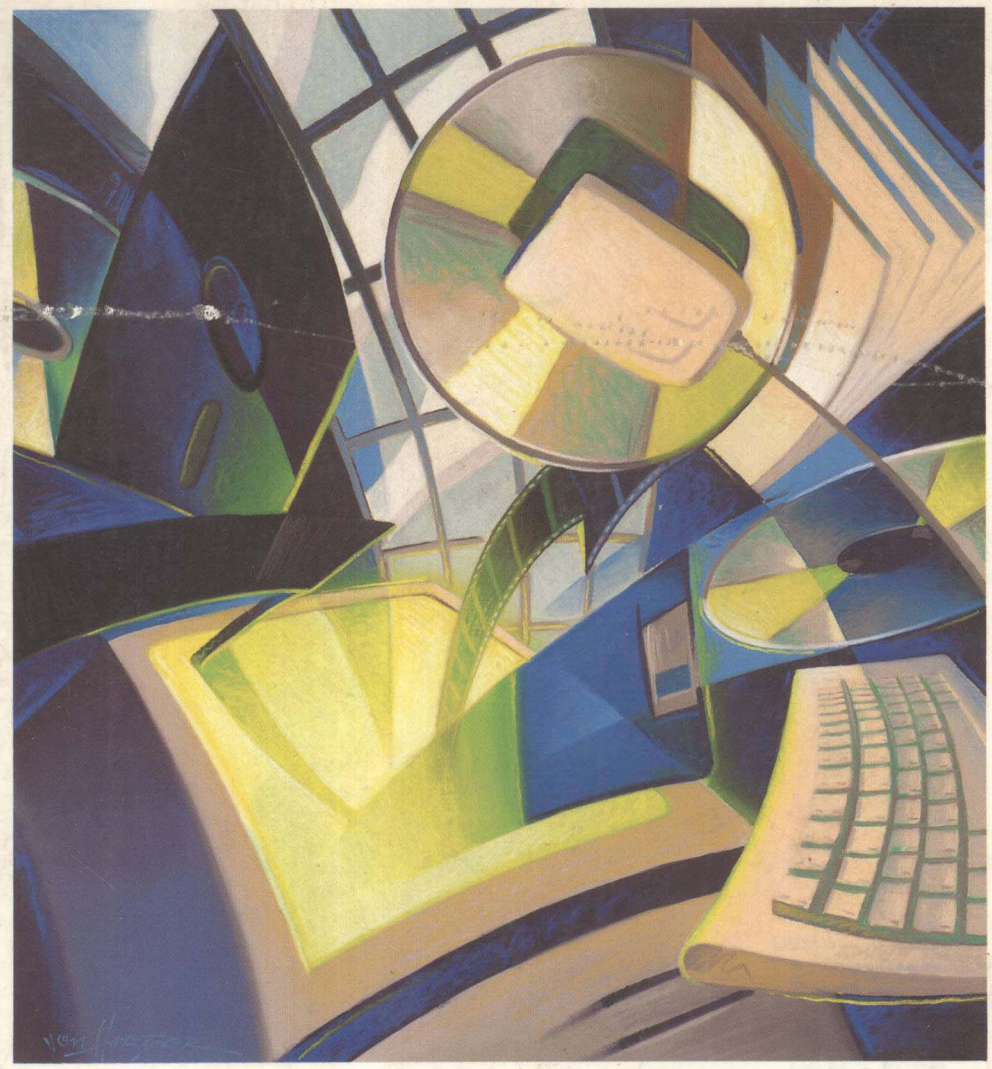

HUTCHINSON

SAWYER

COMPUTERS AND INFORMATION SYSTEMS

1994-1995 Edition

1994–1995

EDITION

Computers and Information Systems

Sarah E. Hutchinson

Stacey C. Sawyer

IRWIN
Advantage Series for Computer Education

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Preface

Why We Wrote This Book: Meeting the Needs of Users

Computers and Information Systems: 1994-1995 Edition is written for future computer users—people for whom the computer will be an everyday tool for working with reports, spreadsheets, databases, and the like. It is not intended for specialists who will write programs or design computer systems.

We wrote this book in order to provide instructors and students with the most useful information possible in an introductory computer course. Specifically, we offer the following five important features.

