

APPLICATIONS AND RESEARCH ON GIS FOR THE REAL ESTATE

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ABSTRACT: This paper presents the concepts and technology of GMN and its application in developing real estate management software. GMN abbreviating GIS+MIS+Network, is a new technology integrating Geographic Information Systems (GIS) and Management Information Systems (MIS) in the Internet environment. Previous real estate management software products which are mainly based on MIS cannot meet various essential requirements of real estate industry in the Internet age. GIS provide geographic information and 3D visualization capabilities to traditional real estate software systems. GMN-based real estate systems enable users to browse real-estate information and conduct real estate business online. On the technical level, this paper proposes a new GIS architecture based on ASP. Finally, a few particular problems emerged during the exploitation of the GMN-based real estate management systems are discussed.

1. INTRODUCTION

Research and applications of Geographic Information Systems (GIS) in China started in the early 1980s. In the early period, the development of GIS was mainly depended on the progress and applications of remote sensing, aerial photography, as well as computer-aided design (CAD). With the rapid progress of Management Information System (MIS) and Internet technology, GIS has developed vigorously in the country in recent years. Real estate industry provides a booming sector for GIS and MIS as well as for Internet applications.

Real estate management information system is the essential part for a real estate enterprise, it is very important for the decision makers and managers. However, previous office management methods have many faults, it could not meet the requirements of modern society. Nowadays, more and more office software come in force, but they are short of a new methodology for tackling the difficult problems.

For example, there are many databases having geographical information in real estate systems. How to represent the geographic information in an easy way is an important problem. With the investment on the cable systems growing fast in China, the Internet users are increasing greatly; the traditional management methods of the drawing are very difficult to satisfy the development of the real estate systems. In the design of communication systems, the share of the resources, especially the geographic information, is very limited. Geographic information systems technology can meet these requirements.

In the strictest sense, a GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information, i.e. data identified according to their locations. Practitioners also regard the total GIS as including operating personnel and the data that go into the system. GIS technology can be used for scientific investigations, resource management, and development planning (He, 2001).

2. CONCEPTS AND TECHNOLOGY OF GMN

From the viewpoint of object-oriented principle, in fact, the real estate system is totally known as a management information system (MIS). In the real estate nowadays in China, there have many defects, one of these is that the MIS has the ability to manage the non-spatial data, that is the attribute of the spatial data, but not the spatial data, it has caused many difficulties to the development of the real estate.

The office automation has become more and more important recently. The MIS technology is built on this basis. MIS becomes the main body for the daily business management, the method of quantitative research, and the progress of the entire enterprise function. The wide use of MIS has brought great benefits to the data analysis, and computerized decision-making.

As we all know, spatial data is the basis of the GIS, and non-spatial data is the intension and the description of geographic cell. How to connect the spatial and non-spatial data affects greatly on the result of application analysis and the realization of the practical goals on GIS. With the rapid development of network technologies and the popularity of World Wide Web (WWW), GIS has developed from the original isolated and centralized information management model to an open and distributed architecture. Typically, current solutions for building distributed GIS applications becomes more incompetent to fulfill the various requirement of dynamic, complicated and distributed computing; however, with the Internet is growing, such GIS application becomes more larger, and could accommodate more heterogeneous machines. (Guan, 2001)

GIS has been an essential tool for enterprise organizations and government to do scientific management and make important decisions. MIS is a solution of the modern business, not only it provides the means of management and the mechanism of operation, but also it enhances the efficiency of the business. However, GIS alone cannot build a real management system, because it cannot manage the great capacity and diversity of data. Therefore, a new solution is required. The realization of modern real estate system depends on the GIS technology to some degree, and it needs much more technologies, such as the management technologies. The key technologies, for creating the real estate system, mostly including Geographic Information System (GIS), Management Information System (MIS), computer Internet, database management etc.

The new concept of GMN is set force under the situation. GMN is the abbreviation of GIS + MIS +Network. GMN is also called Geographic Management System; we can look it as GIS for MIS. It is a leading edge technology in the GIS field recently.

