The design scheme of urban and rural planning management system based on GIS

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Abstract. In urban construction and development, computer technology, information technology and CGI technology have been widely used in urban planning and management, and there are more and more application studies on related information systems. Although excellent results have been achieved in the overall development, there are still many places to be improved. CGI, as a combination of technology and geographic information system technology, applies innovation in the field of urban planning, which can not only show the characteristics of distributed, interactive and dynamic, but also fundamentally ensure the operation efficiency of urban planning management information system. Therefore, on the basis of understanding the current development status and application research of urban planning and management information system, this paper mainly studies the design scheme based on geographic information system technology according to the key technologies of urban planning and management system, so as to improve the effect of traditional urban planning and management and provide more quality services for social residents.

Keywords: urban planning management; Geographic information system; Computer network technology.

1. Introduction

In essence, urban planning refers to the urban people's government in accordance with development planning, natural environment, historical conditions, resource conditions and national economy development characteristics, clear the scale and direction of future urban development, in order to achieve the economic and social development goals of the city, scientific use of urban land, coordinated arrangement of urban spatial layout. With the rapid development of information technology and computer hardware and software technology, there are more and more loopholes in the traditional urban planning and management mode in the increasingly complex urban planning and management. Therefore, some scholars have proposed to use information technology and geographic information system (GIS) to transform and innovate. From the perspective of practical application, urban planning management system is a kind of architecture system composed of people and computers, which includes urban planning information collection, information transmission, information transmission, information storage and information processing operations. In the development of modern society, the pace of urbanization construction is getting faster and faster, and the pace of construction and reform of urban land and resources information resources facilities is getting faster and faster. In order to meet the needs of the public for development services, the rational use of information technology and GIS design and analysis can further improve the comprehensive ability of urban planning departments and promote industrial technology upgrading.

The construction of urban digitization and information technology has promoted the development of various industries to a certain extent. As a basic component of digital city construction and development, GIS technology has been widely concerned by scholars in many fields. By guiding traditional urban planning and management methods to modernization and digital transformation, according to the development situation of the new era, urban planning preparation and planning management are guaranteed to be scientific and legitimate, so that with the

development of database technology, Internet technology and geographic information system technology, it can provide more feasibility for achieving the expected goals. The city itself is a comprehensive system composed of multiple functional elements, and the actual construction and development will be dominated by human factors. Therefore, it is necessary to use scientific urban planning to form a layout, only in this way can the material and energy of the urban system be guaranteed. After GIS has been widely used in the fields of resources and environment, people gradually realize that spatial information occupies a large proportion in the global information concentration. Because spatial data in different regions and industries have the characteristics of distribution, the independence and heterogeneity of spatial data management and application systems constitute spatial information islands on a global scale. The development of informatization requires GIS to have cross-platform, distributed data sharing and other operational capabilities. Nowadays, urban planning has achieved good development results, but the application and approval of construction projects mainly rely on manual completion, and in each stage of the approval period, a variety of graphic reference materials, data forms, etc., should be used. Therefore, it is necessary to establish an urban construction project planning and management information system, which can not only integrate and manage various materials, but also integrate and manage information. It can also ensure the information management to achieve the goal of office automation.

On the basis of understanding the current situation of urban planning and construction development, this paper mainly explores the architecture of urban planning management system with information technology and geographic information system as the core, and then starts from the long-term perspective of urban construction, defines the future development direction, in order to fully demonstrate the application value of urban planning management system.