1. Practicality and Completeness

A textbook, we feel, should above all be *practical and complete.* It should give users all the information they need to understand the basics of information systems and to effectively use a microcomputer at work or at home. Thus we try to avoid the weaknesses we've seen elsewhere of stressing software to the detriment of hardware coverage, or of being too brief or too encyclopedic. We try to give users just what they need to know to use a computer competently for business or personal purposes. Some examples:

- We present up-to-date PC and Macintosh hardware information and compatibility issues so users can understand the capabilities of the computer systems they are using.
- We provide an entire chapter on how to purchase and maintain a microcomputer system, with information on user health and safety.
- We give practical information about ethics, privacy, and security.
- We offer "bonus" information users may find useful on the job, such as the different RAM requirements of different color monitors
- We cover advanced topics such as object-oriented programming, expert systems, virtual reality, and digital convergence—subjects users are sure to encounter in the workplace in the near future.

2. Flexible, Reasonably Priced Software Labs

We realize that students (and instructors) have a great deal of concern about the cost of textbooks. Accordingly, we offer many *reasonably priced,* separately

bound software tutorials. These hands-on tutorials from *Irwin's Advantage Series for Computer Education* include the following:

dBASE III Plus
dBASE IV
DOS 3.3
DOS 5.0
DOS 6.0
Excel for the Macintosh
Excel 3.0 for Windows
Excel 4.0 for Windows
Filemaker Pro for the Macintosh
Lotus 1-2-3 release 2.01 and 2.2
Lotus 1-2-3 release 2.3
Lotus 1-2-3 release 2.4
Lotus 1-2-3 release 3.1
Lotus 1-2-3 for Windows release 1.01
Paradox 3.5
Paradox 4.0/4.5
Quattro 1.01
Quattro Pro 3.0
Quattro Pro 4.0
QBASIC
System 7.0/7.1 for the Macintosh
Windows 3.1
Word for the Macintosh
Word 2.0 for Windows
WordPerfect 5.1
WordPerfect 5.2 for Windows
WordPerfect 6.0

Additional tutorials will be added to the series as the need arises.

3. Avoidance of Clutter

Our market research finds that many instructors have become tired of the cluttered, over-illustrated look and style of many introductory texts. Thus, you will not find margin notes, confusing icons, cartoons, and other such distractions here.

Also, we have attempted to use color to enhance content, not overpower it. We use four specific colors to indicate input (red), storage (blue), processing (gray), and output (yellow).

4. Interesting, Readable Style

We are gratified that reviewers have consistently found our writing style praiseworthy. Our primary goal is to reach students by making our explanations as clear, relevant, and interesting as possible.

5. Effective Pedagogy

We have carefully developed our learning aids to maximize students' comprehension and learning:

- *Chapter previews and outlines:* Each chapter opens with a list of chapter objectives, a brief outline of the chapter's content, and an introductory section called "Why Is This Chapter Important?" which explains why the material in the chapter is important to the user.
- *Chapter summaries:* Each chapter concludes with a useful summary section to help students review.
- *Key terms:* All the important terms covered—and the numbers of the pages on which they are defined—appear in a section called Key Terms at the end of each chapter. All key terms are also listed and defined in the glossary in the back of the book.
- *Self-tests and exercises:* Fill-in-the-blank tests, short-answer exercises, and projects test students' comprehension and encourage them to learn more about microcomputers on their own.
- *Career boxes:* One- or two-page boxes show students how computers are used in some common and uncommon ways in business and the professions.

- *Time-line chart:* This chart, which follows the last chapter, provides an overview of the historical development of information processing and related events from the beginning of recorded history to projected developments in the 21st century.
- *Glossary:* All boldface key terms are included, with their definitions, in the comprehensive glossary at the back of the book. We have also listed many terms that are not included among the key terms but that might crop up in students' readings.

Supplements That Work

It's not important how many supplements a book has but whether they're truly useful, accurate, and of high quality. We offer a number of supplements that you will find useful.

