REAL ESTATE APPLICATION USING SPATIAL DATABASE

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ABSTRACT

Real estate can be defined as rights andimprovementsto own or use land. Most of the real estate applications provide the features such as specification based searching, agent notification, adding property for sale, loan informationetc.according to some specifications. This paper presents a system which will have all the features of real estate application but using spatial databases, thus incorporating with it the flexibility and strength provided by the Spatial Databases.

KEYWORDS: *Spatial Database, Real Estate.*

I. INTRODUCTION

Whenever choosing or searching is done for a new house, the main focus is on the location. As location being a spatial entity we are using the advantages given by spatial databases for our application. The application provides the user to select any particular location and get related information appropriately.

Spatial data is data about location and space. This data can be represented in 2-dimension or 3-dimension form. Spatial data is primary used in geographical information system. Different examples of spatial data are existing, but the prominent example of spatial data is satellite image. For satellite image earth system will act as a reference system. Another example of spatial data is medical imaging in which human body acts as a spatial frame of reference.

A spatial database is collection of spatial data and spatial database system is collection of spatial data and software which help us to store, retrieve, modify and search spatial data efficiently. R.Guiting has defined the spatial database system as follows

- A spatial database system is a database system.
- It offers spatial data types (SDTs) in its data model and query language.
- It supports spatial data types in its implementation, providing at least spatial indexing and efficient algorithms for spatial join.

The above definition is sound, it tells that spatial database system is like a traditional database system as spatial data is complex and different from non-spatial data it needs different data type support and different query language for retrieval of data.

A road map is common example of spatial database system. It is represented as two dimensional objects. It consists of cities, roads, boundaries which can be represented as a points, lines and polygons respectively. Representation is in two dimensional forms. While representing this thing its relative position with respect to earth system is preserve.[1]

II. LITERATURE SURVEY

2.1 Need for Spatial Databases

The Geography Information System (GIS) is main factor of motivation behind the development of Spatial Database Management Systems. It has different techniques for analysis and visualization of

geographic data. GIS used to store spatial data and non –spatial data separately. For storing spatial data, it uses file management system and for non-spatial data it uses traditional RDBMS. Because of this separation of data, maintaining the integrity of data was difficult task. To overcome from this problem, solution is use a single database system for storing and managing spatial as well as non-spatial data. Different benefits can be achieved by combining spatial and non-spatialdata. The few are listed as follows

- It provides better data management for spatial data.
- Reduces the complexity as don't have to deal with different systems.

A GIS provides a rich set of operations over few objects and layers, whereas an SDBMS provides simpler operations on set of objects and sets of layers. For example, a GIS can list neighbouring countries of a given country (e.g. India) given the political boundaries of all countries. However it will be fairly tedious to answer set queries like, list the countries with the highest number of neighbouring countries or list countries which are completely surrounded by another country. Set-based queries can be answered in an SDBMS.[3]

2.2 Spatial Query

A traditional selection query accessing nonspatial data uses the standard comparison operators: >,<,<=,>=,!=. A spatial selection is a selection on spatial data that may use other selection comparison operations. The types of spatial comparators that could be used include near, north, south, east, west, contained in, and overlap or intersect. Many basic spatial queries can assist in data mining activities. Some of these queries include:

1. A region query or range query is a query asking for objects that intersect a given region specified in the query.
2. A nearest neighbor query asks to find objects that are close to an identified object.
3. A distance scan finds objects within a certain distance of an identified object, but the distance is made increasingly larger. [4,5]

2.3 Spatial Indexing

Spatial indexes are used by spatial databases (databases which store information related to objects in space) to optimize spatial queries. Indexes used by non-spatial databases like B-tree cannot effectively handle features such as how far two points differ and whether points fall within a spatial area of interest. A number of structures have been proposed for handling multi-dimensional point data. Cell methods are not good for dynamic structures because the cell boundaries must be decided in advance. Advance Quad trees and a k-d tree does not take paging of secondary memory into account. K-D-B trees are designed for paged memory but are useful only for point data. We have used R-tree indexing which is supported by Oracle database.[2]

III. RELATED WORK

Real Estate is a field that has widely expanded and has provided a huge ground for scope to many users for finding desirable properties and for entrepreneurs. The users need appropriate properties and the entrepreneurs who contain this information help the users for correct selection of properties. With the immense amount of profitability this concept holds for both the sides of the parties involved, the idea has caught fire.

