6

iSeries and Your Business

An important first step in bringing iSeries systems (or any computer systems) into your business environment is planning. Largely depending on how well you plan, introducing new computer resources can be like pouring either water or gasoline on a fire. Many readers will already have a significant number of computers in their business and will add iSeries systems to their computer arsenal, whereas others will be bringing iSeries systems in as their first business computer.

In either case, the information in this chapter should help you understand how to introduce iSeries systems into your particular environment. The chapter starts by discussing what you should consider when determining your business needs. Then it covers software selection, followed by some specific iSeries system hardware configurations appropriate for small, medium, and large businesses. In addition, the following topics are discussed:

- Business decisions

- Implementation management

- Physical planning

- Training

- Ergonomics

- Security

- Technical support

- Service

- Migrating from iSeries CISC to iSeries RISC.

This chapter is not a complete guide to introducing iSeries systems into any business, but it does provide a starting point for developing your plan and discusses some important issues.

What Are My Business Computing Needs?

Many businesses today use some type of computer system(s) to help run their business. These businesses must constantly evaluate whether their current system is good enough. Businesses that are still using manual methods for specific functions within the business must determine whether automating their business might help.

Whether your business already has millions of dollars' worth of computer systems or none at all, the way to begin answering these questions is to forget about computer hardware and software, and look very closely at your business. Too often, businesses buy computer systems and then look for problems to solve. A properly managed computer project should start by careful consideration of the collective business needs of all functional areas within the business. Independently attacking specific business problems often can result in a "dead-end" computer solution that provides no coherent strategy for the future.

From the very start, key people from all affected business areas should be collected into a project team. Since multiple business areas will be involved, the top management of the business must consistently demonstrate a commitment to the project. Without top management involvement, disagreements among the peer business areas are slow to be resolved and the sense of priority is diminished. Lack of consistent top management commitment at either the investigation or implementation

phase of a computer project is a common cause of unsuccessful projects, which can prove to be quite expensive.

The project team should start by reviewing the overall goals of the business (or segment of a larger business) over the next few years. In some cases, these goals will be well known, but in others a great deal of soul-searching will be necessary. These goals should be as specific as possible and should include any business strategies already in place to achieve these goals. After the business goals are clearly defined, the project team should look closely at the current day-to-day operations of the business as it is and document the movement of information through the entire organization. Only after the information flow is understood can the team candidly discuss what is good and what is bad about the current way of doing business. Work to identify the sources of problems rather than focusing on symptoms. Understand the interaction among the various areas of the business. Consider the flow of information from one group to another as you trace the business cycle.

Chances are, not every problem that you will uncover can be solved through a computer. For example, a computerized inventory-tracking system will not solve inventory problems if just anyone can casually walk into the inventory storeroom and walk out with what he or she needs with no controls. Computers are only a tool for effectively managing a business; they will not manage your business for you. Only after you have examined your current operation with a critical eye can you begin to see if a computer solution makes sense for your business. In the case of small businesses, this type of analysis can be done in a matter of weeks or even days. In larger businesses, it can span months or even years and typically is done on an ongoing basis. Some businesses choose to do the analysis on their own. If you want assistance with solving business problems with computers, however, there are plenty of places to turn, including consultants and computer manufacturers.

Choosing the Software

iSeries system computers become a useful business tool only when they are executing the appropriate software. Although there are many ways of generating a strategy for introducing computers, considering software needs before selecting detailed hardware configurations usually

makes sense. The hardware requirements, such as performance levels, memory size, and disk storage space, will be based in part on the needs of the software selected. The application programs you select must perform the tasks needed by your end users both today and in the foreseeable future.

Selecting the basic type of application program often is fairly simple: An accounting department needs accounting applications, an e-business initiative needs e-business applications, and so on. What is more difficult is identifying the specific application program that best fits your particular needs. Is a custom application program preferred, or will a prewritten application program be acceptable? If a prewritten application program is desired, exactly which one is the best for your needs? If a custom application program is desired, who should write it and what should it include? The answers to these questions depend largely on the specifics of a given business environment and thus are beyond the scope of this book. However, a few basics remain the same whether you are selecting a program for a multinational corporation or one for a corner fish market.

First, you must precisely understand the tasks you are trying to put on a computer before pursuing any application program alternatives. A thorough knowledge of these tasks helps you to identify specific requirements your application program must meet. After a detailed understanding of the tasks is obtained, a search can begin through the many prewritten or off-the-shelf application programs. If you can find an appropriate prewritten application program that fits your needs, you can avoid the expense, delay, and ongoing effort associated with custom software development and maintenance. Good prewritten application programs can be quite flexible. However, because everyone typically has slightly different needs and methods even within a given business function, you can bet that any prewritten application will have some features you do not need and will not have other features you will wish it did.

Do not forget to consider the more specialized type of prewritten application program—vertical market applications. **Vertical market application** programs address a highly specific segment of users such as lawyers, doctors, distributors, or manufacturers. There are several sources of information about the many prewritten application programs on the market. Of course, computer companies and consultants can help you select particular application programs to fit your needs. There are also many popular computer and industry trade magazines that pe-

riodically conduct extensive reviews of prewritten application programs. These can be excellent and timely sources of information.

For specific or highly specialized needs, prewritten application programs may not be adequate. In this case, custom-developed software may be desirable. Although the development and maintenance of custom software is a long-term commitment that typically is expensive, it may be less costly in the long run to pay for the development of custom software than to settle for a prewritten application program that does not do the job. If you do select the custom-software route, an important step is to select the proper developer.

Businesses that have their own programming staff can do their own custom program development. If you do not have your own programmers, it will be necessary to seek outside help—that is, an outside software developer. In either case, the developer will have the largest effect on the ultimate success or failure of the custom-development activity. The developer's job is not an easy one. In addition to having programming expertise, the developer must become an expert in all aspects of your business, must be a good communicator to understand and discuss software requirements, must understand human psychology when defining the user interface for the program, must be a proficient teacher to train the end users on the new program, and, finally, must be dependable and reliable and therefore available to provide technical support, software maintenance, and any needed modifications.

Choosing the Hardware

Selecting the proper iSeries system hardware components that together will fit your needs can be confusing. You must select among the iSeries models and their disk configurations, feature cards, peripherals, and so on. Although we cannot possibly cover all needs for all environments in the limited scope of this book, we can examine some business environments—for example, a small manufacturing establishment, a medium business, and a large business—and outfit them with the appropriate iSeries system configurations. With the insight provided by outfitting these hypothetical business environments, you will be better prepared to properly select the iSeries systems components useful in your environment. Assistance in selecting specific iSeries system configurations is available from IBM or remarketers.

Small Business Environment, Manufacturing—Bob's Gearbox Co.

The hypothetical small business is a gearbox manufacturer named Bob's Gearbox Co. Bob's has a standard line of gearboxes and also accepts orders for custom gearboxes. It is a private corporation (owned by Bob, of course) with thirty-two employees. Bob has been in business five years and has experienced moderate growth. He currently conducts business by noncomputer methods but finds himself needing to streamline his operation as the business grows. Bob is particularly concerned that his profits seem to be shrinking as his sales increase. A study of Bob's business shows that there are two basic causes for this. First, his sales staff often commits to discounted pricing on a gearbox order to capture the business. The trouble is that Bob never really knows what it actually costs him to produce a given gearbox. He uses standard cost estimates to price a customer's order and hopes that the actual cost of building the gearbox is close to this. The second basic problem uncovered in the study is that Bob's inventory is not well managed. The production department is often hampered by not having the right parts and raw materials in inventory. This often causes slips in the delivery of customer orders that hurt customer satisfaction and fuel heated arguments among the marketing manager, the production manager, and the materials manager. Finger pointing is commonplace. The study also showed that 25 percent of the inventory items in stock are obsolete and will never be used.

In this scenario, it is clear that Bob has outgrown his manual methods of doing business. Bob needs a better way to track the actual costs associated with manufacturing his products. This may uncover the fact that his sales staff often sell gearboxes at or below cost. Bob also needs help tracking his inventory. He needs to know when critical parts are getting low and what parts are moving slowly. The deficiencies in Bob's business can be addressed with the proper computer solution.

