with a greater number of measured points the result tends to approximate LSC from MZC methods.

5. References


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A new approach for multiuser access library full-text image cd-rom database via campus network

Abstract

This paper proposes a approach to solve this problem. A case study is presented that describes the practical design and implementation of an microcomputer system and novell server that allows multiuser access library CD-ROM jukebox database via campus network. The method use microcomputer via standard network interfaces like Ethernet, high speed fiber networks, and standard protocols TCP/IP and IP-tunnel until login novell server. Its advantages are that it reduces waiting time, improve access speed, reduces the damage incurred by handing jukebox CD-ROM devices in and out, and novell sever with network secure access control to allow many users to retrieving the jukebox CD-ROM from microcomputers. Keywords: Distributed network, CDROM jukebox. Campus network. Microcomputer.

1. Introduction

Library automation is a goal for many libraries, the utilization of CDROM in the library and information science area goes back to 1985, when Bibiofile was announced by the library corporation. CDROM provides enormous storage of about 600MB, retrieval capacities, and reasonable price. It has been gradually replacing some of its printed counterparts. Most of European and American universities have used CDROM databases since 1987. A survey of libraries in Taiwan has shown that currently 86% of academic libraries have CDROMs in their library collection [1].

In fact, one of the greatest limitations is on the use of library stand-alone CDROM database at a time [2], we have solved it. But now we have a large amounts of image CDROMs such as 1ЕЕЕDEE publication ondisc (IPO), Business publication ondisc (BPO), General publication ondisc (GPO). How to network it. As we know, CDROM jukebox can solve it. Campus network can offer other benefits, such as facilitating searching of databases containing more than one disk[3]. For examples, Dartmouth College Library has developed system that uses modem login to file server access an on-
line database via a campus-wide network of Macintoshes, Microcomputers and Mainframe computers. The access network CDROM database has restricted the library's involvement in CDROM and the latter has been effectively leapfrogged in favour of the network [4]. Miami University libraries have an Ethemet local area network to provide multi-user access to multiple CDROM database through selected workstations in the libraries. Dial-up access will be available to users outside the libraries [5]. Multiplier is a CDROM local area network that allows multiple users to access the same CDROM disc simultaneously. The first test site was Boston College. Computer network offer several advantages over single-processor system, it provides resource sharing, increased reliability, distributing the workload and expandability. So it is important to develop a library CDROM campus networking system and to use standard network protocol (Ethemet, FDDI and TCP/IP ) to implementation a practical system to share CDROM resources.

In this paper, we proposes a method that allows endusers to use microcomputers to access a library full-text image CDROM jukebox database, use remote login NOVELL file server through computer network. In section 2, we introduce the types of library CDROM jukebox networking. In section 3, we show how to provide network access the library CDROM jukebox database from the campus network. In section 4, we practical design a library CDROM campus networking system for use at National Chiao-Tung University in Taiwan. In section 5, performance evaluation and discussions. In the last section, we make a short conclusions.

2. The types of library CDROM jukebox networking

Fig. 1 shows a library CDROM campus network environment.

![Diagram](image)

Fig.1 Using FDDI as backbone to connect ethernet LANs.

The building inside use ethemet and between building use FDDI to communicate with each other. The following shows some kinds of communication modules [12].

2.1. Personal computer connect to file server.

PCs in the client part run ipx software. The file server part runs on a Pentium PC and connect the CD server. This kind type is suitable only for a LAN inside the library.

2.2. Personal computer connect to local area network.

This is the most usual solution for campus networks. It is shown in Figure 2. It is common because most libraries already have CDROM connected to a LAN. A LAN usually needs one file server, which is dedicated to nothing but running the CD-
connection software. The LAN will let you connect more CD drivers, and each user can access all of them. Fig. 2 shows how DOS-clients can use LAN-workplace for DOS, IPX, TCP/IP and tunnel software through routes, to remote server and release IPX to CDROM file server. This is our design model for a library jukebox CDROM campus networking system.

2.3. Local area network to local area network.

The advantage is that a large network has several file servers using TCP/IP protocol to communicate with each other. So in a network environment with router, each LAN's file server has a running program, and a database is stored in each LAN.

3. Access the library CDROM jukebox from the campus network.

Theoretically, if the LAN file server is connected to the ethernet and defined as a node on the network, any remote PC with an ethernet card running TCP/IP should be able to access it directly from the campus network. The LAN software will provide access to CDROM jukebox. It performs a logical mount and will only do this for a "computer" not a "terminal". If its running MSCDEX.EXE plus CD networking software, it can provide access to an optical drive just as it does to a magnetic drive. The following are some options [13].

3.1. Personal computer access library CDROM jukebox via local area network in library.

This is the most usual solution inside of a library. A PC use ipx software connected to NOVELL file server. So many users can attach the CDROM jukebox, but only one user can access it simultaneously. It is suited for local area networks inside a single building.

3.2. CDROM drives on SUN/UNIX running NFS.

NFS is a public-domain networking software system. It has two parts: the server-part, which manages the CDROM jukebox, and the client-part, which try to access the CDROM jukebox from the campus network. Any PC connected to the network and running the client version of NFS can access the CDROM jukebox, which are connected to SUN/UNIX running the server part of NFS.

