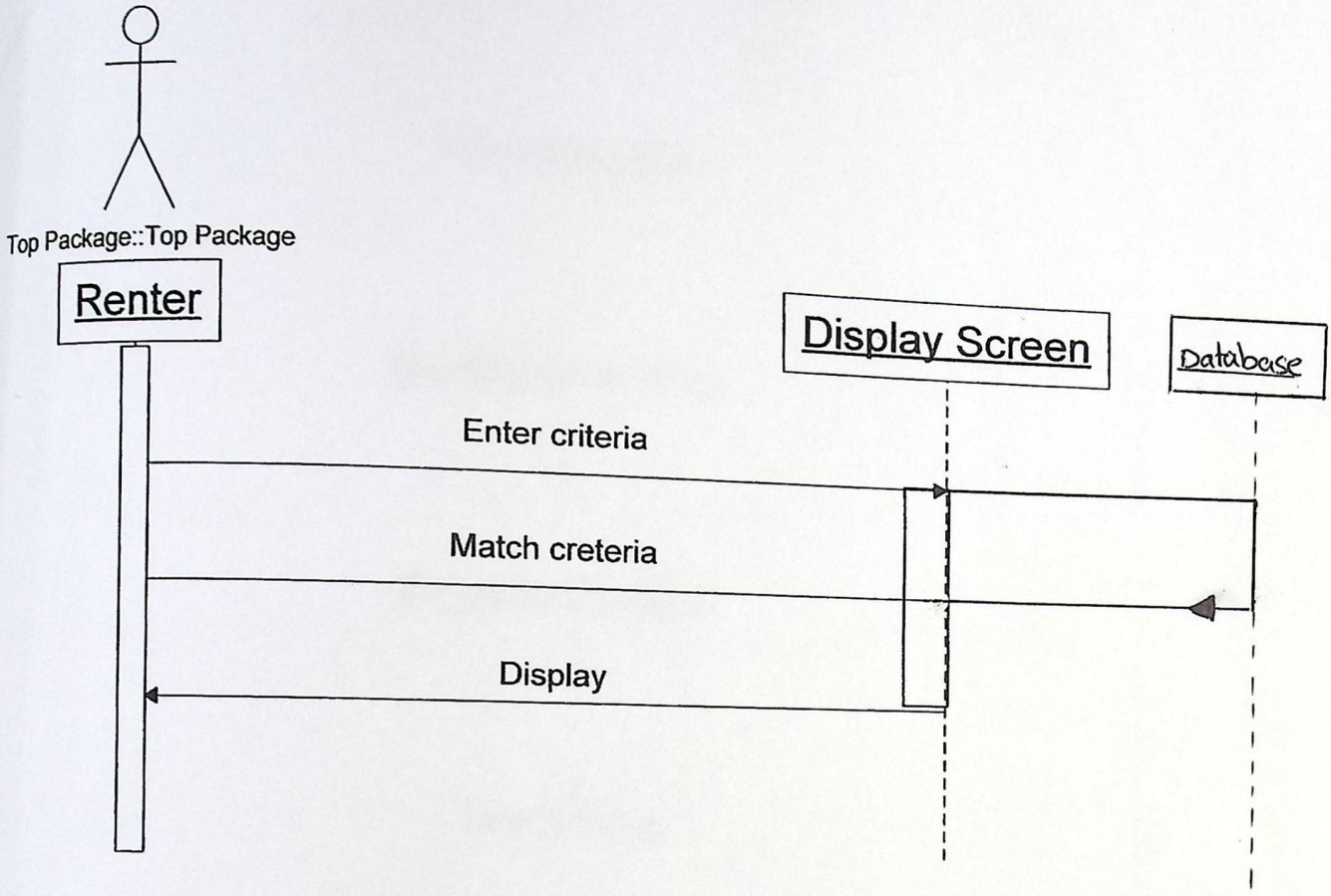


Figure 4. 3: Renter Sequence diagram

Chapter 5

System Design

Introduction

Database Design

Screens Design

Test Plain

5.1 Introduction

The primary deliverable of the design phase is design specifications that satisfy the software requirements. This chapter is divided into several sections. In each section one of the design specification is described such as designing database , screens . finally, text plan is discussed at the end of this chapter.

5.2 Database Design

There are several tables in data base as follows:

- User table:
- Home table:
- Places table:

The following are data dictionaries for each table. Include the description for each field and validation is there in note column

Field	description	Type	size	PK/Fk	notes
User Id		Integer number	11	PK/auto increment	Auto Increment
Personal Id	the Owner Personal identification card	Integer number	9	unique	required
First Name	the user first name	text	50	------	required
Middle Name	the user middle name	text	50	------	required
Last Name	the user last name	text	50	------	required
Phone No	the user phone No	Integer number	11	------	required
Work No	the user Work phone No	Integer number	11	------	null
Address	the user home Address where he is living	text	100	------	required
Email	the user email	text	100	------	required

Group	the user type admin, or owner where admin set to 1	Integer number	1	------	-------

Table 5. 1: data dictionary for user table

The following table describes the data dictionary for the home table:

Field	description	Type	size	PK/FK	notes
Home Id		Integer number	11	PK/auto increment	Auto Increment
Home No	The home No where it is identeficates from the Hebron City Hall	Integer number	9	unique	required
Owner Id		Integer number	50	FK	required
Place		Integer Number	11	FK	required
Address		text	50	------	required
Price		Float number	3	------	required
Area		Float number	11	------	null
Number of Rooms		Integer number	2	------	required
Floor No		Integer number	2	------	required
Other Feature		text	300	------	Null
Video		text	100	------	Null
picture		text	100	------	Null
X		Float number	3	unique	required
Y		Float Number	3	unique	required
Rented		Integer Number	1	------	------
Accepted		Integer No	1	------	------

Table 5. 2: data dictionary for Home table

Field	description	Type	size	PK/Fk	notes
Place Id		Integer number	11	PK/auto increment	Auto Increment
Place	Hebron city areas	text	9	------	------

Table 5. 3: data dictionary for Places table

The figure below shows the relations between two tables (class). Each class has its own properties and methods. Properties are described in previous tables. The methods will be described below.

User class methods:

- Add User: it's enable the admin and owner to adjoin user
- Delete User: its enable the admin to cross out user from database
- Update User: its enable the admin and owner to exchange the old user data with the new .

Home Class Methods:

- Add Home: it's enable the admin and owner to adjoin Home.
- Delete Home: its enable the admin to cross out home from the database.
- Update Home: its enable the admin and owner to exchange the old home data with the new .

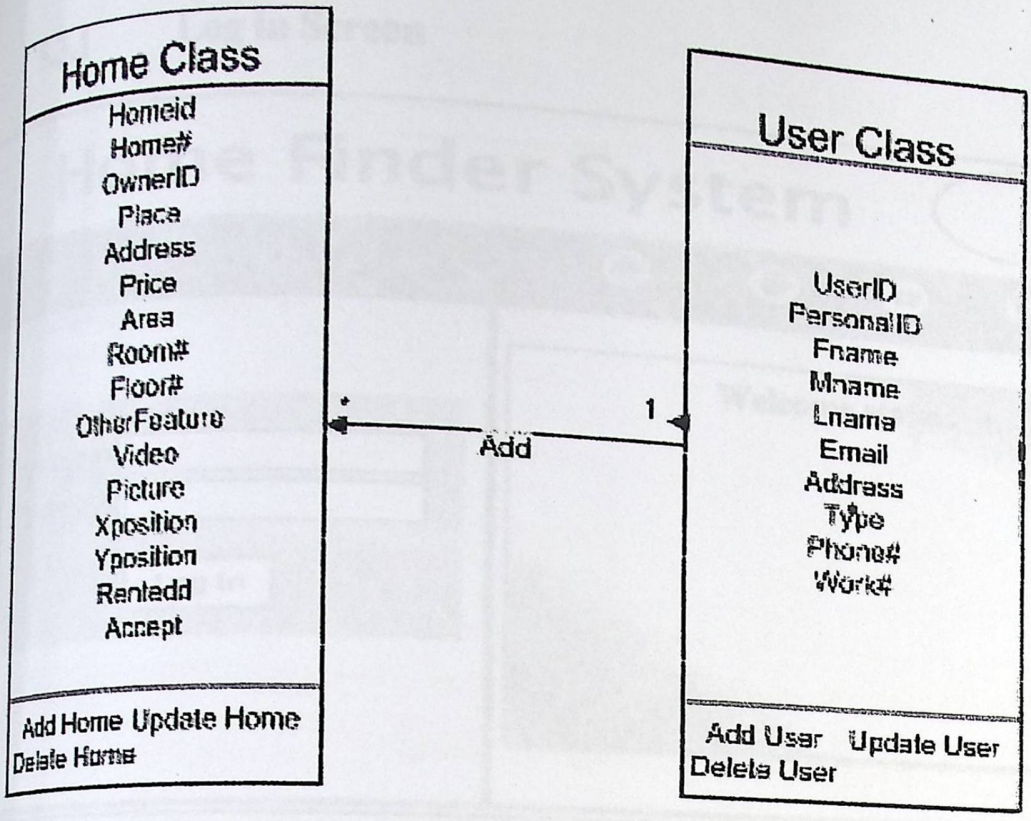


Figure 5. 1: Database Class Diagram

5.3 Screens design

In the direction of facilitating the process of designing before going on the actual design; we will produce the screen prototypes using (Pidoco). The prototypes helps us in determining which aspects are valuable and which parts need to be changed, revised, or discarded. The prototyped screens are shown below with a logical design for each one.

There is main menu in all system screens. The menu includes the following items:

- Home
- Renting:
- Gallery:
- Sign up: let the owner to enter his own information.
- About us:
- Contact us:

5.3.1 Log in Screen

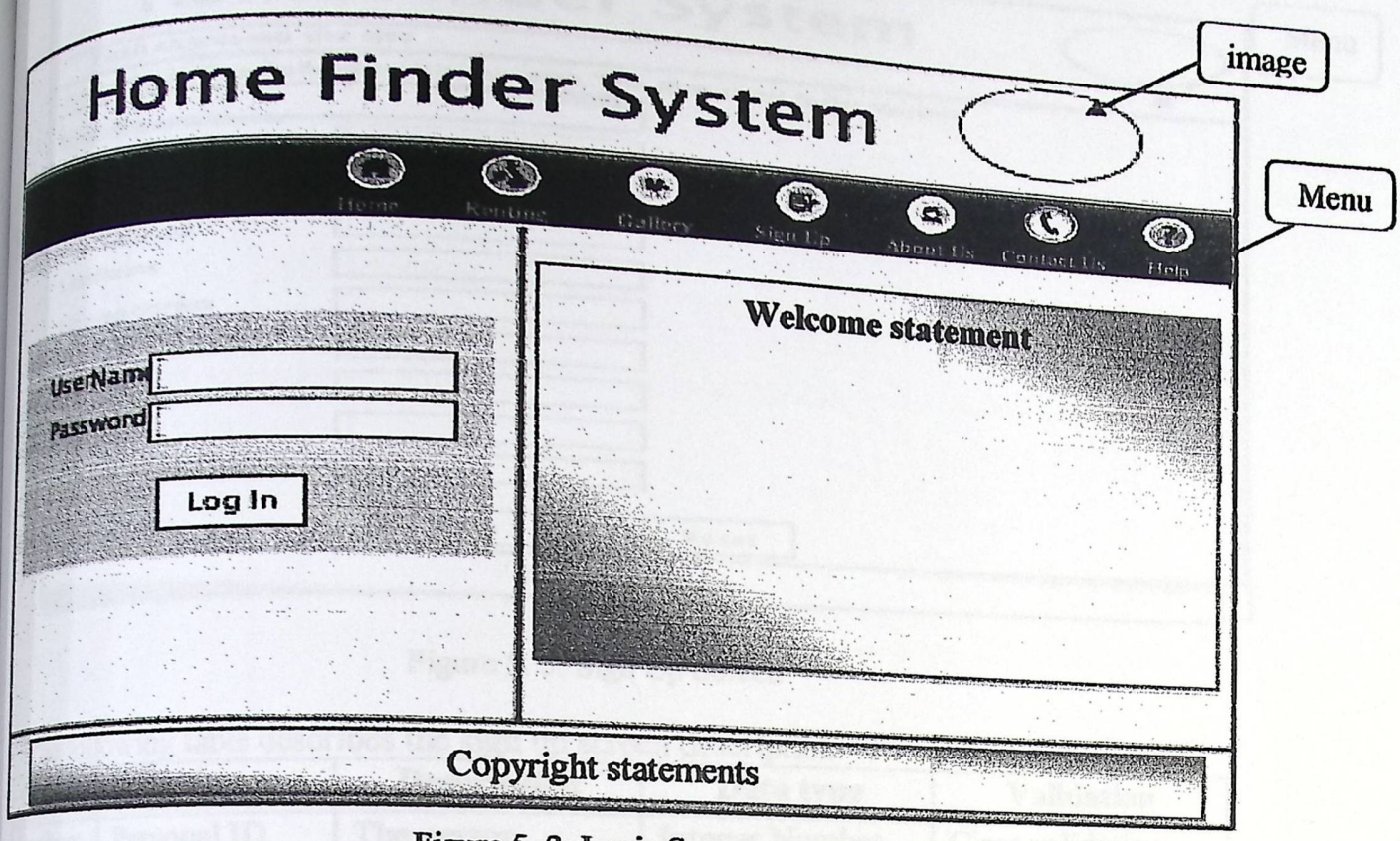


Figure 5. 2: Login Screen

The following table describes the login screen description:

Object	Fieldname	Data type	Description	Validation
textbox	Username	Text	Enter username	The username must be as the email address of the user.
textbox	Password	Text	Enter password	The password not less than 6 characters.

Table 5. 4; Login description

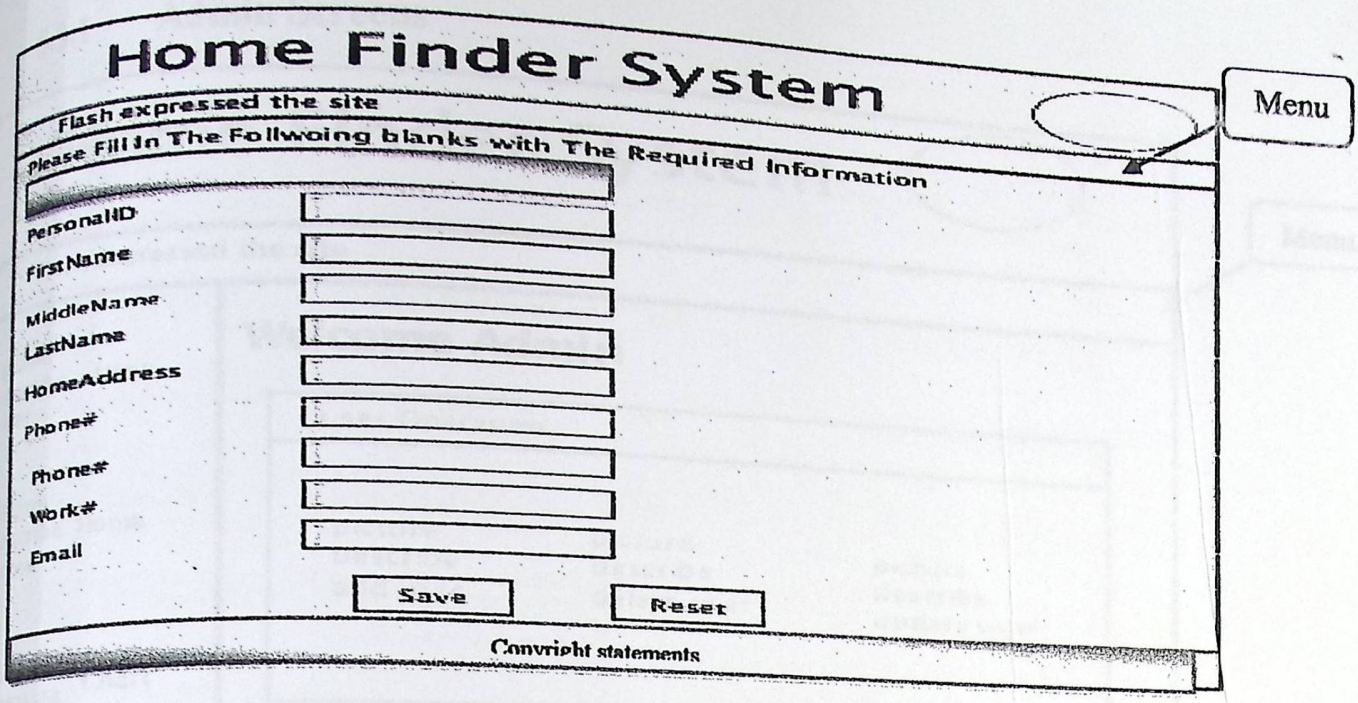


Figure 5. 3: Sign Up Screen

The following table describes the sign up screen description:

Object	Fieldname	Description	Data type	Validation
textbox	Personal ID	The person identification card number	Integer Number	Class validation.
textbox	First name	Owner first name	Text	Class validation
textbox	Middle name	Owner middle name	Text	Class validation
textbox	Last name	Owner last name	Text	Class validation
textbox	Home address	Owner home address where the owner live.	Text	—
textbox	Phone number	owner phone no	Integer Number	Class validation
textbox	Work number	owner work no if available	Integer Number	Class validation
textbox	Email	Owner email address	Text	Class validation
Button	Save	Saving owner information	—	Class validation
Button	Reset	Clear all field	—	—