Let us examine the iSeries system configuration suitable for Bob's Gearbox. Bob will use the Manufacturing Accounting Production Information Control System (MAPICS/DB) to help gain better control over his business. By selecting the appropriate modules (programs) within the MAPICS/DB family of software, Bob can track manufacturing costs more closely (Production Control and Costing, and Product Data Management modules) and better manage his inventory (Inventory Control module). Bob also chooses to take advantage of the computer system to automate the general accounting functions of his business such as pay-

roll, accounts receivable, accounts payable, and general ledger, and he will use the Order Entry and Invoicing module to track and bill customer orders. The Cross-Application Support module is required on all systems. Through a questionnaire, this module allows Bob to customize MAPICS/DB for his particular business environment. Furthermore, the Cross-Application Support module automatically passes information among the various MAPICS/DB modules, making them function as a single system.

Based on the requirements of the software and Bob's business transaction volumes, Bob will get the iSeries Server i810 #2466 processor shown in Figure 6.1. The Model 810 system was selected for its low cost and its ability to first be upgraded to higher-performance processors and the enterprise program package option be replaced by a larger iSeries system. The standard 17,500 MB of disk storage will be expanded to 52,500 MB to provide enough storage for the system software, the
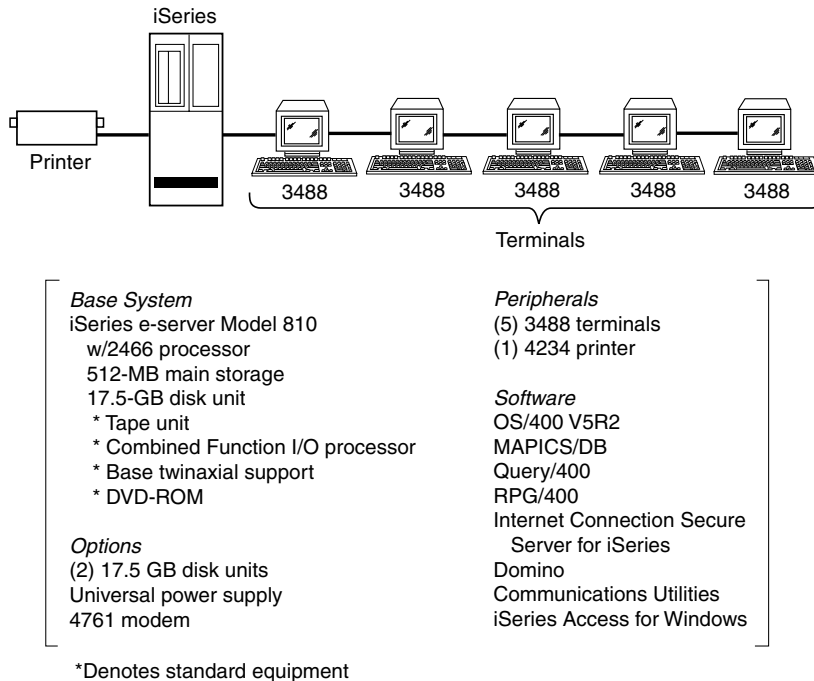

Base System
iSeries e-server Model 810
  w/2466 processor
  512-MB main storage
  17.5-GB disk unit
   * Tape unit
   * Combined Function I/O processor
   * Base twinaxial support
   * DVD-ROM

Options
(2) 17.5 GB disk units
Universal power supply
4761 modem

Peripherals
(5) 3488 terminals
(1) 4234 printer

Software
OS/400 V5R2
MAPICS/DB
Query/400
RPG/400
Internet Connection Secure
  Server for iSeries
Domino
Communications Utilities
iSeries Access for Windows

*Denotes standard equipment

Figure 6.1. Bob's iSeries advanced system.

MAPICS/DB modules, and associated data and allow a minimum RAID data protection capability. The Model 810 system's ability to expand to 13,791,000 MB of disk storage will allow for expansion as Bob's business grows. Bob feels the base 512 MB of main storage is sufficient to get started, but he likes the option to grow to 16,000 MB. The optional uninterruptible power supply unit will help prevent disruption of the system by power failures—Bob can do without the extra headache. The #9771 PCI two-line WAN with modem will be used to access IBM's Electronic Customer Support (ECS) network.

The system console function is performed by a 3489 Modular Display Unit. For the users, four 3488 Displays are provided initially. One display is for the inventory clerk, one is for the purchasing agent, one is for the production department, and one is for Bob so that he can get the management information he needs to make intelligent decisions. The 4234 Printer will be used to produce the various reports provided by MAPICS/DB. The 14 GB 7208 Cartridge Tape Unit will allow data stored on disk to be backed up on tape. This will help prevent important business information from accidentally getting lost. Since OS/400 V4R5 is now bundled with the Model 250 hardware, Bob has no need to concern himself with the iSeries operating system. Bob will also get the Query/400 and Domino programs so that he and his staff can generate customized reports and manage schedules as needed.

Bob expects to participate in electronic commerce through the Internet, so he insists on having a #4761 modem attached. He also figures this will provide him closer contact with his sales force (whom he plans to provide with notebook computers) through e-mail while they are interacting with customers for his gearboxes. Because no one on his staff has programming skills, Bob anticipates consulting with IBM about setting up his Internet site and storefront.

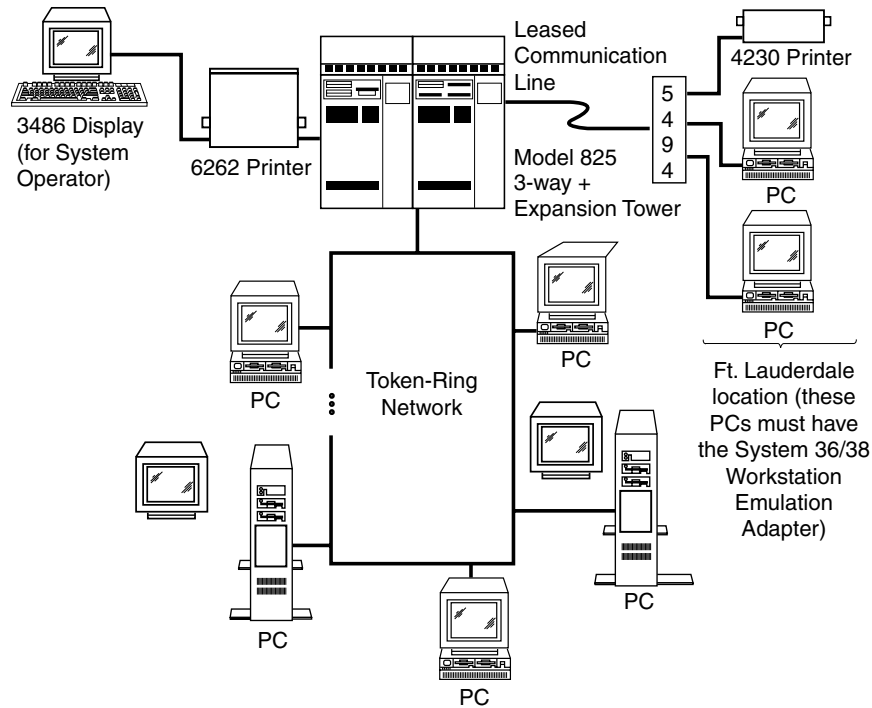### Medium Business Environment—Johnson & Thornbush

The hypothetical medium-sized business is an advertising agency named Johnson & Thornbush. This company has been in business for twelve years. Their business started with one major account, and today they have seventeen active clients. Steve Johnson and Perry Thornbush are both still active in managing the business. The main office, located in Chicago, has seventy-four employees. A second office, with seven em-

ployees, is located in Fort Lauderdale, Florida, to handle several large accounts in the Southeast. Almost every person at each location has a PC providing personal productivity tools for such tasks as market analysis, trend analysis, word processing, and financial modeling.

Steve Johnson recently sponsored a company-wide study to find a way to address the business goals of increasing marketing effectiveness and reducing operating costs. The results of the study revealed that the market analysis being done by one PC user seldom correlated with the market analysis done by another PC user. The cause of the disagreement in information was that there were different versions of the area demographic information residing on the various PC disk units used in the market analysis. Even though one person had responsibility for periodically updating the demographic information and distributing the updates, eventually different versions of the information emerged, making the market analysis inaccurate. Further, as the company's market coverage grows, the demographic information is growing in size and is becoming impractical to distribute via diskettes. It is apparent that more-sophisticated data management and analysis techniques will become necessary as the firm continues to grow.

