

ONLINE REAL ESTATE AGENCY IN MACEDONIA: NEEDS AND REQUIREMENTS

Sanja Toleska	Galina Josifovska	Vlado Drakulovski	Jovan Pehcevski
European University	European University	European University	European University
Skopje, Macedonia	Skopje, Macedonia	Skopje, Macedonia	Skopje, Macedonia

ABSTRACT

The internet usage in Macedonia has grown rapidly since 2000, resulting in an increased number of online applications offered by various industries. The real estate industry is rapidly growing in Macedonia, yet to our knowledge none of the existing real estate agencies offer their customer services online. In this paper, we define all the necessary needs and requirements to design and develop an online real estate agency application. The application allows Macedonian citizens to find proper real estate in a more convenient way, and it also allows agencies to more efficiently sell/rent the existing real estate. We present a feasibility study for the proposed project, and describe the corresponding Use Case, Data Flow and ER Diagrams necessary to develop the application. Our fully functional prototype demonstrates that the online real estate application implements a robust and extensible platform, capable to manage various functionalities needed both for the real estate agents and for their clients.

I INTRODUCTION

The number of internet users is steadily increasing nowadays, which means the internet have become one of the main sources for information. The internet usage in Macedonia has also grown rapidly since 2000, resulting in more than a double increase of online users vs. population ratio in 2008 when compared to the rest of the world (see Fig. 1).

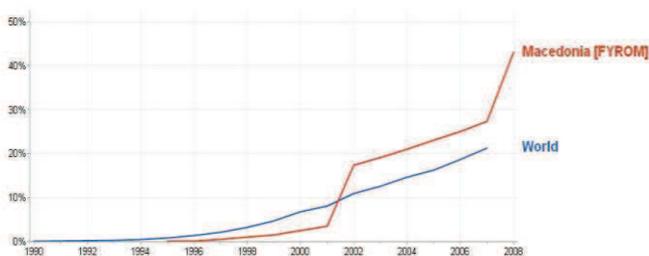


Figure 1: Internet users as percentage of population ¹

One reason for this increased usage is the endless number of opportunities and online applications offered by the internet. In this paper, we discuss about the needs and the requirements to design and develop an online real estate agency in Macedonia. There are many existing online real estate agencies on the internet, however to our knowledge none of the existing real estate agencies in Macedonia offers their services online, thus preventing online users in Macedonia to search for and rent/buy appropriate real estate. Macedonian real estate agencies seldom use information technologies; in other words, almost all communication is done by telephone with the documentation of sales or advertisement done on

paper. Furthermore, advertisements are solely placed and published in newspapers and on television.

Some of the circumstances that influenced the need for our project are the following:

- ✓ real estate agents have to call clients by telephone in order to pass information and promote offers;
- ✓ clients have to visit each place to see how it looks like;
- ✓ organizing open days for a large number of clients is very difficult for the agents as they have to call each interested client by telephone informing them about the event; in the end, they must take the time to show the estate to every client separately (and some may not be interested);
- ✓ clients spend large amount of time to sell or buy an estate, because of the aforementioned reasons;
- ✓ clients that place advertisements do not have information how the agency is promoting their advertisement or how many customers may be interested in their advertisement;
- ✓ agencies usually find clients by finding their advertisements in newspapers, because often clients do not want to place an advertisement through an agency (as most people want to avoid agency provision); and lastly,
- ✓ clients and agents do not have a clear view at the competition's offers; allowing this would raise the level of competition between agencies, and at the same time would provide a wider promotion choice to the clients.

There is certainly a great room for improvement for the real estate agencies in Macedonia; indeed, replacing the current paper-based/telephone system with an online system will result in faster access to up-to-date information, better customer satisfaction and more rapid growth in this type of business. Accordingly, the project has to satisfy not only the needs of a real estate agency, but also those of the clients.

II AIMS OF THE PROJECT

The aims of the project are to determine the suitable needs and requirements to design and develop a real estate agency web application. The application will provide a systematic assessment of the quantity and the quality (in terms of both the location and the price) of the real estates offered in Macedonia. The primary goal of the application is to connect the agencies with the clients, providing them with the up-to-date information of the available real estate.

The project combines datasets and various knowledge and interpretation tools from the real-estate industry to provide images of, and characterise resources. By using the application, clients can upload information about their estates, while potential customers can visually search for an estate and take a look of its surrounding, the exterior and the interior of the estate and the household. Furthermore, customers can browse through different areas of the country, thus allowing

them to obtain information on the prices and the estates offered around the country. This type of online application is very helpful and can thus be applied by any real estate agency. By manipulating and utilising the existing database of the agency, the application can also be linked and made available from the web site of the agency.