- *Instructor's Resource Manual with Transparency Masters*, prepared by Phil Koneman, Colorado Christian University (text available also on DOS or Windows disk). This supplement contains:

  —Course planning guidelines
  —Chapter outlines
  —Lecture notes
  —Teaching tips
  —Suggestions for using transparencies and transparency masters
  —Approximately 100 transparency masters

- *Color Transparencies*

  —65 full-color overhead transparencies of key illustrations and tables are available to qualified adopters.

- *Test Bank*, prepared by Anne Breene, Texas A&M

  —True/false, multiple choice, fill-in-the blank questions graded in difficulty
  —Sample midterm exam
  —Sample final exam
  —Answers to test questions

- *Irwin's Computerized Testing Software: Computest 3*

  —This computer-based test bank is available to qualified adopters.

- *Videos*

  —These 21 videos are from the acclaimed PBS series, Computer Chronicles. Each video is approximately 30 minutes long. The videos cover topics ranging from computers and politics to CD-ROM and visual programming languages.

- *Classroom Presentation Software*

  —Available for both the PC and Macintosh, Classroom Presentation Software can be used for in-class lecture presentations or in the lab for interactive self-study. Classroom Presentation Software combines text, graphics, and animation with interaction to dynamically illustrate major computer concepts. System requirements for the PC are 640 K RAM and EGA, VGA, or super VGA graphics.

Advantage Custom Editions (ACE)

The preceding supplements are available with Hutchinson/Sawyer, *Computers and Information Systems: 1994-1995 Edition* and/or *Computer Essentials*.

In addition, Irwin is proud to offer adopters an exciting new *customization* program. Now it's possible to order chapters from either text in a sequence that best fits the needs of your course. You may also order a *combination* of chapters from both texts. In addition, you may order an array of lab manuals (see above) from the Irwin Advantage Series to accompany any customized text.

Your custom product will be spiral bound and shipped to your bookstore approximately six weeks from the time you place your order. The only limitation to an order is that the custom text not exceed 1.75 inches. For more information about ACE, please contact your local Irwin representative or Faculty Service at 1-800-323-4560.

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Write to Us

Finally, we need to know: Was this book truly useful to students? We'd like to hear from you about any improvements we might make. Write to us in care of our publisher, Richard D. Irwin.

Sarah E. Hutchinson
Stacey C. Sawyer

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EPISODE

1

DO YOU REALLY NEED A COMPUTER?

There is no point in having computer skills unless you are going to use them. These four episodes will help you do precisely that. These episodes are not "hands-on" tutorials; instead, they are meant to be thought provoking and to be the basis of discussions.

You have started a business in something near and dear to most of us—food. And, since your target market is college students, you opened a pizza parlor near a campus and called it "Professor Pizza."

You, Pat Sanderson, started out the pizza parlor with a small loan from your local banker and have spent a year building a customer base. Paul Robison runs the night shift, which is usually your busiest and most hectic time. Juanita Chavez is your bookkeeper. You additionally have a staff of 15 full- and part-time employees working as cashiers, kitchen helpers, and cooks. Your business is a success, but you have experienced some real growing pains during the past year.

You gross about $750,000 during your 11 A.M. to 2 A.M. business hours. The long hours that your business is open require you to staff two full shifts. You have had a lot of requests for delivery service to the college dorms and near-by student housing, but you are nervous about expanding your business much more at this point, because you are already having trouble keeping up with demand.

Although there is room for more pizza-making tables in the kitchen, the set-up is disorganized, and pizzas often are not made correctly because the cooks can't read the cashiers' handwriting on the orders. Juanita has suggested that most of the problems seem to be with a few specific cooks, and maybe they just want to eat the mistakes. But you currently have no way of tracking who makes each pizza.

Due to the nature of the business, there is a high turnover in employees. To entice employees to stay longer, you offer longevity bonuses. For each six-month period of employment with no absences, the employee will receive a bonus of $200.

Inventory maintenance is out of control. You don't have a method for tracking how much of any particular item you have in stock, and consequently you over- and under-order items. For example, you currently have enough canned tomato sauce to last six months but have run out of fresh mushrooms two of the last five days.

Paul, who is finishing up a computer science major during the day, keeps insisting that a computer could solve all your problems. But Juanita prefers things the old-fashioned way—all manual. You need to weigh all the alternatives and arguments in order to make a decision regarding the future purchase of a computer system for your business.