Initially, the overall real estate process was manual. But due to increasing facilities of Internet and due to the popularity of the concept, many web sites have come up which provide real-estate information to the users. These web sites guide the user through various properties and help the user to find the needed and available estates as per his/her requirements.

Example of traditional web sites

1. www.99acres.com
2. www.makaan.com
3. www.indiaproperties.com
4. www.realestateindia.com
5. www.realestateonline.in

These websites provide features like search property, add property and gives different offer which will be beneficial to user. But even with these features there are certain required aspects which make these sites limited. They are:

1. No search gives correct information about basic services available from chosen location like displaying the distance of nearest bus stop, railway station, hospital etc.
2. No flexibility in information retrieval for e.g. listing houses that is within the 2Km radius of alocation.

The above and many more factors have to be addressed.

IV. PROPOSED SYSTEM

4.1. Proposed system

Our proposed system provides all the features provided by the traditional existing systems, but instead of working only with non-spatial data, the system also works with spatial data. The system will have the following prominent features:-

1) Specification based searching

This feature provides the related information to the users according to the specification they have provided to the site. For e.g., if a user is looking for a house with 1bhk at 9 lakhs at Thane, then only those properties which satisfy the aforementioned requirements will be returned to the user.

2) Agent Notification

Once the user is interested in a particular property and clicks the "Confirm" button a mail type message would automatically be sent to the agent who manages the corresponding area, informing agent about the user's name, his contact number and email address.

3) Adding property for sale

A user can add his property that he is willing to sale so that it can be viewed by other potential clients interested in similar property. For this purpose the client is supposed to enter not only the address but also *pictures* and the cost at which he is willing to sale that property.

4) Notifying interested users

Whenever a new property is added, then a mail type notification is automatically sent to all those clients who were interested or were searching for a similar property. Thereby notifying those users about the availability of that property.

5) Allowing users to put interesting property finds in cart

The cart is an added database advantage to the users. The users would be given the feature of adding interesting properties into a cart before making a final decision. This would help the user to separate interesting property finds and thus help in final decision making.

6) Providing user with map based search

Once a particular region is selected the user can gain needed related information on the basis of geographical factors. For example, requesting information of a particular location and getting information about regions which lie in a particular boundary of that location (e.g.In the radius of 2km from Thane Railway station)

The features that are based upon geographical factors have to be implemented using spatial databases. Spatial databases provide functions that help in finding distance between two points in a spatial domain. Using these functionalities, we can very efficiently perform spatial mining and provide advance and flexible features to the users. The relational databases prove to be slightly incompetent in these aspects and thus the use of spatial domain is evident in the application.

4.2 Modules of the system

The following are the modules considered in our proposed system :

(1) Specification Based Search:

This search provides the user to scrutinize properties based upon Property details such as "City", "Cost range", "BHK", "Buy/Rent". The "Search" then provides the user with all the available properties from the database, which satisfy the requirements as specified. On clicking any of the result, the website provides the user with that property's details, along with its location pinpointed on map and nearest services from that property.

(2) Map based Search:

Along with the standard search, 'Propsdeal' provides a special "Map-Based Search" to the user. In this search, the user can select properties based upon their Geographical location. The user can pin-point areas on the map and then specify the radius in Kilometers from which to search properties.

(3) Add property for sale Module:

This feature allows the user to add his/her, own property on to the site's database by which it will be enlisted as an available property for sale to the other users. The main advantage 'Propsdeal' has over other traditional sites in this case is that, it only requests for obvious details from the user and calculates the nearest features from that house dynamically. Thus here, the user does not need to go through the gruesome process of adding all the nearby services information by him/her self.

(4) Notification Module:

This feature, as the name suggests is a mail type service which provides notifications to the user about properties that had been added onto the site's database, when that user had been offline. Initially when that user had been online, his history for searched records is maintained. Then, when this user is offline and if any other user, adds a similar property to that what the earlier user was looking for, then that user who is currently offline will be appropriately notified about the new property addition through a notification mail. This notification mail will be sent to the aspiring user, even if he is online.