Another area the study uncovered as needing improvement was that basic office operations could be streamlined, increasing productivity and thereby reducing operating expense. Mail delays between the two offices were slowing down many day-to-day business operations. Because of busy schedules, it often was difficult to schedule meetings, as the last attendee contacted often would have a conflict. Although the secretarial staff also had PCs and WordPerfect for word processing, turnaround time for even a simple memo was getting longer as the workload increased.

The project team recommended a computer solution that streamlined office functions and centralized the area demographic information. All PCs were to be connected in such a way that they could share information and facilitate business communications. Figure 6.2 shows the system configuration suitable for Johnson & Thornbush. In this solution, the PC users retain their PCs, protecting that investment in hardware, programs, and training, only now all PCs (in both Chicago and Fort Lauderdale) are attached to an iSeries located in Chicago, allowing them to double as PCs and iSeries workstations. As PCs, they can do everything they could before. As workstations on the iSeries, the PCs allow users to interact with the iSeries, providing some additional capabilities provided by iSeries programs.

Leased Communication Line

4230 Printer

3486 Display (for System Operator)

6262 Printer

Model 825 3-way + Expansion Tower

5494

PC

PC

Token-Ring Network

PC

PC

PC

PC

PC

Ft. Lauderdale location (these PCs must have the System 36/38 Workstation Emulation Adapter)

Base System
iSeries Model i825
  *2,048 MB main storage
  *17.5 GB disk unit
  *13-GB tape unit
  *Twinaxial workstation IOA
  *MFIOP
  *EIA 232/V.24 cable
  *CD-ROM
  *Universal power supply

Options
(6) 17.5 GB disk unit
EIA 232/V.24 50-foot cable
#9771 PCI WAN IOA
(2) 4761 modems

Peripherals
Existing PCs w/adapter
3488 display stations
6262 Model T14 printer
5494 remote control unit
4230 printer

Software
OS/400 V5R2-Enterprise Edition
Domino
Language dictionaries
Communications utilities
Query/400
ILE RPG/400
Access Family for Windows
Application Development Tools
Query and SQL Development Kit

*Denotes standard equipment

Figure 6.2.   iSeries system for Johnson & Thornbush.

Hardware Configuration

Based on the number of users and the growth the business is experiencing, an iSeries Model i825 and a processor option #2473 3-way with CUoD growth to 6-way as needed. For now, 2,0048 MB of main storage should meet the need. Six additional integrated 17.54 GB disk units will expand the standard 17.5 GB to over 122.5 GB of disk storage—more than enough for now. The 25 GB 3-inch cartridge tape unit provides for efficient backup of the information stored in the iSeries disk storage. The 100/16/4 MBps Token-Ring Network Adapter/HP will allow the iSeries to participate in a 100 MBps token-ring network. A 100/16/4 MBps Token-Ring Network Adapter must also be installed in each of the local PCs, allowing them to participate in the network. The 6262 Printer will provide high-speed printing to all local users.

In Fort Lauderdale, a 5494 Remote Workstation Controller is attached to a communications line to Chicago, where the PCs are equipped with the Workstation Adapter and attached to the 5494 so they can be used as iSeries workstations. The smaller 4230 Printer, along with the PC printers they already have, will meet printing needs for the Fort Lauderdale users. Although the PCs will be attached to the 5494 via twinaxial cable for now, a token-ring network could be installed later at the Fort Lauderdale location. The PCs can then be attached to the 5494 via the token-ring network to provide for more efficiency and flexibility as the Fort Lauderdale location grows.

Johnson & Thornbush Software Scenario

The Domino for iSeries application program provides the basic office functions needed to streamline operations. The electronic mail feature of Domino allows any user to electronically send documents or quick notes to any other user. This eliminates mail delays and reduces the word-processing workload, because simple notes and messages can be typed and sent by the users themselves. The calendar-management function of the Domino application can automatically schedule a desired meeting by electronically checking the calendars of all attendees and finding a time suitable for all.

OS/400 V5R2 Enterprise Edition will run in the primary partition with Domino for iSeries running in a secondary partition. The customer plans to WebFace their 5250 OLTP applications. The programs for the

Fort Lauderdale site will also run as a second OS/400 V5R2 secondary partition with another secondary partition running the required Domino for iSeries for the mail and calendaring services for Fort Lauderdale.

Although Domino has a word-processing function, those with primarily word-processing activities to perform will continue to use the WordPerfect word-processing program on the PCs. Since both offices have a heavy word-processing workload, using the intelligence in the PCs for this function will provide the highest productivity (lowest response time). This is particularly true in Fort Lauderdale, because iSeries response time will be reduced by the relatively slow telephone line communications speeds. Furthermore, removing the word-processing tasks from the iSeries provides improved response time for the electronic mail, calendaring, and demographic activities performed on the iSeries system.

The iSeries Access Family for Windows program allows iSeries disk storage to act as the central repository (file server) for the demographic information. In effect, a portion of the iSeries disk storage appears to be a giant PC disk unit shared by all PCs. With iSeries Access Family for Windows, all PC users can simultaneously share this single copy of the information, ensuring that all are using the same current data for their marketing analysis. This will result in a more accurate market analysis and thus more effective marketing efforts for the firm's clients.

With the iSeries WebSphere Development Studio, Johnson & Thornbush will develop custom application software over time that will allow the iSeries to act as a database repository and interact with the PCs in a cooperative processing environment. Through the token-ring network, all of the PCs located in Chicago are attached to the iSeries.

The token-ring network was selected for its high-speed information transfer rate and because it could use the twisted-pair wiring already installed throughout much of their building. All of the PCs in Fort Lauderdale will be attached to the iSeries system as remote workstations through a 5494 Remote Workstation Controller, appropriate modems, and a leased voice-grade telephone line. This allows every PC, no matter where it is located, to double as an intelligent iSeries workstation. Whether PC users are in Chicago or Fort Lauderdale, they will have access to the same functions. However, because the Fort Lauderdale PC users are attached via a telephone line, their response time will not be as good (fast) as that of those in Chicago, who are attached over the high-speed token-ring network.

To improve the exchange of ideas and responsiveness of the people-to-people interactions, Domino 5.0 was installed on the iSeries Model i825, and Lotus Notes was installed on the PCs both in Chicago and in Fort Lauderdale.

Large Business Environment—Atole Enterprises

The hypothetical large business that will be outfitted with iSeries systems is Atole Enterprises. This multinational corporation is a distributor of canned foods and enjoys financial prowess worthy of its Fortune 500 membership. The many benefits afforded by computers are well known at Atole Enterprises. They have been using computers in their day-to-day operations for many years. The U.S. headquarters is in New York City and currently has a large System/390 computer complex. There are seventeen distribution centers located from coast to coast. Each distribution center has its own small System/36 and Atole-written application programs to track orders and local inventory, and to transmit information to the System/390 in New York. System/36s were originally selected for their ease of operation, which minimizes the need for technical skills at each distribution center.

A company-wide study sponsored by headquarters came to the following conclusions: Most of the System/36s are fully depreciated and in many cases are not providing enough computing power to meet growing demands. The custom-written application programs written for the System/36s have been around a long time and need major updates to keep the company's competitive edge in customer service. The study therefore recommended that Atole convert the distribution centers from System/36s to entry-level iSeries Server i800s using the Processor #2463 with improved application programs.

Also, the System/390 located in New York will be right-sized to an iSeries server 870 with Processor Feature #2486 8-way Enterprise Edition, which will save significant operating cost over the next five years. In addition, future applications will be developed on the 870 and verified before being shipped to the distribution centers, thus avoiding the need to install a separate Model i800 at the main office.

Atole Solution Scenario

The first step in implementing the solution is to install Model i800 systems at the distribution centers. The distribution center staff will use

the migration tools to quickly move the current distribution center application programs from the System/36 to the iSeries system. After the initial migration is complete, the headquarters staff on the Model i870 will exploit the programmer productivity features in the iSeries system to enhance the distribution centers' application programs. It is critical to get the improved application programs ready as soon as possible. Once this is done, each distribution center will download the updated application programs. The headquarters staff will assist each distribution center in performing systems management on the new systems.