Current Business

You've now have heard, in a nutshell, about all the basic problems with your business. Now let's examine each of the current practices in a little more depth.

Inventory and Ordering

You personally have had control of all ordering, but this duty often gets neglected until it is too late.

The items you stock comprise three main categories: fresh vegetables, such as onions, tomatoes, green peppers, etc., which have a shelf life of less than one week; fresh meats and cheese, which can be frozen and defrosted as needed; and canned items, such as tomato sauce. You have one main supplier

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Many thanks to Mark and Diane Poe for their help with revising these episodes.

for the fresh vegetables, three different suppliers (depending on who has the best price) for the meats and cheeses, and four suppliers for the canned items. You can get better prices for the canned items if you are able to order two weeks before you need delivery. So far, you have not been able to take advantage of this discount very often.

The best way to approach this problem would be to track what quantities of items you use on an average daily basis and then determine future orders to take advantage of discounts. Additionally, by having the night shift take an inventory each night, you could quickly identify items you need to order immediately.

Accounts Payable

Juanita currently pays all bills as soon as she receives them in order to take advantage of any discounts offered for paying promptly. This practice was also helpful when you were first starting your business so that you got a good reputation with your suppliers for paying quickly. But you now would like to pay invoices when they are due (usually 30 days after the invoice date).

You would like to set up a system that will allow you to know when invoices need to be paid and then track them on a daily basis so that you can project cash needs. You approve all invoices before payment since you receive all deliveries and know what has been received.

Payroll and Personnel Information

The weekly payroll and the required federal and state monthly and quarterly payroll reports take a great deal of Juanita's time. Most of the employees are hourly employees, and they are paid according to the hours recorded on their time sheet and initialled as approved by their supervisor. Juanita does all of the payroll manually by filling out payroll cards on each employee. She records the gross wages (hourly wage times hours worked—for example, $4.00/hour × 8 hours), federal income tax withheld, state income tax withheld, social security tax withheld, Medicare tax withheld, and, finally, the net pay that the employee receives on each individual's payroll card along with his or her name, address, exemptions, and social security number. This information is also recorded on a payroll register that records the name, hours, earnings, deductions, net pay, date paid and check number for each employee paid per pay period (see Figure 1).

FIGURE 1

Payroll Register

Employee	Total Hours	Earnings			Deductions				Payment	
		Reg.	Overtime	Gross	Fed W/H	FICA*	Medicare	Other	Net	Check #
Juanita Chavez address Social Security number	40	320.00		320.00	32.00	19.84	4.64	—	263.52	1056
Kim Soong address Social Security number	25	150.00		150.00	15.00	9.30	2.18	—	123.52	1016
•	•	•		•	•	•	•	•	•	•
•	•	•		•	•	•	•	•	•	•

*FICA—Federal Insurance Contribution Act (Social Security)

Each month, Juanita sums up the monthly wages paid to each employee on his or her employee payroll card. She then totals all amounts paid in that month and prepares a report for the state workman's compensation fund based on a percentage of each employee's monthly income. However, only the first $15,000 per employee is taxable. So, she also needs to keep track of how much each employee has been paid each year (see Figure 2).

At the end of each quarter, Juanita also goes through the same procedure to report to the federal government how much federal withholding tax and employees' and employer's share of Social Security Tax and Medicare Tax should be and how much federal unemployment needs to be paid. Also, on a quarterly basis, she reports how much state income tax was withheld and how much state unemployment tax should be paid.

All this reporting takes up a lot of Juanita's time, and sometimes she forgets to pay the employee longevity bonuses. This has created some ill will in the past, and it is a priority for you and Juanita to find a solution to this problem.

Cash Receipts

When customers come into Professor Pizza, they place a pizza order at the cash register. The cashier writes up the order and collects the customer's money for the order. The cashier rings the amount up on the cash register, so there is a record of the amount collected. However, except for the handwritten order, there is no record of what was ordered.

The handwritten order goes from the cashier to the kitchen, where the order is prepared from the slip of paper. As mentioned previously, there is a problem with occasional incorrectly prepared pizzas. This not only wastes food but makes some customers unhappy.