(5) Cart Module:

Adding interesting search to cart is a feature which has been provided for user personalization. Herein, the user can add his essential searches to cart for short listing them. Each cart is separately stored for individual user. Moreover, the status of the cart is maintained when the user logs out and is reproduced back to that user when he/she logs-in again.

V. DESIGN

5.1 UML Diagram:

Our system has been thoroughly analyzed using UML approach .Use case diagram and Component diagram is shown in Fig 1 and 2.

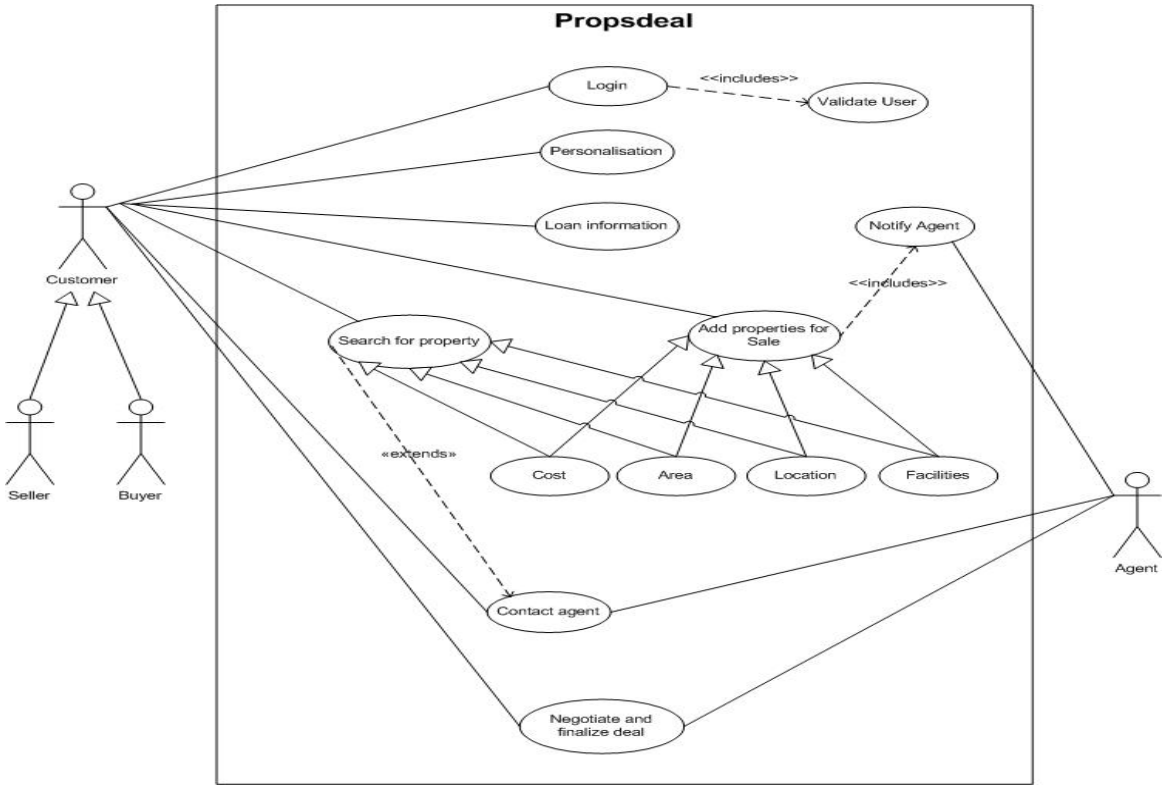

Fig 1 Usecase Diagram

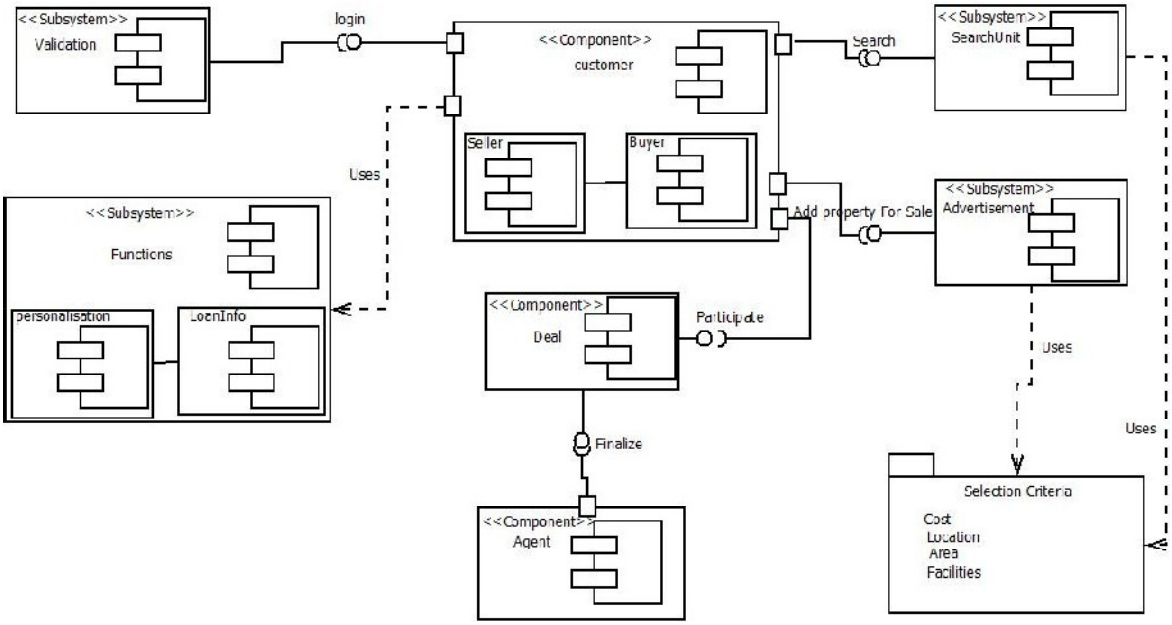

Fig 2 Component Diagram

5.2Data flow diagram**:**
Data flow diagrams are shown in Fig 3,4,5,6,7.