The long term strategic value of the project is that it will:

- identify estates that may have potential for future development;
- identify estates that may be used for rent;
- identify estates that may be used for sale;
- identify estates that can be bought;
- identify client that want to buy, sell or rent an estate;
- provide a systematic evaluation from sites which require sales management;
- increase the costs of attractiveness of some estates; and
- identify new (unknown) real-estate sources.

III SCOPE OF THE PROJECT

The scope of the project is defining what will and will not be supported by the application. This application will enable clients to manage their accounts: upload photos, fill out and submit offers and advertisements, including short text descriptions, as well as register for an open house days and place offers for auctioned estates. On the other hand, it will also enable real-estate agencies/agents to place ads, text descriptions and schedule open-house and presentation days. In its current stage of development, it is not planned for the application to support chat rooms, videos and games.

IV FEASIBILITY STUDY

The requirements of the online real estate agency application can be divided into three areas: technical, economical and operational.

Technical feasibility

Technical feasibility refers to the actual ability to build the system [1]. It can be divided into two views: human and technological. The human view refers to the aspect of knowledge in programming (we use the PHP programming language and the HTML markup language) and the knowledge of manipulation with databases (we use the MS SQL Server database). The technological view refers to the software and hardware requirements. The platform on which this application is developed is Microsoft Windows server using Visual Studio 2005 and SQL Server Management Studio Express (for the database application) and the PHP programming language, HTML, and CSS (for the web implementation).

The criteria upon which the system is evaluated takes into account all the characteristics that must be present in the system for it to be acceptable. For example, the following characteristics are distinguished by the application: the type and the number of inputs; the type and the number of outputs; the functionality of each query; and the application interface.

Economical feasibility

Two different estimates were calculated to determine the estimated labor cost of development. Independently, a top-down analogous estimate using the WebIMS project and a bottom-up task-based estimate using the Work Breakdown Structure (WBS) were performed to derive estimates of around \$3,000 and \$4,000 respectively. These estimates vary by a mere 11% and therefore would seem to represent a high reliability in the estimating process.

The first attempt at estimating the labor cost for this project was done using an analogous estimating technique, while the second attempt was done by following a bottom-up estimating technique using the WBS that had been developed by the IT applications project team. Extrapolation for the system was done after many interviews and several meetings with the business team members to document the current business processes for each of the sub-systems. This bottom-up estimate concluded that the labor cost to complete the project based on the identified tasks in the WBS would cost approximately \$4,000, given that a bottom-up estimate is generally considered to be a more detailed and therefore more accurate estimate of work to be performed [1].

Operational (Function Point) feasibility

We use function point as a unit of measurement to express the amount of business functionality that one information system provides to the user. We categorize basic function points into five groups: *outputs*, *inquiries*, *inputs*, *files*, and *interfaces*. These function points represent a measure of the size of computer applications and the projects that build them. Their size is measured from a functional, or user, point of view. It does not depend on the computer language, the development methodology, or on the technology or capability of the project team used to develop the application. Our function points are based on screens, reports and other external objects, meaning that this measure takes the users' point of view.

For example, Fig. 2 shows an example of function point table we use in our project.

Type of Component	Complexity of Components			Total
	Low	Average	High	
External Inputs	x 3 =	x 4 =	x 6 =	
External Outputs	x 4 =	x 5 =	x 7 =	
External Inquiries	x 3 =	x 4 =	x 6 =	
Internal Logical Files	x 7 =	x 10 =	x 15 =	
External Interface Files	x 5 =	x 7 =	x 10 =	
Total Number of Unadjusted Function Points				
Multiplied Value Adjustment Factor				
Total Adjusted Function Points				

Figure 2: Function Point Table Example ²

V USE CASE, DATA FLOW AND ER DIAGRAMS

In this section, we present the Use Case, Data Flow and ER Diagrams necessary to develop the application. We use the Unified Modeling Language (UML) to describe the system

concept as a collection of objects incorporating both processes and data [2].

Use Case Diagram

The Use case diagram is used to identify the primary elements and processes that form the system. The primary elements are termed as "actors" and the processes are called "use cases". The Use case diagram shows which actors interact with each use case. An actor portrays any entity (or entities) that perform certain roles in a given system. For the online real estate agency application, the actors are: Client, Agent and System Administrator. The different roles the actor represents are the actual business roles of users in a given system. An actor in a Use case diagram interacts with a use case. A use case in a Use case diagram is a visual representation of distinct business functionality in the system. Some of the use cases are individual for each actor and some are common. Use cases share different kinds of relationships. A relationship between two use cases is basically a dependency between the two use cases [2].

Fig. 3 shows a use case example for Place advertisement. This use case describes how an advertisement is handled by the application. The actions are triggered as clients fill in the online advertisement and submit it.

The major steps performed by this use case are as follows.