Figure 6.3 shows the iSeries distribution center configuration that Atole will use. The iSeries Server Model i800 with Processor Option #2463 was selected because its performance and capacity best matched the need and because of its continuing upgrade path. The standard Model i800 configuration will be expanded to 105,000 MB of disk storage and 1,024 MB of main storage to provide enough capacity to meet the needs of the distribution centers for an estimated five years. In the event of a power failure, the UPS power unit will provide power to sustain critical components while they ride through short power outages and will allow the system to perform an orderly shutdown in case of longer outages. This will reduce the disruption associated with power failures at the distribution centers.

The #9771 two-line PCI WAN with modem will be used for IBM Electronic Customer Support (ECS). This will derive from the base #9771 PCI WAN/Twinaxial IOA which will support up to twenty-eight twinaxial-attached workstations in addition to the ECS communications line. In this case, however, Atole chooses to provide the ECS for each distribution center from the headquarters location; that is, headquarters will maintain a help desk and a technical question-and-answer database pertaining to their custom software in addition to the IBM question-and-answer database. They will be the first line of support for the distribution centers. A second communications line is provided by the #2772 PCI Two-Line WAN IOA. This leased line will be used to communicate with the Model i870 at headquarters to consolidate information needed from each distribution center much as before. This will allow for communications at 56,000 bps.

The NetView program running on the iSeries Model i870 will work with the #4761 Modems to manage the communications network. Further, the SystemView System Manager for OS/400 program will be loaded on the central site's iSeries to allow the retrained S/390 personnel to perform change and problem management for the remote iSeries systems. Atole will use #3487 Display Stations as color terminals to allow
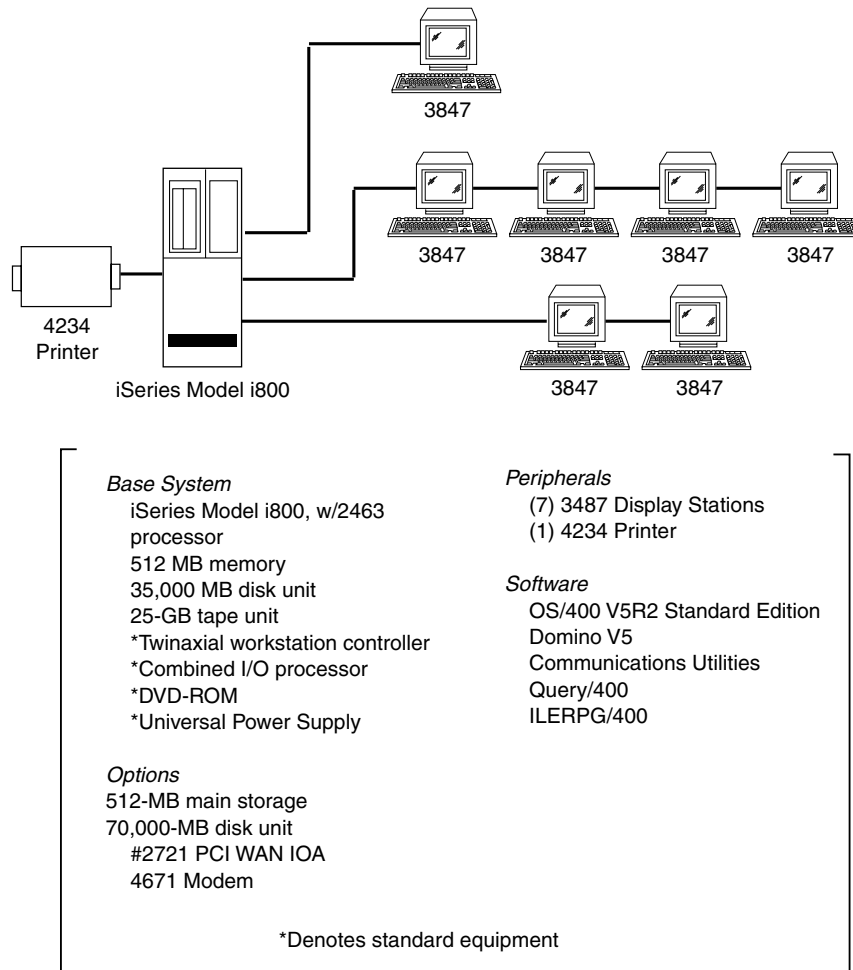
Base System
    iSeries Model i800, w/2463
    processor
    512 MB memory
    35,000 MB disk unit
    25-GB tape unit
    *Twinaxial workstation controller
    *Combined I/O processor
    *DVD-ROM
    *Universal Power Supply

Options
512-MB main storage
70,000-MB disk unit
    #2721 PCI WAN IOA
    4671 Modem

Peripherals
    (7) 3487 Display Stations
    (1) 4234 Printer

Software
    OS/400 V5R2 Standard Edition
    Domino V5
    Communications Utilities
    Query/400
    ILERPG/400

*Denotes standard equipment

Figure 6.3. iSeries distribution center configuration that will be used by Atole.

their custom application programs to exploit color to associate and highlight information on the screen. This will result in improved ease of use. Each distribution center will have a #4234 Printer to produce reports and correspondence-quality documents. The standard streaming tape drive provided with every Model 870 will be used to back up disk storage. Backup will be performed to the Model 870 at the central headquarters site only.

The iSeries software needed, in addition to OS/400, includes IBM's Communications Utilities, Query, and ILE RPG/400. IBM's Communications Utilities provides some additional communications functions between the iSeries systems. Query/400 will allow local distribution center management to develop their own custom reports, giving them more flexibility. Finally, Domino for iSeries will facilitate communications between headquarters staff and each distribution center.

Dedicated Server for Domino Web Serving Environments

The following example describes how the iSeries Dedicated Server for Domino (DSD) can provide value to users. In this example, a manufacturing company with an Enterprise Resource Planning application running on the iSeries is described. The customer begins with a simple requirement to deliver e-mail to its users, but also knows that the possibility exists to leverage adding some Domino applications in the future, after discussing its problems with its counterparts at other companies with some Domino experience.

The customer begins with the purchase of a small DSD system to implement e-mail, and they extend the LAN infrastructure to the Internet and install a firewall for protection. The e-mail project is a raging success, so they decide to embark on another small project to deliver a project-management tool for new product development. They install a second partition on the existing DSD, pilot the application there, and roll it out to the product-management team in a third partition.

While the project-management application is deployed, two members of the in-house Domino implementation team attend education about Domino R5 and Web development at a Lotus Authorized Education Center. The two return full of ideas, and they implement another Domino partition where they use Domino Designer clients to create a small internal Web site for their colleagues to look up the company softball team schedule, view organization charts, and post ideas for IT improvements to be reviewed by their team. They show it to the IT manager, who quickly expands the idea by requesting the company policy documents and product information online. The members comply and a company intranet site is born and put into production with a bit of tweaking and an upgrade to a larger DSD to serve the expanded user base. The upgrade is installed with minimal disruption over some pizza on Saturday night, and on Monday all the users benefit from the in-

creased processing power as it is dynamically applied to the various Domino environments: Domino mail during peak access in the morning, then the Domino intranet and applications throughout the remainder of the day.

After the success of the Domino intranet, the IT staff decide the Domino collaborative capabilities can be extended even further to improve its competitive capabilities and provide higher levels of customer service. First, Lotus Quickplace is implemented to address some of the new business requirements to work on joint bids and at large opportunities with suppliers, contractors, and other business partners through ad hoc, user-managed Internet workrooms. Quickplace is installed on a separate iSeries Dedicated Server for Domino placed on an external LAN for security purposes and protected by a packet-filtering router. Users in engineering, marketing, and sales work together securely with project teams from other companies and compile information to complete price requests and to create proposals for new business faster and with less e-mail and more organization and quality than ever before.

