

VIRTUAL COMMUNITY TRIALS PLATFORM

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ABSTRACT:

With the evolutions of technologies of computer, network, remote sensing and GIS, CyberCity researches are dramatically being improved, and CyberCity applications are becoming more and more important in our world. As the minimum unit for people's living in a city, community is a primary part of city management. Therefore, virtual community plays a key role in CyberCity. Virtual Community is not only the key node to combine families with the city, but also the indispensable part to construct digital nation in China. In this paper, the architecture and function structure of a proposed virtual community trials platform are presented. Three sub-systems like 3D real-time walkthrough, community services and community managements are included in this platform system. With a virtual community system, residents in a real community may login a specific virtual community via Internet with a computer (or a handheld device) at any site, and then may acquire some information about their real communities. They can order commodities via online E-Commerce, and even acquire some services like education, entertainment and health care, or online work. On the other hand, managers and service providers can provide knight service and manage efficiently with the virtual community system.

1. INTRODUCTION

With the evolutions of technologies of computer, network, remote sensing and GIS, CyberCity researches are dramatically being improved, and CyberCity applications are becoming an important part in our world.

As the minimum unit for people's living in a city in China, community is a primary part of urban management. Therefore, virtual community plays a key role in CyberCity.

Virtual community is a community where managers and services providers are related with residents in a real community via information technologies. The advance of the modern Web browser and various applications of network multimedia technologies make virtual community rich and colorful.

Virtual Community is not only the key node to link families with the city, but also the indispensable part to construct digital nation in China. Via the construction of broadband-based multimedia

communication network, virtual community can form a synthetic information service platform. It may provide people with government services, community services, housekeeping services, personal services and electronic commerce.

Along with the rapid development of the technology for high-speed broadband network, technologies of virtual reality and 3D visualization are playing more and more important roles in virtual community applications.

In this paper, the design for a proposed Web3D based virtual community trials platform will be presented. Especially, the system architecture and function structure of the proposed virtual community trials platform will be addressed.

2. SYSTEM OBJECTIVE

The objective of the virtual community trials platform is to develop a Web3D based software platform for community services, community management and 3D visualization.

We can carry through real-time dynamical walkthrough in the 3D community scene, and accomplish community services and community management based on the 3D scene and 2D maps in virtual communities constructed with this software platform.

3. SYSTEM ARCHITECTURE

Distributed 3-tier architecture based on Internet is applied in the virtual community trials platform. It includes browser tier, Web server tier and application server tier. Figure 1 gives an overview of the system architecture of the virtual community trials platform.

- (1) Client-side is a general HTML browser (for example Microsoft Internet Explorer or Netscape Explorer) extended with Java applet, Java 3D, and VRML to support 2D and 3D graphics rendering and community function applications.
- (2) Web server-side utilizes operating system Windows NT4.0 and Service Pack3, and Web server software (such as Microsoft Internet Information Server, CGI, ASP and ISAPI).
- (3) As the core of the system, application server-side is the bottom of the system architecture. We use SQL server as the DBMS of the system on application server-side. The application server-side is of very importance in the system. It takes charge of data storage, organization, management and computation, the implementation of primary functions of the system, and coordinating with DBMS and various server components.

Application server-side is developed with Java applications. It access Oracle database via JDBC.

Three-dimensional rendering is enabled using the Java Plug-in and the Java 3D API on client-side.

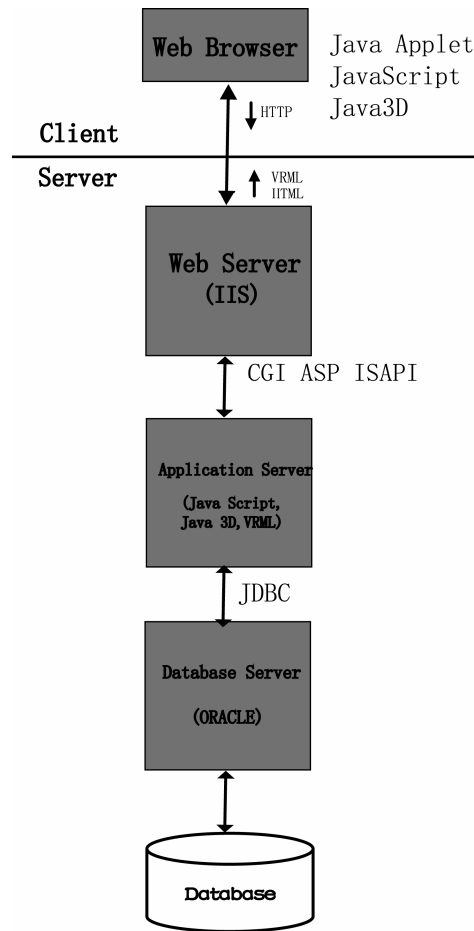


Figure 1. System architecture of the virtual community trials platform

4. COMMUNITY 3D MODELLING

A virtual community model may include architectural structures, indoor detail objects (furniture, electrical appliances, and cables, etc.), and outdoor public devices (telegraph pole, trees, sculptures, roads, etc).

