VIRTUAL SPACE FOR COOPERATIVE DESIGN BASED ON ACTIVE SERVER PAGES

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Abstract. This paper describes the Virtual Space System, which is a system based on Internet to help cooperative design. ASP technology is used to build the system. The system is easy to use and has nothing to do with clients’ local computers. It is also manageable and has powerful ability of extension. All these features of the system make the cooperative design more reliable and efficient.

1. Background

With the development of Internet, architects begin to realize that Internet not only makes the cooperative design in long distance possible, but also greatly increases the efficiency in design. To exchange drawings and data with others, architects use email or FTP site. But the methods are difficult to manage and not efficient. Since Prof. W. J. Mitchell of MIT proposed the concept of “Virtual Design Studio” (VDS) in 1993, many VDS projects have been executed. Most of these VDS need extra applications on the computer and special knowledge about using it. These disadvantages limit the spreading of the VDS. Only small groups with support of special device and technology can use them.

Today, a building project is so complex that it needs the cooperation of many specialists (architects, construction engineers and lighting engineers, etc). Sometimes it needs cooperation of people from different cities or countries. With our experience, the key problem of the collaboration design is the organic management of shared work of various professionals. A visible and efficient method of communication is also important. In our CAAD Lab, we choose Active Server Pages (ASP), the server-side scripting technology, to build a dynamic and interactive web space to let architects share data, show their design and communicate with others.
2. Overview of the System

Based on the features of ASP, we developed the Virtual Space System on a Windows NT 4.0 Server and SQL 7 database to help cooperative design. Compared with other cooperate design system, Virtual Space System has many advantages. The interface in the users’ web browser is much similar to Windows Explorer. People who have basic experience in operation of web browser can master it in short time. Users who have different computers, operating system and software can cooperate with others.

2.1. STRUCTURE OF THE SYSTEM

Users of the Virtual Space System are organized by workgroups. Different workgroups have their own space. Users contact the Web Server through the homepages to submit their data and request. The ASP Applications process the data and request and return the results through Web Server. Also, the ASP applications record the data and information into the Database.

![Figure 1. Structure of the System](image)

2.2. MANAGEMENT OF THE MEMBERS AND FILES

Secure and organic data is important in cooperation. Members of a project have different authorities. Managers of a project can access all the data of the project and administrate common members, who can administrate their data and share the public data. Visitors can only view the public data but have no authority to modify it. Every data files and other information are recorded in the database of the Server. In case errors occur in operation, it will be easy for manager to correct them and there is no risk of losing data.
2.3. COMMUNICATION

Both synchronous and a-synchronous communicative functions are integrated in the system. Users can publish their works on the Web, discuss them with others. Every group has its own forum. People can comment others’ works and give his own suggestion. NetMeeting is embedded in the web pages to achieve synchronous communication. Users can call other people who are online and communicate them by kinds of means: typing, speaking, video and drawing.

![Figure 2. Interface of the system](image)

2.4. SERVER SIDE APPLICATIONS AND EXTENSION OF THE SYSTEM

A creative idea of the system is to peel off some professional work, which is difficult but useful in expressing one’s idea in the collaboration, from the design work. For example, VRML scenes are important to show one’s design on the web, but writing the VRML file is a time-consuming work. We develop Server-Side Applications to do the work automatically. When users upload their AutoCAD DWG files, which are mostly used by architects in digital design, and submit a request, the applications on the Server will process the conversion. With such functions, users can easily published their DWG file on the Web or even set up a 3-Dimension scene. The function greatly enhances
the interactive ability of the cooperative design. No longer bothered by such work, architects can concentrate on the design itself.

The system has strong ability of extensions. Once the system is upgraded on the Server, users’ work will not be interrupted and damaged. They can just enjoy the new system and need not upgrade their own computer. Like the function of conversion from DWG file to VRML file, other server-side applications on the Server can be developed incrementally in the future to enhance the system. Because these functions are also run on the Server, users can use them without buying special software.

3. Experimental Use of the System

In the summer semester 2000, we tested the system with the education of 3rd undergraduates. Students were divided into 3 groups to study Chinese historical architectures. Space, constructions and details are the 3 topics. The final work needs the cooperation of the several students. When students finish their phased drawings on their own computers, they transferred them to the Server. Teachers examined the works and gave them suggestion. At the same time, students could also discuss their design and improve their work. They published pictures, animations and VRML scenes on the website, which made their ideas easier to understand. They could also refer others’ work. For example, the students who studied the construction of the building could refer details made by other. During the summer semester, we fixed some bugs and improved the functions gradually.

Conclusions

The system was proved to make great benefit to the education in practice. Half of the assistances were reduced while the efficiency was much higher than before. From Fall 2000, students and teachers of School of Architecture in Tsinghua University have used the system in the education. With the help of the system, both the quality and the efficiency of the education are improved. We can safely conclude that the system not only increases the efficiency of school of architecture, but also conduces to small company based on Intranet and long-distance cooperative design from Internet.

References