4. Practical Design Structure.

4.1. Hardware implementation.

We applied DOS-client to NOVELL file server as in Figure 2.
The users must have a personal computer with ethernet card and a LAN work-place for DOS software. Mounted software maps any networked CDROM jukebox to logical drive on the modulation with minimum memory usage. The users can access to one or more CDROM jukeboxes from campus network Simultaneous, multi-user access to CDROM jukebox connected to the NOVELL file server. In-house archiving of documents and spoolout data.

4.2. Software implementation

Access principle is the endorser's personal computer runs LAN workplace for DOS Ip-tunnel software through the campus network router into the library NOVELL file-server. A CDROM jukebox retrieval program is running through RS-232 to call the robot-arm to pick up the CDROM into jukebox driver, then the retrieving program copy the needed image files through the NOVELL file server into enduser personal computer hardisk.

The steps of the network running program is giving below:

Step 1: Load LAN work-place for DOS.
Step 2: Set parameters of Ethernet card and link driver.
Step 3: Load TCP/IP protocol.
Step 4: Load IP-tunnel protocol.
Step 5: Load IPXODI software.
Step 6: Execute NETX attach to server.
Step 7: Login file server and call CDROM running program.

The algorithm for the CDROM jukebox access program.

Step 1 Open CONFIG.JUK file and initialize all the configuration for the jukebox. If failed then go to step 8.
Step 2 Open CONTENTS.JUK file and initialize all the contents of the jukebox. If failed go to step 8.
Step 3 Check REQUEST.JUK and ACCOUNT.JUK files and open it.
Step 4 Get user requests, and write the requests into REQUEST.JUK file and make reservation for next user.
Step 5 Clear the reservation of the current user, load disk and check disk for the current user.

If error, then report error, and go to step 8.
Step 6. Copy requested article for the current user.
Step 7. Take next user as current user. Then go to step 4.
Step 8. Exit.

5. Performance Analysis and Discussion

To analyze the performance of a CDROM campus networking system, we assume that the FDDI backbone's circumference is equal to the maximum distance, i.e., 200km. The FDDI backbone runs at 100bps and each of its Ethernet-like local area networks runs at 10 Mbps. The ordinary delay for one FDDI station is 600ns and the total delay for the 200 km long ring cable is 1.017 ms [10]. Theoretical analysis calls on each Ethernet-like LAN concurrently, but each Ethernet-like LAN has also a capacity limit on the number of remote PCs. By reducing this limit from 281 to 140, we can increase the maximum number of FDDI routers from 10 to 21 [11].

From the above data, the campus network can support 100 users accessing the library CDROM jukebox database but only one user can access CDROM simultaneously, though it a single user CDROM jukebox, but access time average only 30 seconds for one user. From convent views, CDROM jukebox is popular for all of users Because the dedicated server is needed to overcome the slow access time of the CDROM drive and to allow multiple users is trying to access the same CDROM without appreciable delay, large cache memory capability is available through the CDROM server, which reduces physical CDROM access and boosts access speed for remote users. Data can be read from all drives simultaneously, which dramatically increases performance during heavy usage. To improve retrieval time performance, CDROM disk caches are frequently used. Disk caching lowers overall retrieval time by transferring information from RAM instead of from CDROM.

When we compare the performance of a non-network workstation to the performance of a twenty-concurrent-users CDROM system, the worst case lag time for full screen VGA graphs was approximately double for CDROM system. In addition, through library CDROM campus network can increase retrieval speeds by running multiple copies of the same CDROM in different research rooms. This system offers high performance that allows multiple users to share a CDROM database.

6. Conclusion

Ethernet and FDDI are a high performance and high bandwidth network system that can be used as the backbone of campus network. In this paper we design an Ethernet-Routher-FDDI for CD-ROM campus network system which can allow faculty and graduate students to access library CDROM database from their room. Theoretical analysis modules and practical design structure for a campus network are proposed for the system. From analysis, we know that our scheme is secure not only for the computer system but also for the users. The results and contributions of our library full image CD-ROM campus networking system are as follows:

It offers a practical high performance way to provide multi-user access the full text image CDROM data.
Campus network compatibility with most CDROM products.
It allows access to multiple copies of the same CDROM for increased performance.

For further study, we may connect a group of universities using modems to build a wide area campus networking system that provides to share library CD-ROM resources.
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Hojjat Adeli
Large-scale computer-aided design

Abstract

The author and his associates have been working on creating novel design theories and computational models with two broad objectives: automation and optimization. This paper is a summary of the author’s Keynote Lecture based on the research done by the author and his associates recently. Novel neurocomputing algorithms are presented for large-scale computer-aided design and optimization. This research demonstrates how a new level is achieved in design automation through the ingenious use and integration of a novel computational paradigm, mathematical optimization, and new high performance computer architecture.

Most of the neural networks research has been done in the area of machine learning [1]. Neural network computing can also be used for design optimization. Adeli and Park [2] present a neural dynamics model for optimal design of structures by integrating penalty function method, Lyapunov stability theorem, Kuhn-Tucker conditions, and the neural dynamics concept. A pseudo-objective function in the form of a Lyapunov energy functional is defined using the exterior penalty function method. The Lyapunov stability theorem guarantees that solutions of the corresponding dynamic system (trajectories) for