Table 5. 5: Sign up screen description

5.3.1 Admin Screens

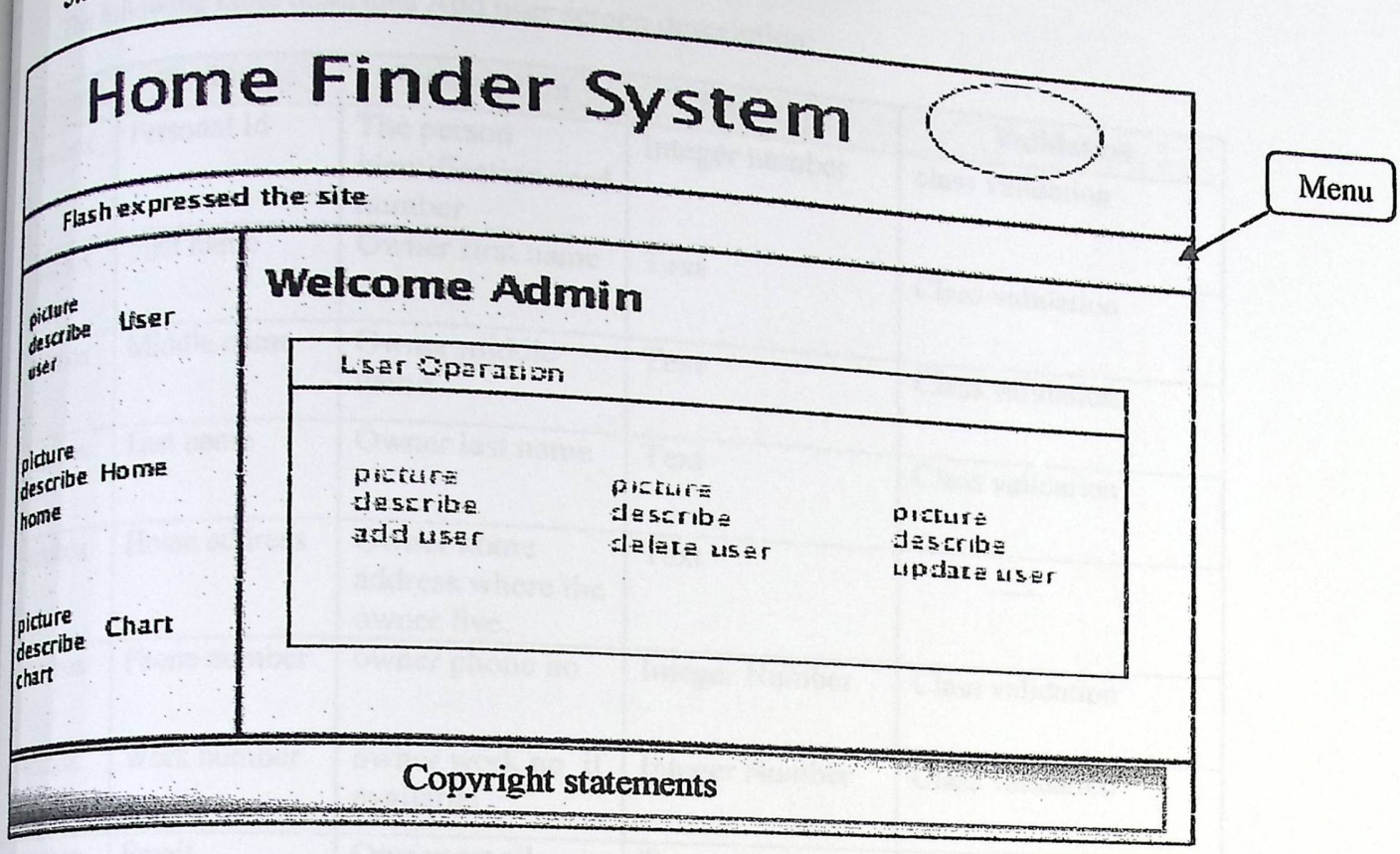


Figure 5. 4: user operations in admin screen

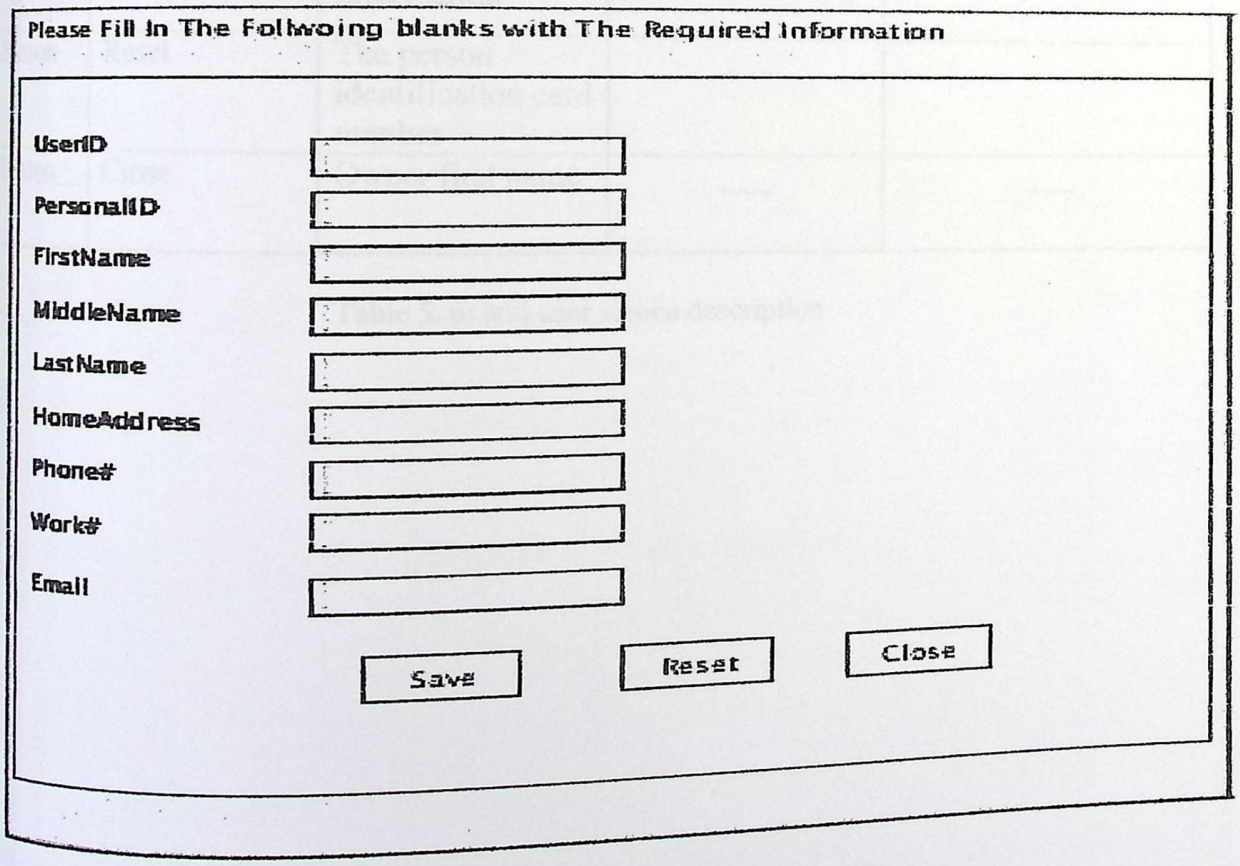


Figure 5. 5: Add user screen

The following table describes Add user screen description:

Object	Fieldname	Description	Data type	Validation
textbox	Personal Id	The person identification card number	Integer number	class validation
textbox	First name	Owner first name	Text	Class validation
textbox	Middle name	Owner middle name	Text	Class validation
textbox	Last name	Owner last name	Text	Class validation
textbox	Home address	Owner home address where the owner live.	Text	—
textbox	Phone number	owner phone no	Integer Number	Class validation
texbox	Work number	owner work no if available	Integer Number	Class validation
textbox	Email	Owner email address	Text	Class validation
Button	Save	Saving owner information	—	—
Button	Reset	The person identification card number	—	—
Button	Close	Owner first name	—	—

Table 5. 6: add user screen description

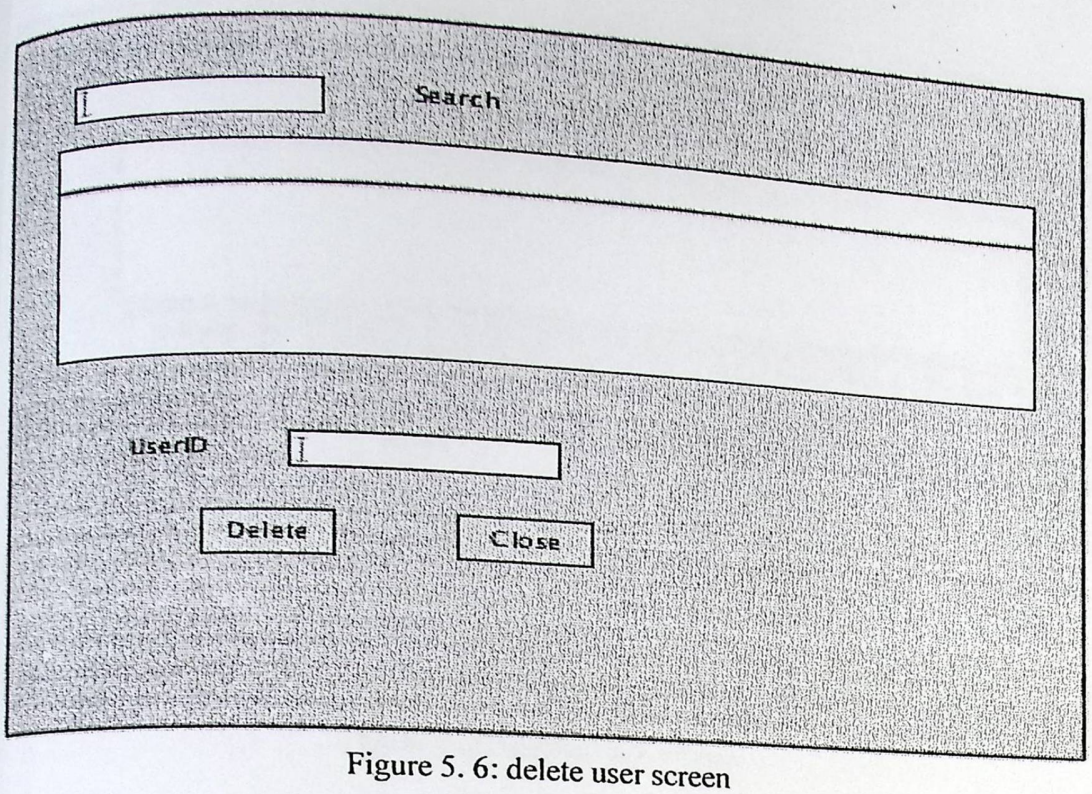


Figure 5. 6: delete user screen

The following table describes delete user screen description:

Object	Fieldname	Description	Data type	Validation
Input textbox	First name	Entering the user first name ,in order to display its information.	Integer Number	—
Input textbox	User Id	User id that displayed in the datagrid	Integer Number	Class validation
button	Delete	Delete the User from the database	—	—
button	Close	Close the screen	—	—

Table 5. 7: delete user screen description

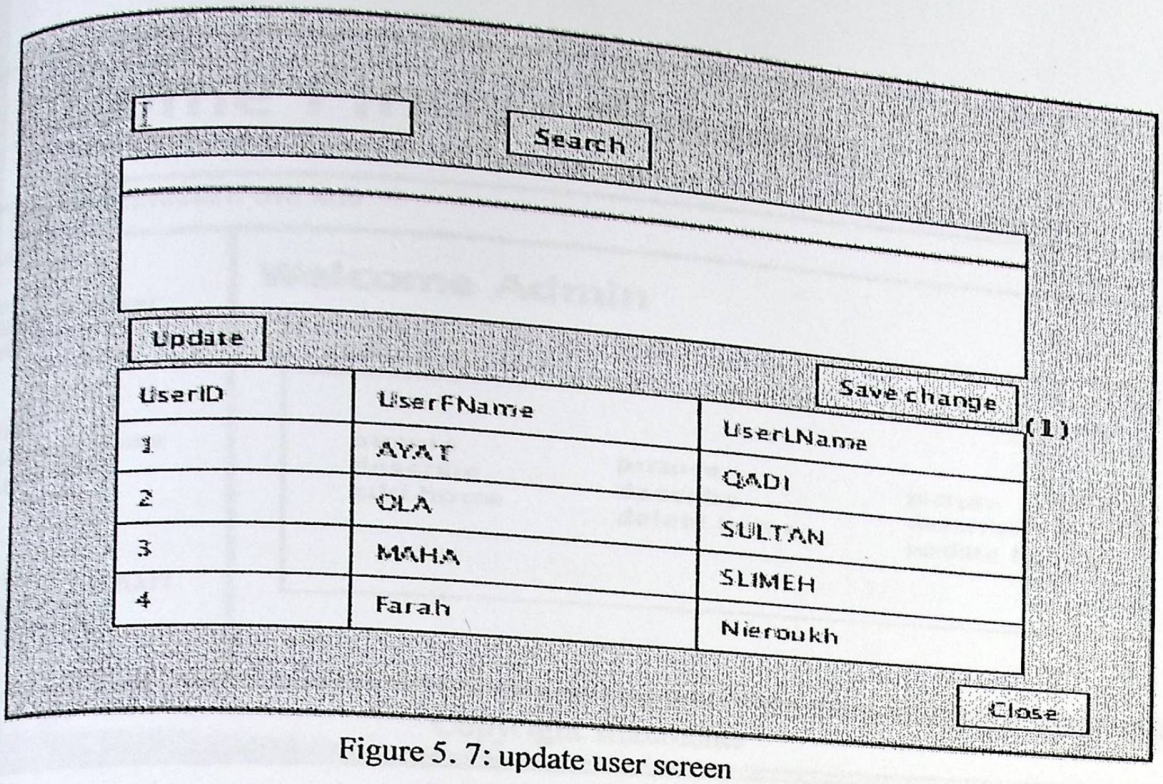


Figure 5. 7: update user screen

The following table describes update user screen description:

Object	Fieldname	Description	Data type	Validation
Textbox	First name	The user first name ,in order to display its information	Integer Number	___
button	Update	Present the datagrid to enable update	___	___
button	Save change	Save the updated information	___	___
button	Close	Close the screen	___	___
button	search	present all the users with the entered first name	___	

Table 5. 8: update user screen description

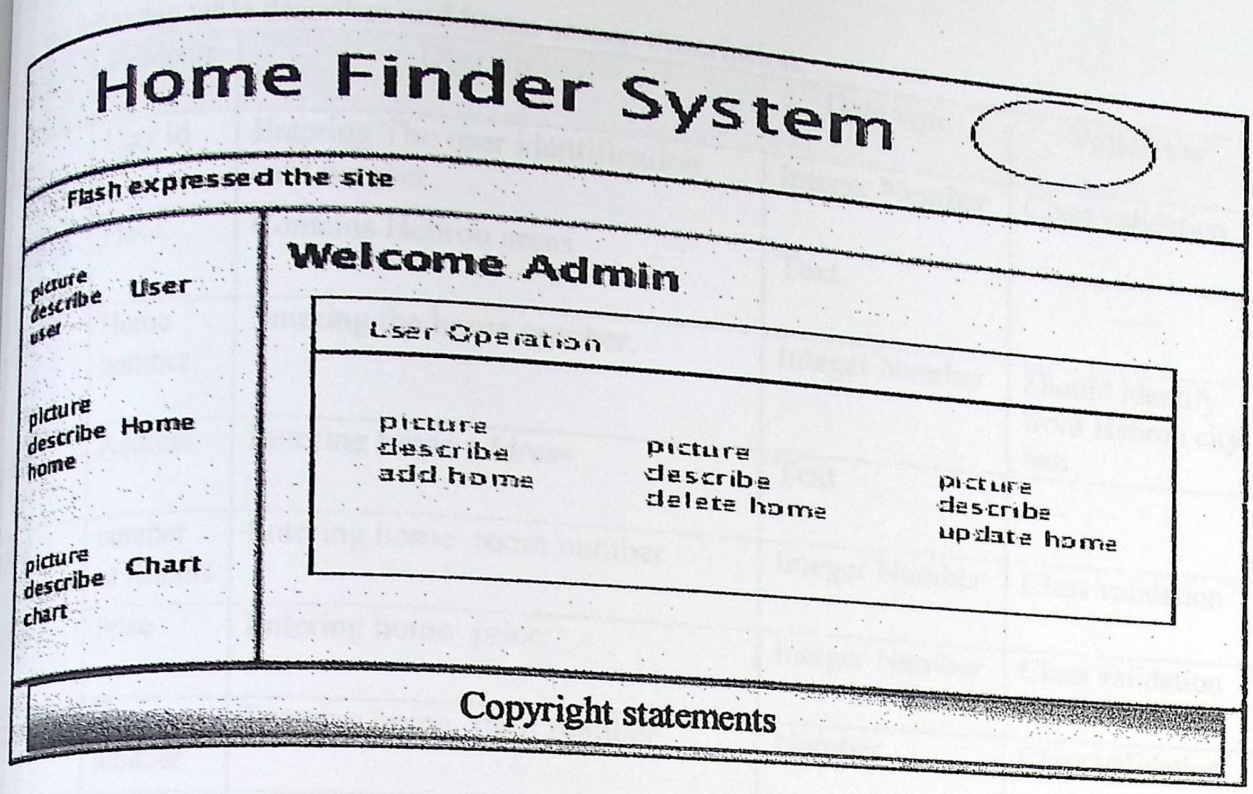


Figure 5. 8 : home operation admin screen

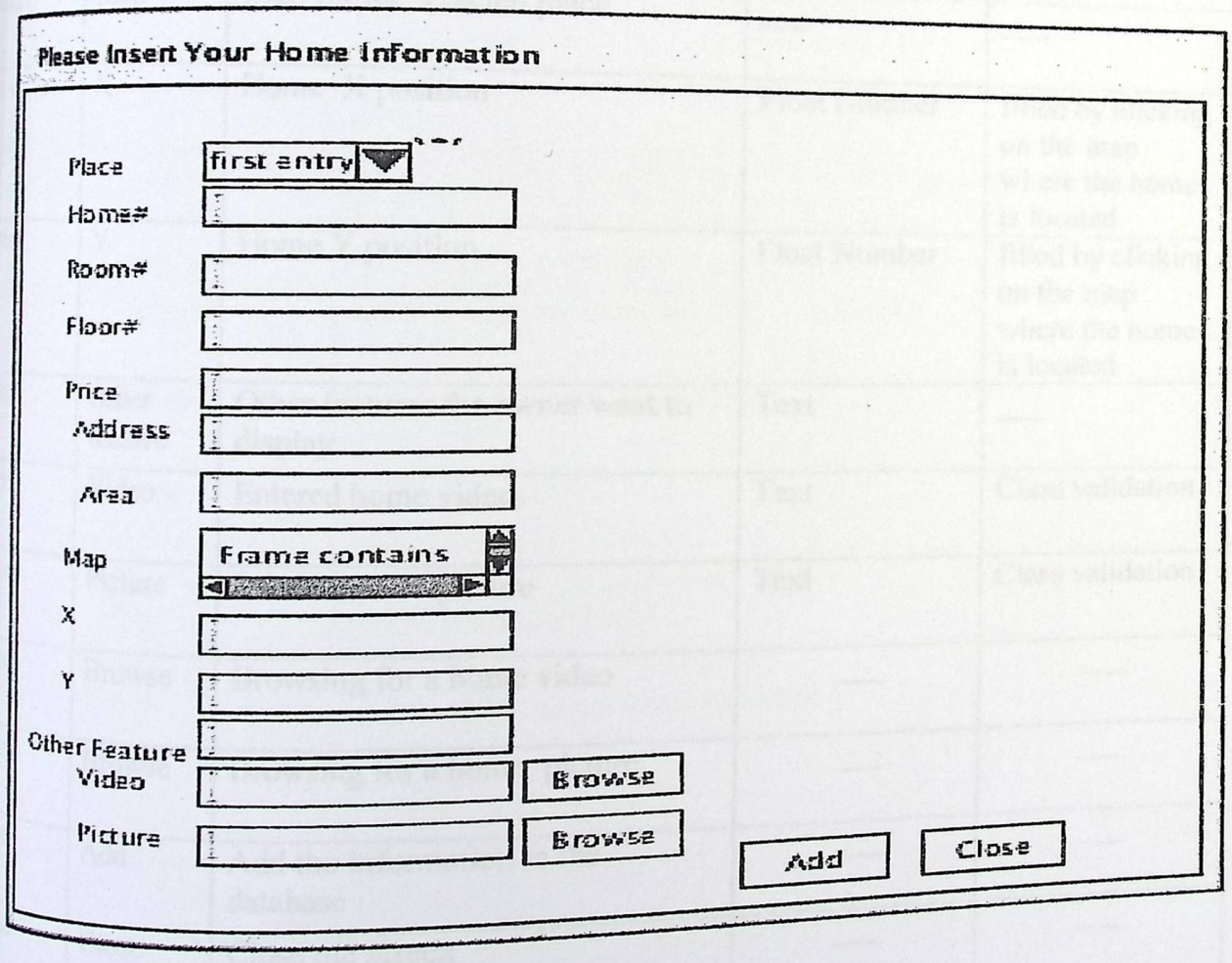


Figure 5. 9: add home screen

The following table describes add home screen description:

Object	Fieldname	Description	Data type	Validation
textbox	User Id	Entering The user identification card number	Integer Number	Class validation
Drop Down List	Place	Contains Hebron areas	Text	—
textbox	Home number	Entering the home number.	Integer Number	Should identify from Hebron city hall
textbox	Address	Entering home address	Text	—
textbox	number of Rooms	Entering home room number	Integer Number	Class validation
textbox	Price	Entering home price	Integer Number	Class validation
textbox	Floor number	Entering home floor number	Number	Class validation
textbox	Area	Entering home area	Float number	Class validation
Scroller	Map	Map for the selected place	—	—
textbox	X	Home X position	Float Number	filled by clicking on the map where the home is located
textbox	Y	Home Y position	Float Number	filled by clicking on the map where the home is located
textbox	Other feature	Other features the owner want to display	Text	—
textbox	Video	Entered home video	Text	Class validation
textbox	Picture	Entered home picture	Text	Class validation
button	Browse	Browsing for a home video	—	—
button	Browse	Browsing for a home picture	—	—
Output	Add	Add the information in the database	—	—
Output	Close	Close the screen	—	—

Table 5. 9 :add home screen description

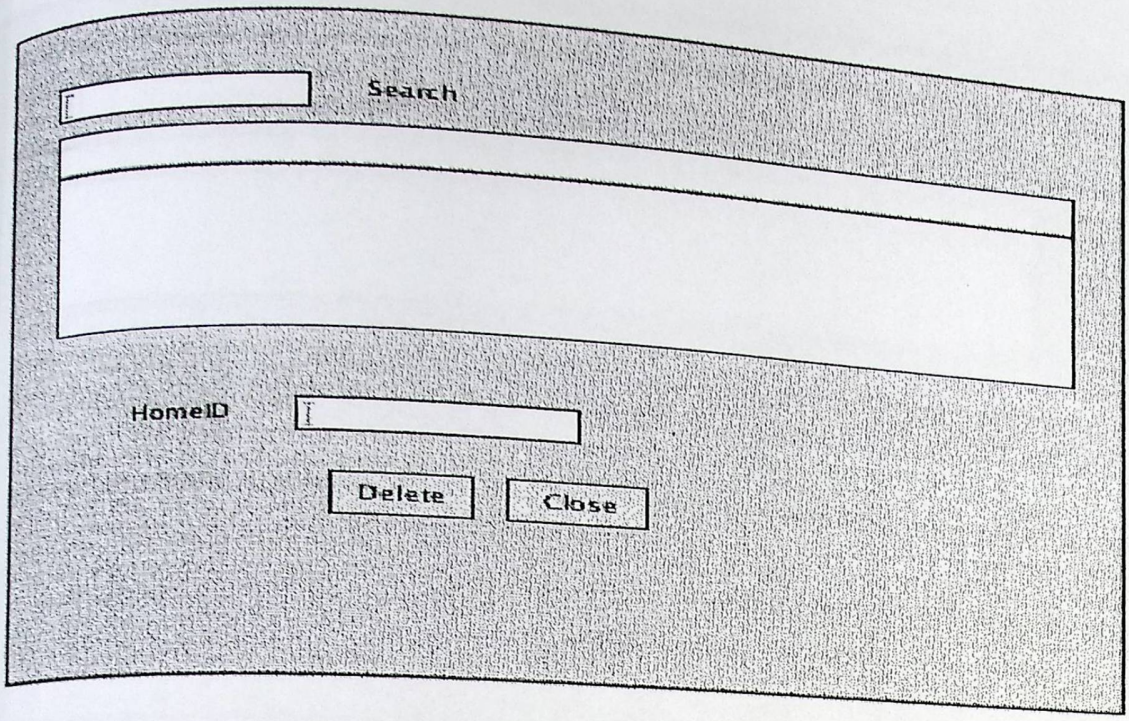


Figure 5. 10: delete home screen

The following table describes delete home screen description :