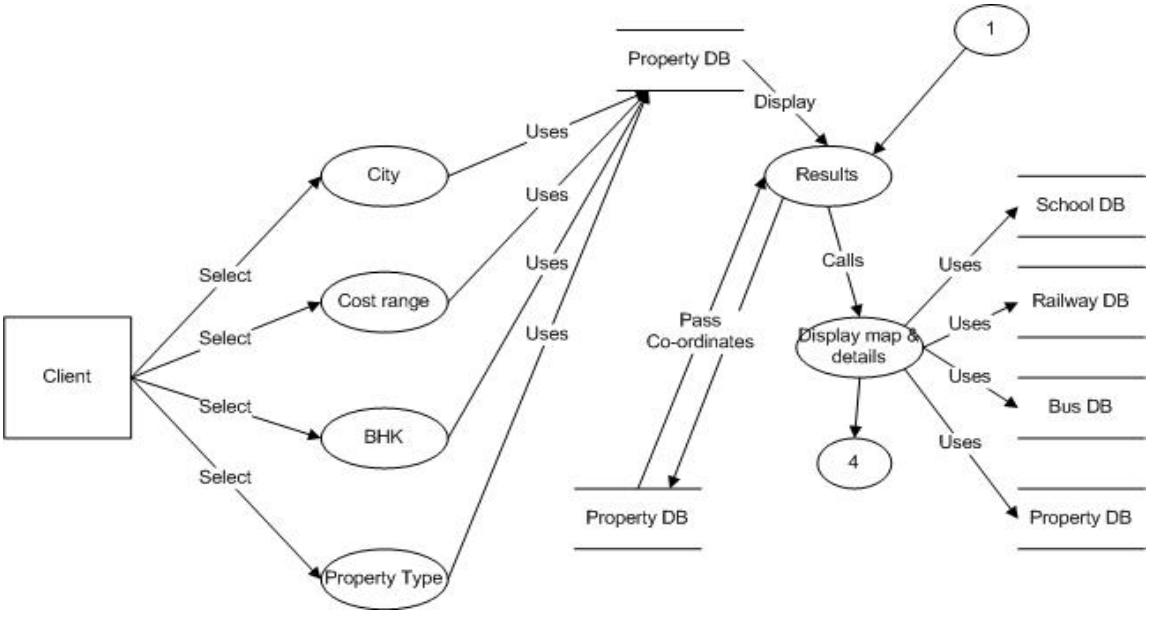

Fig 3 : DFD for Specification based search

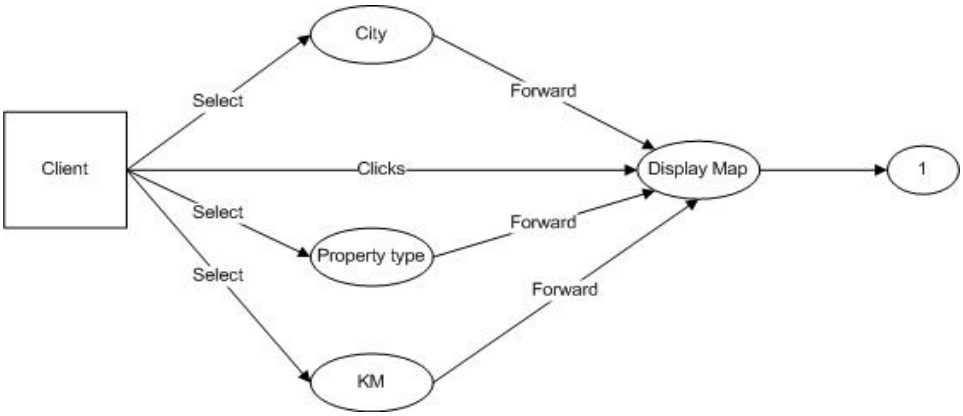

Fig 4 DFD for Map based search

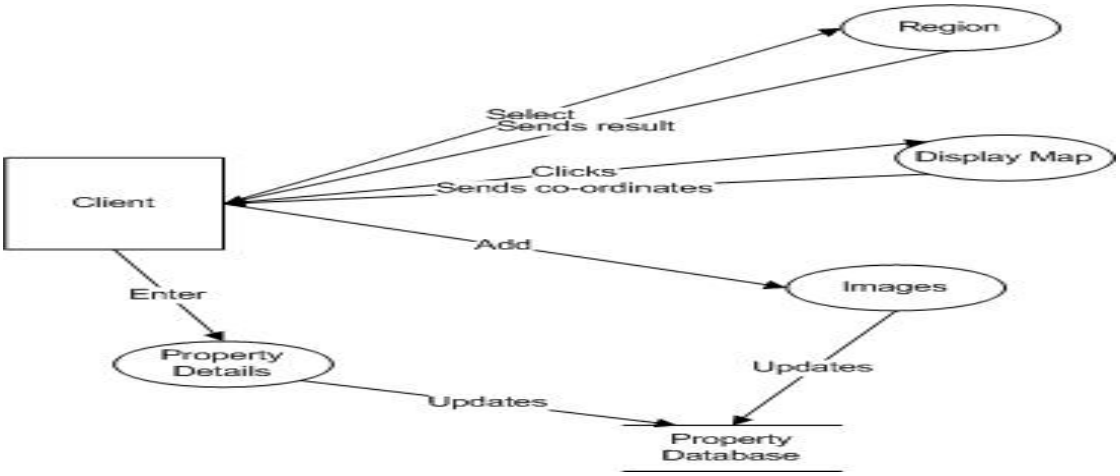

Fig 5 DFD for Add Property for sale

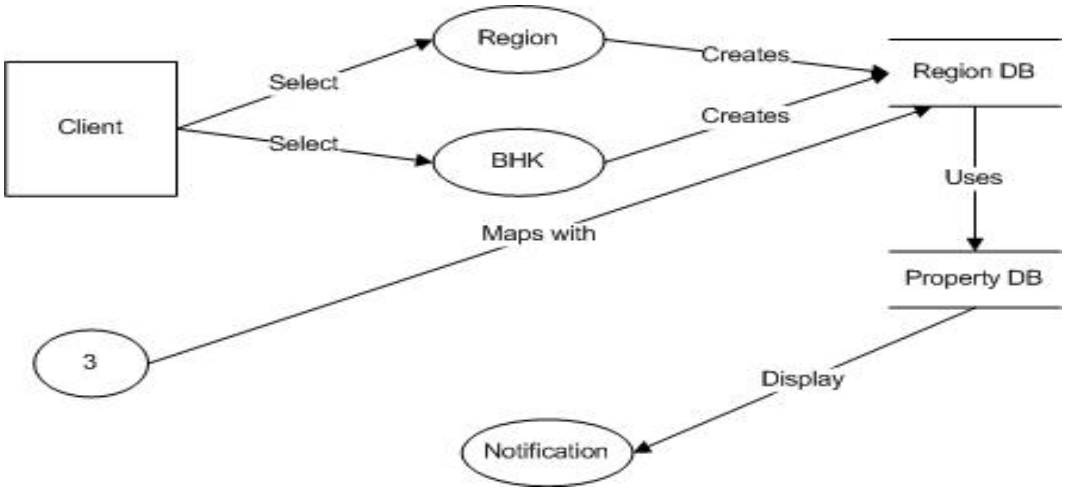

Fig 6 DFD for Notification

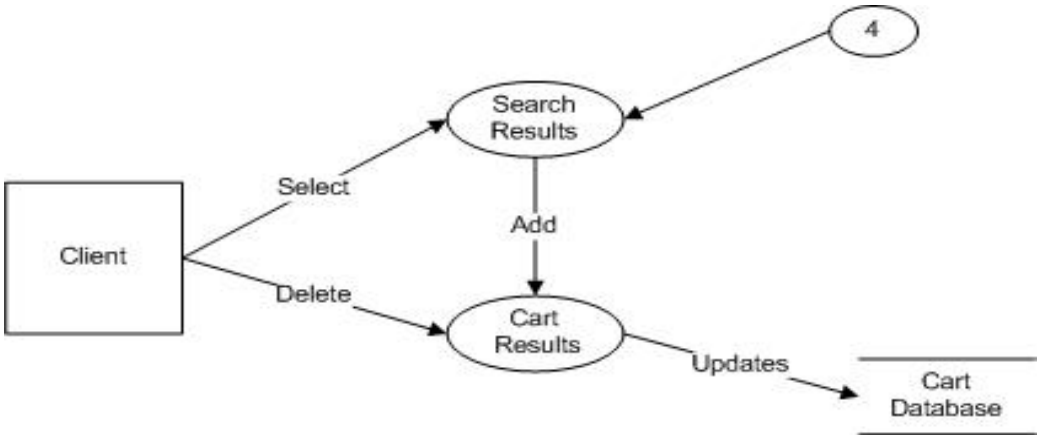

Fig:7 DFD for Cart

VI. IMPLEMENTATION

6.1 Specification based search

Herein, we provide the user with drop down selection box to select "City", "Cost range", "BHK" and we provide two option buttons for the user to select whether he/she wants to buy or rent that property. This form gets submitted, when user clicks the "Search" button. The action of this form submits these fields to the search program written in java. This java program takes the inputs and fires a query onto the database for it to retrieve all those properties from the database. These results are stored in an array and this array is passed to the JSP file which is responsible for showing the search result. The Search result JSP page receives the array containing the search results and prints them as an output to the user.