1. The applicant fills in an online advertisement form containing personal and estate information, along with the type of advertisement.
2. The second step is to validate/verify the information in the advertisement form.
 - a. If the information is false the application is denied and a rejection mail is sent to the applicant.
 - b. If the application is approved, information about the client and the estate is stored in the relational database. A confirmation mail is sent including the client ID, the login name and password, and the information about the agency terms, conditions and provision.

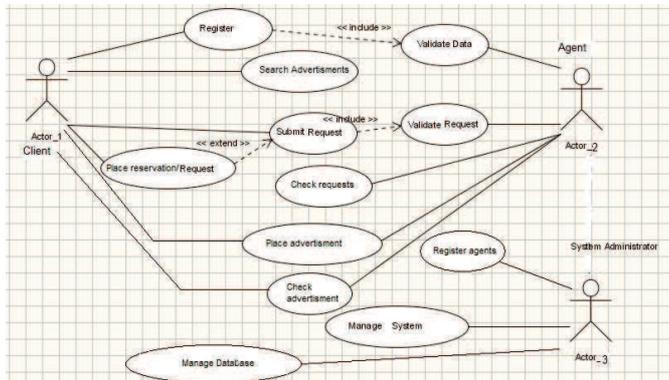


Figure 3: Use Case UML diagram: Place advertisement

Data Flow Diagram

Data Flow Diagramming (DFD) is considered as a common technique for creating process models [1]. Data flow, data store and external entity are elements of a DFD process. That process is an activity or function performed for a specific business reason. It can be manual or computerized. We define data flow as single piece of data or a logical collection of data that always starts or ends at a process. We define data store as a collection of data that is stored in some way where data flowing out is retrieved from the data store and data flowing in is either added or updated to the data store. An external entity could be a person, organization, or system that is external to the system but interacts with it.

DFD level 0 diagrams show all the major processes that comprise the overall system: how the major processes are interrelated by data flows, how they interact with external entities and how they add data stores. Fig. 4 provides an example of a DFD level 0 diagram for our online real estate application.

There are also DFD level 1, 2, and 3 diagrams. In general, DFD level 1 diagram is created for each of the major processes shown on the level 0 diagram. It shows all the internal processes that comprise a single process on the level 0 diagram and also how the information moves to and from each of these processes. If a parent process is decomposed into, for example, three child processes, these three child processes wholly and completely make up the parent process.

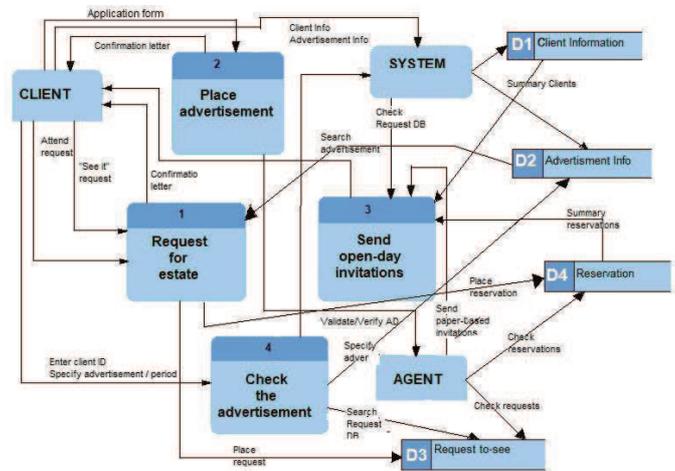


Figure 4: DFD level 0 diagram

ER Diagram

An Entity Relationship (ER) diagram shows the information that is created, stored, and used by a business system [3]. In this diagram, entities generally represent items of related information, while lines drawn between entities represent relationships among these entities. Entities need to be clearly defined in the modeling phase and they can represent persons, places, events, or things for which the data is collected. One

or more attributes can be defined for each entity, which represent information captured about an entity. The ER diagram can also show high level business rules implemented by the application [4]. Fig. 5 shows the ER diagram for our online real estate application, where we also present business rules as constraints that are followed when the system is in operation. To achieve modeling consistency, the ER Diagram must also be balanced with the DFD.