Object	Fieldname	Description	Data type	Validation
textbox	Owner ID	Enter the owner id do display his homes in a datagrid	Number	—
textbox	HomeId	Enter the Home Id to delete it	Number	—
button	Delete	Delete home from the database.	—	—
button	Close	Close the screen	—	—
button	search	Present all the owner homes that is related to his id	—	

Table 5. 10: delete home screen description

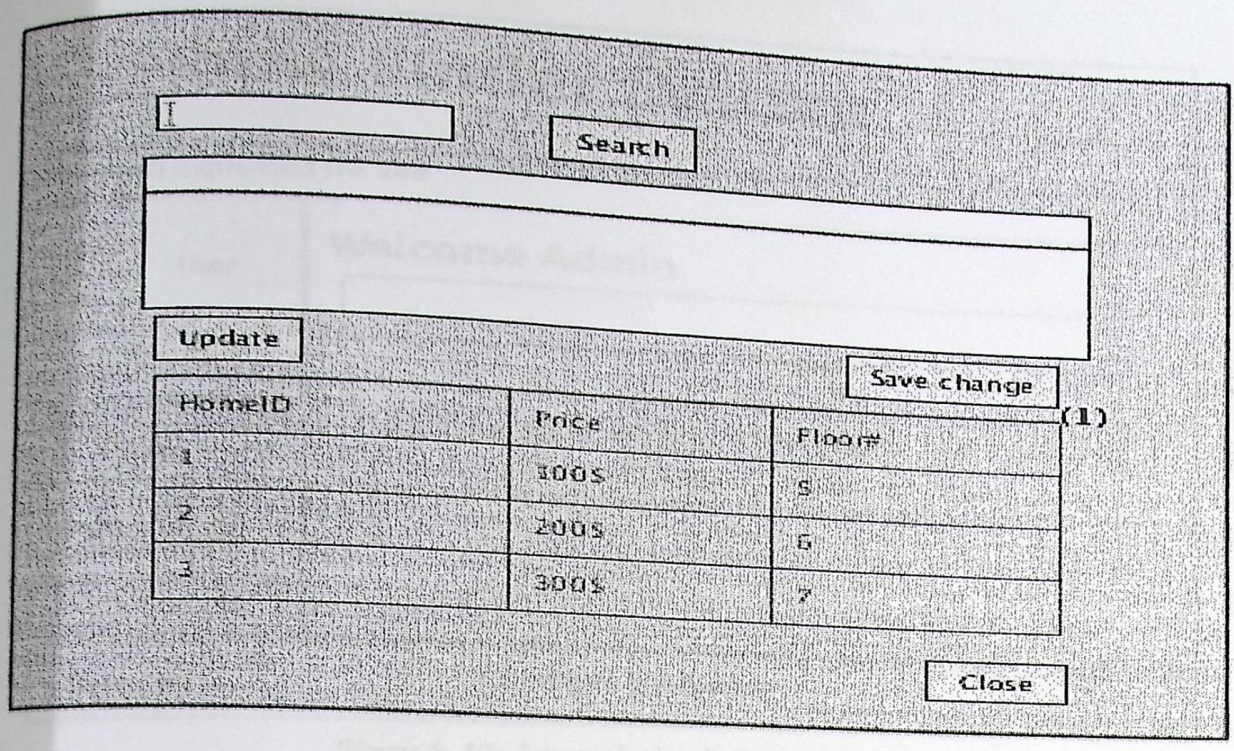


Figure 5. 11: update home screen

The following table describes update home screen:

Object	Fieldname	Description	Data type	Validation
textbox	Owner id	Contains the Home id to update the information	text	—
button	Update	Update home information	—	—
button	Save change	Save change to database	—	—
button	Close	Close the screen	—	—
button	search	Present all the owner homes that is related to his id	—	

Table 5. 11: update home screen description

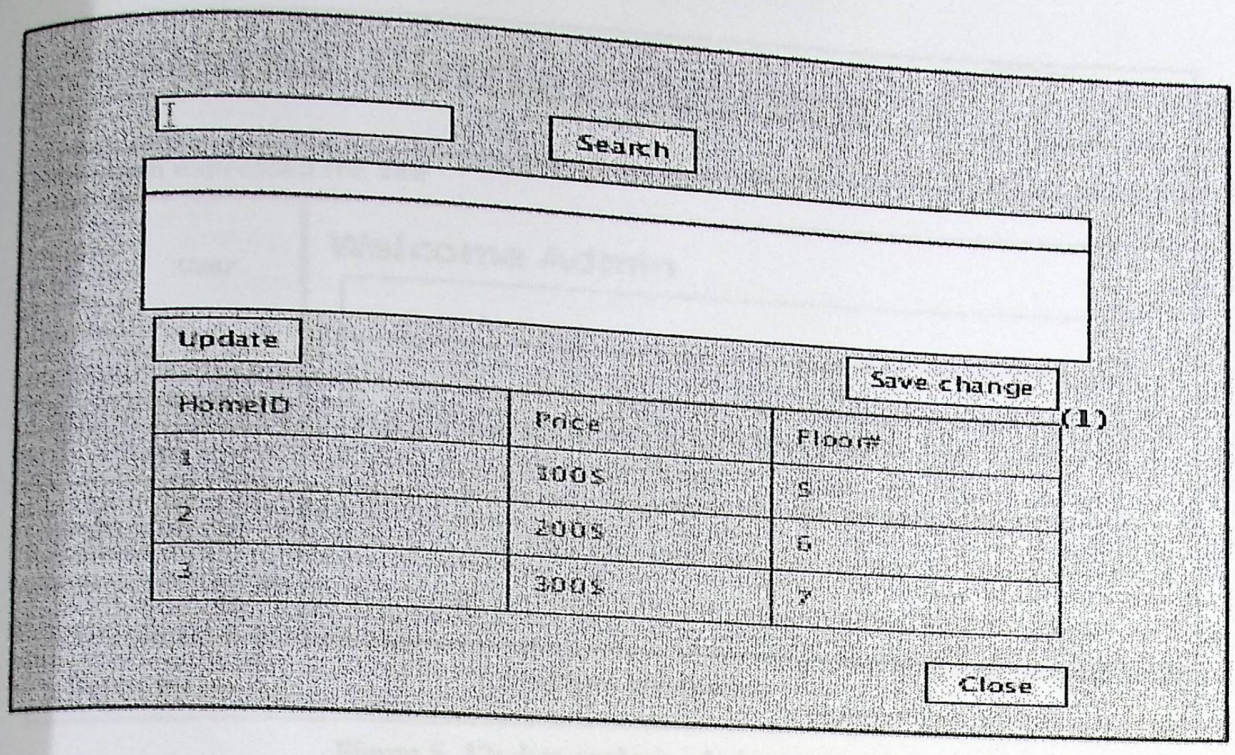


Figure 5. 11: update home screen

The following table describes update home screen:

Object	Fieldname	Description	Data type	Validation
textbox	Owner id	Contains the Home id to update the information	text	—
button	Update	Update home information	—	—
button	Save change	Save change to database	—	—
button	Close	Close the screen	—	—
button	search	Present all the owner homes that is related to his id	—	

Table 5. 11: update home screen description

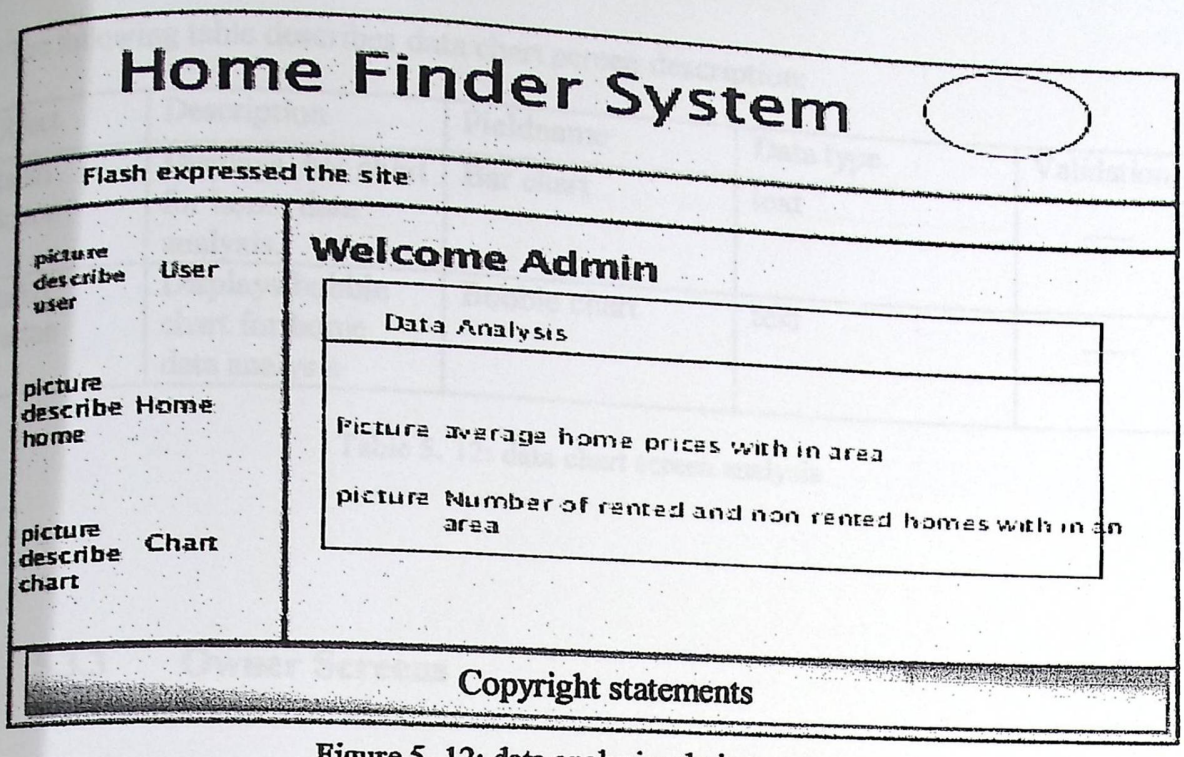


Figure 5. 12: data analysis admin screen

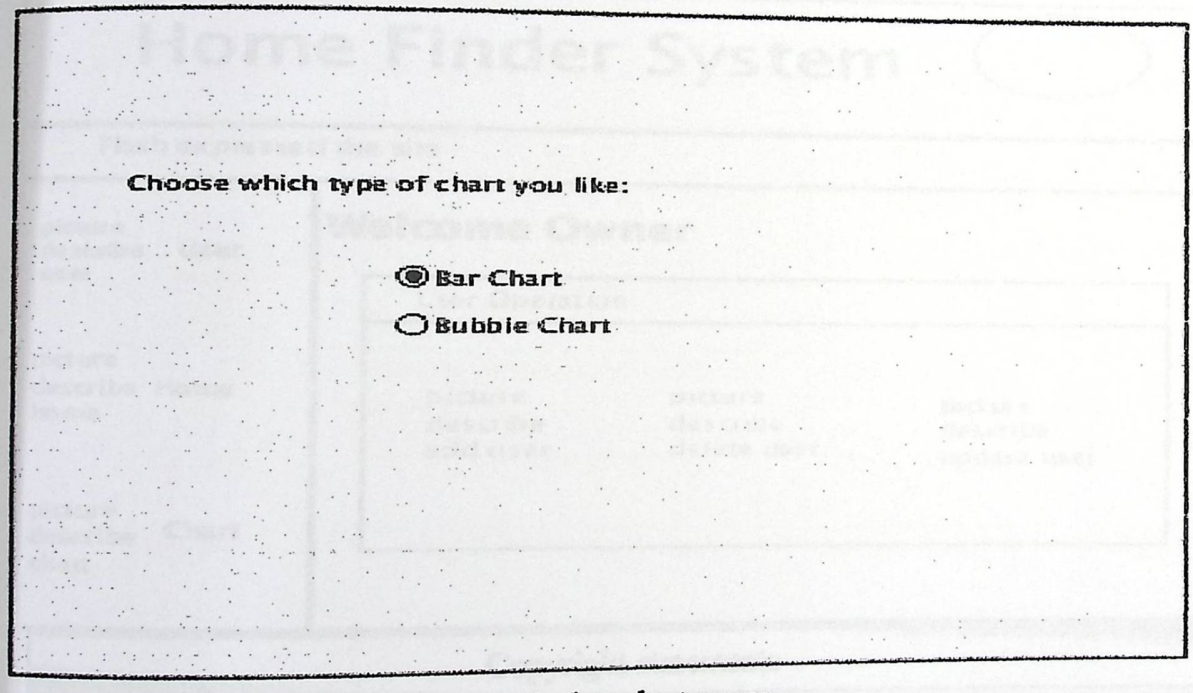


Figure 5. 13: data chart screen

The following table describes data chart screen description:

Object	Description	Fieldname	Data type	Validation
Radio Button	Displays bar chart for home data analysis.	Bar chart	text	—
Radio Button	Displays bubble chart for home data analysis	Bubble chart	text	—

Table 5. 12: data chart screen analysis

5.3.3 Owner Screens

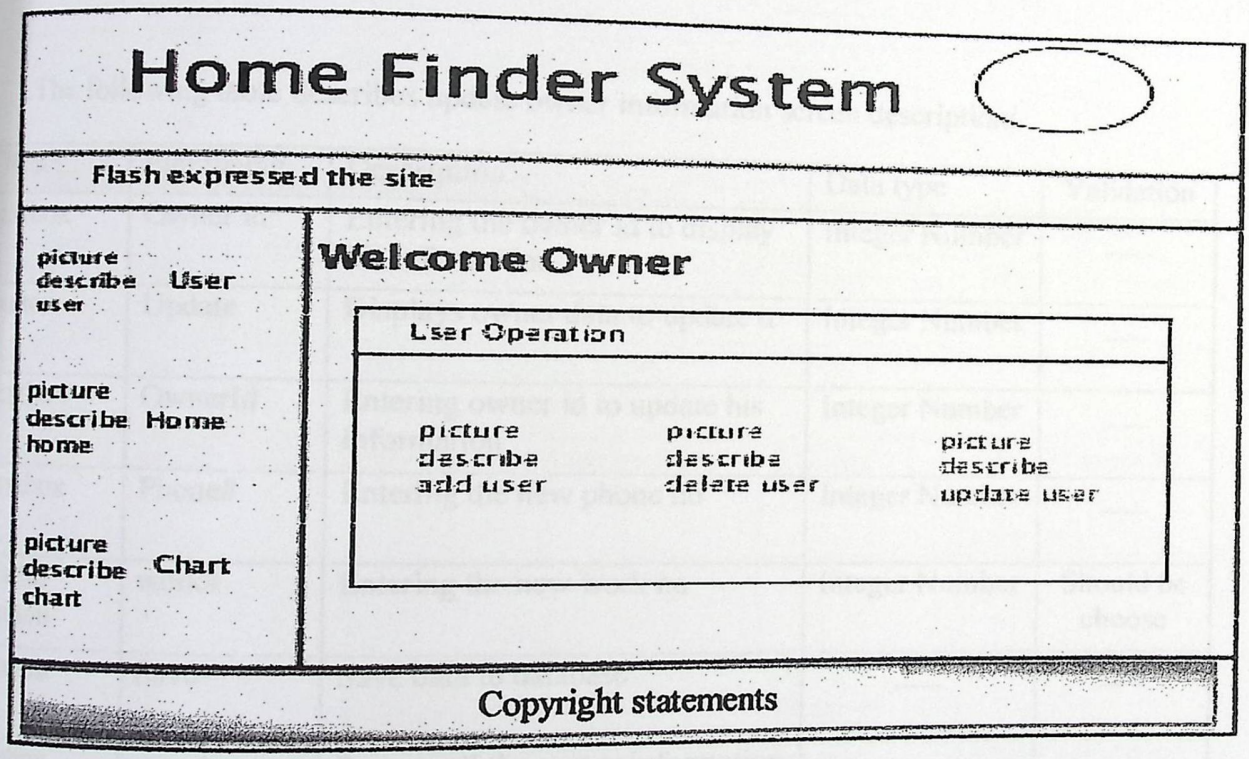


Figure 5. 14: user operation owner screen

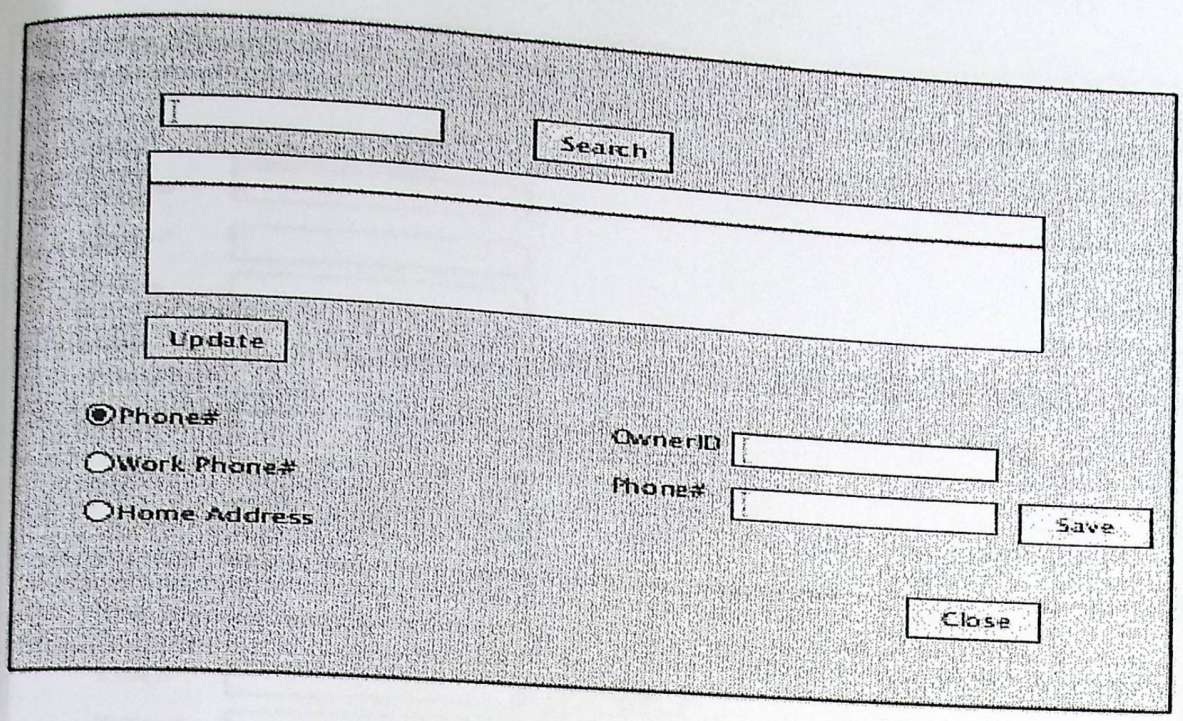


Figure 5. 15: update owner information

The following table describes update owner information screen description:

Object	Fieldname	Description	Data type	Validation
textbox	Owner id	Entering the owner id to display his information	Integer Number	—
button	Update	Displays owner data to update it	Integer Number	—
textbox	OwnerId	Entering owner id to update his information	Integer Number	—
textbox	Phone#	Entering the new phone no	Integer Number	—
Radio button	work#	Entering the new work no	Integer Number	Should be choose
button	Save	Save data to database	—	—
button	search	Present all the owner information that is related to his id	—	
button	Close	Close the screen	—	—