Promotional Materials

You have new competition in the area, and they are sending some slick mailers with coupons to residences around your business. You don't want to invest a lot of money having an advertising agency draw up designs or hiring a printer to print them, so you are interested in what desktop publishing could do for you.

FIGURE 2

Employee Earnings Card

Employee Name Juanita Chavez
Address 121 University Row
College Town, Nevada
Date of Birth 04-01-68
Position Bookeeper

Social Security Number 111-22-3333
Sex: Male ___ Female XX
Single ___ Married XX HH ___
Exemptions 2
Date of Employment 01-01-1993

Employee No. 3
Weekly Pay Rate ___
Hourly Rate $8.00
Date Employment Ended ___

1994	Earnings				Deductions				Payment		
Period Ended	Total Hours	Regular	Overtime	Gross	Federal W/H	FICA	Medicare	Other	Net Earnings	Check No.	Cumulative Gross Earnings
09/10	40.0	320.00			32.00	19.84	4.64	—	263.52	1015	11,520.00

Cost of Goods Sold: Financial Statements

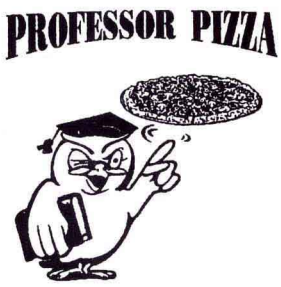
Juanita is not a full-charge bookkeeper; although she is good at math functions, she is not comfortable preparing some types of financial statements. You know you must be making money because you have money in the bank, but you don't know what kind of profit margin you have on the pizzas or on the beverages. In addition, you have no means for forecasting what the pizza parlor's taxable income will be until after the end of the year, when your CPA (certified public accountant) prepares your annual financial statements and tax return.

What Do You Think?

1. What are the problems and inadequacies in your current system? (Make a list.) At this point, how do you think a computer system could eliminate these problems?
2. What information can the computer give you? What form will the output reports take, and how often will you need the reports?
   a. Inventory—Will you have "trigger" points that tell you when to order items that are being used up?
   b. Accounts Payable—How would you like to see information presented so that you can forecast cash-flow requirements?
   c. Payroll—Besides payroll checks, what other types of payroll-related reports should the system produce?
   d. Pizza Order Forms and Cash Receipts
   e. Promotional Materials—What types of advertising flyers, promotional items, and other forms of desktop publishing could you use for the pizza parlor?
   f. Cost of Goods, Financial Statements—What items do you want to track for costing purposes (for example, labor costs, rent)?
3. How will you physically secure the computer system? What other security concerns do you have? What about controls to ensure data input and information output?

EPISODE 2

How Will the Computer Work for You?



*M*eanwhile, back at the pizza parlor . . .

Professor Pizza has continued to grow. You have not yet purchased a computer or even made a final decision regarding one, largely because everyone is too busy to investigate it further.

Your parlor has added delivery drivers, but you are getting too many complaints about late deliveries and cold pizzas, as well as pizzas with the wrong toppings. Juanita had thought that some of the incorrectly prepared pizzas were for the benefit of the pizza makers, who ate their mistakes. Now, the refused pizzas sit in the delivery cars and arrive back at the parlor cold and generally unappetizing, so you believe that there really is a problem with communication between the order takers and the kitchen.

Your gross sales (sales amounts before deductions are made for taxes, payroll, etc.) have increased, largely due to deliveries, from $750,000 per year to $1,000,000. However, an additional wrinkle has been added because of the deliveries. Your lease with the landlord calls for you to pay a fixed amount for rent and a percentage of gross sales that originate on the premises. Currently, you do not track your sales by type and so cannot subtract the delivery gross sales. Consequently, you are paying your landlord a percentage on the delivery sales—but, according to the terms of the lease, you don't have to do this. This has increased the pressure on Juanita to begin preparing monthly profit-and-loss statements that identify the types of sales.

Additionally, the added staff (now 25 people) has increased Juanita's workload. To help her, you have hired one clerk to prepare payroll and a second clerk to handle accounts payable. Since the personnel is new and a good system of checks and balances does not exist, there are numerous mistakes made in paying invoices and employees. Although you still want to maintain the policy of paying workers longevity bonuses, you generally wait for employees to complain before you pay these bonuses. Juanita now agrees you need a computer system and, in fact, has done the most research into what is available to solve the problems and meet the needs you identified earlier.

