

## FBLA NETWORK DESIGN CASE STUDY

### Background

Oosterhauven Bakery has three bakeries in a large city. They currently maintain a good business selling specialty cakes and other bakery items throughout the city. They would like to expand their business to reach out to corporate clients and add catering to their offerings.

The main office is in downtown Houston at one of the bakery locations.

### Current Network Configuration

Oosterhauven Bakery currently has an old IBM mainframe at the main office in Houston. They have dumb terminals set up for POS, inventory, and accounting at each of the other two sites. All of the sites are connected using Frame Relay.

Applications:

- Proprietary bakery management software that is available on a variety of platforms.
- An accounting program called InterAcct. This program too is available on a variety of platforms.

The company would like to expand the network and

- replace the mainframe with more versatile workstations and servers.
- move to an operating system that will support most common products.
- purchase a cake-decorating machine that takes photographs and reproduces them onto a cake. This machine requires a computer running Windows 98 or 2000.
- set up a web presence where customers can order cakes and other bakery items for delivery within the city. In addition they want to be able to give real time catering quotes, and communicate with customers through the Internet.
- upgrade their current software packages, but keep the same vendors as they do not want to have to re-enter the information maintained in these packages.
- set up one database server to keep track of inventory, catering jobs, client information, and recipes needed by all three sites. This server will be maintained at the company headquarters.
- all sites have Internet connectivity.

Restrictions

- They like their current software packages and want to maintain them, although they understand that some of the information will need to be moved to the database server.
- Because the database server is a mission critical piece of equipment, they understand the need for redundancy and fault tolerance. However, they cannot afford a database cluster at this time.
- Their current setup uses coaxial cabling.

Your interview with the members of the company reveals the following information:

### CEO

- Oosterhauven Bakery was started by my great great grandfather when Houston was just a hole in the wall town. Our quality has always been top notch, and our customers feel like they are stepping back in time when they enter our shops. I want to bring Oosterhauven's into the new millennium, but it is imperative that we do not lose that old time charm. Therefore, while we will use computers at POS, we do not want them to be a strong presence in the front of the store.
- Currently we do not offer catering, but I have hired a catering consultant to help us set up that part of the business. She will help hire someone who has both catering know how and computer experience to be our front person on the Internet catering segment of operations.

- Each site should maintain its own network, but WAN connectivity is desired.
- Employees will need to be trained in how to use this new system. Would you be able to provide this training?
- Because our recipes are top secret, we must have security at all sites.
- Right now we only back up once a month. We need a backup system that is easy to maintain, but reliable.
- We would like at least 10-15 client workstations at each site, with more at headquarters.

### **Accounting Department**

- All these pie in the sky ideas have us concerned. We would like to keep costs low. We have researched some of the costs and find that costs can be cut in some areas without compromising quality. The areas we believe are reasonable are listed below. You're the expert, though.
  - Leasing WAN connectivity through the telephone network.
  - The cost of IP address leasing can get pretty pricey with as many workstations as we want to put in. Is there a reasonable alternative that will work?
  - Can we get cheaper cabling and still go as fast as we need to?
  - We'd like to see price comparisons on hardware before purchases will be okayed.

### **Clarissa Moon, Catering Consultant**

- There are a few legal issues you should familiarize yourself with before continuing. I will leave those documents with you.
- Timeliness is as important as quality in the catering business. If customers cannot reach you, or you cannot reach them you will lose business. "Better late than never" is not acceptable. You must be available, prompt, and forthcoming.
- There are many many catering companies in Houston, so if you're going to set this up it has to be good. I suggest you do some research into what their websites are offering and go beyond that.

### **Employees**

- We haven't really received any computer training except on the software used to take and fulfill orders.
- Our current set up seems to have bugs. It is up most of the time, but it runs slow requiring customers to wait. We worry when we have more computers and more employees using our system.
- We are reluctant to try this new system. What's wrong with the way things have always been done? What happens if the "network goes down." We don't know what that means, but we've heard it enough to be concerned.