Table 5. 13: update owner information screen description

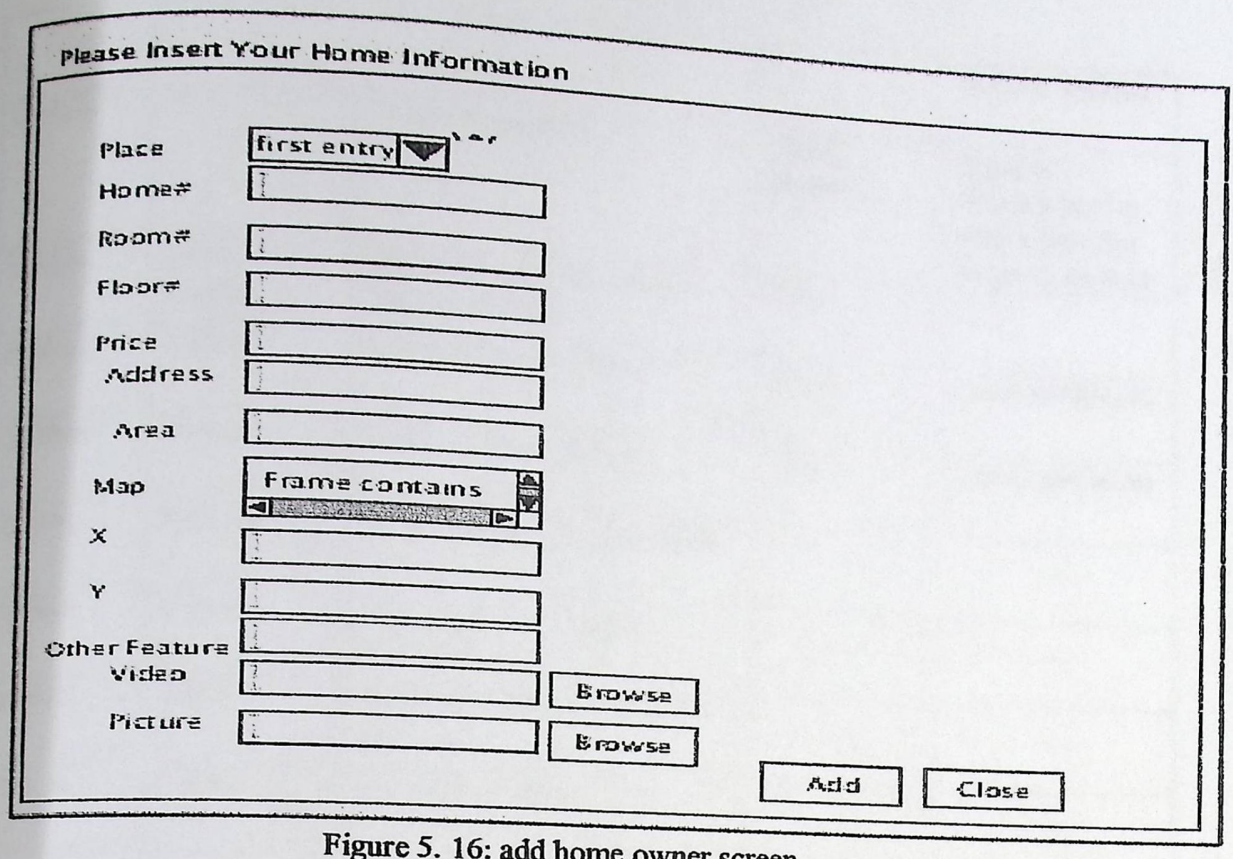


Figure 5. 16: add home owner screen

The following table describes add owner screen description:

Object	Fieldname	Description	Data type	Validation
textbox	User Id	Entering The user identification card number	Integer Number	Class validation
Drop Down List	Place	Contains Hebron areas	Text	___
textbox	Home number	Entering the home number.	Integer Number	Should identify from Hebron city hall
textbox	Address	Entering home address	Text	___
textbox	number of Rooms	Entering home room number	Integer Number	Class validation
textbox	Price	Entering home price	Integer Number	Class validation
textbox	Floor number	Entering home floor number	Number	Class validation
textbox	Area	Entering home area	Float number	Class validation
Scroller	Map	Map for the selected place	___	___
textbox	X	Home X position	Float Number	filled by clicking on the map where the

				home is located
textbox	Y	Home Y position	Float Number	filled by clicking on the map where the home is located
textbox	Other feature	Other features the owner want to display	Text	—
textbox	Video	Entered home video	Text	Class validation
textbox	Picture	Entered home picture	Text	Class validation
button	Browse	Browsing for a home video	—	—
button	Browse	Browsing for a home picture	—	—
button	Add	Add the information in the database	—	—
button	Close	Close the screen	—	—

Table 5. 14: add home owner screen description

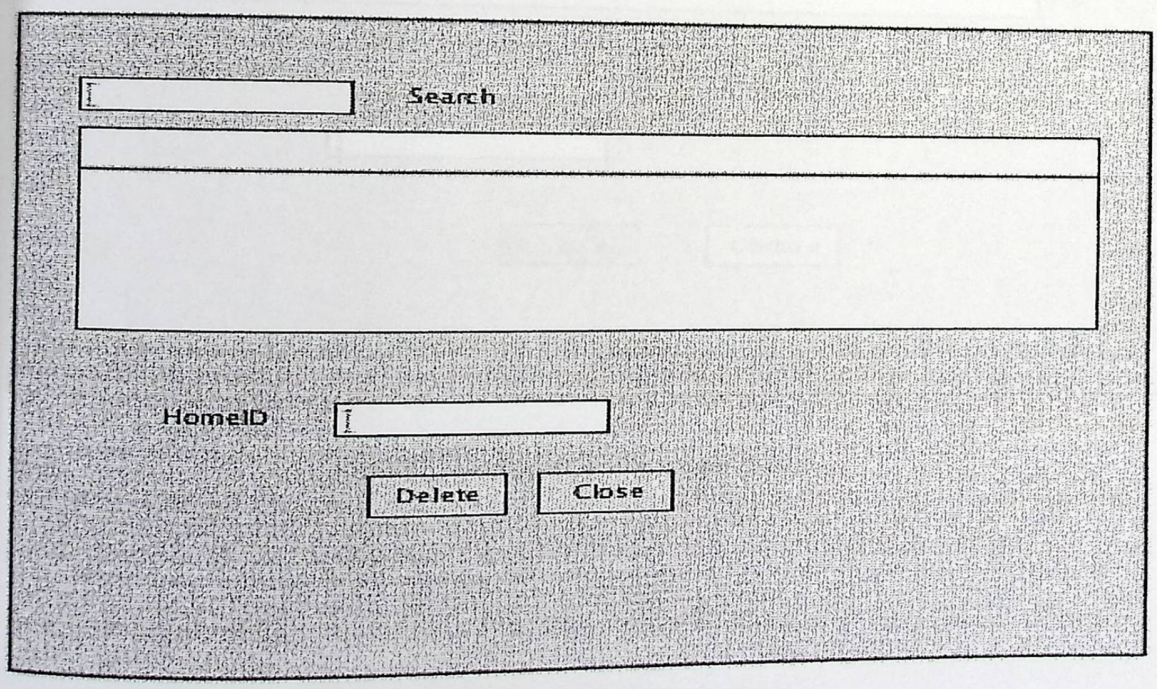


Figure 5. 17: delete home owner screen

The following table describes delete home owner screen description:

Object	Fieldname	Description	Data type	Validation
textbox	Owner id	Entering the owner id to display his information	Integer Number	—
Textbox	Home Id	entering the HomeId to delete it	Integer Number	—
button	Delete	Delete the home from the database	—	—
Button	Close	Close the screen	—	—
button	search	Present all the owner homes that is related to his id	—	—

Table 5. 15:delete home owner screen description

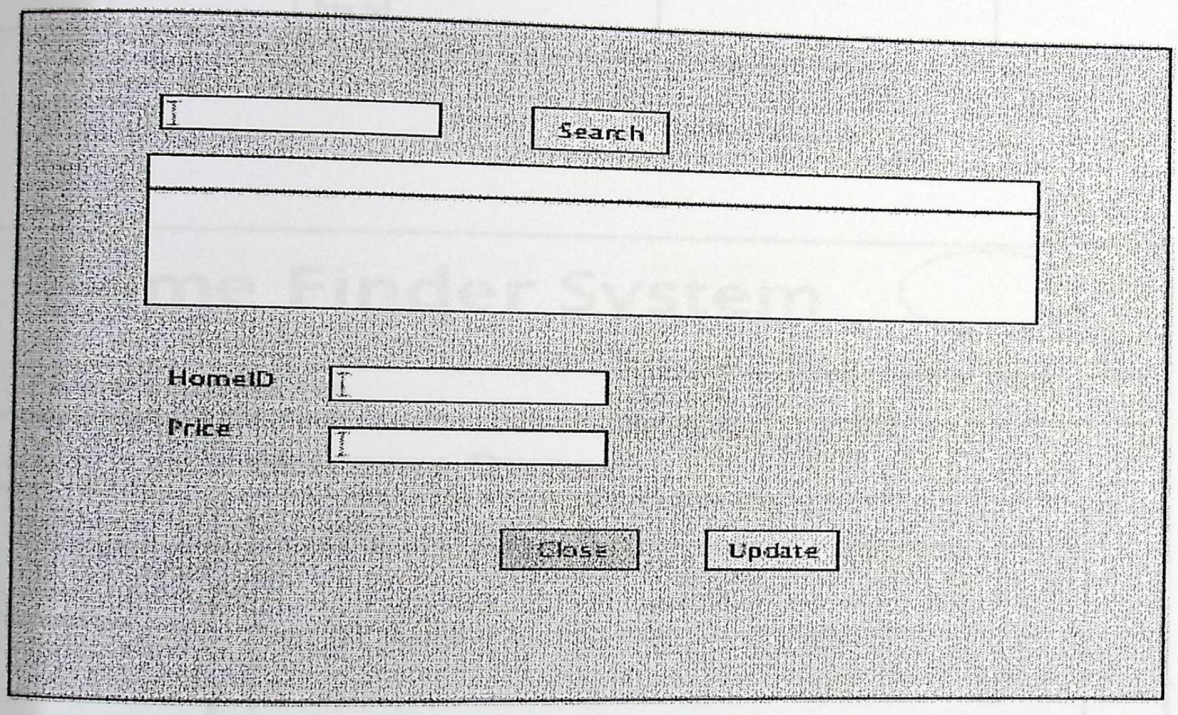


Figure 5. 18: update home owner screen

The following table describes update home owner screen description:

Object	Fieldname	Description	Data type	Validation
textbox	Owner id	Entering owner id to display his homes information	Integer Number	—
textbox	Home id	Entering the home Id	Integer Number	—
textbox	Price	Entered the new home price	Integer Number	—
button	Update	Update the home price	—	—
button	Close	Close the screen	—	—
button	search	Present all the owner homes that is related to his id	—	—

Table 5. 16: update home owner screen description

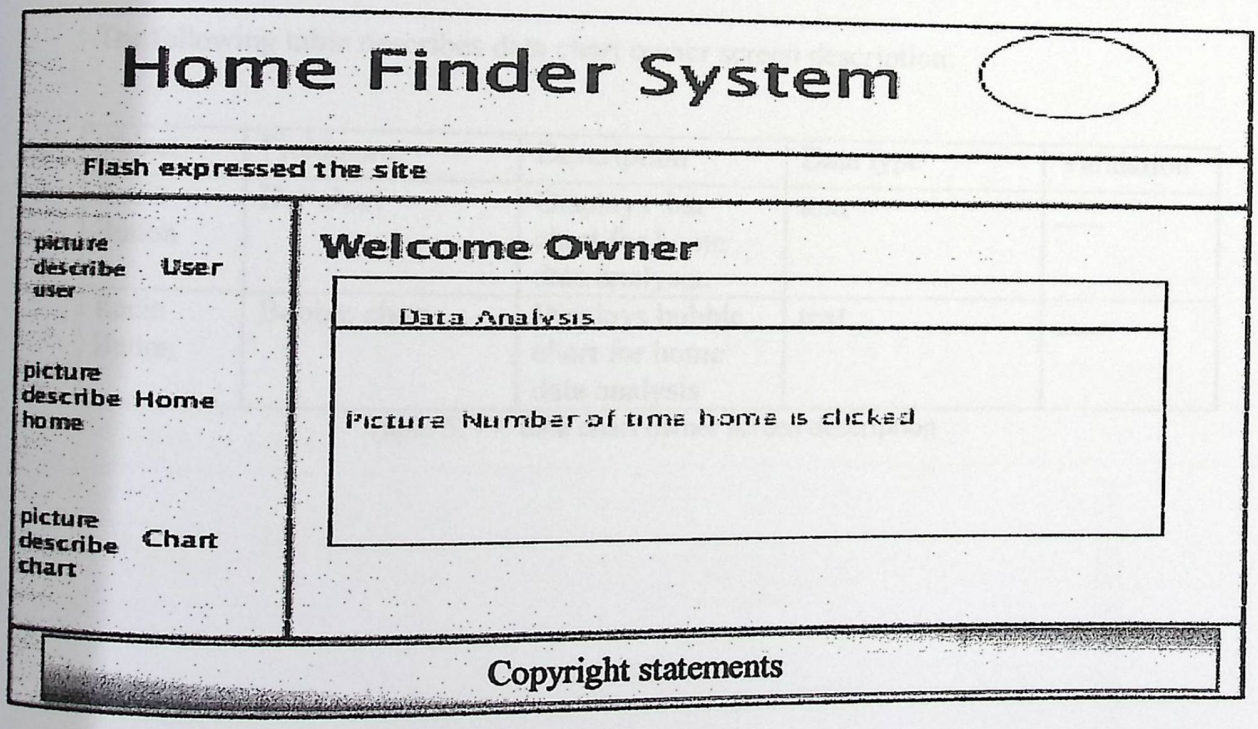


Figure 5. 19: data analysis owner screen

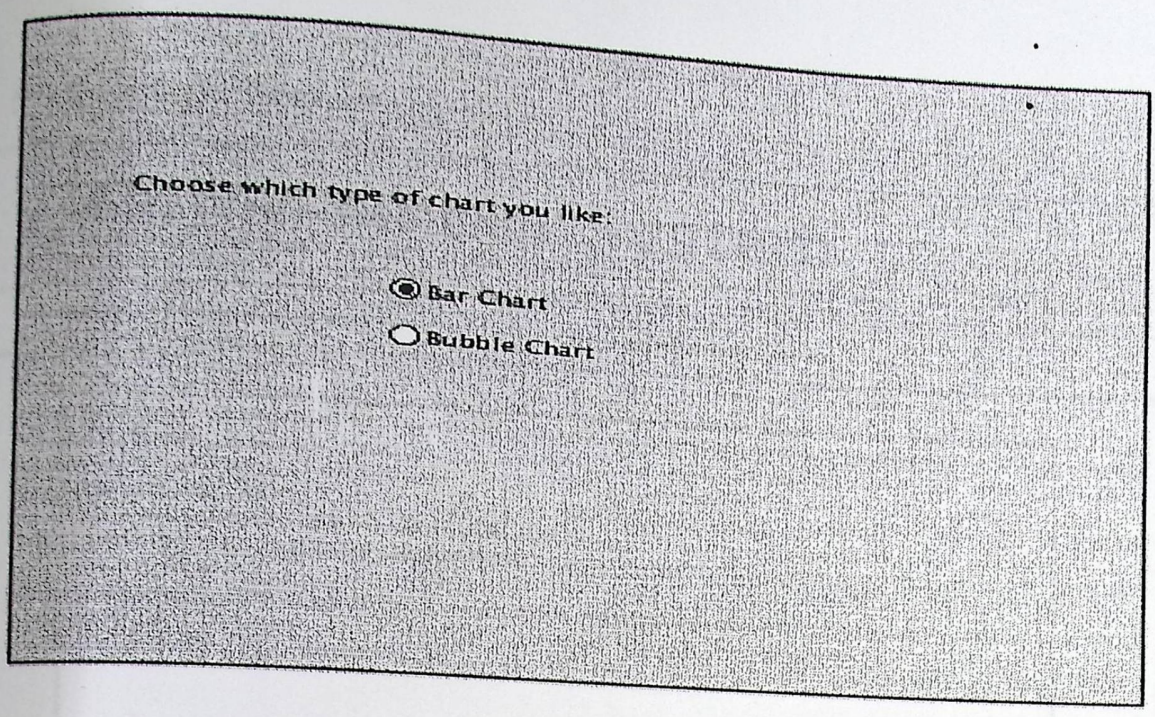


Figure 5. 20:data chart owner screen

The following table describes data chart owner screen description:

Object	Fieldname	Description	Data type	Validation
Radio Button	Bar chart	Displays bar chart for home data analysis.	text	—
Radio Button	Bubble chart	Displays bubble chart for home data analysis	text	—

Table 5. 17: data chart owner screen description

5.3.4 User Screens

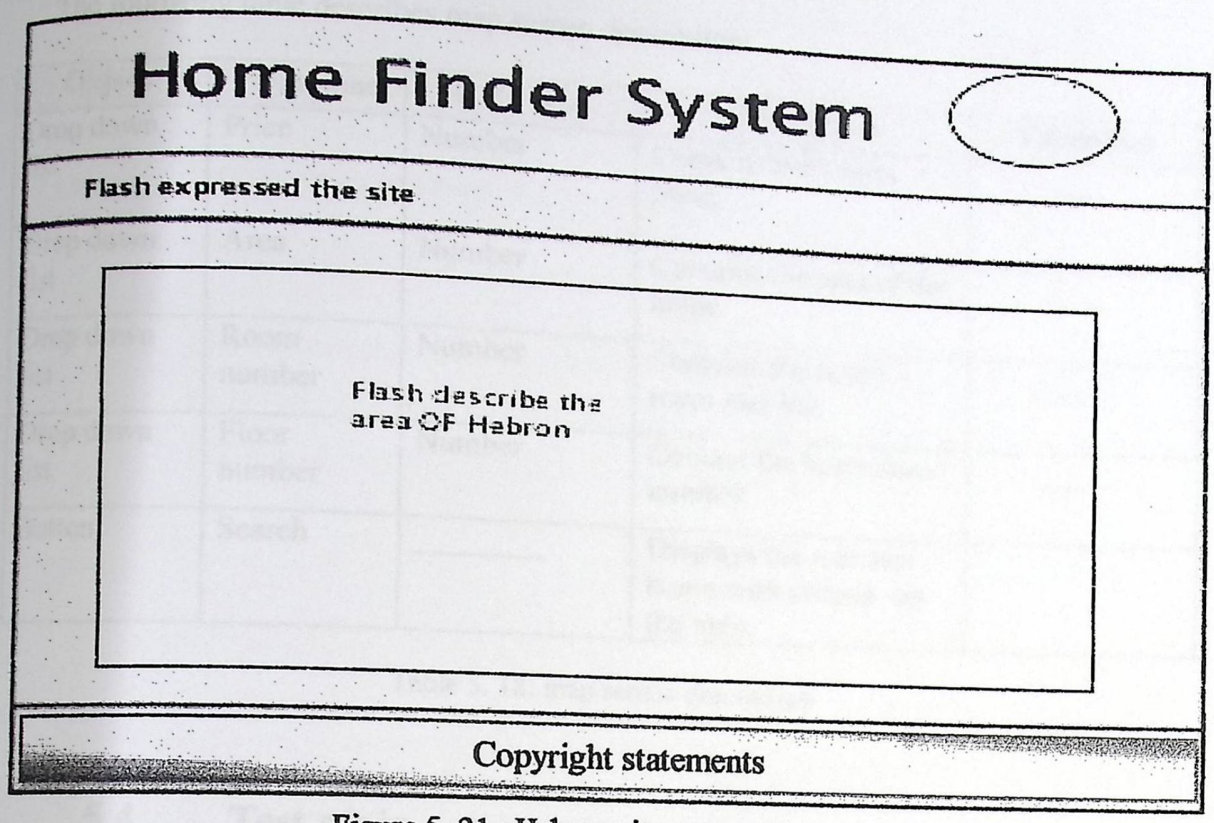


Figure 5. 21 : Hebron city areas screen

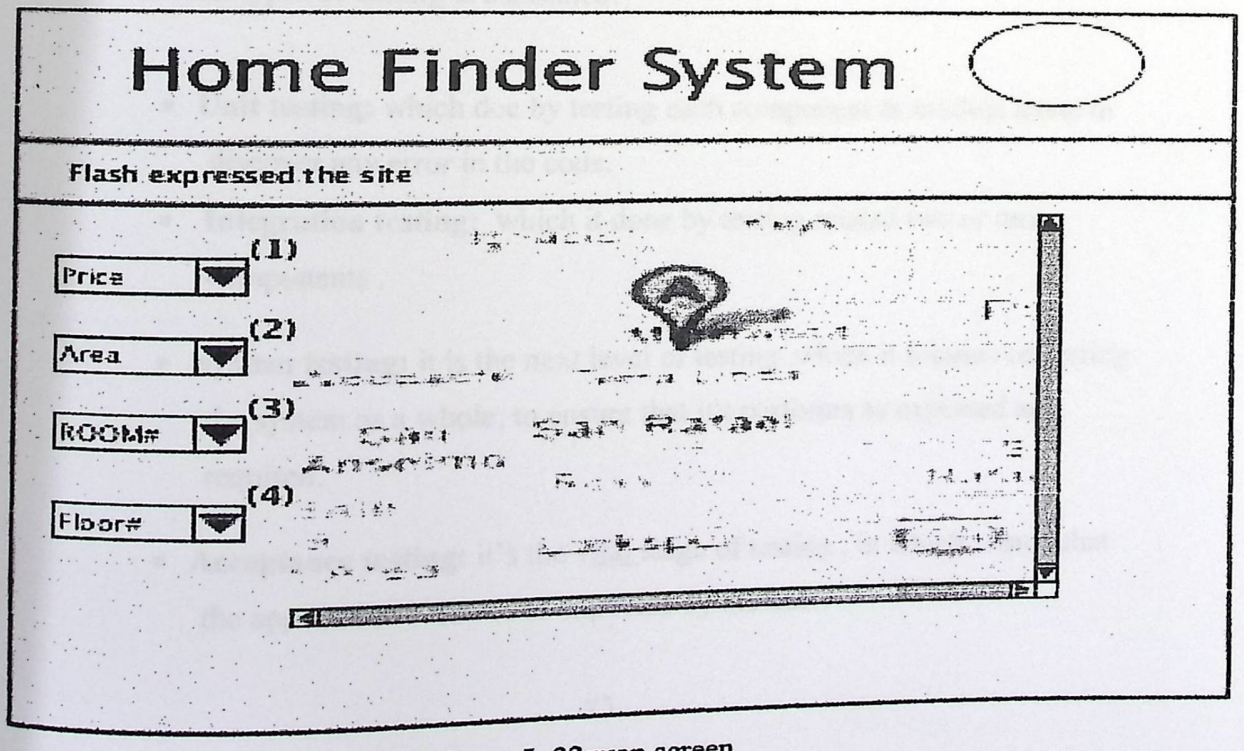


Figure 5. 22:map screen

The following table describes map screen description:

Object	Fieldname	Data type	Description	Validation
Drop down list	Price	Number	Contains the homes price	—
Drop down list	Area	Number	Contains the area of the home	—
Drop down list	Room number	Number	Contains the home room number	—
Drop down list	Floor number	Number	Contain the home floor number	—
Button	Search	———	Displays the matches home with criteria on the map.	