2. Method

2.1 Architecture

From the technical point of view, the system is a networked distributed geographic information system, which needs to comply with or be compatible with network-related technical standards, including file data transfer protocol, network communication protocol and other content, mainly to achieve client and server data communication. Combined with the system structure diagram shown in Figure 1 below, it can be seen that there are a variety of technical methods used to realize the GIS architecture at present, among which the initial application is the gateway interface method CGI, and the server application program interface method such as ISAOI and NSAPI developed later. Nowadays, the more common methods are ActiveX, component object model COM, and so on.
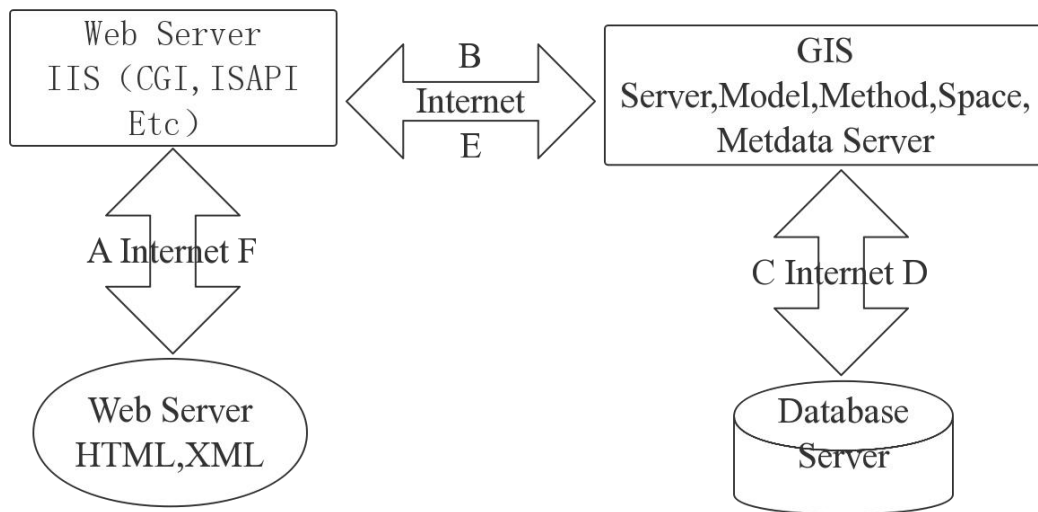
Figure 1 Schematic diagram of the system

Among them, CGI technology is mainly used to connect the network server and the application program, is the standard protocol when the server calls the API. When the system transfers the request to the network server, the server will first use CGI technology to forward the request to the GIS service program running in the background, the service program will generate the corresponding result to the server, the server will pass the request result to the client front end display. Universal network interface CGI is one of the earliest technologies to achieve dynamic pages, allowing users to complete interactive operations through the browser, and can return the corresponding operation results, the specific structure is shown in Figure 2 below:
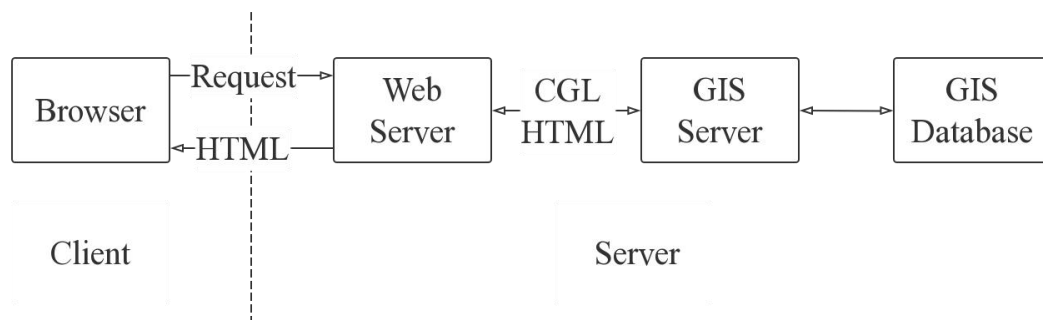

Figure 2 Architecture based on CGI technology

It is important to note that this technology also has application shortcomings. When processing client requests, a whole new service process needs to be started, and when multiple users make GIS requests at the same time, the server becomes overloaded and slows down.

Server API technology is very similar to CGI technology, after starting the dynamic link function module, it will always be in the running state, and it does not need to be re-switched like CGI technology, and the overall running speed is improved, but it needs to apply a specific server and computer platform. Nowadays, the more common platforms are divided into two types: NSAPI and ISAPI. Among them, NSAPI is proposed based on dynamic link library, which is mainly used to improve the running speed of service program and reduce the running load of service system. ISAPI is composed of ISAPI filter program using ISAPI application program, the former function module and status is similar to CGI technology, the latter is mainly used to expand the server function module, the specific architecture is shown in Figure 3 below:
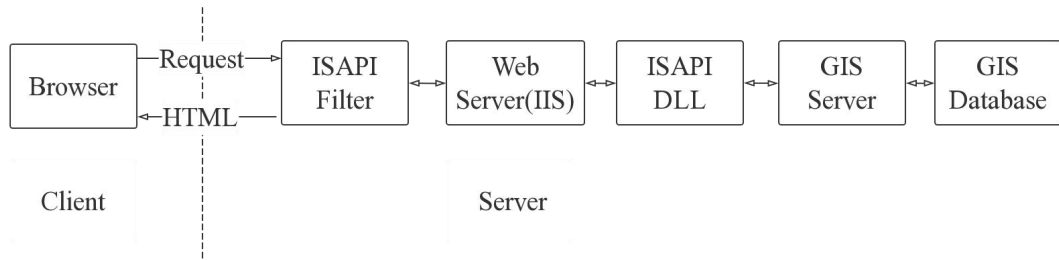
Figure 3 Architecture based on ISAPI technology