As a means of dealing coherently with the needs of the different departments, you have asked Juanita and Paul (night manager) to come up with more detailed "wish lists" of what the computer system could do for them—that is, what they want the software to do. You will also come up with a list. You'll then have a meeting to determine what can best serve all your needs.

Pat's List (You)

1. I want monthly profit-and-loss (P&L) statements that will tell me how much our food costs are and how much our overhead is. (Overhead is business expenses—like rent, insurance, heating, phone—that are not actual parts of the product—like cheese, mushrooms, etc.) I read an article that said that we should make a bottom-line profit percentage of 2% of total gross sales (income before deductions for costs and overhead) and that cost of foods should be around 25%, with the rest of the cost in overhead. Currently, we don't get that information until a couple of months after the end of the year.
2. We need to be able to identify our types of gross sales—that is, how much of our total sales is made in the store and how much is made from deliveries. Thus we can avoid paying the landlord a percentage of delivery sales.
3. We need a better system to track inventory. By having the night-shift employees take inventory of items on a nightly basis, we do have better control of items in stock than we used to. But, we can't easily get comparative costs on items and don't know if we would be better off ordering large quantities.

4. I really would like to produce our own menus and advertising material. Our system would have to be able to handle text and graphics—a laser printer would be necessary. Could we afford color?

Paul's List

1. It appears to me that my night shift crew is selling most of the pizzas and making most of the deliveries. Yet, we have the same size crew as the day shift. We need more people on the night shift and fewer on the day shift! Is there any way of having a computer-based system that tells us on a daily basis how much in sales each shift has done so that we can staff the shifts appropriately?
2. A lot of my people have been complaining about not getting their longevity bonuses. Can we make this system automatically identify who's eligible and when?
3. Some of the cashiers have horrible handwriting and don't seem to be able to spell. Can we get a computer-based system that prints orders to the kitchen?

Juanita's List

1. I want to computerize our accounts payable so that we can start paying our bills twice monthly. Before writing checks, we will get a printout of all outstanding bills so that we can decide what to pay.
2. I have seen payroll programs that will allow the user to input a lot of data about personnel—such as days missed, start date and birth date, as well as the usual data like hourly wage and hours worked, etc. A standard program like that will do what I need. This program will also give me the information that I need for my payroll reports.
3. We need to also find a way to get the sales information into the accounting system. I have heard of systems that do that directly from the cash register, or we could manually enter sales figures from the cash register tape at the end of the day. Pat and Paul have mentioned different ways they want to track sales and we just need to make sure that we set up the system the way we want.
4. I think that Tao, the accounts payable clerk, and Michelle, the payroll clerk, should have computers (in addition to one for me). We will need a regular dot-matrix printer and probably a higher quality laser printer for correspondence.

After identifying what you want your computer system to do for you—that is, what the software should do for you—you must decide what you need in the areas of input, processing, storage, and output hardware.

What Do You Think?

1. Consider Pat's, Paul's, and Juanita's comments. Do all their requests seem to be practical or realistic? Why or why not?
2. In order to conceptualize how the system would work, you have begun a procedures manual before the actual computer system is in place. What type of back-up should be done on the system? How often and who is responsible for the back-up? What type of storage medium do you want for the back-up? What could happen if you don't back-up your system frequently?

   How could you ensure business recovery if someone broke in and stole the computer equipment?

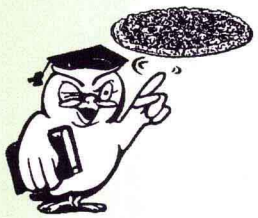
3. You went down to your local computer store this weekend to begin pricing hardware. A salesperson told you about a two-user network system for $5,300 that has a 486 50 MHz 330 MB server with two workstations; a single-user 486 33 MHz 170 MB system for $3,200; and a 386 25 MHz 120 MB notebook computer for $2,700. What does all that mean?

EPISODE

3

CHOOSING THE SYSTEM

PROFESSOR PIZZA



Onward . . .