GIS is the computing system for collecting, processing and analyzing spatial geological information. Since 1980s, with the mature of the GIS technology, geological departments in developed countries have started to construct the geological spatial databases using the GIS technology, and also have developed the standard of spatial database construction. (Chen, 1998)

The invention and popularization of the Web enables every user access various data at any time from any where with world. The World Wide Web is a system for distributing information on a global basis, and users can scan and search for any kinds of information in the Internet. The public can access Internet, including Intranet, make full use of all the information through the Web. If 3D scene and 3D virtual reality are available in the Web it is more convenient, flexible and vivid to acquire and query all kinds of information from the WWW. Users can "walk

through" the different kinds of houses, visit the virtual rooms before he (or she) arrives at the real estate, thereby he can choose the beautiful environment to stay, plan to which house to buy, and design his garden himself with the help of the virtual city existing on the Internet. (Li, 2000)

In order to take advantage of GIS, MIS, Network, GMN has its own characteristic. Also, as GMN could be seen as "GIS for MIS", it is a new form for the development of GIS. The key points are:

- (1) High compatibility makes more applications possible on the GIS and MIS.
- (2) GMN is so compact and exquisite, but has more and powerful function.
- (3) GMN connects with MIS seamless.
- (4) Good customization takes no more training.

The main function of GIS is to manage graphic data and attribute data. However, how to connect the graphic and attribute data is a main difficulty in GMN. GIS data is basic spatial information of the real estate, therefore, GMN provides not only a 2D map but also the information of a 3D model, and provides management, storage and maintenance functions for a large database.

The GMN technology is a new method when people interact with computers and it supplies windows and tools when users design their living space. Many people had realized that the techniques of GMN are changing the way GIS is applied. Only after the GMN techniques come into being could GIS users overcome some existing restrictions of GIS. Even so, letting the mass image, texture, geometry and attribute data of the GMN system run in the Internet, the problem, such as data compression, data transfer, data decompression and graphic output, figure statistics etc. , which some GIS technique will have to be resolved firstly.

3. REAL ESTATE MANAGEMENT SYSTEMS BASED ON GMN

One of the important application areas of the GMN system is the real estate designing and planning. The GIS model has become a main tool in real estate designing and planning which is based on the various spatial data in community management. There are two main relations between a GMN and real estate designing and planning. One is using the Web to help real estate marketing and sales. If people can access Internet they can provide some information and they will be encouraged to participate in the area planning. In fact, many real estate enterprises have distributed the design information and the related standard in the Internet. Through the Internet, we can conveniently analyze all kinds of the spatial information in a community: the environment and distribution of a real estate in a short period, greenery and its relation to buildings and ecological significance, personal spaces and public spaces among buildings, etc. In the second place, the GMN provides a new way for the system composing of digital data stored and managed in Internet. The descriptive information of the terrain and the topology information can be uploaded to Internet. Unlike the traditional real estate, which cannot maintain the information before it is changed, the data in the system will be stored forever unless they are deleted, and can be maintained and updated easily. Therefore, the buyers can compare the building models in different stages.

On the design of the real estate system, the real data should be taken into account, and we have used the Baoan Garden real estate in Wuhan, China, as a real example for our research. With this background, we summarized the specialties of all kinds of communities, which leads to this system. Now we expect to expand the system marketing and scales of real estate to other fields such as on the military, on the urban planning, as well as on the city designing.

4. A GMN-BASED REAL ESTATE MANAGEMENT SYSTEM SOFTWARE

The real estate system software is a new product designed by us, and it is basic geographic information system software. It was developed and designed especially to manage the real estate and help the operator to sell the houses. The main characteristic of the software is exploiting the 3D coding data, GIS data, CAD data and managing the real estate attribute data including area, price, floors, rooms and so on. Also, the system can be used as the MIS for the administrators; it is designed to assist administration of enterprises.

In order to possess the function of real-time ramble seamlessly, to contain and to expand the spatial multimedia function of the traditional GIS such as query, presentation, analysis and decision, the system have 6 basic function modules, which are fiscal charges module, database management module, statistics module, graphic output module, data input module and system module. Each module is connected through the GMN. Fig 1 shows the relationship of the modules in the system.