## **PROBLEM**

### **Your proposed solution should include**

- upgrade current network for speed and reliability.
- address all needs of Oosterhauven Bakery.
- address the needs of customers by ensuring that the upgrade results in little or no downtime.
- update hardware and software.
- provide a reasonable security scheme to include
  - secure data by limiting access
  - secure the internetworks from external networks
  - secure hardware and data from loss
- address the issues posed by the CEO, the employees, Accounting, and Ms. Moon.
- diagram the proposed upgrade including all hardware, cabling, and networking hardware.

### **FBLA Network Design Judge Solution 2002**

Proposed solution should include:

- Update the current hardware, getting rid of the mainframe. Updating software to Windows 2000 for security, reliability, and compatibility. (May also say XP.)
- Updating hardware to support Windows 2000 on all clients and the server:
  - 128 MB RAM
  - Larger hard drives on at least the servers (larger drives may not be necessary on the workstations)
  - Update network cards to 10/100 cards that support category 5 unshielded twisted pair (UTP) cabling.
- Update the current software they are using to work with Windows. Stay with the same vendors as they provide software on a variety of platforms.
- Purchase servers at each location:
  - One server for each outlying location.
  - Three servers for the headquarters location.
    - One server for authentication of users and to provide network connectivity.
    - Two servers as SQL database servers. The two servers will provide redundancy needed to maintain maximum uptime of the database.
- Get rid of the Frame Relay and least Internet connectivity from the telephone company with bandwidth high enough to meet their growing needs. (At least 1.5 Mbps connection. The solution may suggest a fractional T-1 or high speed ADSL. Those would both be reasonable.)
- Replace existing coaxial cabling with Category 5 UTP cabling to increase speed and reliability.
- Implement security by setting up one server at each site to be a domain controller for authenticating users and computers. Require usernames and passwords for all users on the network.
- Assign permissions to all data on the network, securing important data from users who do not need access.
- Implement a backup system for all servers. Train managers at each site how to back up the system once a day. Implement a tape rotation.
- Place uninterruptible power supplies on all servers.
- Implement a Redundant Array of Independent/Inexpensive Disks (RAID). RAID level 5 would be the most reasonable. RAID 0 gives no fault tolerance so should not be used. Disk mirroring or disk duplexing (RAID 1) would be a low cost solution. Implementing RAID would require a purchase of hard disks:
  - RAID 5-add 3 hard drives to an existing server
  - RAID 1-add 2 hard drives to an existing server
    - Duplexing would also require an additional hard drive controller
    - Mirroring would not require an additional controller
- Implement a virtual private network (VPN) between the two sites for updating inventory once a day.
- Provide training for employees.
- Set up new hardware and software and fully test it before switching from the existing network. Work out all bugs before performing the switch. Complete the switch in the evening before traditionally slow workdays in case of problems.
- Network drawing should include:
  - Workstations labeled as such
  - Three servers at the company headquarters, one server at each other site.
    - One domain controller at each site. This domain controller should include:
      - Active directory installed.
      - DNS installed or a separate server used for DNS. (Since the budget does not allow for the purchase of another server at both sites, DNS should be installed on the main server.)
    - The domain controller at the company HQ can also act as a web server. (Alternately they may purchase an additional server for this purpose.)

- Two servers at the HQ set up as database servers, providing redundancy for each other.
  - Cabling Cat. 5 UTP. Lower rated cabling is cheaper, but will not provide the bandwidth.
  - Network firewall (either software or hardware) between the network and the Internet connections.
  - Router between networks can be used if a VPN is not included.
  - Hubs connecting workstations to servers
  - Indicate Internet connection
- IP Addressing options
  - Lease IP addresses for all computers (servers and workstations) and routers in the network.
  - Lease IP addresses for all servers and routers, use a proxy server and Network Address Translation or private addressing for the client workstations. This is the cheaper solution, which would fulfill the needs of the Accounting department.
  - May also mention using DHCP to assign IP addresses.
- At least two sets of prices would be offered to Accounting. (Obviously students cannot get prices, but they should mention that they will offer at least two solutions for the purchase of hardware.)
- Research other catering websites to see what they offer.
- Implement a telephony or live customer service option on the website.