When we left the last episode, we were pondering the needs of our prospective computer system, and we have finally gotten all the key people behind the idea of purchasing a system. In fact, they're actually enthused about the prospect. Since you and your managers listed your wishes for the new computer system, more questions have been raised. For example, one of the workers in the kitchen wants to put a bar code on the pizza boxes so that you can track the prepared pizzas and scan them when they are delivered. This system would be similar to tracking systems used by many overnight delivery systems, such as Federal Express.

Decisions Made So Far

You have decided to purchase an industry-specific accounting software program instead of an off-the-shelf software package. Although the cost of such software is initially higher (approximately $5,000 compared to about $200 for an off-the-shelf accounting software package), the software will deal with many of the peculiarities of your business. This integrated software program will handle all your accounting data such as sales, accounts payable, payroll, and general ledger as well as inventory and inventory control. It will also provide many useful financial calculations such as labor costs, overhead costs, and average cost of a pizza

Additionally, you have determined that you need point-of-sale cash registers. These registers will allow cashiers to punch a key and easily record the customer's order, as well as produce sales receipts. These registers will also track sales by category for easy summary at day's end. The software that you want to purchase will integrate this sales information easily into the accounting data so that you can easily and quickly analyze what is selling best and what products give you the most profit.

Decisions to Make

What other kinds of software do you need?

- *Word processing:* With word processing you can more easily create letters, memos, and reports. Would this be required in your business?
- *Spreadsheets:* Do you anticipate a need to further analyze data you receive or present the data in a graphic form? Would you use the computer to prepare "what if" scenarios for your business?
- *Database management:* Do you need to create mailing lists, mailing labels, or cross-referenced lists of products with supplier data?
- *Communications:* Do you foresee a need to communicate via modem with other computers in other locations? Will you make use of on-line services such as Prodigy or CompuServe for stock quotes, travel plans, or the like?
- *Desktop publishing (DTP) and presentation graphics:* Would a high-end word processing package provide enough capabilities for you to create your own menus, fliers, and advertising pieces, or do you want to purchase more sophisticated DTP software and software to create art for very fancy publications?

Of course, you need to purchase hardware that will run your special accounting program plus any additional software you want to use. You must

consider cost, compatibility, speed, storage capacity, and convenience. In addition:

- Do you need all desktop computers, or do you also need a laptop or notebook computer or two so that you and others can take work home?
- Do you need color or monochrome monitors? for which work areas?
- What types of printers do you need? Dot matrix printer for printing on multiple forms? Laser printer for high-quality text and graphics output for important correspondence and desktop published items? Do you need to use special paper sizes? Is noise a concern?
- What will best serve your back-up needs? Cartridge tape units? (The tapes could be stored in another location.) How can you set up a back-up system to back up all your computer storage units regularly and at the same time?
- What kind of peripheral equipment does your business require? Mouse? Special ergonomic keyboards for workers who must do a lot of keyboard data entry? Fax? (Customers could fax you orders to be picked up later!) Could you use a CD-ROM drive?
- In what areas should your system have maximum upgrade capacity? Speed? Video capabilities? Communications? Secondary storage capacity? RAM?

Other Future Plans

Business has been so good recently that you want to open a second location within the next year. What special computer system requirements would a second, satellite location of your business have? You have considered linking the second location via modem to your current location so that you can more closely monitor sales. Also, the modem would allow the second store to report directly to the main store and save you (or the manager) time spent traveling between the locations.

At this point, however, you want to keep it small and simple. If you plan well and choose the right hardware, you can always upgrade and add additional software and hardware later. This will help not only keep costs down, but make it easier to adapt to the new system.

Final Considerations

The purpose of the newly automated system is to provide information in a more usable fashion and, of course, to save time and money. But you have heard some horror stories about system "crashes" and realize the importance of having a good support system from your computer dealer and consultant.

- Will your dealer provide technical support for a specific length of time? Is there a charge for this support? What is the response time to questions? Does the dealer or manufacturer have a hot line? (If you are a beginner in the world of computers, it is usually more worthwhile for you to pay a little more in order to ensure good technical support. Mail order catalogs can provide cheaper prices, but may provide little or no support.)
- Do the manufacturers offer warranties?
- Does your dealer offer training classes on site for you and your workers? (You don't want to lose time and money by having confused workers sitting around trying to teach themselves how to use a new computer system.