A business partner is engaged to work with the IT staff to develop a new customer service site that lets customers access order and status information from the ERP system. The business partner uses Domino Enterprise Connection Services nightly to pull order summary information into Domino from the database files on the iSeries that runs the majority of its line of business applications. Other DB2 information is accessed from the Domino applications in real time through Domino Enterprise Connection Services. The business partner creates the Domino site, which is tested on the Domino development partition and is then replicated and put into production on the second DSD on the external LAN.

Domino Workflow is then utilized to enhance the company's processes by automating the approval cycles of purchasing, expenses, and pricing exceptions.

The growth in the preceding example illustrates how Domino starts small and expands to become integral to a company's operations. In the past, multiple PC servers would have been used to implement the various Domino application environments, mail, applications, internal Web serving, development, Domino Workflow, and Lotus Quickplace. The iSeries uses logical partitioning to serve these applications on fewer systems, sharing computing resources and minimizing the cost of managing and maintaining many physical servers, while leveraging the integration to the back-end database files through common iSeries remote database technology (DRDA).

Server Selection

The medium-sized business environment of Johnson & Thornbush could equally well have used an iSeries Server 870. Performance within the locally connected personal computers would have been improved with no degradation at the remote site. In fact, performance would appear to improve if the process of maintaining the database concurrent between the two server systems were managed properly. Figure 6.4 illustrates the preferred configuration for Johnson & Thornbush in a server-based implementation. Note that the #5494 Remote Workstation Controller has been replaced with a LAN-configured iSeries Entry Model 800. This transformation is possible because the servers are specifically set up to manage LAN-connected personal computers.

The only non-LAN-connected terminals on either of the systems are the system console and the printers. If the 9771 Base PCI WAN/Twinaxial IOA feature had been chosen using an additional communications line, both the console and printers could have been LAN-connected. It is worthwhile for a business that has almost all of its terminals as personal computers to consider the server configurations because specially priced packages to meet those configurations are available. Figure 6.5
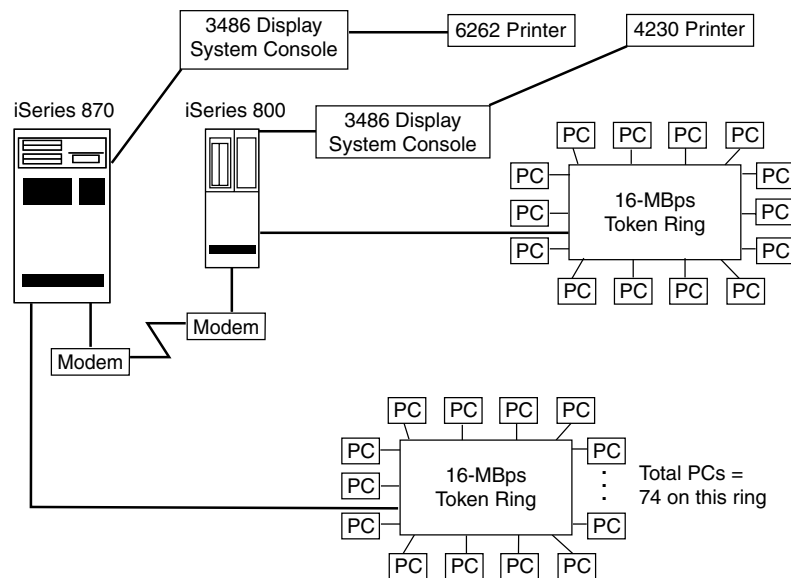
Figure 6.4.   Johnson & Thornbush configuration as a set of servers.

illustrates the Johnson & Thornbush system configuration as it would
appear if implemented as a network configuration. In a network com-
puting configuration, the leased line connecting the two modems in Fig-
ure 6.5 would be replaced by an Internet cloud, which would give each
group of users (those on the Model 825 and those on the Model 800)
access not only to each other's groupings, but to all the information on
the Internet. Of course, it would cost more to provide security—includ-
ing a firewall, an encryption card to send encrypted corporate informa-
tion, and the HTTP Server for iSeries software on each system, as a
one-time expenditure which would displace the leased-line ongoing ex-
pense, eventually resulting in a savings.

The Competitive View of 64-Bit Processing

One other aspect needs to be considered before deciding which com-
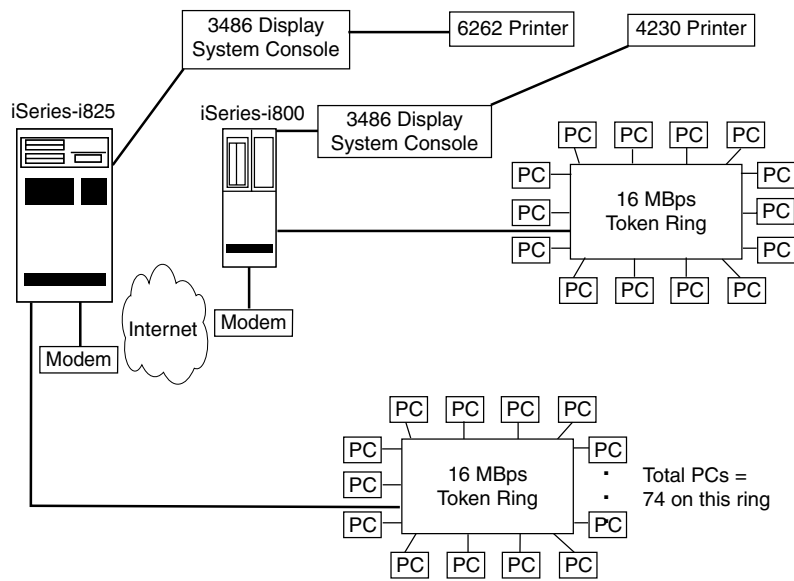puter system does the best job in the long term for your business. That

Figure 6.5. Johnson & Thornbush system configuration in a network com-
puting environment.

consideration is the turmoil associated with getting your applications to execute as the industry migrates from 16-bit and 32-bit processing to 64-bit processing. As described in *PowerPC AS Microprocessors* in Chapter 1, the iSeries is based on a 64-bit RISC processor. So are DEC's Alpha and HP's Precision architecture-based systems and Microsoft's NT architecture. In the case of DEC and HP, the processor is 64-bit, but the applications that exist are 16-bit and 32-bit; and because they are processor-centric (written with a direct relation to the processor that they were intended to execute on), they must be rewritten to perform in a 64-bit manner on the 64-bit processors. This is not to say that those applications will not run on the 64-bit processors from those vendors, but that they will run as 16-bit or 32-bit applications, dissipating the value of the 64-bit processors they are using.

The NT architecture defined by Microsoft has the same problem except that rather than being processor-centric, it is API-centric (each application program is written with a direct relationship to the interface—16-bit or 32-bit—provided by the processor it is expected to be executed on) and the 16-bit and 32-bit applications must be rewritten to match to the interfaces of a 64-bit world before they can leverage the hardware when it becomes available from Intel, Motorola, Sun, or whoever provides it. The IBM iSeries, because of the **Technology-Independent Machine Interface (TIMI),** can take applications written for 16-bit or 32-bit environments and translate them (i.e., the applications execute as 64-bit applications) to a 64-bit environment. This translation is intrinsic in the iSeries system and has happened with each release of new processing hardware, which did not affect the applications that executed from previous releases. Figure 6.6 illustrates the impact of the architectural decision on the applications for these companies as it relates to the movement to 64-bit processing.

