How To Design A Network Essay, Research Paper

I. STATEMENT & BACKGROUND

The college of Business (COB) server is now being used to support deliver to the

Computer Information System (CIS) department. The CIS professors would be using the server

for various operations. Assignments, e-mail, and other types of information would be easier for

the students to access. Network users are able to share files, printers and other resources; send

electronic messages and run programs on other computers. However, certain important issues

need to be addressed and concentrated on. In order to begin the process of setting up the COB

server, the total numbers of users (faculty and students) must be determined. Some other

significant factors to be approached are: the required software applications needed on the

network, an efficient and appropriate directory structure and effective security structure. In

designing the directory structure, the major focus must be on accessibility. The number of

undergraduate CIS courses that the server will be used for is be!

tween 15 and 17. For the users to be ensured that their information is not at risk, we will create

an effective security structure. In composing the appropriate security structure there must be

certain access rights assigned to the users. An important technical detail in setting up a server is

the amount of money that will need to be allocated for the restructuring of the system. For the

system to function properly, the amount of hardware/ software will need to be determined.

II. FUNCTIONAL REQUIREMENTS

The COB server will primarily be used by CIS professors and CIS students. The

approximate number of professors in the CIS department is between five and seven and the

approximate number of CIS majors is between 100 and 120. As computer technology continues

to grow, the number of CIS majors is vastly increasing. If we see a considerable rise in

Computer Information Systems majors the department will have to expand its faculty members.

The CIS professors will be using the server to disburse their syllabi, distribute specific

assignments and send e-mail to their students. The layout, design and complexity of each class

will determine how much the professor may be using the server.

The first class a CIS major usually takes at Western is CIS 251. Management Information

Systems (CIS 251). This class offers students a basis for management information systems in

business organizations. In putting the COB server to use and getting the student ready for

hands-on knowledge of computer-based information systems, CIS 251 focuses on analysis,

development, design, implementation, and evaluation. Other tasks that are covered in this class

are computer applications ins spreadsheets, word processors, and database systems.

Information systems affect both business people and people who live in society.

The first programming class CIS majors take is CIS 256. This CIS course will be very

beneficial for the server. Business Computer Programming (CIS 256) introduces the student to

an application of programming principle in business. Detailed assignments involve flowcharting,

coding, documentation, and testing. This course provides the student with a background of

computer architecture and data representation. This class account will require the BASIC

programming language that will be used as well as the compiler.

The CIS elective, CIS 301, emphasizes maximum “hands-on” experience with

microcomputers and software packages, including word processing, spreadsheets, database

managers, and graphic systems. Microcomputer Applications (CIS 301), is an important course

for students not majoring in Computer Information Systems, but would like to familiarize

themselves with the personal computer. This account will contain Microsoft Office and e-mail

capabilities.

An important class that becomes useful for the server is the CIS 358 course. The professor

can send applications, reports, programs and other data to the server where the student can

transfer to a disk or their VAX account. Applications Development II (CIS 358) is a study of

the state of art tools and techniques for developing complex business applications; data

organization, on-line processing, software engineering, and software maintenance. This CIS class

is an extension to CIS 258. The student will expand his/her knowledge of the COBOL

programming language. In order for the CIS major to apply principle of good application design

and solving problems, the Visual Basic programming language will also be introduced. The

account for these two classes will contain the COBOL programming language and the compiler

for it as well as Visual Basic.

For the students to learn more about client-server technology, CIS 365 is required to the

Computer Information Systems curriculum. The student will be involved in learning about

different types of client-server environment such as configuring Worldwide Web environment and

building a Netware LAN to support delivery client-server computing. Computer Architecture,

Communications, and Operating Systems (CIS 365) focuses on the architecture of modern

computer systems including peripherals; data communications networking with fault tolerant

computing; language transition; operating systems software/hardware and utilities. This account

will have internet connections and Netware operations.

In studying Database Management Systems (CIS 453), the CIS student will learn the role

of databases, database applications, data modeling using entity-relationship and semantic object

models. The significance of the COB server for CIS 453 is that the student will focus on

multi-user database processing on LANs with the emphasis on client-server systems. In this

database class, students will also be required to design and implement a database using the

current technology. This account will require Microsoft Access and Salsa.