3D reconstruction of a Community scene can be accomplished using 3D Studio MAX or Multigen. Based on the large-scale community map, the pipeline layout map, and the plans of primary buildings, we can construct a community 3D model and export it into VRML file format, and realize Web3D-based visualization via Java3D API.

5. SYSTEM FUNCTIONALITY

The virtual community trials platform consists of community 3D walkthrough system, community services system and community management system, as illustrated in figure 2.

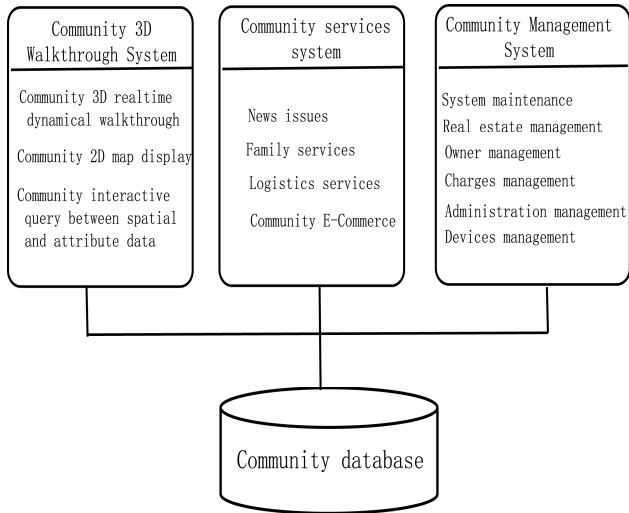
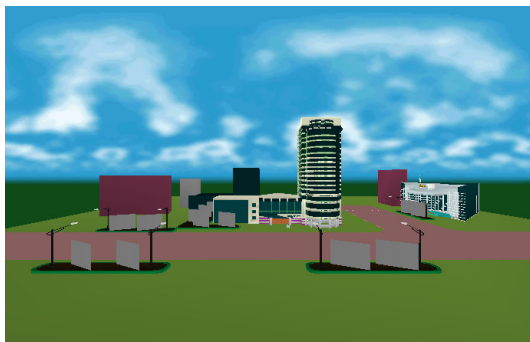


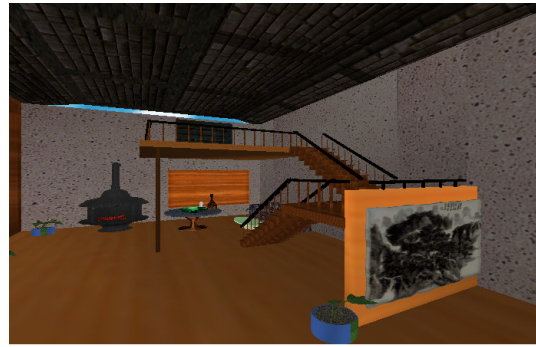
Figure 2. Function structure of the virtual community trials platform

5.1 Community 3D Walkthrough System

Interactive dynamical real-time walkthrough in a virtual community is realized in the community 3D walkthrough system. A user can move forward or backward, turn left or right, even move into a building and step upstairs. We can record key walkthrough position nodes to generate a walkthrough path, or playback the 3D animation with a walkthrough path. Figure 3 shows a community outdoor and indoor 3D scene. Meanwhile, in the community 3D walkthrough system, we can implement some functions like interactive query between a 3D graphics object and its attribute data, as well as analysis and computation.



(a)



(b)

Figure 3. (a) Community 3D outdoor scene (b) Community 3D indoor scene

5.2 Community Services System

The Community services system includes some functions like news issues, family services, logistics services, and community electronic commerce. Especially, community electronic commerce combined with community 3D scene can provide online commodity sales and goods delivering services based on 3D environment. For example, community residents can order commodities via community electronic commerce system, and community shops can deliver goods via the residence situation found from the 3D scene.

5.3 Community Management System

The community management system includes some functions like system maintenance, real estate management, owner management, charges management, administration management, devices management, and virescence management. We can interactively query residential information via doorplate number in the community management system combined with 3D scene.

6. CONCLUSIONS AND FUTURE WORK

In this paper, we presented the design for system architecture, function structure of a proposed virtual community trials platform. It adopts 3-tier architecture with the characteristics of scalability and security. It can implement visualization, community services and community management based on Web3D techniques.

Future work includes the development of the virtual community trials platform and the construction of a virtual community.

With the proposed virtual community system, we can imagine that the residents in a real community may login a specific virtual community via Internet with a computer (or a handheld device) at any site, and then may acquire some information about their real communities. They can order commodities via online E-Commerce, and even acquire some services like education, entertainment and health care, or online work. On the other hand, managers and service providers can provide knight service and manage efficiently with the virtual community system.

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