Table 5. 18: map screen description

5.4 Test plain

Test plan is require to verify and ensure that our system meets the design specification and the system requirement. Indeed, testing is essential to examine the accuracy of project and its free from errors. In order to do so, several types of testing is examined:

- **Unit testing:** which doe by testing each component or module alone to discover any error in the code.
- **Integration testing:** which it done by testing related two or more components .
- **System testing:** it is the next level of testing ,which it focuses on testing the system as a whole; to ensure that it's performs as expected and required.
- **Acceptance testing:** it's the vital stage of testing , in which ensure that the application behaves as expected by the user.

Our test plan will be as the following:

- Make testing unit after finishing each unit of code which has specific function
- Make System testing for adding home in specific coordinator and displaying home image in the same position.
- The developer team will make System test for the whole system.
- Making acceptance testing during designing for some functionality to take early feedback such as icon positions and interface skin. Indeed we want to make testing after finishing system development.

Chapter 6

System Implementation, Testing, and Recommendation

Introduction

Development Software tools

Faced Problems

Important Code

System Screens

Testing

Recommendations and feature work

6.1 Introduction

In implementation phase, we will code the designed project in previous chapter either from scratch or by composition. Indeed, we test our project to build free errors project as possible as we can. Actually we faced a lot of problems because we used new software tools in building the project. Therefore, in this chapter we will talk about the major features of the new software tools and major problem faced us during implementation. In order to make learnable document, we illustrate how to make new project in adobe flex and we put some foremost functions code. Finally captured interface is demonstrated.

6.2 Development Software tools:

In this section, we depict the most important software are used in development the project which are Adobe flex4, PHP and Photoshop.

6.2.1 Adobe Flex builder 4:

Flex is framework and programming language used in building visual and highly interaction interfaces. That enables us to build rich website, mobile, and desktop applications using actionscript language and extensible markup language (XML). Action Script is an object oriented programming language is used to build client side dynamic web pages. It is similar in syntax to JavaScript. Whilst, XML language is an XML-markup language, which it is used to layout application display elements. Moreover adobe flex uses XML to be the container between it and other environments. (http://www.adobe.com/products/flex)

Advantage:

Referring to previous mentioned adobe site, there are several advantages that are summarized in the following points:

1. It reduced the time and cost of the application creation and maintenance.
2. It supports an open source libraries for pure information visualization like bird eye.

3. It's supported the applications with rich component like busy cursor and tooltip.
4. Flex can migrated with different environment like php,coldfusion.asp.net…etc
5. The ability to incorporate rich media like streaming video and sound.

6.2.1.1 Steps for starting New Project in flex:

1. Write the project name and choose the server technology you want to connect with.

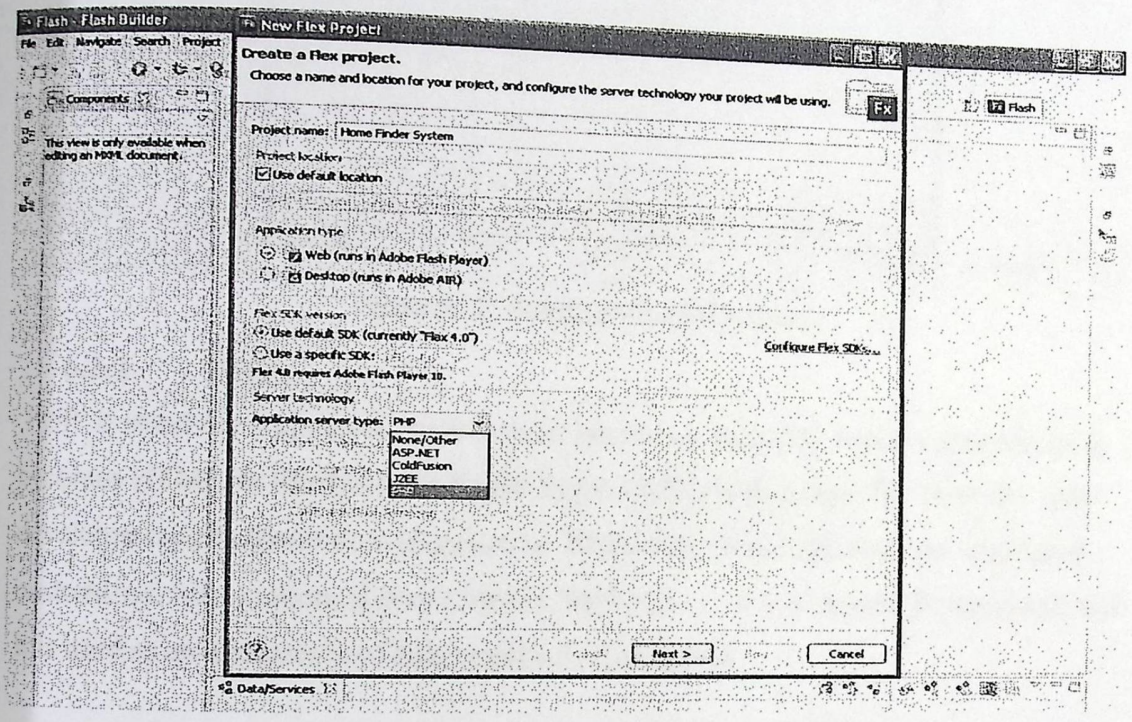


Figure 6. 1: Create Flex Project

2. Write the **web root and its URL then validate it.**

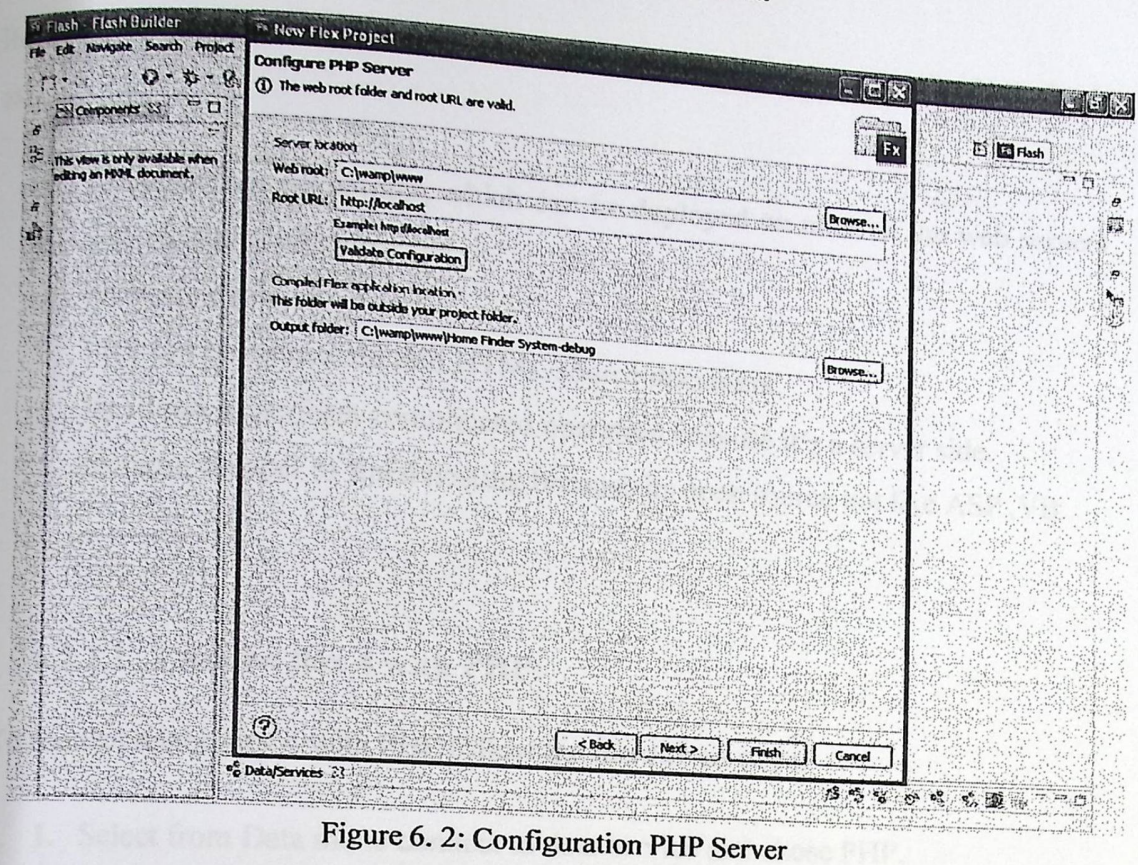


Figure 6. 2: Configuration PHP Server

6.2.2 PHP:

PHP is stand for Hypertext Preprocessor because it basically handles data before it becomes HTML as illustrated in figure Pages (ASP) technology. By PHP the web developer creates dynamic web pages by interacting with databases and displayed customized information. (Larry Ullman 2009) (5..) . It is a server side language and it is used as an alternative of Microsoft's Active Server

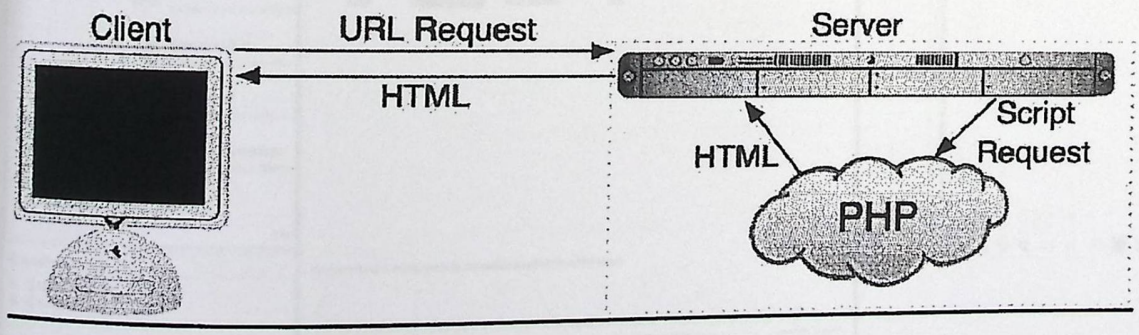


Figure 6. 3: How PHP works

Advantage:

Referring to the previous mentioned book ,there is several advantage for PHP. Such as:

1. Its standalone interpreter, which can be deployed on most of the web servers and operating systems.
2. Its freely available.
3. PHP can be embedded into HTML source document.
4. Its allows to perform complicated operation because it's a server side.
5. Its more cheaper to fined hosting because its open source not like ASP ,VB.

6.2.2.1 Adobe flex 4 with PHP:

To connect adobe flex 4 with PHP follow the mentioned steps:

1. Select from Data menu connect to data service and chose PHP.

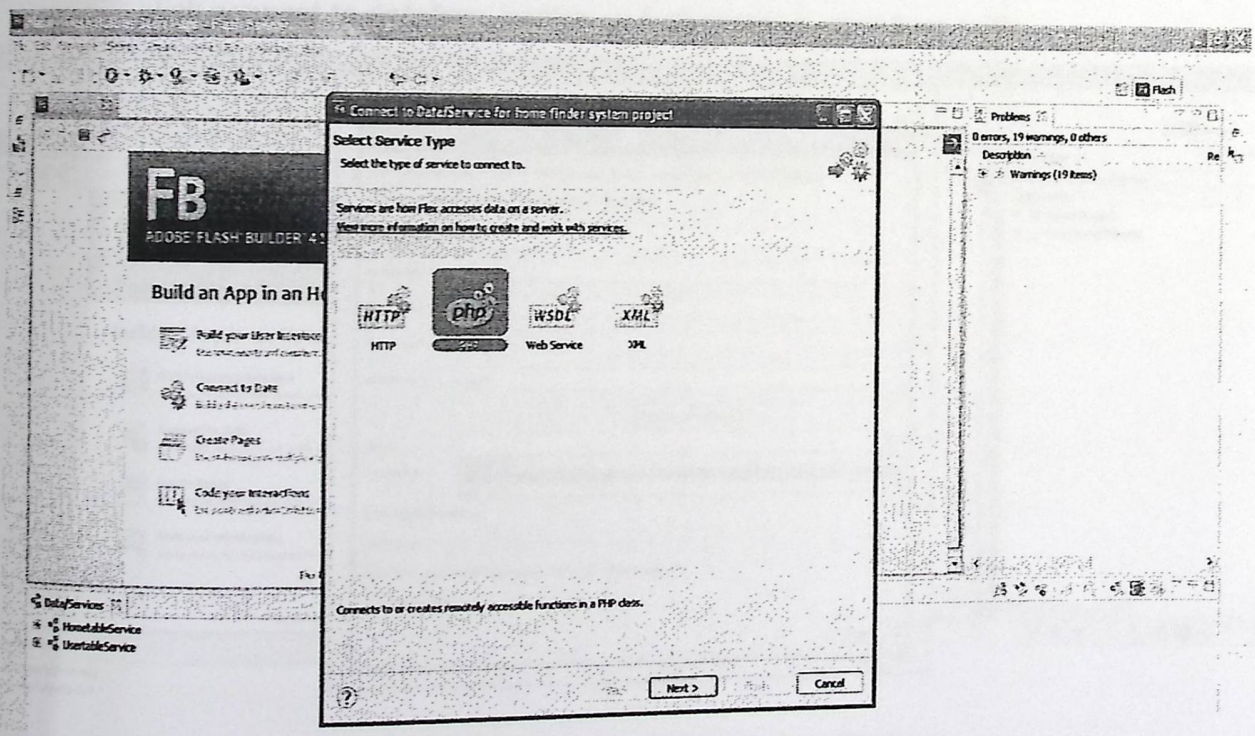


Figure 6. 4: Select Service Type

2. Click to click here to generate a service.

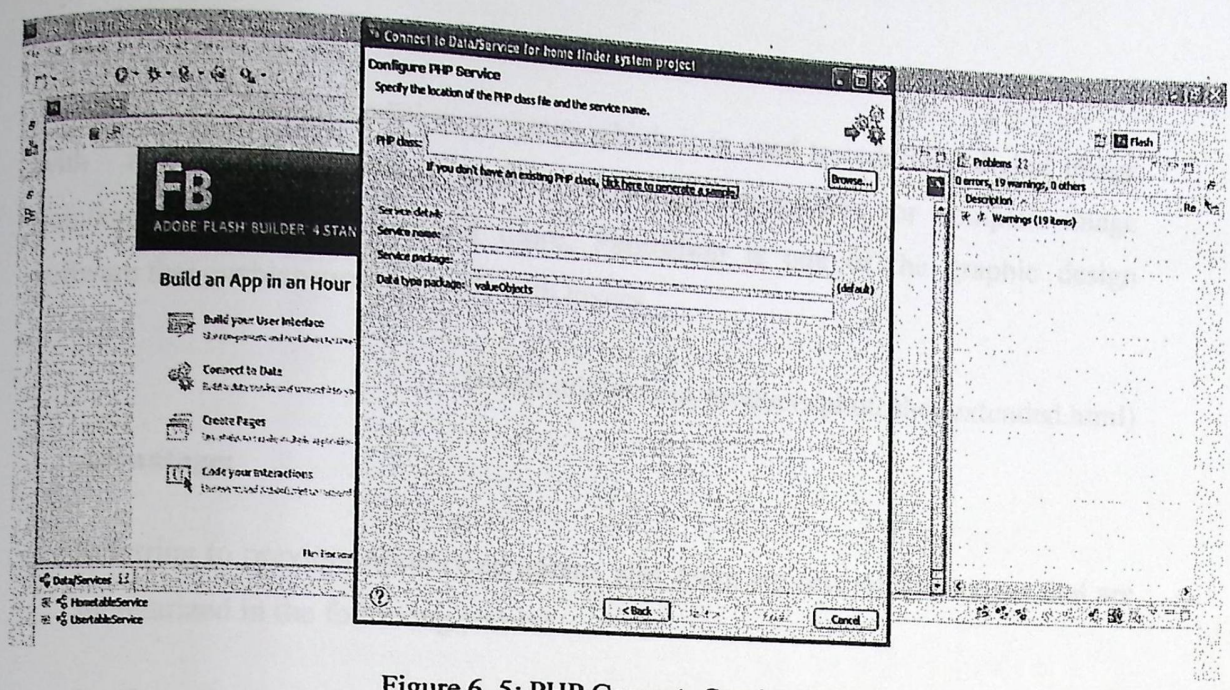


Figure 6. 5: PHP Generate Service

3. Fill the username , localhost, server port and choose your database . then click **connect to database button and choose your database table .**

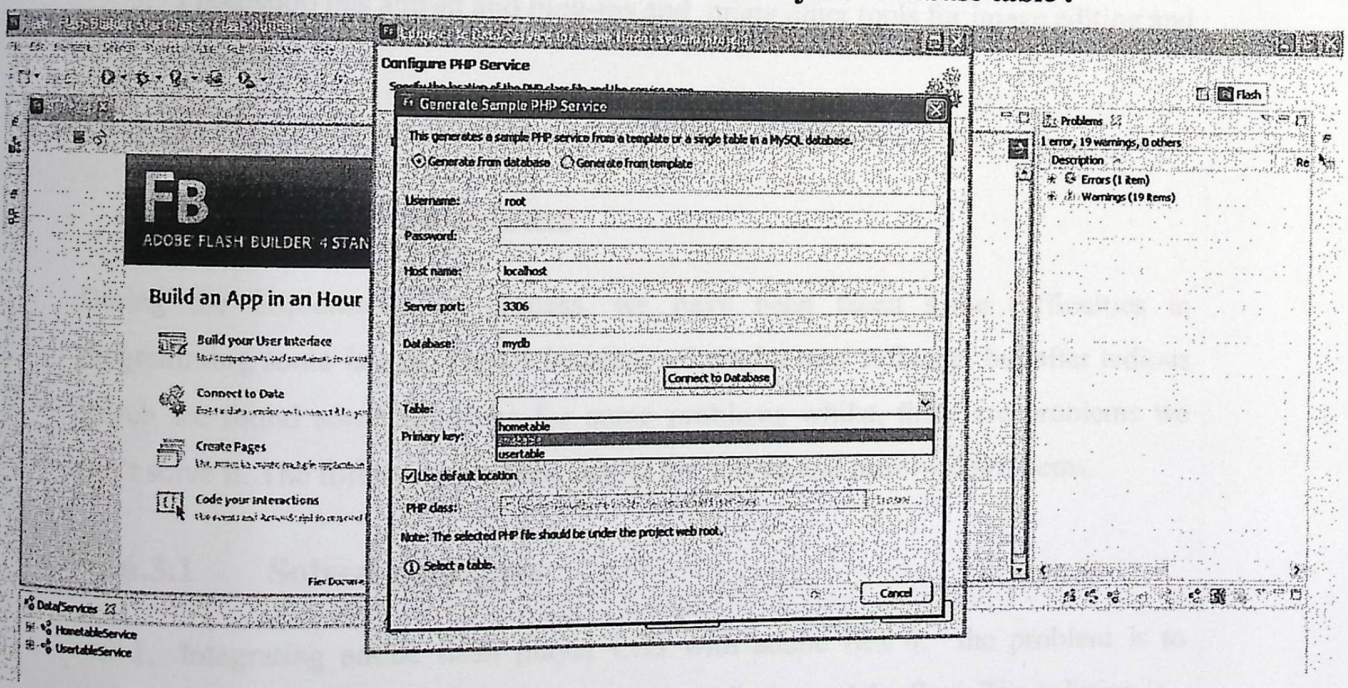


Figure 6. 6: Generate Sample PHP Service from Database

6.2.3 Adobe Photoshop CS5

Photoshop is a graphics editing program which it is used to redefined digital image with new photography tool and breakthrough capabilities for complex image painting, realistic, selection and more. Photoshop is one of the graphic design software that enables users to work with layers.