To familiarize the CIS major with systems development, CIS 455 is required by the

curriculum. This class introduces the student with cost/benefit justification; software design;

implementation and maintenance procedures; quality assurance; and integration of information

systems into management decision-making processes. Computer Information Systems Analysis

and Design (CIS 455) will require that a student design an appropriate computer system for a

specific company or business. The account for this class will contain Microsoft Office and will

have internet connections.

The last class that is required for in the CIS core is CIS 465. In this course, the focal point

is to strategically use information systems in the business environment. Information Resource

Management (CIS 465) centers on responsibility and accountability of information resource

managers; security, legal, and ethical issues; procurement and supervision of resources and

resource assessment. This class will have Visual/IFPS Plus as well as Internet capabilitites.

III. Technical Design

Local area networks (LANs) could be thought of as pockets of coordinated computing

within a small geographic area. The network has three layers of components: Application

software, network software, and network hardware. Application software that will be used will

consists of computer programs that interface with network users and permit the sharing of

information, such as files, graphics, and video, and resources, such as printers and disks. The

type of application software that will be used is called client-server. Client computers send

requests for information or requests to use resources to other computers, called servers, that

control data and applications. The network software to be used will consists of computer

programs that establish protocols, or rules, for computers to talk to one another. These

protocols are carried out by sending and receiving formatted instructions of data called packets.

Protocols make logical connections between network applications, d!

irect movement through the physical network, and minimize the possibility of collisions between

packets sent at the same time. Network hardware is made up of the physical components that

connect computers. Two important components that will carry the computer’s signals will be

wires or fiber-optic cables, and the network adapter, which will access the physical media that

links the computers, receives packets from the network software, and transmits instructions and

requests to other computers. Transmitted information is in the form of binary digits, or bits which

the electronic circuitry can process.

The new local area network (LAN) that we are proposing to design will only be a one volume

server. The directory structure for this server will go as follows: There will be a system directory

where the queue holds and services the print jobs prior to being printed. A login will be

established to activate and open a session to the Network Operating System for a user. The

DOS applications available to the public will be Word Perfect, Excel, Power Point, and Lotus

1-2-3. A mail directory will be created for users to be able to send e-mail and also retrieve it.

The users of this directory structure will be focused around the faculty which will be Heinrichs,

Perry, Banerjee, Clapper, and Carland. The faculty will have the rights to the classes that are

taught here at Western Carolina University. These classes will also be used by the students of the

Computer Information Systems program. The applications that will be used by the students and

faculty of CIS will be Salsa, CO!

BOL, Visual Basic, Database applications, Basic, and Visual/IFPS Plus. In these courses faculty

can assign programs or assignments to the students and all they have to do is go to the

appropriate class that they are in and get the homework that is do for that certain class.

The medium used to transmit information will limit the speed of the network, the effective distance

between computer, and the network topology. The coaxial cable will provide transmission

speeds of a few thousand bits per second for long distances and about one-hundred million bits

per second (Mbps) for shorter distances.

The type of topology that will be used to arrange computers in this network will be the bus

topology. The bus topology is composed of a single link connected to many computers. All

computers on this common connection receive all signals transmitted by any attached computer.

Local area networks which connect separated by short distances, such as in an office or a

university campus, commonly use a bus topology. Twisted pair, for slow speed LANs, will be

the cabling of these computers. Here, the main cable is typically a shielded twisted pair (like

phone lines). The board is attached to a TAP via three cables then the tap is connected to the

twisted pair again at three points. An active hub will connect up to eight PCs and workstations.

Each PC or work station can be up from two thousand feet from the active hub. Each port of the

active hub will be electrically isolated and will not need terminators for unused ports.

Typically a LAN has a server node to provide certain services to the LAN users. In this case of

a small scale PC LAN, the server is attached to a laser printer, so that all users can share that

printer through the server. Another use of the server is that if the LAN users need to get some

updated files. Instead of copying to all the nodes each of them can copy / share from the server,

where only once those files can be loaded or updated.

The Network security structure would not be a very complicated. The Supervisor would be

granted full access to all the resources in the CIS program. Students who are a CIS major will

have read, copy and write capabilities for the classes they will attend. The Public accounts will

only have the right to be able to access the rights to Word Perfect, Excel, Power Point, etc. The

Faculty will also have rights to the classes with read, copy, write and send.