2.2 System Requirements

From the perspective of long-term development of urban construction, the main functions of urban and rural planning management system include user information management, map display editing, spatial analysis and decision support, query statistics, etc. Taking user information management as an example, setting different levels of data access rights for different users can fundamentally guarantee the security of urban planning management information data and fully reflect the basic responsibilities of staff in various departments. In this process, the management organization of the Urban Planning Bureau is shown in Figure 4 below:
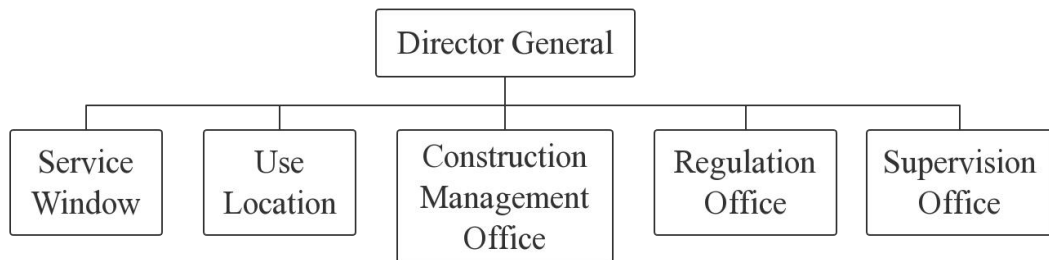

Figure 4. Management organization structure chart of Urban Planning Bureau

Spatial analysis decision support is an important basis for urban planning and management staff to provide scientific decision-making. Common functional requirements include construction land balance analysis and technical evaluation index requirements. In addition, it is necessary to comprehensively consider the parameters of urban planning and scientifically analyze the value changes during urban construction, so as to complete the tasks of urban planning and management.

2.3 System Design

When using CGI technology to build an urban planning management information system, it is necessary to ensure that the technical means are advanced and practical, that the war meets the needs of daily work, and that the staff can be skilled and effectively used. The goal of the overall system design is reflected in the following points: First, according to the unified data specification standard construction management; Secondly, according to the three-level model of ministries, provinces and cities, districts and counties, the planning management information system network is set up. Finally, according to the business process of planning the land Bureau, scientific design of

application functions, rapid processing of daily main business, real-time tracking and monitoring management in the overall business process.

From the perspective of practical application, urban planning management is a process of collective collaborative decision-making, which will review the applications submitted by land users in accordance with relevant laws and regulations and post responsibilities and authority during work. Therefore, system design should not only ensure the flexible configuration of work flow, but also form a scientific, standardized, flexible and efficient work mode through reorganization. Adapt to computer system operation requirements as soon as possible. In this study, the process of urban planning management system based on CGI technology is shown in Figure 5 below:
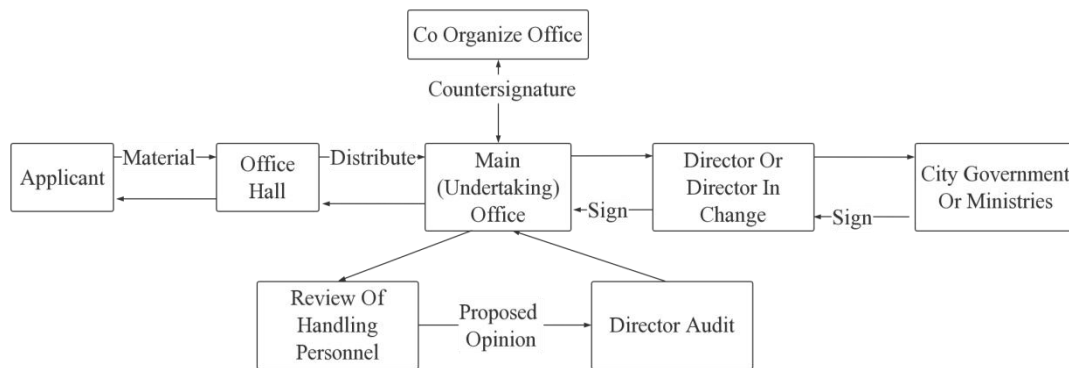