Figure 8 is the home page for our website 'Propsdeal'.Figure 6.2 shows the available results for specified cost range, city, bhk and property type.Figure 6.3 shows the property details for the selected property along with its location on map.Figure 6.4 shows Nearby services for the selected property.

Fig. 8 Home Page

Fig 9 Specification Based Search

Fig 10. Property Details along with its location on map

Fig 11. Nearby Services for the selected property

6.5 Map based search

Here the user is provided with three drop down selection boxes to, select the region where he wants to re-centre the map, to select what kind of properties (Buy/Rent) to be displayed on the map and to select the kilometer radius for search, respectively. Whenever the user makes any selection onto any of these selection boxes the appropriate functions are called which then give the desired results. On clicking any of the point on the map, the co-ordinates of that point is retrieved. These co-ordinates are then passed to the java program which fires a spatial SDO_Distance query onto the database for retrieving properties whose latitude-longitude coordinates are in the user's selected range(in KMS) from that point. Those properties satisfying these requirements are then displayed to the user on the right side of the map.Figure 6.5 shows results for map based search

Fig 12 Map Based Search

6.6 Adding Property onto the site's database

Initially, the user specifies the location on the map where the property he/she desires to sale/rent is located. Then the user is redirected to another page where he fills in the obvious details of that property such as "BHK", "Address", "City", "Area", "Price", "And certain facilities(Parking, gym, garden, lift, etc.)". Then, the user is provided with 4 dropdown selection lists that allow him/her to

add pictures of his/her property. After filling all these details the user then submits them and then that respective property gets added onto the site's database and is displayed on the map.Figure 6.shows screen shot for the property details to be filled.