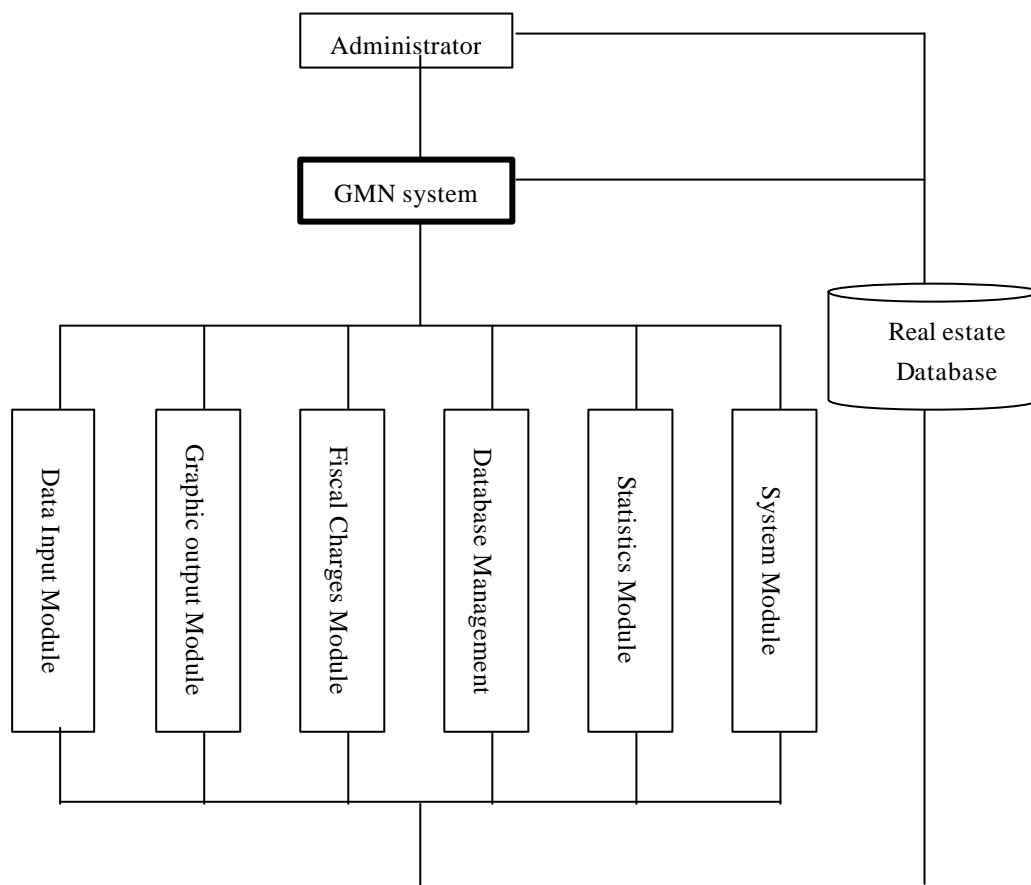


Fig 1 Function modules in the real estate system

In spatial database, because of cast volume of geometric data, usually, users manipulate a large scope of data items and hold for such a long time that long transactions occurred frequently, the traditional mechanism can no longer satisfy in spatial data management. Therefore, the ASP technique, which locates the client combining with DBMS, has overcome many difficult problems. The primary problem is data converting and inconsistency.

The basic premise is that the inconsistency and imperfection of data is not allowed without considering how to solve for the problem once it happens. To a certain extent, the traditional database management system is very passive. In fact, if DBMS is able to feed back the database update (adding, deletion, modification) of the committed

transactions to some application programs of relative transactions, the problems may be solved to a large extent.

The Internet ASP technique is the best way to solve the DBMS and the data transmission. The key point of the improvement is to inform the client side of the database modification promptly, then send client sides related to the modified data after receiving the message. One method is to reread all data, which, however, will cause low efficiency of the system. The other method is to reread the modified part of the data. It is required that the notification message should include information of the modified data. In the object-oriented system, information of the modified data can be represented by object identification. (Gong, 2001)

In the Web environment, it is a difficult problem to realize GIS for Web. Therefore, it is important to firstly build a GIS platform above the Internet or to firstly extract the big objects in the low level of detail on sever; this is the realistic solution for the web, it is more important especially in the low speed network. Fig 2 displays the real estate system framework in the web form.