Networks are subject to hacking, or illegal access, so shared files and resources must be

protected. A network intruder could easedrop on packets being sent across network or send

fictitious messages. For important information, data encryption (scrambling data using

mathematical equations) renders captured packets unreadable to an intruder. This server will use

an authentication scheme to ensure that a request to read or write files or to use resources is from

a legitimate client (faculty or CIS majors) and not from an intruder. The system will have a

security measure of telling whether or not the user is a CIS major or not by given each CIS major

and faculty a code or password.. The CIS majors will be given a code in which they will have to

enter in every time he or she gets to the computer and wants information from a CIS class. Every

time the student enters in the code the computer will keep it in memory so if the same password

is entered somewhere else the person wil!

l not be allowed in. This station restricitions will keep students from going in and messing around

with the students information while that CIS student is working. There will be disk restrictions to

assure that storage space is evenly allocated. The CIS users will also have to change the

password every now and then to keep confidentiality of his or her passwords. This will put an

account to have an expiration date to it so that the user will have to change his or her password

as the semester goes on to insure the security of their account.

Under no circumstance should an administrator put an entire system at risk for the

convenience of a few users. Certain measures and precautions should be implemented to ensure

that the network will operate effectively and effeciently.

Another major concern when designing a system is to anticipate the addition of more

workstations and eventually more users. By considering this now many problems can be solved

even before they exist. If there is room allotted for expansion in the beginning, then actually

implementing the new ideas and hardware should be simple. Assumptions about how large

the system will actually get and how many users it will accomadate are very serious issues that

need to be addressed in the utmost fashion. These questions require serious answers that if not

dealt with could destroy a system.

Another key issue that needs to be addressed is who will be issued an account on the system.

Certainly each CIS faculty member will have his or her own personal account. In these accounts

some items such as personal research materials and grades will reside. Then there is the matter of

the individual CIS classes and individual CIS students. Logically each class will have a separate

account because the information in each account will be different (applications etc.). The main

point of concern is the applications involved with each class. Using Visual Basic and Visual/IFPS

Plus, having a COBOL compiler to run your programs on and so on.

CIS students will have their own personal account. A space will reserved for them to

execute e-mail and other personal things. They will need to have a good understanding of the

network to be able change their

directory to the class that they need to locate and do their work in. Each faculty member will

have their own account as well. They will be able to send e-mail to students and also put

homework in the accounts of the classes that they teach. Other faculty members will not have

access to the server. As stated before the main purpose of the server is to deliver CIS

information only and for the CIS discipline only.

The main points of concern when dealing with the printer configuration are reliability and

accessibility. Reliability is centered around quality and effeciency. Top quality network printers

are expensive but sometimes are not the best choice. Speed of output, such as papers per

minute, play a big role in choosing a network printer. Printers that are easy to get to and easy to

service are a key to a successful network. I personally can not stand to walk into a lab and have

to hunt where the printers are and have to wait for someone to remove a jammed paper. The lab

on the second floor of the Belk building is a good example. An excellent example of a good

configuration is in Forsyth. The printers are easily seen and easily worked on. The printers

separate the two main islands of workstations which allow for effecient management.

This system will be of considerable size and area. It will require constant monitoring and any

on-line maintenance will be in the form of a supervisor or network administrator. This designated

person or person’s will need to be very knowledgable in all the system’s hardware and software.

For example CAN certified would be an excellent standard for consideration. The person or

person’s would have to be a full time faculty member in the College of Business. I feel that having

a daily interaction with the system and the users would prove to be very helpful in comparison to

having someone called in to diagnose and solve the problems. Outside consultants are usually

expensive and are most of the time are not worth it.

The load placed upon the system will vary at times. Classes are going to have a conflict in

assignment due dates and everyone is going to rush to the lab to finish their assignments.

However I think that most of the time there will be a slight to moderate load placed on the

system. Most students bounce in to check their mail or to send a quick message anyway. Sitting

down and writing a program in one session is impossible any, so that will reduce the load in itself.

Login scripts for each user need to be simple. Allowing students to write their own should

not even be considered. Each student should have the same format and be placed at the same

starting point each time that they login. Alloting a specific number of search drives and network

drivers would definitly reduce problems. Students should be required to change their passwords

periodically. The system login scripts could execute certain commands for each different users,

faculty and students. These are just a few areas within the entire Technical Design process that

require a serious answer.

Directory Structure