Figure 5 System flow chart

Nowadays, the system development design will choose the client/server and browser/server model. After comprehensively considering the design requirements of urban planning management information system, if only a single mode is selected, it will be difficult to guarantee the running speed of the system, which will increase the difficulty of data sharing and data release under the constraints of network, security and other factors. Therefore, the design of this paper effectively combines the two architectures, and finally forms the system architecture diagram as shown in Figure 6 below:
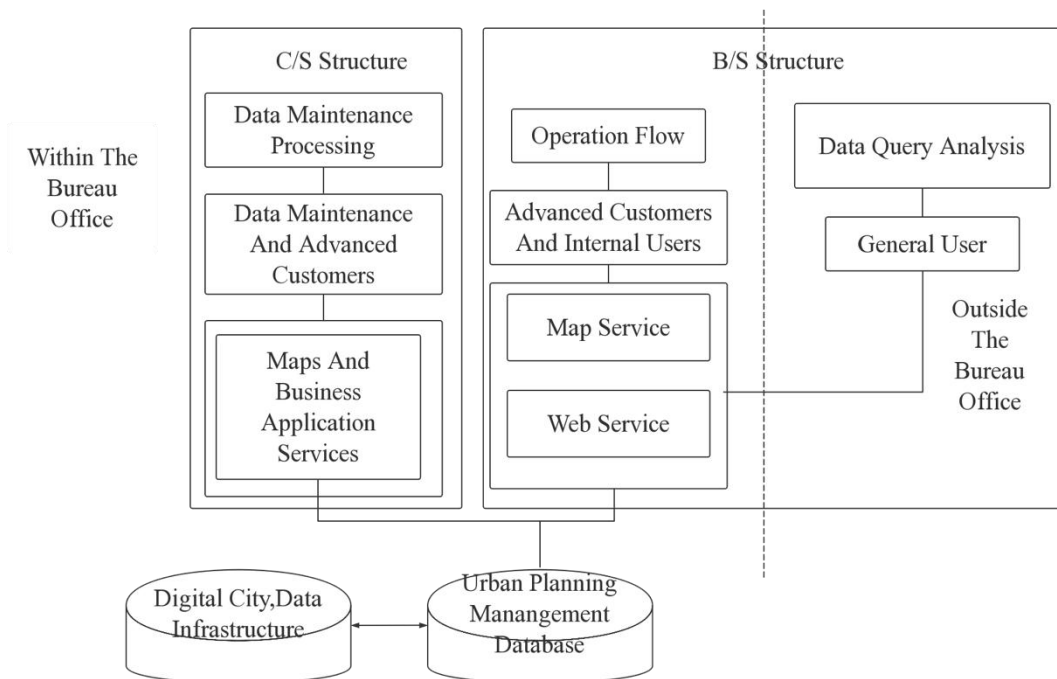
Figure 6 System architecture diagram

According to the analysis of the above figure, the system adopts the three-level management form for different users' application requirements, so that no matter advanced users or internal clients, they can complete graphic operation, measurement, data extraction, red line drawing and other business processing.

3. Result analysis

Based on the analysis of the urban planning management information system architecture obtained from the above research, it can be seen that it effectively integrates information technology, computer technology, office automation and CGI technology. During the construction and application, it solves the problem of low work efficiency during the office communication of traditional urban planning management departments, and basically meets the work requirements proposed by urban planning management departments. By deeply exploring the basic concepts of GIS and Internet technology, we can see that existing urban planning and management departments are facing a number of problems. By integrating various technologies to design new system architecture and functional modules, planning information management is basically scientific and automated, and users can easily complete data storage. By using visual methods to quickly query and output the required planning data, the daily planning and city management can be orderly completed after the operation of the system, which further improves the work efficiency of the planning and management department and truly realizes the expected goal of developing this system.

Although from the perspective of practical application, the urban and rural planning management system based on CGI technology has achieved excellent results, but the system architecture and application functions need to be improved and improved. Especially after entering the era of big data, some system functions should be gradually innovated in line with the needs of job development, which should not only solve the problems faced by the traditional system operation, but also comprehensively consider the business needs of future urban planning and management. Only in this way can we contribute to the construction of socialism with Chinese characteristics.

4. Peroration

To sum up, like the rapid development of computer technology and information technology, CGI technology has also experienced multiple stages of scientific research and innovation, and has gradually matured. In the study of the design scheme of the urban and rural planning management system based on CGI technology, it is found that some advanced functions of urban planning and management have not been realized. Therefore, in the future, researchers should continue to independently develop the prototype system and constantly improve the internal application functions, so as to improve the comprehensive level of urban planning and management.

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