The Business Decisions

In addition to selecting the hardware and software to solve identified business problems, you must also consider financial questions before you install your computer solution. Two important areas that must be addressed are cost justification and the lease-or-buy decision.
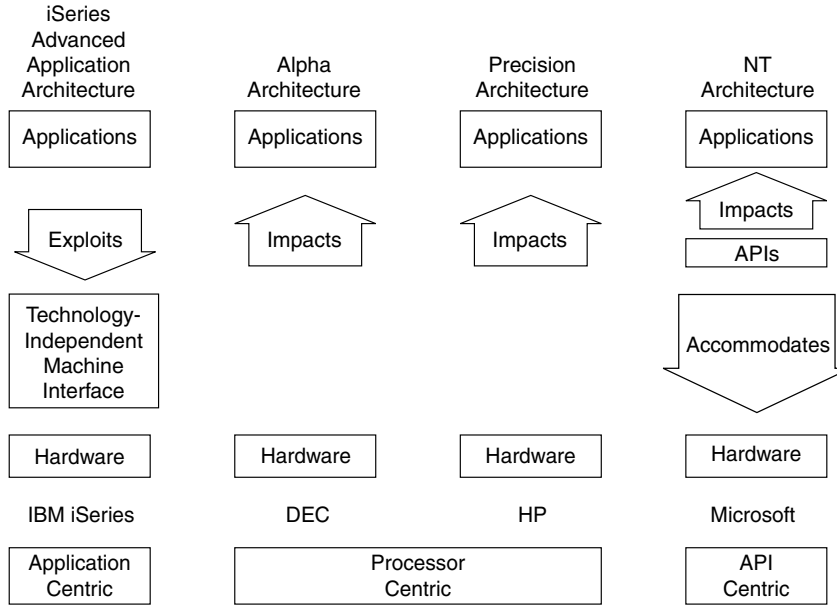
iSeries Advanced Application Architecture	Alpha Architecture	Precision Architecture	NT Architecture
Applications	Applications	Applications	Applications
Exploits	Impacts	Impacts	Impacts
			APIs
Technology-Independent Machine Interface			Accommodates
Hardware	Hardware	Hardware	Hardware
IBM iSeries	DEC	HP	Microsoft
Application Centric	Processor Centric		API Centric

Figure 6.6. Positioning 64-bit processing, a competitive view.

Cost Justification

All businesses are the same in one respect: They exist to make a profit. In the final analysis, the only reason for a business to buy a computer is to increase profits. In other words, the computer system must be **cost justified.** There are two parts to the cost-justification analysis: costs and benefits. The price you pay to the computer company is easily identified early in the project. What many people fail to consider are the costs of owning a computer system beyond the original price paid. The costs of operating the computer installation after you buy it should also be considered over several years. Some costs that should be considered beyond the price tag are identified next.

Hardware Maintenance

This is usually a monthly or annual fee you pay that basically is an extended warranty for the computer hardware. There are various alter-

natives, but the basic deal is that if your computer system breaks down, the service company will come out and effect repairs at no charge. You do not have to put your system on a maintenance contract, but if you do not you will have to pay an hourly fee and costs of parts when your system breaks down. Since this parts/labor billing approach can be extremely expensive, most businesses choose to put their system on a maintenance contract.

Software Maintenance

In some cases you will have to pay the software supplier a fee to get fixes and updates to your programs. Users who purchased applications that used two-digit year designations in date codes in the past have already faced up to the expensive software maintenance job centered around year 2000, unless they used or updated to OS/400 Version 3 Release 2 or Version 3 Release 7 or later.

Technical Support

Technical support provides answers to your questions and resolves any technical problems in either the hardware or software. This kind of support ranges from providing a telephone number to having permanently assigned personnel from the computer company on your premises. Sometimes this support is provided free of charge; other times it is on a fee basis.

Whether a business is large, medium, or small, if more than one computer is functioning within that business, there is a system-management concern, with a very real cost associated. It is difficult to associate a dollar value because each system configuration is different, but estimates of the cost do exist. Whether you hire someone directly to deal with the concern, do it yourself, or get technical support from an external company, you must pay that cost. *Cost estimates* indicate that for three to forty computers or terminals the cost is one full-time person, and this increases with the addition of one full-time person for each additional forty computers or terminals.

Facilities

It is often necessary for you to modify your building to accommodate a computer system. These modifications might include adding additional

air conditioning, running cables between workstations and the computer, or modifying the electrical power services available. Fortunately, the costs of such building modifications are relatively low with iSeries systems as compared with large computers, which often require water cooling and raised floors. The new packaging reduces these costs for new installations, because only the largest systems require two-phase service to operate.

Education/Training

The people who will be using the new computer system will need education. The computer operators will need to understand how to manage the day-to-day operations of the computer. The users of the computer system will have to understand the application programs. It may also be necessary to train your own programmer(s) to write custom application programs for your business. Fortunately, iSeries systems are easier to operate and use than larger computer systems. However, some education is still necessary. Many different types of education are available, some of which are discussed later in this chapter.

Communications Line Costs

If your computer system is attached to remote workstations or other remote computers, you will incur communications line costs. There are many different communications services available today, and these costs should be considered in your justification.

Environmental Costs

Environmental costs are the costs to operate the system over a period of time. It has been calculated that the difference in operational costs for an existing System/36 Model D24 and an Advanced 36 over a period of five years is $20,220. This difference results from the reduced heat load on air conditioning systems, reduced cost in electrical requirements, and reduced cost of a maintenance agreement. That *cost reduction* will pretty much pay for the new system, and you will reap the benefit of improved performance that increases the efficiency of your workers.

Enhancing Applications

Any time you either downsize or modify your computer installation to modernize it, it is expected that you will have to pay the cost of updat-

ing your applications or purchasing new applications to operate within that new environment. This was dealt with in greater detail in the discussion of WebSphere Development Studio for iSeries in Chapter 4, but the one thing you can trust is that your host-centric applications will *not* operate in a distributed client/server-centric environment.

Benefits

On the brighter side, the computer is being purchased to solve identified business problems or address new business opportunities. You will receive benefits after the computer system is installed. (Or else why install it?) Although it is fairly easy to identify and quantify the costs associated with a computer system, it is often difficult to do the same for the benefits. This does not mean that benefits are any less real than costs; it simply means that they require more work to uncover. Benefits are also more specific to your business, so it would be impossible to list all of them here, but we can consider some common benefits associated with the application of computer systems to basic business functions.

Improved Business Cycle

The basic cycle of most businesses has the same components: The business buys goods/equipment, takes customer orders for goods or services, makes deliveries, and bills the customer. The classic application of computer systems to these areas produces improvements in the basic business cycle that result in real dollar savings. These savings can result from such basic things as collecting accounts receivable more quickly and taking better advantage of accounts payable discount terms.

Inventory Reduction

Many carrying costs are associated with a business inventory. These include items such as warehouse space, insurance, tax, and interest expense. The proper application of computers can reduce the level of inventory that must be kept on hand, thus reducing carrying costs.

Improved Productivity

Given the proper tools, anyone in any part of a business can do his or her job more efficiently. This allows a business to get the same amount

of work done more quickly or with fewer people. Excess time can then be redirected to performing other tasks that help meet the business objectives. Further, as natural attrition reduces the workforce, it may not be necessary to hire replacements, allowing for a reduction of the workforce over time.

Improved Quality

By providing more timely or better-organized information to personnel, businesses can often improve the quality of the services or products they provide. This is particularly true in manufacturing environments, in which computers can be applied to everything from design simulations to statistical quality control. It has also been found that providing the needed information in a more timely fashion (reduced wait time) results in fewer errors being made by the users, thus increasing productivity.

Improved Customer Service

By allowing a business to respond to customer orders, questions, and special requests, computer systems can improve customer service. These improvements can involve quickly responding to requests for price quotations and accurately quoting and meeting delivery dates.

Competitive Advantage

The items that have been discussed contribute to reducing costs, improving quality, and improving customer service, so they all work to improve the competitive posture of the business. The flexibility provided by a computer system can also help improve your competitiveness by allowing you to respond more quickly to changing market demands. The business also has the opportunity to use advanced software technology products such as multimedia, telephony, and so on, to increase revenues.

This list of general benefits is in no way comprehensive. Every business can add to the list based on its current position and business objectives. Once benefits have been identified, however, you are still not finished. You should try to quantify the benefits in dollars and cents where possible, to help focus on the areas with the largest payoff first. *Quantified benefits* also help when comparing computer investments

with any other capital projects under consideration. However, quantifying benefits can be difficult and subject to judgment. Unlike the price of a computer, which can be looked up in a catalog, benefits must be calculated according to expected results.

For example, if you feel that inventory can be reduced by 10 percent by installing an inventory-management application program, you would multiply 10 percent of your inventory value times the carrying costs to determine the annual benefit. This is not very difficult, but other areas are more difficult to quantify accurately. As another example, if an engineer's productivity is increased by 15 percent, then you might multiply the annual salary and benefit costs by 15 percent, yielding the annual savings. In this case, some would argue that because the engineer is still paid full salary, nothing is saved. However, if the time is devoted to, say, developing a product to enter a new market, the actual benefit may be much higher than 15 percent of the engineer's salary. You will have to decide what a benefit is worth to your business.