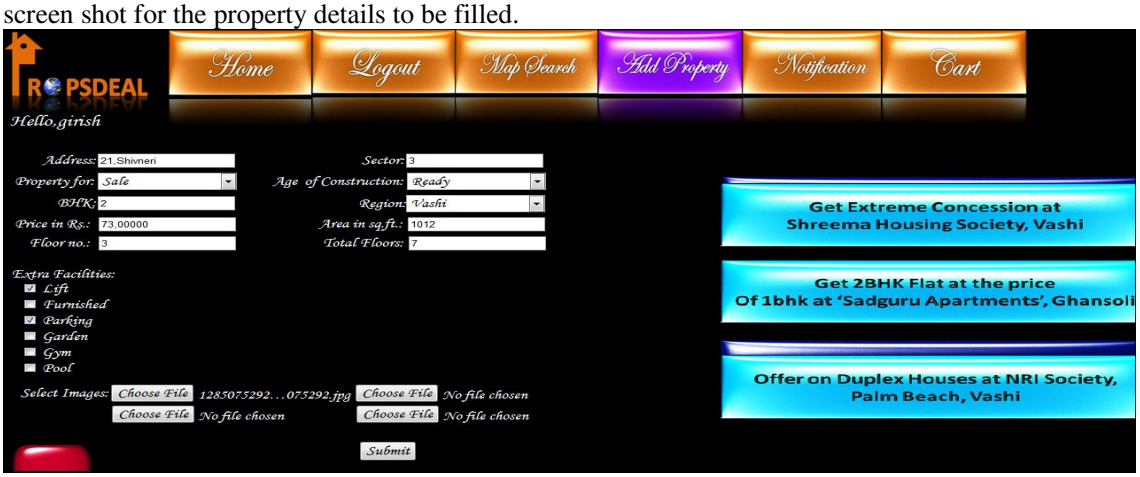

Fig 13 Add property for sale

6.7 Notification

Every distinct search of each registered user is maintained separately for them. This historical record of user's search, is then used for Notification feature. Herein, whenever a new property is added onto the site's database, then the user's historical search records are checked to see if he/she had ever searched for a similar property before. If the response is positive then that respective user is notified individually by a mail type service, to that effect. On the next login, that user will be notified of the new property addition in which he might have interest. Figure 6.7 shows screen shot for Notification.

Fig 14 Notification

6.8 Cart

The cart allows the registered users to shortlist their search. Here in the user is allowed to add any of the searched properties onto his/her cart. The user can then later on review those particular properties whenever he/she finds time thus saving his/her time to search from start. Also, he/she can delete items from the cart as required.

Figure 15 shows screen shot for Cart.

Fig 15 Cart

VII. CONCLUSION

Real-Estate has always been a field which contained a mass of information and had various angles from where the elements of this information can be viewed. Each user has his/her own perspective of this data and can move through them according to own needs. Amongst the whole information related to Real-Estate, the more complex are the desires and requirements of the user. Though considering these complex user requirements and allowing the user to navigate through the Real-Estate information is of crucial importance.Unfortunately the Existing Real-Estate web applications have failed in grasping this as a valid issue. Due to these insignificances the user is left unsatisfied as he/she is equipped only with a blunt tool to dig a vast field.

Thus to solve these problems and to well equip the user, this paper discusses a system, "Propsdeal"which has made efficient use of spatial databases. Through the features of these databases, we have provided the user an efficient tool which empowers him to specifically search for properties. Our map based search is an excellent way for the user to search for properties based upon their geographical locations. Thus the user's requirements and desires can be much well fed now to the "Search" mechanism. This is much better than the standard inflexible search.

The reason why we chose Spatial databases for our application is that they are designed to provide an excellent way to address our necessity in developing a location based search. Their inbuilt features reduce a lot of complex calculations which would have to be handled by us in case we had used Relational databases in their place for designing the same system.Our system gives an efficient and an extremely user-friendly perspective for the users to search available properties.

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