(www.adobe.com/products/photoshopextended.html)

Advantage:

Referring to previous mentioned adobe site, there are several advantages that are summarized in the following points:

1. Complex selection are made easily, in which user can select a specific area with fewer clicks.
2. Photoshop gives the user high opportunity to change the images picture as they prefer.
3. Photoshop has add-in and plug-ins and many other tools for image editing and creation.

6.3 Faced problems

During the implementation process, we have been faced some difficulties in programming some issues. This is because we used a new software, but after tedious search we found some solutions for some problems whilst, there are problems we can't solve it. The following sections depict the solved and unsolved problems.

6.3.1 Solved problems

1. Integrating adobe flash player CS5 with adobe flex 4: the problem is to import dragged and dropped image from flash to adobe flex. The solution is
    - to take the code snippet in adobe flash player and past it in the adobe flex within the scripting area for an new MXML component

- putting the calling function in the creation complete handler that is called when the page is loaded.
- Then we called the MXML component from the flex run application as seen in the following code.

Written code in the MXML component:

```
?xml version="1.0" encoding="utf-8"?>

<s:Group xmlns:fx="http://ns.adobe.com/mxml/2009"
 xmlns:s="library://ns.adobe.com/flex/spark"
 xmlns:mx="library://ns.adobe.com/flex/mx" clipAndEnableScrolling="true"
width="300" height="200"
creationComplete="group1_creationCompleteHandler(event)">
        <s:layout>
                <s:VerticalLayout/>
        </s:layout>

        <fx:Script>
                <![CDATA[
                        import mx.controls.SWFLoader;
                        import mx.events.FlexEvent;

protected function group1_creationCompleteHandler(event:FlexEvent):void
{
movieClip_1.addEventListener(MouseEvent.MOUSE_DOWN, fl_ClickToDrag);
movieClip_1.addEventListener(MouseEvent.MOUSE_UP, fl_ReleaseToDrop);
}

function fl_ClickToDrag(event:MouseEvent):void
 {
        movieClip_1.startDrag();
 }

function fl_ReleaseToDrop(event:MouseEvent):void
 {
  movieClip_1.stopDrag();
 }

]]>
</fx:Script>
```

To call the creation complete handler when the page is loaded

Written code in the flex running application

```
<ns1:DragMap id="dm" x="298"y="3 mouseDown="handleMouseMove(event)" />
```

Name of mxml component

2. Determining x and y home coordinat[illegible] drop map: this [illegible] doesn't work correctly because [illegible] position of x and y changing while moving the map. so the solution was is to use a slider for map instead of using drag and drop map . the following code is building slider for map :

```
<s:BorderContainer  id="mapc" x="468" y="205" width="553"
height="332" backgroundColor="#FFDDC6" borderVisible="false">

<s:Scroller width="510" height="327" x="21" y="3" id="sc">

<s:VGroup width="510">

<mx:Image id="abur" source="@Embed(source='abu.jpg')" x="19" y="0"/>

</s:VGroup>

</s:Scroller>

</s:BorderContainer>
```

3. Updating specific data in adobe flex 4 cannot be handled: updating is only done only by entering all of the data again which it is not efficient. The solution is:
   - using editable data grid, by enable it editable property in the datagrid.
   - Call editdata function from a datagrid using Item Edit End property, which it used to swap the old value with the new one.
   - To save the changers generate click handler from a butoon and call save function.

   The code for changing and swapping function is written below:

```
private function save(event:MouseEvent):void
{

var dataProvider = adg3.dataProvider;
var item = null;
for (var i:int = 0; i < dataProvider.length; i++)
{
item = dataProvider.getItemAt(i);
 usertableService.updateUsertable(item);

Alert.show("Data saved.");
}
}
```

This function save the changes. which it called from mouse click event.

```
private function editdata (event:AdvancedDataGridEvent):void
{
Var myEditor:TextInput =
TextInput(event.currentTarget.itemEditorInstance);
// Get the new value from the editor.
var newVal:String = myEditor.text;
// Get the old value.
var oldVal:String =
event.currentTarget.editedItemRenderer.data[event.dataField];
var dataProvider = adg3.dataProvider;
var item = null;

if (oldVal !== newVal)
{
var item = dataProvider.getItemAt(event.rowIndex);
//CONT is the name of the row's column we want to update
adg3.selectedItem.CONT = newVal;
usertableService.updateUsertable(item);

}}
```

This function used to swap the old values with the new value .

Data grid name

6.3.2 Unsolved problems

1. In order to make zooming to a specific area in Hebron map, We should to divide the Hebron map into parts depending on the areas . We made Gif image background is transparent for each area that are overlapped to be as a single component. But , If specific area is zoomed out the selected image and part of another one are zoomed . This is because of the overlapped images which they are stored in a square or rectangle container. After along search we found

the solution by editing the images using adobe illustrator, which it create vector images. But unfortunately, adobe flex does not deal with the generated format by illustrator EPS or PDF format. The following image shows the problem. The following screen snapshot illustrate the problem.

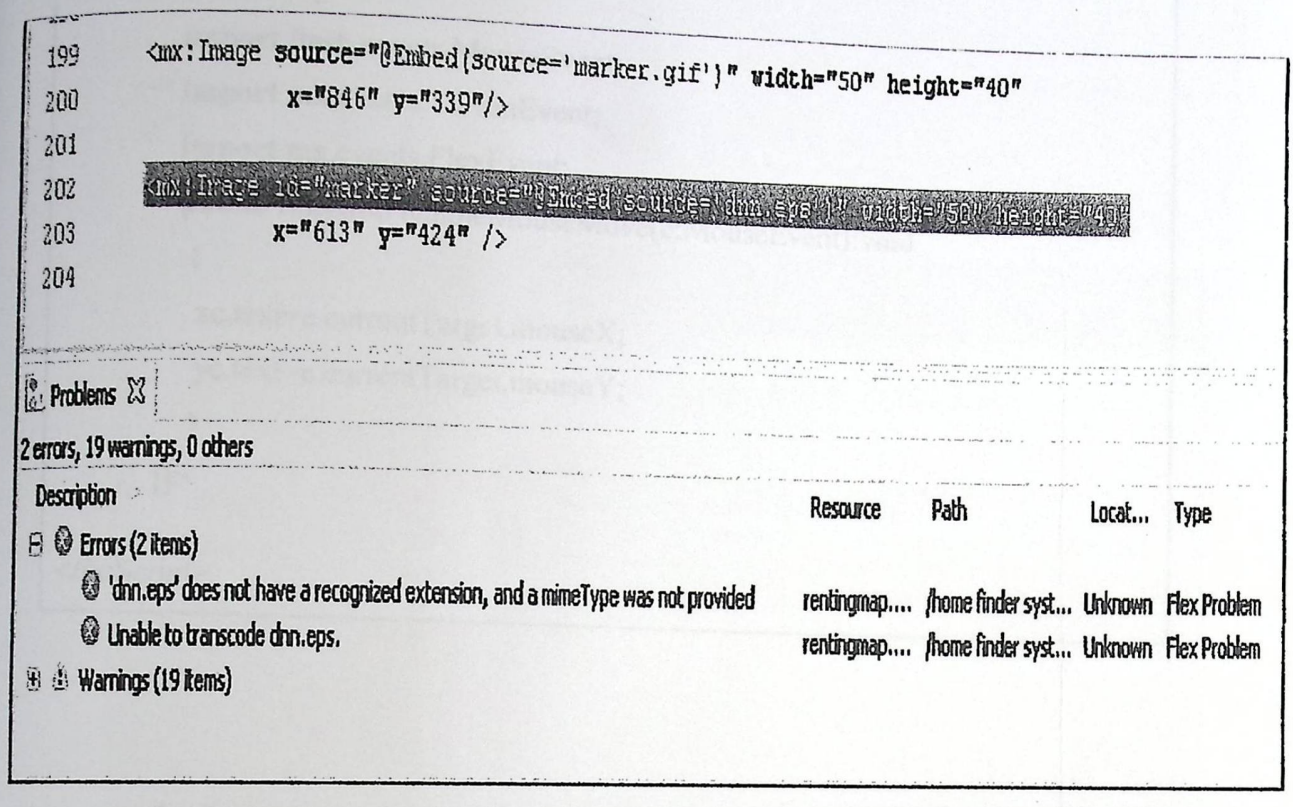


Figure 6. 7: EPS Image Format error message

6.4 Important Code

In order to write learnable document we will illustrate essential code for some processes.

1. Making zoom-in and zoom-out for an image.

```
<fx:Declarations>

<mx:Resize id="zoomin" target="{img}" widthBy="10" heightBy="10"
duration="100" />

<mx:Resize id="zoomout" target="{img}"widthBy="-10" heightBy="-10"
duration="100"/>

</fx:Declarations>
```

The name of the image we want to make zoom for it.

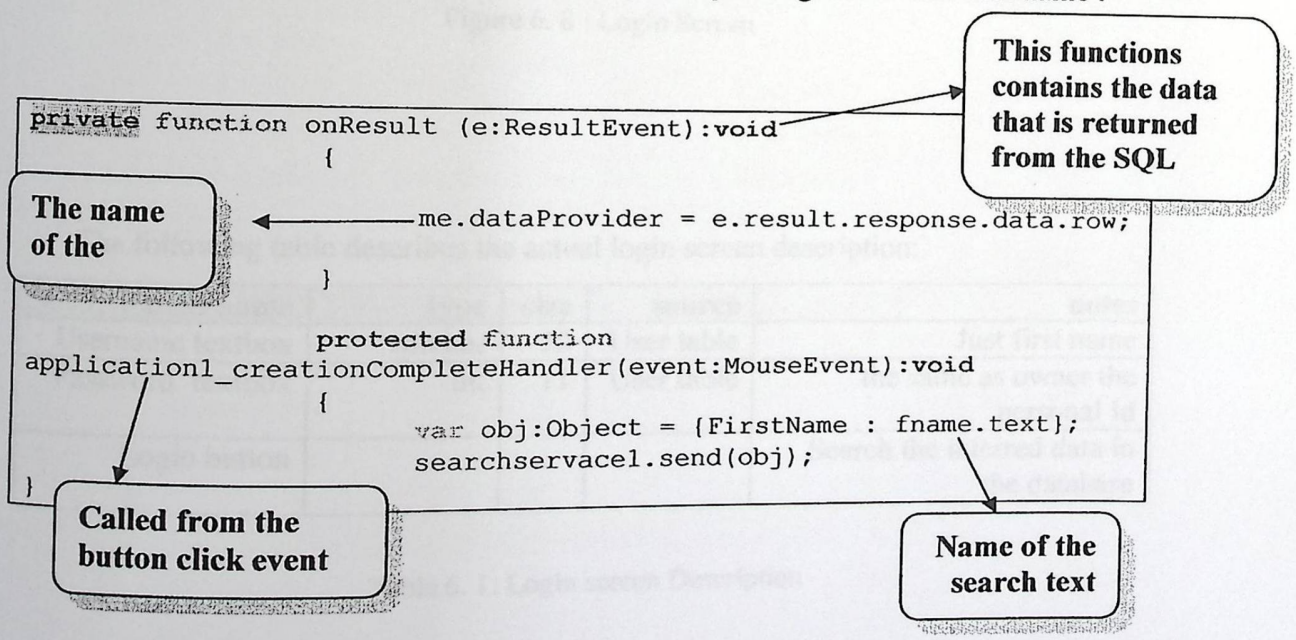
^^

2. Locate any point within the coordination of the image.

```
<fx:Script>
    <![CDATA[
     import flash.events.MouseEvent;
     import mx.events.TweenEvent;
     import mx.events.FlexEvent;
     public function handleMouseMove(e:MouseEvent):void
     {
      xc.text=e.currentTarget.mouseX;
      yc.text=e.currentTarget.mouseY;
     }
    ]]>

</fx:Script>
```

3. Receiving the user data in a data grid depending on the user first name .



6.5 System screens

In this section, we will display the actual screens, after implementing the system and their description.

Figure 6. 8 : Login Screen

The following table describes the actual login screen description:

Failed name	type	size	source	notes
Username textbox	varchar	50	User table	Just first name
Password textbox	int	11	User table	the same as owner the personal Id
Login button				Search the interred data in the database

Table 6. 1: Login screen Description

6.5 System screens

In this section, we will display the actual screens after implementing the system and their description.

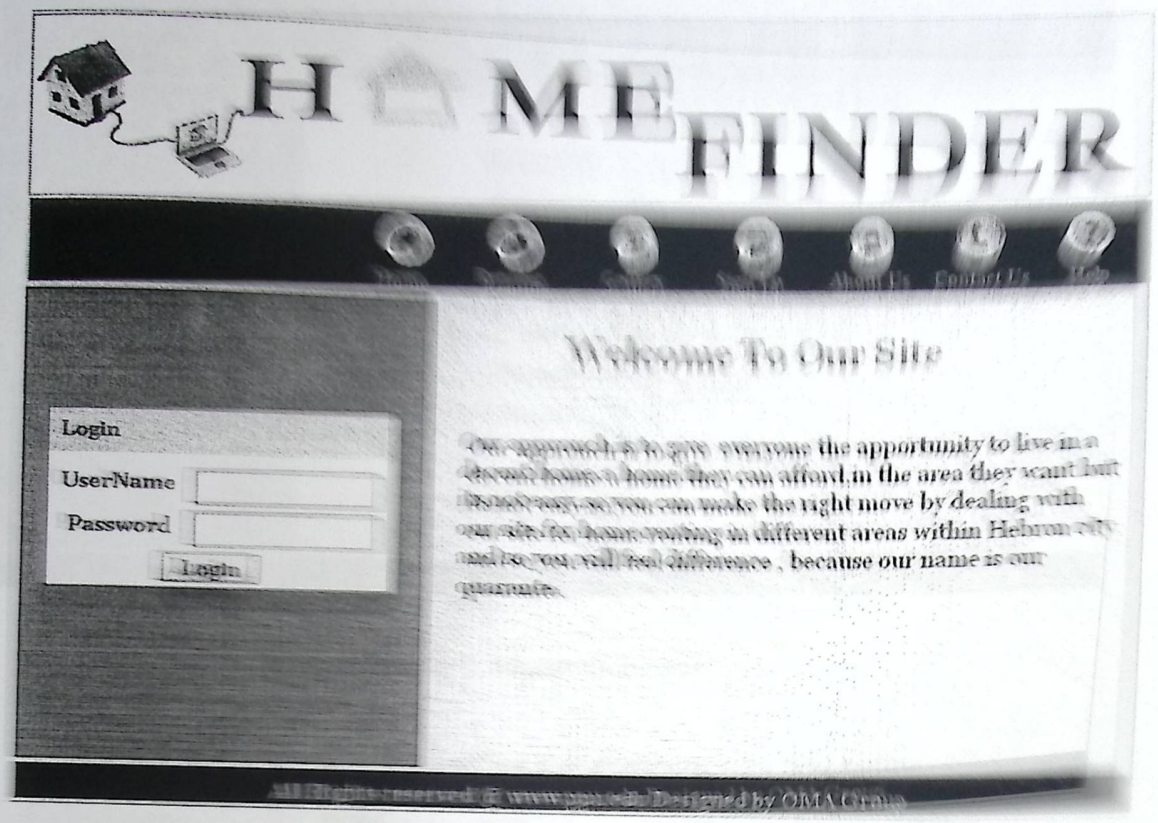


Figure 6. 8 : Login Screen

The following table describes the actual login screen description:

Failed name	type	size	source	
Username textbox	varchar	50	User table	
Password textbox	int	11	User table	
Login button				

Table 6. 1: Login screen Description

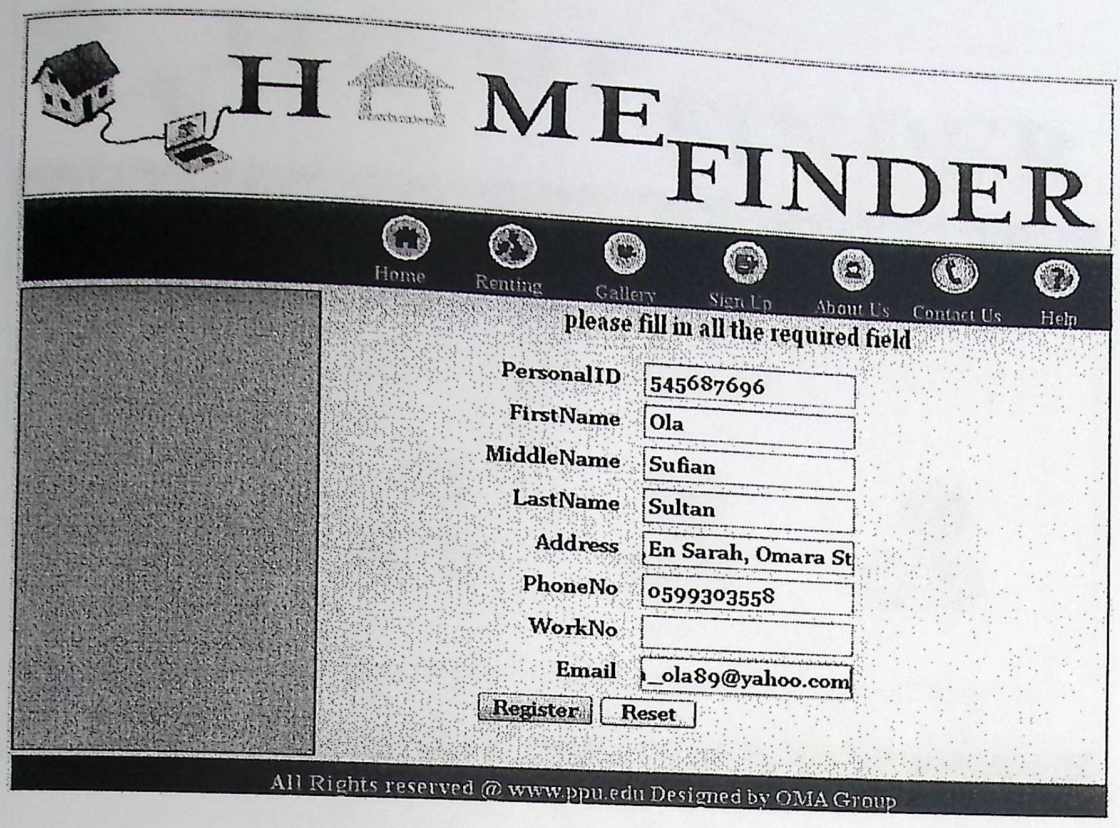


Figure 6. 9: Regestration Page

The following table describes the actual registration screen description:

Failed name	type	size	source	notes
Personal id textbox	int	9	User table	
First name textbox	varchar	50	User table	
Middle name textbox	varchar	50	User table	
Last name textbox	varchar	50	User table	
Phone number textbox	int	11	User table	
Work number textbox	int	11	User table	Allow null
Address textbox	varchar	50	User table	
Email	varchar	100	User table	
Reset button				Clear the textboxes
Registers button				Registers new data in the database