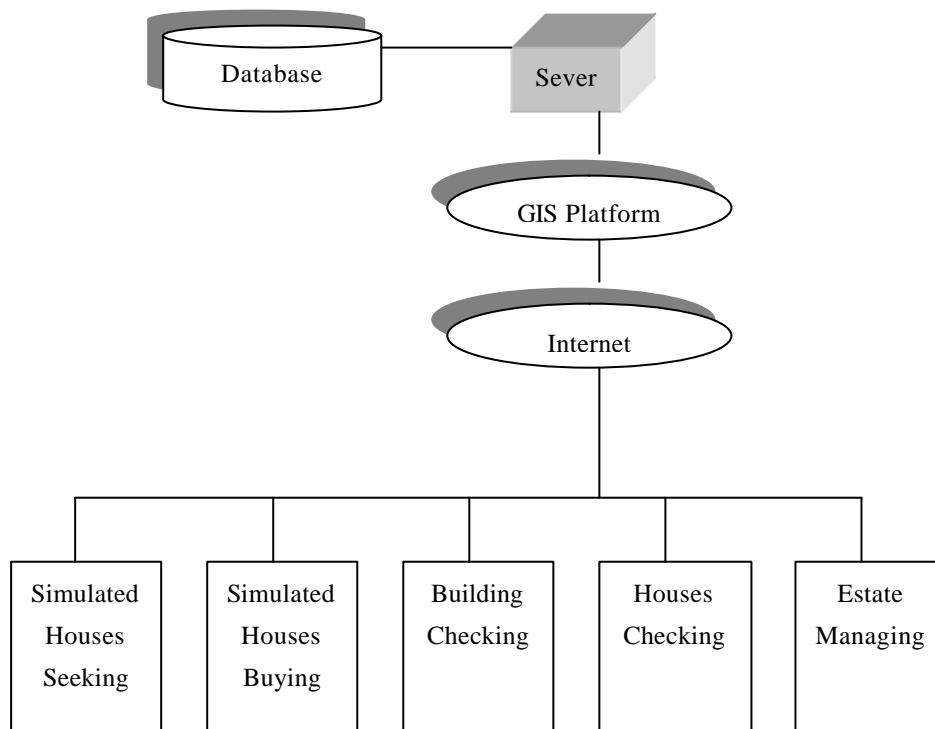


Fig 2 Real estate system framework in the Internet environment

The real estate system provides various data for users. The buyers can access their own interesting scene. Once they click the place on homepage they will enter into the corresponding scene and know the community, tour route, traffic information, building structure and so on. The more details system allows visiting the rooms in buildings. In a word, users are personally on the scene in the real estate system.

In order to describe the detailed geometry of a building we must sample some points and create dozens or hundreds of basic surfaces. Those data, especially in the buildings, are usually extracted from the aerial photography or digital camera. There are mass images in order to present the material or texture feature of each surface, so we have specially a proper systematic coding rule, which can ensure efficiency during extracting data, and devised the integrity during creating.

On the other side, excellent real estate software should have sufficiently powerful function to manage the business everyday. Each module gives administrators a good way to deal with non-geographical data. The real estate software applies managers the office automation, improved their efficiency. In order to acquire more real virtual scene, some simplified methods are exploited for arranging the entities that offer many advantages such as the simple data structure, easy manipulation, fast processing, and good graphical visual effects, which provide a good idea to simulate scene realistically.

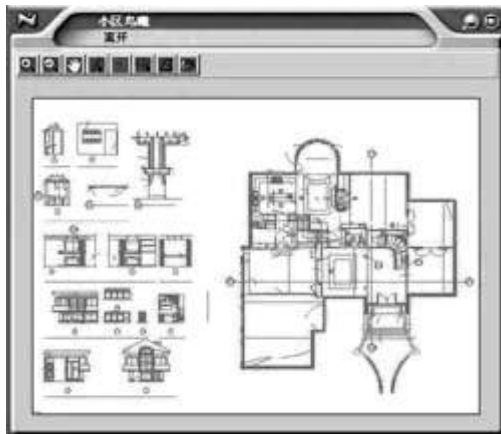


Fig 3 A snapshot of the GIS estate system



Fig 4 The real estate system function list

Creating a realistic building model is only one of the important steps in designing a real estate software. We should do a lot to organize and manage more effectively such complex and great amount of data and to develop various useful applications. Fig 3 and Fig 4 show the software actual effects in transit.

The real estate software we have developed has provides complete solutions for spatial indexing, selecting and clipping the data in the perspective space, dynamic loading, office automation, capabilities for managing large volumes of information as well as real-time applications. It has realized fast browsing and multimedia interactive query of real estate. GMN has a great prospect on GIS applications, not limiting to real estate, but also applicable to building construction, city planning, mineral resource detection etc. This is an ongoing research and development project, further progress will be reported in the near future.

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