Other benefits that typically are difficult to quantify and thus are often overlooked when tallying savings include increased sales (resulting from improved customer service) and lower employee turnover (resulting from improved working conditions and pride). The fact that these benefits (and others like them) are difficult to quantify does not make them any less valuable, but it does mean that they often are overlooked. After the costs and benefits have been quantified, you can begin to evaluate the proposed computer project against other capital projects.

Two guidelines often used to measure a proposed computer system are:

1. The *payback period,* in which the time to recover the investment from accrued benefits is calculated

2. The *net present value,* in which the cash flows are calculated and then discounted based on the cost of money and risk associated with the project.

Although this type of analysis can be valuable, do not overlook other aspects of the capital project such as its strategic value and its effect on customer-perceived quality and professionalism. Classic accounting techniques are easy to defend but do not always reveal the entire picture.

Lease or Buy?

Just when you think you are through analyzing all the software and hardware alternatives, you are faced with a whole new set of questions concerning the acquisition method you will use. Several methods are commonly used to acquire a computer system. The most obvious alternative is simply to pay cash for the computer system—**outright purchase.** This is the least expensive way to acquire a computer system. However, it has a direct and usually substantial impact on the business's cash flow and capital position.

The next acquisition alternative is to finance the purchase price over a period of time, just as you would finance a new house or new car. In this case, you simply make a down payment, typically 10 percent, and take out a loan for the balance. The loan and interest are repaid through monthly payments (over a period of from two to five years typically). Since you must pay back the interest on the loan, this is a more expensive alternative than a cash purchase, but it can reduce cash flow requirements. In either case, the title of the computer system passes to the business, as do any tax benefits such as depreciation. The purchaser of a computer also has the ability to sell the computer when it is replaced or is no longer required, thus recovering the **residual value** of the computer system.

Another acquisition alternative is the **term lease.** In this alternative, the lessor (computer owner) grants use of a computer system to the lessee (the using company), which in turn agrees to make lease payments for some specified period of time, or **term.** The term of a lease can be any length, but typically runs from two to five years. If the lessee decides to terminate the lease before the end of the term, there is usually a termination fee, which can be substantial. Some of the advantages offered by the term lease alternative include the conservation of business capital and lines of credit, which can then be used to finance other investments.

Two commonly found lease types are a capital lease and an operating lease. **Capital leases** are rent-to-own; at the end of the term, you can purchase the computer system for a relatively small fee (e.g., 5 or 10 percent of the original cost). With a capital lease, the lessee is considered the owner and gets the tax benefits of ownership. Capital leases are much like a financed purchase, the major difference being that a capital lease does not require the user to make a down payment, as does a financed purchase. **Operating leases** are real leases in which there is no discounted purchase option at the end of the lease term. The lessor is

considered to be the owner and thus retains the tax benefits of owner-ship. Because of this, the lessee typically makes a lower payment than with the capital lease alternative.

A final acquisition alternative is to rent the computer system month by month. This provides the most flexibility, because this kind of arrangement typically requires only one to three months' notice to discontinue. Of course, you usually must pay higher rental payments to get this flexibility; and because the payment is usually not fixed, you are subject to increases.

The acquisition of computer software is a whole different story. Typically, you will not have the option to buy software. Most companies **license** software. A software license grants the licensee the right to use the software under the conditions specified in the document supplied by the software company, called the **license agreement.** Typically, these licenses allow the licensee to use the software on a specified computer system for a specified fee. Three common ways to pay for this license agreement are *one-time charge, lease,* or *monthly charge*. With the one-time charge, the licensee pays a set price and retains the right to use the software indefinitely. The price can be paid in cash or be financed. The leasing alternative is really just another way to finance the one-time charge with no down payment. Finally, the monthly charge is like renting the software month to month indefinitely.

Although some basic lease/purchase alternatives have been introduced in this section, the rules governing these various alternatives are complex and subject to change. The effects on a company's cash flow, income statements, balance sheets, taxes, and so on, can also be strongly affected by the various acquisition methods. You should consult the proper professionals to determine the best alternative for your situation.

Education

The discussions in the chapter so far should assist you in selecting the appropriate software and hardware to fit your needs. However, no matter what computer hardware and software you select, they will require people to interact with them. To maximize efficiency, these people (users) must be educated in the use of the computer system itself as well as its software. Proper education is critical to the success of any computer-automation project. Inadequate education prevents reaping the productivity benefits of moving a task to the computer.

The first goal of education is to make users (and system operators) proficient at using the computer hardware and software they need to do their jobs. Another important goal of education is to make the users' interaction with the computer system enjoyable. If using the computer is enjoyable, users will be more motivated. However, if using the computer is a frustrating struggle (because the users have inadequate education), they will be less productive or perhaps will avoid the computer altogether. Education that is specific for iSeries is available from IBM Education and Training (IBM's training subsidiary), as well as from other non-IBM companies.

The IBM Education and Training educational offerings come in the following forms:

- *Classroom courses* are traditional lectures/discussions led by an IBM instructor. These forums provide for direct interaction between students and instructors. Hands-on, in-class exercises often are part of a classroom course. Public courses are held regularly at IBM facilities. Alternately, private courses can be arranged and held either at IBM locations or at customer locations.

- *Personalized learning series* courses are basically duplicates of classroom courses, except in self-study format. Students are provided with transcriptions of the classroom course lectures in electronic form. Transcribed lectures are loaded on an iSeries system using a CD-ROM and are read on the user's display screen. Also provided is a booklet containing the foils (illustrations) normally presented in the classroom lectures. An additional offering in the self-study format is a set of diskettes containing the self-study courses for the iSeries that may be loaded onto a personal computer and be studied from there.

- *Discover/education series* courses cover additional iSeries-related topics in a format identical to the online education provided as standard with iSeries systems.

- *Learning centers* are educational facilities where students come in and use the materials just discussed (for a fee) without having to buy them. These educational offerings are also available for sale.

- There is also a set of self-study courses shipped with every iSeries system. Those courses are listed in Figure 6.7.

Security

In many business environments, computer systems are the very backbone of business operations. This makes the information stored on the computers a corporate asset at least as valuable as cash. Because of the new methods of accessing the data on your business computer (Internet, intranet), it is necessary to rethink the security aspects of your system. One of the items that distinguishes the iSeries family from most other computer system families is the flexibility of its security features. System security has three important objectives:

- Confidentiality:

    - Protecting against disclosing information to unauthorized people

    - Restricting access to confidential information

    - Protecting against curious system users and outsiders

- Integrity:

    - Protecting against unauthorized changes to data

    - Restricting manipulation of data to authorized programs

    - Providing assurance that data is trustworthy

- Availability:

    - Preventing accidental changes to or destruction of data

    - Protecting against attempts by outsiders to abuse or destroy system resources.

Course ID	Type of Course	Course Description
PS586	Self-study	AS/400 Getting to Know Your System
PS587	Self-study	AS/400 Administrator-Work Management and Basic Tuning
PS588	Self-study	AS/400 Administrator-Security Planning and Implementation
PS589	Self-study	AS/400 Administrator-Availability and Recovery Management
PS590	Self-study	AS/400 Administrator Library
PS682	Self-study	Lotus Notes R4 System Administration I: Extending A Notes
PS684	Self-study	Lotus Notes System Admin II: Cross Certificates and Multiple
PS685	Self-study	Lotus Notes R4 System Admin II: Server Activity and Performance
DE204	Self-study	AS/400 Basic Education Series
DE205	Self-study	AS/400 Implementation Series
DE206	Self-study	Office Vision/400 Support Series
DE208	Self-study	AS/400 Implementation for Entry Systems
DE209	Software	AS/400 Overview and Introductory Topics
PS153	Software	AS/400 Implementation and Operation Series
PS154	Software	COBOL/400 and SQL/400 Programming Series
PS155	Software	RPG/400 and SQL/400 Programming Series
PS156	Software	AS/400 Library
PS163	Software	AS/400 System Using the S/36 Environment
PS164	Self-study	AS/400 System for the Experienced S/38 Implementer
PS274	Self-study	SQL/400 Programming Workshop

Additional information on each of these courses can be obtained by accessing the Internet at
<http://www.training.ibm.com/ibmedu/news/400f96.htm.