Table 6. 2: Registration Page Description

6.5.1 Admin Screens:

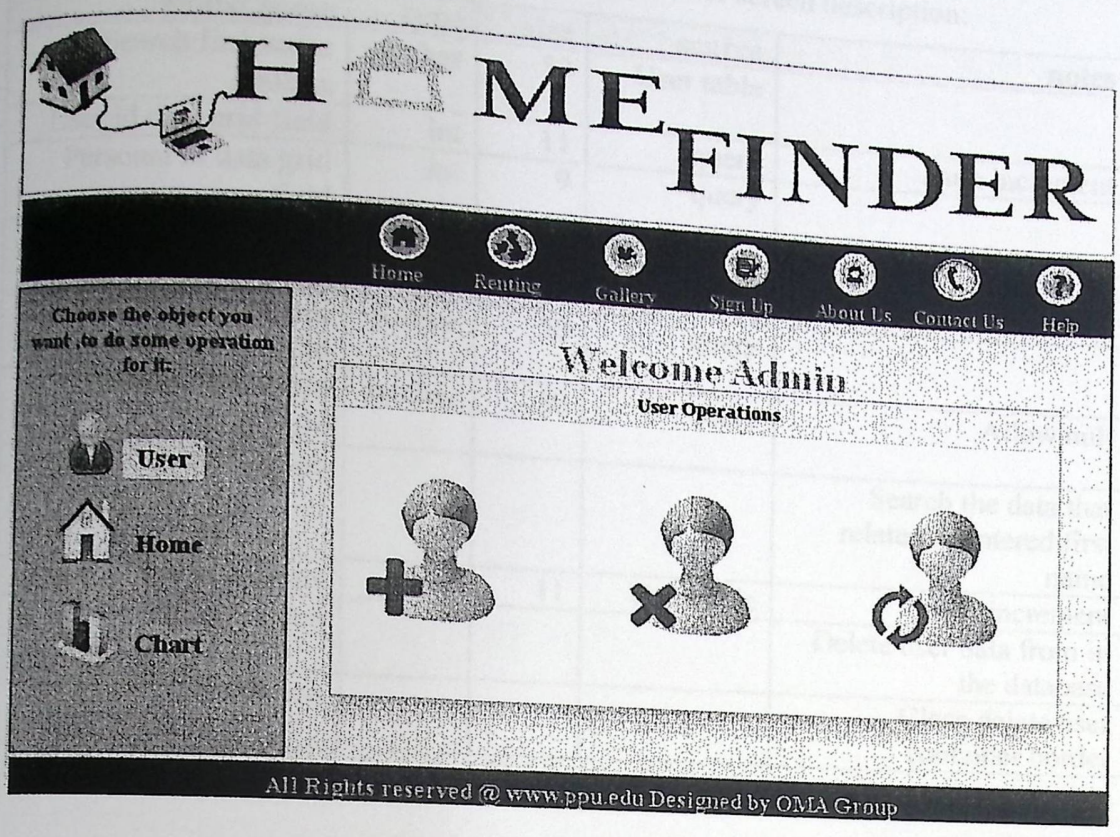


Figure 6. 10: Admin Screen

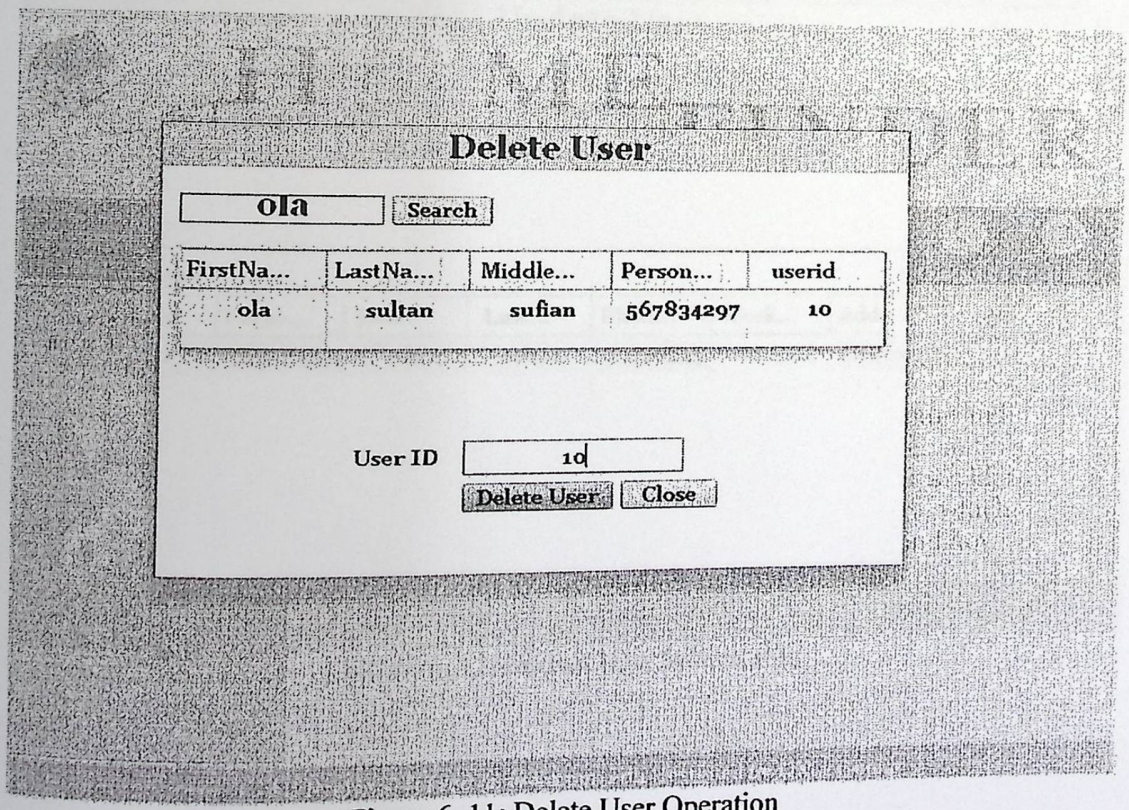


Figure 6. 11: Delete User Operation

The following table describes the actual delete user screen description:

Failed name	type	size	source	notes
Search first name textbox	varchar	50	User table	
User id data grid field	int	11	query	Auto increment
Personal id data grid field	int	9	query	
First name data grid field	varchar	50	query	
Middle name data grid field	varchar	50	query	
Last name data grid field	varchar	50	query	Allow null
Search button				Search the data that related to entered first name
User id textbox	int	11	User table	Auto increment
Delete button				Delete user data from in the database
Close button				Close delete user container border

Table 6. 3: Delete User Description

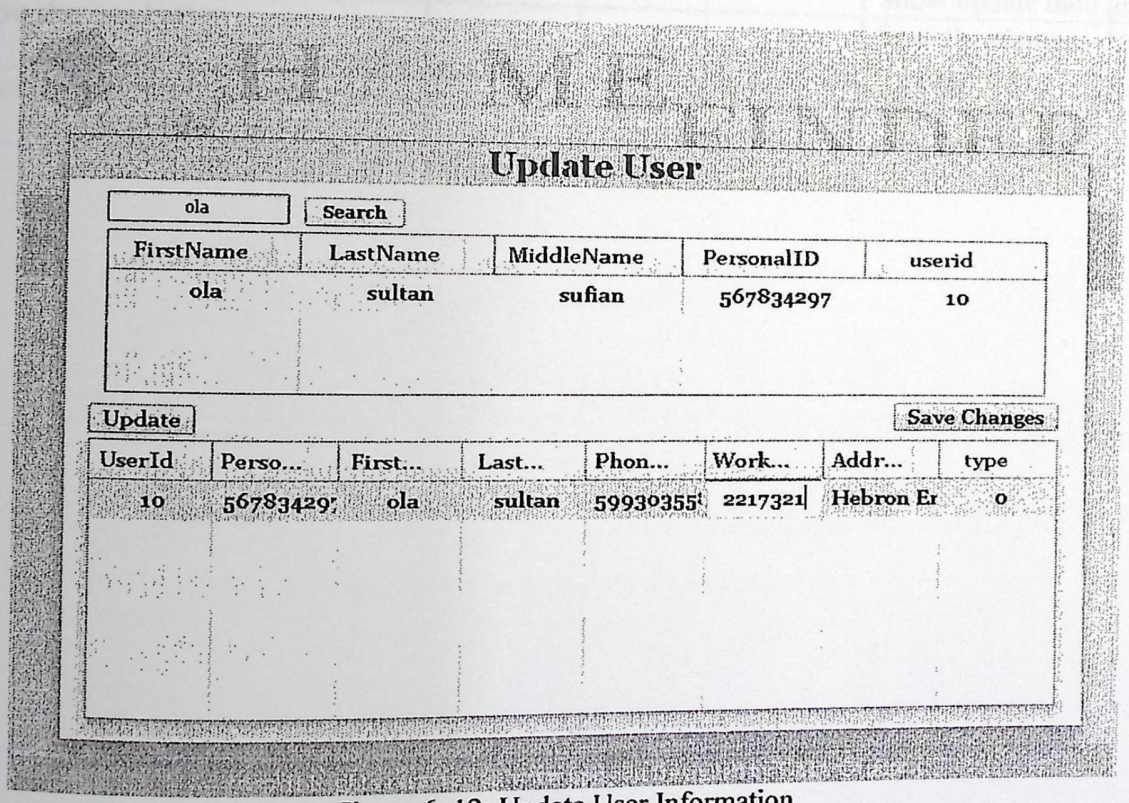


Figure 6. 12: Update User Information

The following table describes the actual update user screen description:

Failed name	type	size	source	notes
Search first name textbox	varchar	50	User table	
User id data grid (1) field	int	11	query	Auto increment
Personal id data grid(1) field	int	9	query	
First name data grid(1) field	varchar	50	query	
Middle name data grid(1) field	varchar	50	query	
Last name data grid(1)field	varchar	50	query	Allow null
Search button				Search the data that related to entered first name
Personal id data grid (2) field	int	9	User table	
First name data grid (2) field	varchar	50	User table	
Phone number data grid (2) field	int	11	User table	
Work number data grid (2) field	int	11	User table	Allow null
Address data grid (2) field	varchar	50	User table	
group data grid (2) field	int	1	User table	0 or 1
Update button				Show update data grid
Save changes button				Save the changes data in data base
Close button				Close update user container border

Table 6. 4: Update User Information Description

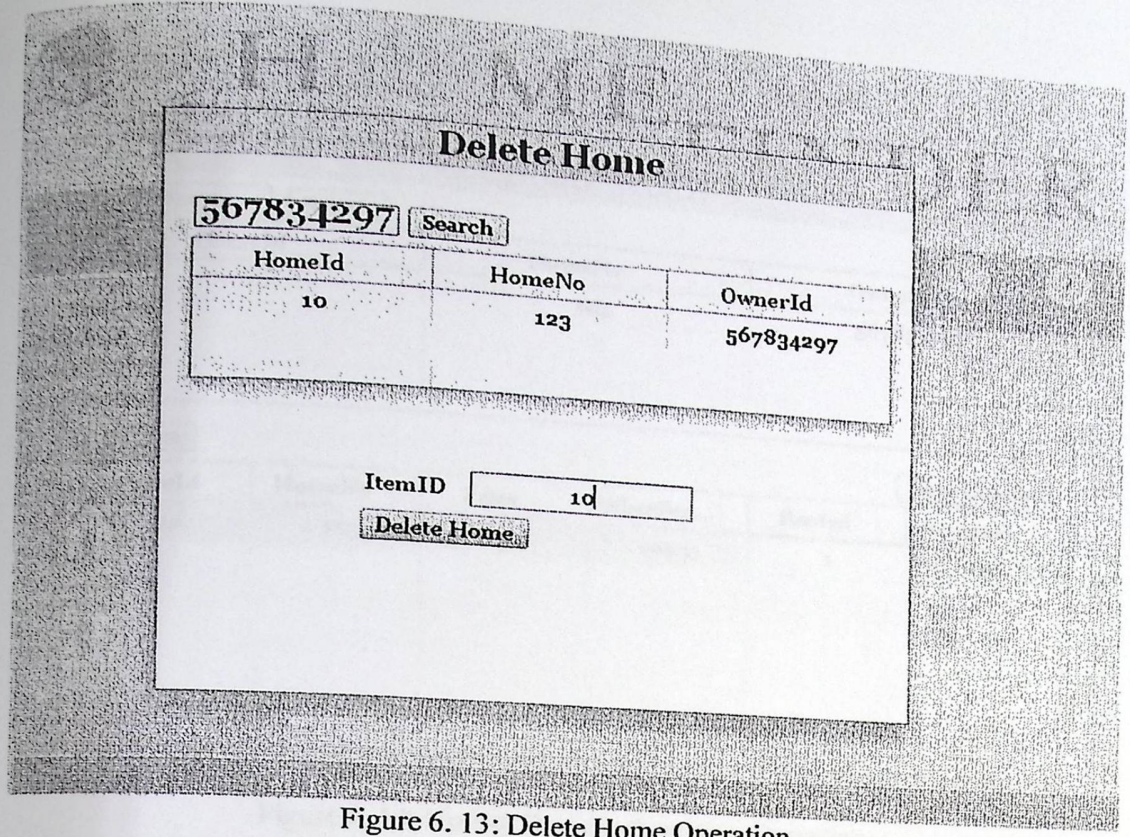


Figure 6. 13: Delete Home Operation

The following table describes the actual delete home screen description:

Failed name	type	size	source	notes
Owner id search textbox	int	9	Home table	
Search button				Search for homes by ownerId
Home Id data grid(1) field	int	11	query	Auto increment
Home number data grid(1) field	int	11	query	
Place data grid(1) field	varchar	50	query	In Hebron city
Owner id data grid(1) field	int	9	query	
Home id textbox	int		Home table	Auto increment
delete button				Delete home from database by home id
Close button				Close delete home container border

Table 6. 5: Delete Home Operation Description

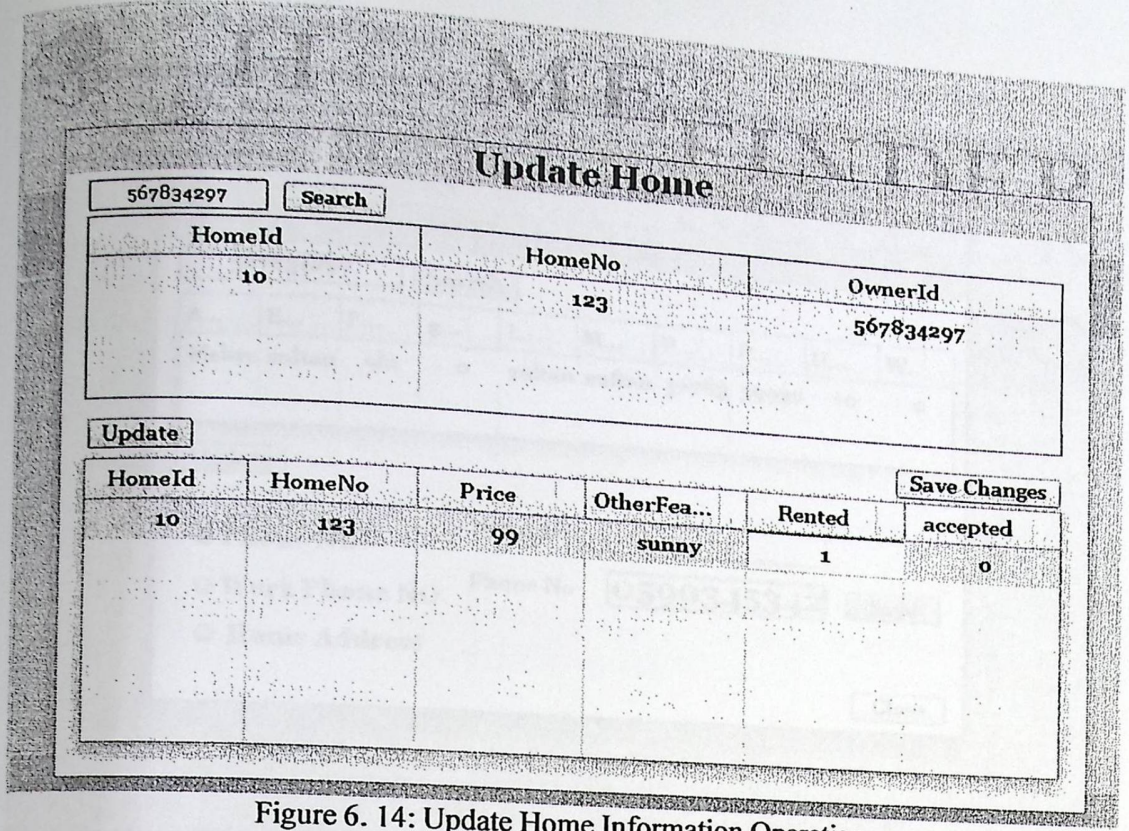


Figure 6. 14: Update Home Information Operation

The following table describes the actual update home information screen description:

Failed name	type	size	source	notes
Owner id search textbox	int	11	Home table	
Search button				Search for homes by ownerId
Home Id data grid(1) field	int	11	query	Auto increment
Home number data grid(1) field	int	11	query	
Place data grid(1) field	varchar	50	query	In Hebron city
Owner id data grid(1) field	int	11	query	
Home Id data grid(2) field	int	11	Home table	Auto increment
Home number data grid(2) field	int	11	Home table	
Place data grid(2) field	varchar	50	Home table	In Hebron city
Owner id data grid(2) field	int	9	Home table	
Price data grid(2) field	int	3	Home table	
Update button				Show update data grid
Save change button				Save the changes data in data base
Close button				Close update home container border

Table 6. 6: Update Home Information Operation Description

6.5.2 Owner screens

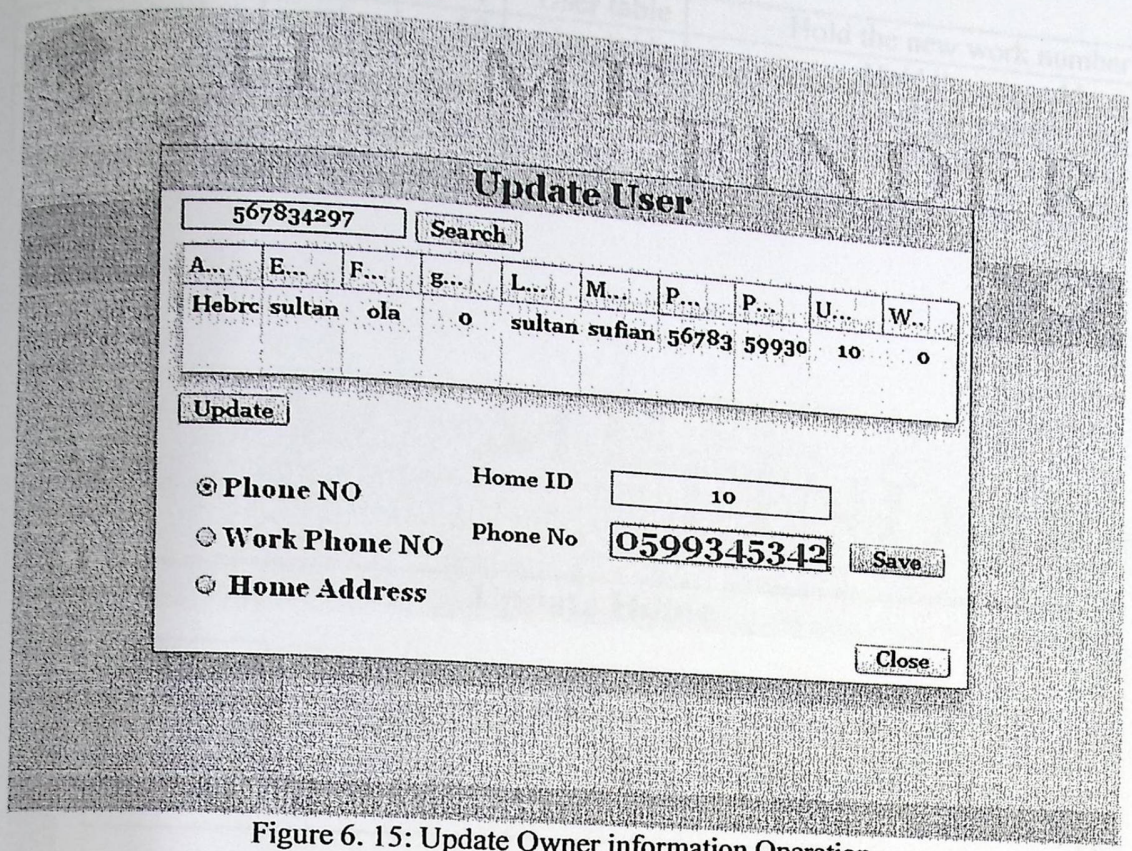


Figure 6. 15: Update Owner information Operation

The following table describes the actual lupdate owner screen description:

Failed name	type	size	source	notes
Search owner id textbox	varchar	50	User table	
User id data grid field	int	11	query	Auto increment
Personal id data grid field	int	50	query	
First name data grid field	varchar	50	query	
Middle name data grid field	varchar	11	query	
Last name data grid field	varchar	11	query	Allow null
Search button				Search the data that related to entered first name
Phone number radio button				When clicked phone number text box appear
Phone No textbox	int	11	User table	Hold the new phone number
Owner id textbox	in	11	User table	
work number radio button				When clicked work number text box appear
Address radio button				When clicked address text box appear

Work No textbox	int	11	User table	Hold the new work number
Address textbox	varchar	50	User table	Hold the new address
Save button				Save the updated data
Close button				Close update user container border

Table 6. 7: Update Owner Information Operation Description

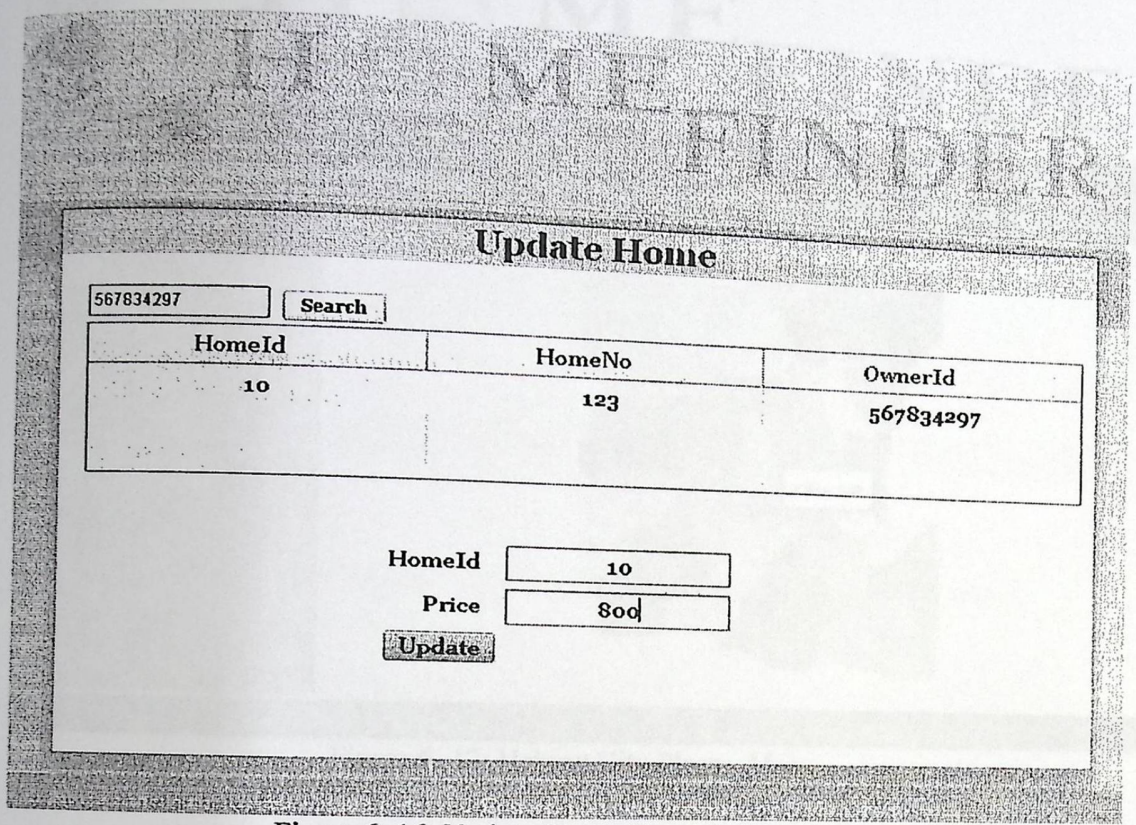


Figure 6. 16: Update Owner Home Information

The following table describes the actual update home owner screen description:

Failed name	type	size	source	notes
Owner id search textbox	int	11	Home table	
Search button				Search for homes by ownerId
Home Id data grid(1) field	int	11	query	Auto increment
Home number data grid(1) field	int	11	query	
price data grid(1) field	varchar	50	query	In Hebron city
Owner id data grid(1) field	int	11	query	
Home id textbox	int		Home table	Auto increment
Price textbox	int	11	Home table	
update button				Update price in database by home

Close button				id
				Close update home container border

Table 6. 8: Update Owner Home Operation Description

6.5.3 User Screens

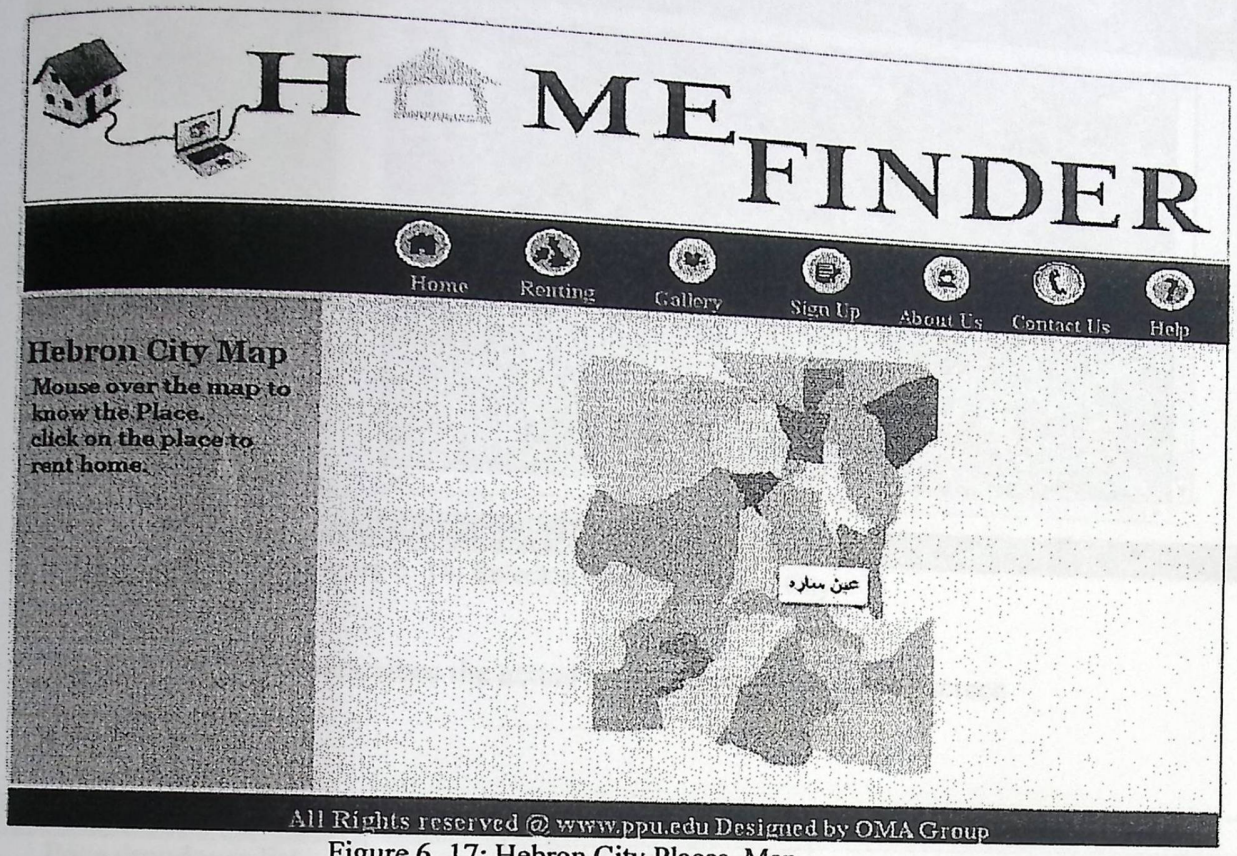


Figure 6. 17: Hebron City Places Map

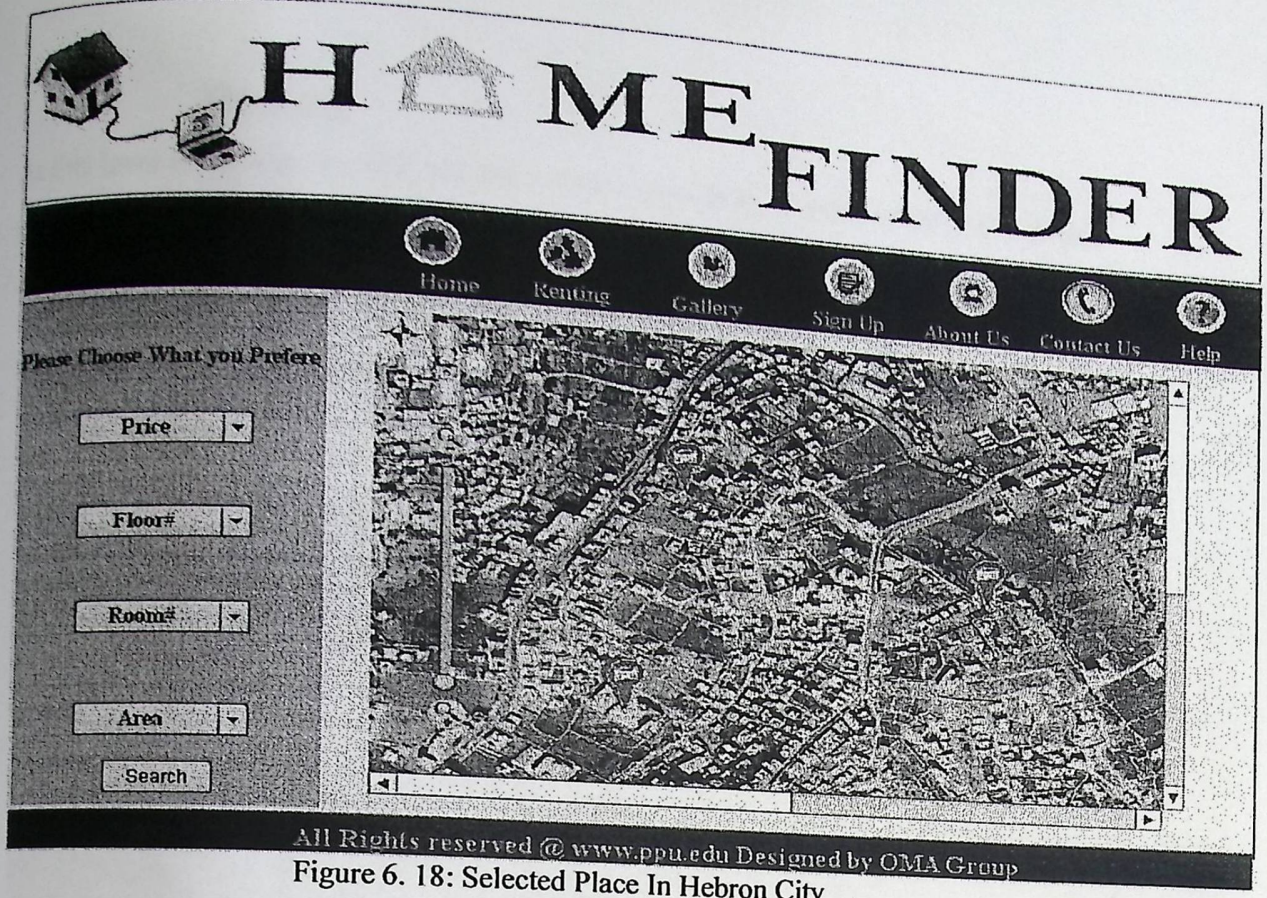


Figure 6. 18: Selected Place In Hebron City

The following table describes the actual select place in hebron city screen description:

Feiled name	type	size	source	notes
Price dropdown list	int	3	Home table	
Floor No dropdown list	int	2	Home table	
Room No dropdown list	varchar	2	Home table	
Area dropdown list	varchar	3	Home table	In Hebron city
button			Home table	

Figure 6. 19: Selected Places ion Hebton City Description

6.6 Testing

At this level of testing we will test the screens separately to ensure that the each one meet the requirement.

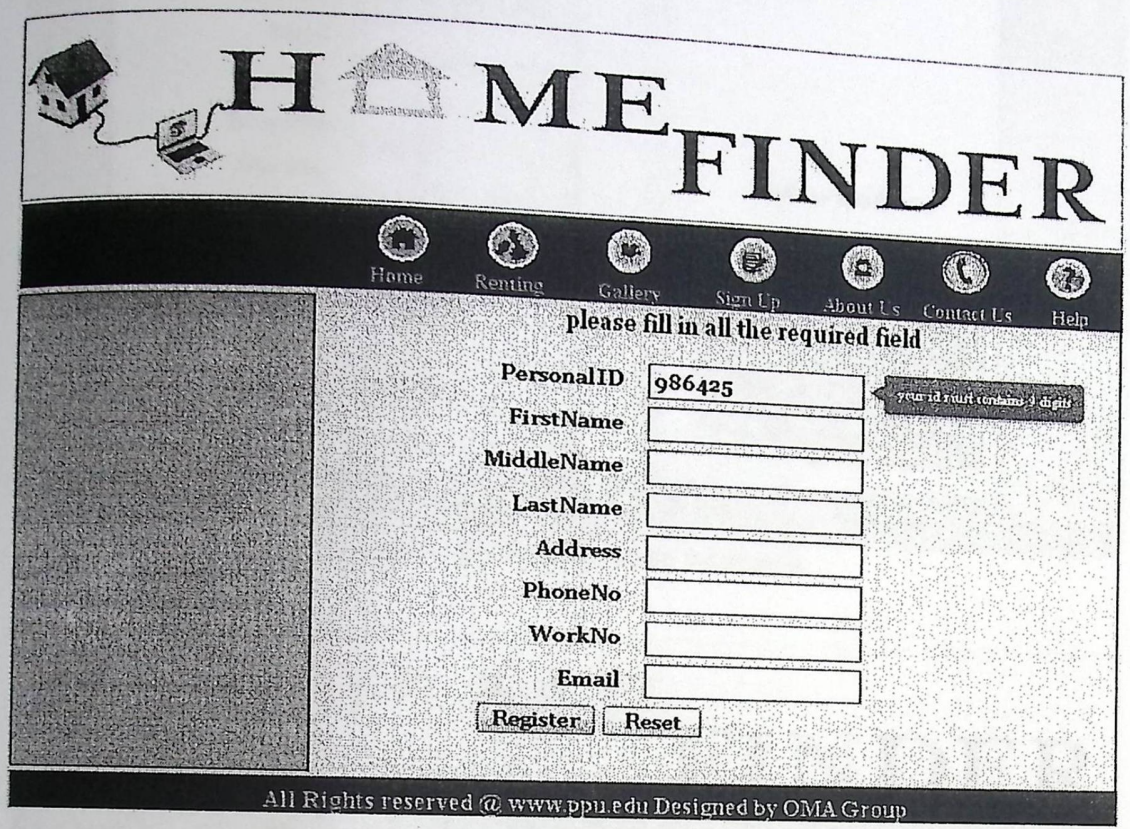


Figure 6. 20: Registration Form Validation

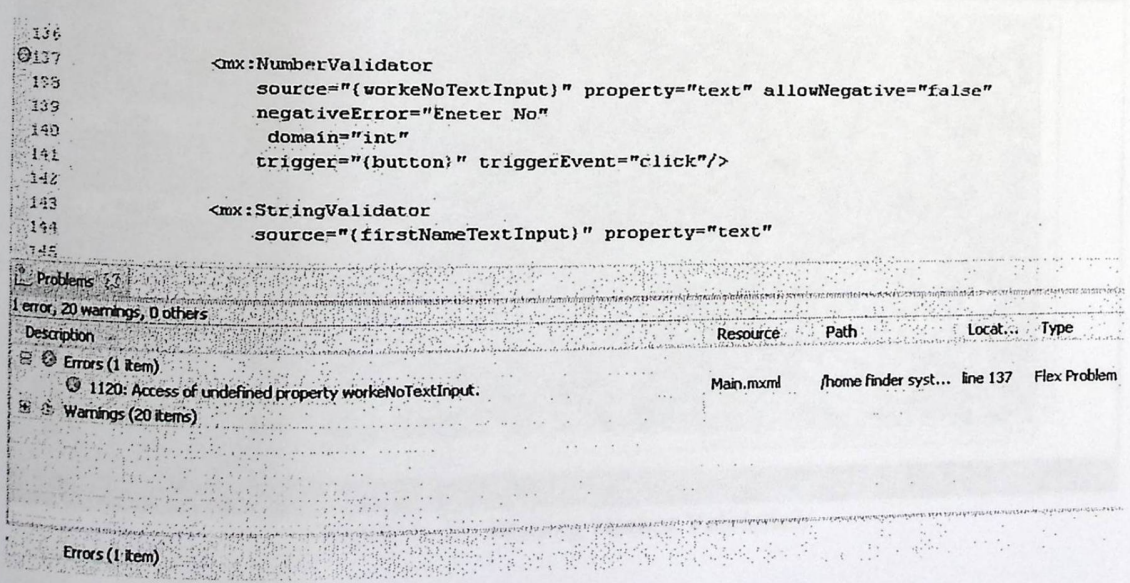


Figure 6. 21: Validation Message Error

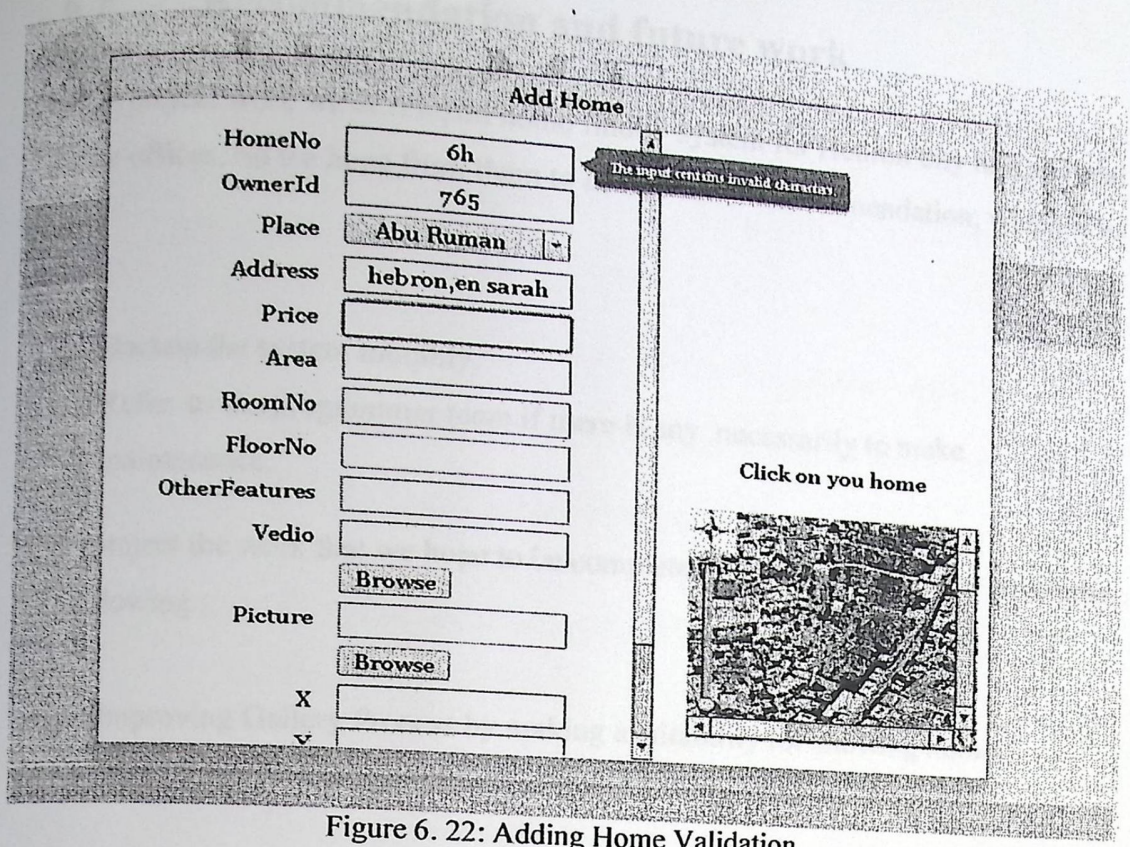


Figure 6. 22: Adding Home Validation

Figure 6. 23: Renting Homes Validation

6.7 Recommendation and future work

In this project work we developed home finder system for Hebron city hall and real estate offices. So we hope from them to adhere to our recommendation, which is as following:

1. Backup the system monthly.
2. Refer to the programmer team if there is any necessarily to make maintenance.

In this project the work that we hope to be completed in the future by other developer, is as following :

1. Improving Gallery Process by making availability for showing home information , while clicking on an image.

2. .Developing the project, in order to embed emailing technology and abandonment of manual communication between the admin and the owner.

3. Expand the project scope to be for all the Palestine authority.

4. Linking software system into Google earth.

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