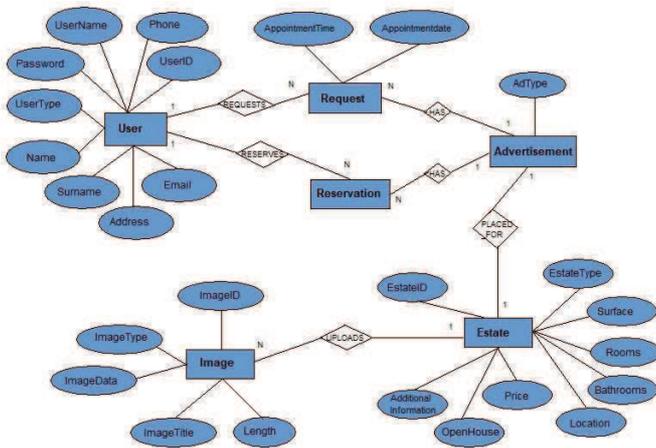


Figure 5: ER diagram

VI APPLICATION PROTOTYPE DEVELOPMENT

We developed a fully functional prototype of the online real estate application. The prototype constructively addresses the issues faced by all the real estate features on the verge of introducing IT and of automating real-estate processes. Fig. 6 shows a Gantt chart containing the results of executing the action points while developing the application prototype.

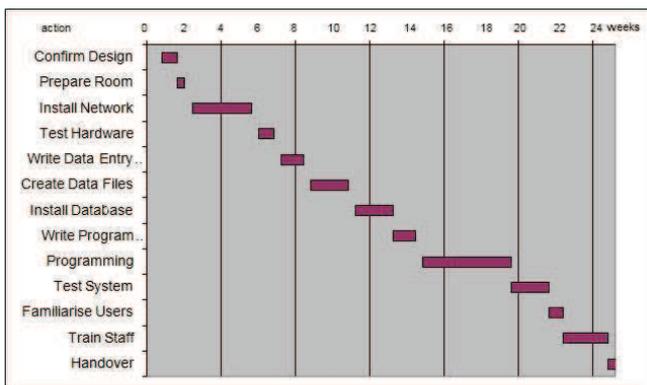


Figure 6: Project Gantt chart

Fig. 7 shows the GUI of the online application prototype. The real estate application implements a robust and extensible platform, capable to manage various functionalities needed both for the real estate agents and for their clients. Each of them (depending on the permissions) have the right to create, edit or delete accounts; post, edit or delete advertisements,

attend or send request for open days, search for advertisements, open days or info about users/clients etc.



Figure 7: GUI of the online application prototype

VII CONCLUSION AND FUTURE WORK

In this paper, we have defined all the necessary needs and requirements to design and develop an online real estate agency application for Macedonian customers. We have presented a feasibility study and described the corresponding Use Case, Data Flow and ER Diagrams necessary to develop the application. We have also developed a fully functional prototype that provides a systematic assessment of both the quantity and the quality of the real estates offered in Macedonia. We have therefore achieved the primary goal of this project, which was to connect the agencies with the clients, providing both of them with up-to-date information of the available real estate in a most convenient way.

We are all witnesses of the fast growing technology that is changing by the minute, where new versions of hardware and software components are developed at a rapid speed. If a web application wants to keep up its attractiveness on such a competitive market, it has to continually upgrade its design and functionalities in order to keep its business growth. Some of the future development plans for our online real estate application include the following:

- to make it more object-oriented and more code independent;
- to integrate Flash files, photos, videos, presentations, and newsletters;
- to integrate real time communication with chats, forums, and video calls; and
- to increase the functionality of the database by including new relations (tables) according to the future demand.

It is our hope that the work presented in this paper will stimulate the growth of the online real estate market in Macedonia, resulting in increased work productivity and more satisfied online customers.

REFERENCES

¹ Source: http://www.google.com/publicdata?ds=wb-wdi&met=it_net_user_p2&idim=country:PRT&q=internet+usage+statistics#met=it_net_user_p2&idim=country:MKD&tdim=true

² Source: http://images.google.com/imgres?imgurl=http://www.softwaremetrics.com/images/fp_table.gif&imgrefurl=http://www.softwaremetrics.com/fpafund.htm&usq=_9wZysRmKyyN8vKaVnrXR3Dh1DaA=&h=207&w=588&sz=10&hl=en&start=13&sig2=lavW31ENjLsfpuyOndutmA&um=1&itbs=1&tbnid=Mpon1ZWL1JNVVM:&tbnh=48&tbnw=135&prev=/images%3Fq%3Dfunction%2Bpoint%26hl%3Den%26rlz%3D1C1CHMZ_enMK330MK337%26um%3D1&ei=nJ91S4ycKoeV_Qa9rpWeCg

[1] A. Dennis, B. H. Wixom and R. Roth. *Systems Analysis and Design*. John Wiley & Sons, 2006.

[2] P. Stevens and R. Pooley. *Using UML: Software Engineering with Objects and Components*. Addison–Wesley and Pearson Education, 1999.

[3] R. Elmasri and S. B. Navathe. *Fundamentals of Database Systems*. Addison–Wesley and Pearson Education, 2004.

[4] P. Chen. *Entity-Relationship Modeling: Historical Events, Future Trends, and Lessons Learned*. In *Software Pioneers: Contributions to Software Engineering*, Springer-Verlag, 2002. pp 296 – 310.