Figure 6.7.   Listing of self-study courses available for the iSeries on CD-ROM.

System security is often associated with external threats, such as hackers or business rivals. The intent of these paragraphs is not to minimize the external exposure, but to present a more balanced approach to system security. More damage can be caused by the accidental depression of the wrong key at the wrong time. A well-designed security system will provide protection against system accidents by authorized system users.

As with an application, good results from the system security functions cannot be obtained without good planning. Setting up security in small pieces without planning can be confusing and difficult to maintain and to audit. Planning does not imply designing the security for every file, program, and device in advance. Planning *does,* however, imply establishing an overall approach to security on the system and communicating that approach to application designers, programmers, and system users. The following questions need to be considered when planning the security on your system and deciding how much security is needed:

- Is there a company policy or standard that requires a certain level of security?

- Do the company auditors require some level of security?

- How important is your system and the data on it to your business?

- How important is the error protection provided by the security features?

- What are your company security requirements for the future?

Like a business's cash, computer information must be protected from loss or theft. Let us look at how this vital information can be protected.

Loss Prevention

An ever-present hazard when dealing with information (with or without computers) is the possibility that the information will be lost. This loss can occur in many different ways. A computer system's breakdown, such as a disk unit failure, can result in lost information; operator error can cause data to be corrupted accidentally, resulting in lost information; or a disaster (such as a fire or flood) can result in a loss of vital business information. For this reason, **recovery** from the loss of vital business information must be addressed.

One way to deal with the risk of losing vital information is to make backup copies of computer information at regular intervals (e.g., daily). Multiple backup copies should be made on a revolving basis and be kept in a place safe from damage or loss. Three copies will allow at least

one copy to be kept in safe storage at all times and will provide for different levels of backup. In the event of an information loss, the computer system can be restored to the point at which the most recent backup copy was made. The iSeries systems' operating systems and the various tape devices discussed in Chapter 2 are designed for these kinds of **save/restore** operations. Any changes to information after the point of the last backup will have to be re-created after the backup copy is used to restore the system. This may involve manually reentering the transactions since the last backup or exploiting OS/400 features such as journaling and checksum, discussed earlier in this book.

Any good disaster-recovery plan will also consider how the business will operate in the event the current computer system is destroyed. Many companies, including IBM, offer disaster-recovery services that essentially provide you with emergency access to a similarly configured computer system located elsewhere. Usually, a test allowance is part of the deal so that you can run disaster-recovery drills to ensure readiness. The *iSeries Backup and Recovery Guide* (SC41-8079), available from IBM, is a good reference when planning your backup strategy.

Theft Prevention

Theft prevention deals with protecting sensitive information from unauthorized disclosure. These security requirements vary widely from environment to environment. Consider your particular needs early in your planning. The iSeries systems provide various levels of security that help deter unauthorized access. All iSeries eServers are now designed to meet the C2 level of security. Security level 50 enables iSeries servers to operate at the C2 level of trust as defined by the U.S. government.

The iSeries is the first system to achieve a C2 security rating for a system (hardware and operating system) with an integrated full-function database. The requirements for the C2 level of security are defined by the U.S. Department of Defense in the its publication DOD 5200.28 STD, **Trusted Computing Systems Evaluation Criteria (TCSEC).** Additional detail related to the C2 operating environment can be found in the IBM publication *iSeries Security—Enabling for C2.*

Security for iSeries is integrated into the computer system hardware along with the associated operating system. Depending on the needs of the user environment, one of *five levels of security* can be activated. The *first* level is basically no security at all. People can access the system and

can do anything they wish. The *second* level of security requires the user to enter a password before access is granted to the system. After the proper password is entered, the user can perform any task. The *third* level of security is user-access control, which is just like the second level except that the user can be restricted to various functions as well. A security officer is usually assigned to manage the security of the system. The *fourth* level of security adds operating system integrity by restricting the use of certain operating system functions and unsupported interfaces. The *fifth* level enhances the integrity protection provided at the fourth level and is designed to meet the requirements of C2-level security.

For sensitive environments, you may wish to consider restricting access to the area in which the Application System itself is located. It may also be necessary to restrict access to the area(s) in which workstations are located. These needs should be considered early in a computer-automation project. For additional discussion of security subjects and iSeries security capabilities, obtain *Tips and Tools for Securing Your iSeries* (SC41-3300-00) from your local IBM branch or IBM representative.

Additional security issues relating specifically to Internet/intranet security and operating system security are discussed in Chapters 4 and 5. The complete picture of the security capabilities of the iSeries systems should include all the discussed offerings and the additional capability of the hardware *keylock function* included with every system.

Service

Although every effort has been made to make iSeries systems as reliable as possible, some computers will fail. If yours does, you must have a way of getting it fixed. All iSeries systems come with a one-year warranty that provides free on-site repairs from IBM's service division seven days a week, twenty-four hours a day. Each of the various terminals and printers associated with iSeries systems has its own warranty terms and periods ranging from three months to three years. After the warranty period, you become responsible for maintenance of the system.

IBM and other companies offer service agreements that, for a fee, provide postwarranty on-site service just like that provided during the warranty. Various maintenance discounts are available, depending on the level of system management procedures you are willing to imple-

ment in your business. If your system fails and you do not have any type of service contract, you will have to pay for parts and labor, which can become extremely expensive. For this reason, most people choose to keep their systems on maintenance after warranty.

Migrating from System/3X and AS/400 to iSeries

Some businesses may be replacing System/3X and AS/400 computers with an iSeries. The iSeries has been designed to ease the migration of most programs and data from these earlier computer systems. OS/400 functions plus available tools provide a guided and highly automated procedure for these types of migrations. Although programming skills are still required to guide the migration activities, the tools reduce the manual work of analyzing, documenting, saving, and restoring application programs. Programs are migrated to the iSeries System/38 environment discussed in Chapter 4. If desired, the programs can be further adapted to take advantage of new iSeries functions at your own pace after the migration is complete. Now let us look at sizing a replacement iSeries when migrating from System/3X to iSeries.

Software Maintenance

Software maintenance combines software subscription and technical support to provide iSeries customers with a full range of benefits including software upgrade entitlement and where available voice and electronic support. Software maintenance will be delivered by two priced Program IDs (one covering support and the other subscription). The PIDs will have a duration of either one year of three years. There will also be a PID representing "after license" if subscription coverage lapses.When buying a new hardware model, a minimum of one year of software maintenance must be purchased. Software maintenance is not transferable outside of the customer enterprise or country. All existing Software Subscription, Support Line and Service Suite contracts will be honored through their termination date. The latest offering will be available to the customers at that time.

Sizing a Replacement iSeries

Whether iSeries is your first computer system or you will be replacing a System/38 or AS/400 system, you will have to choose the appropriate-size iSeries. *Size* refers to the processor speed and capacity, which by model depends on memory size and amount of disk storage. There are many things to consider when choosing the size iSeries needed in a given situation.

Those migrating from the System/38 to the iSeries will need more disk-storage and main-storage capacity than they did with the System/38. More disk-storage space is necessary mostly because of the increased requirements of OS/400. More main storage is needed because more information about each task remains resident in memory. More information in main storage has been a traditional advantage of the System/38 because it makes for better system performance. The iSeries takes further advantage of the same concept. Whether you are migrating from a System/38 or AS/400, you must select the correct iSeries processor model. The *Performance Overview* section of Chapter 1 will give you a rough idea of the relative performance of the various computer systems of interest.

To refine your model selection, you must start by examining your current computer system very closely. Tools like the **iSeries Performance Tools** can be used to determine the workload on your current system. The capacity-planner portion of the **PATROL for iSeries—Predict** can help analyze your current system to determine which iSeries model is appropriate. An IBM document that will help in using these sizing tools and determining iSeries disk-storage requirements is the *iSeries Performance and Capacity Planning Newsletter* (GC21-8175). If you are adding additional functions (programs and data) or more users to the new iSeries system, you must also consider the effect of these new requirements on performance, memory, and disk-storage requirements. IBM personnel have tools and resources available to them to help you size the appropriate iSeries system.