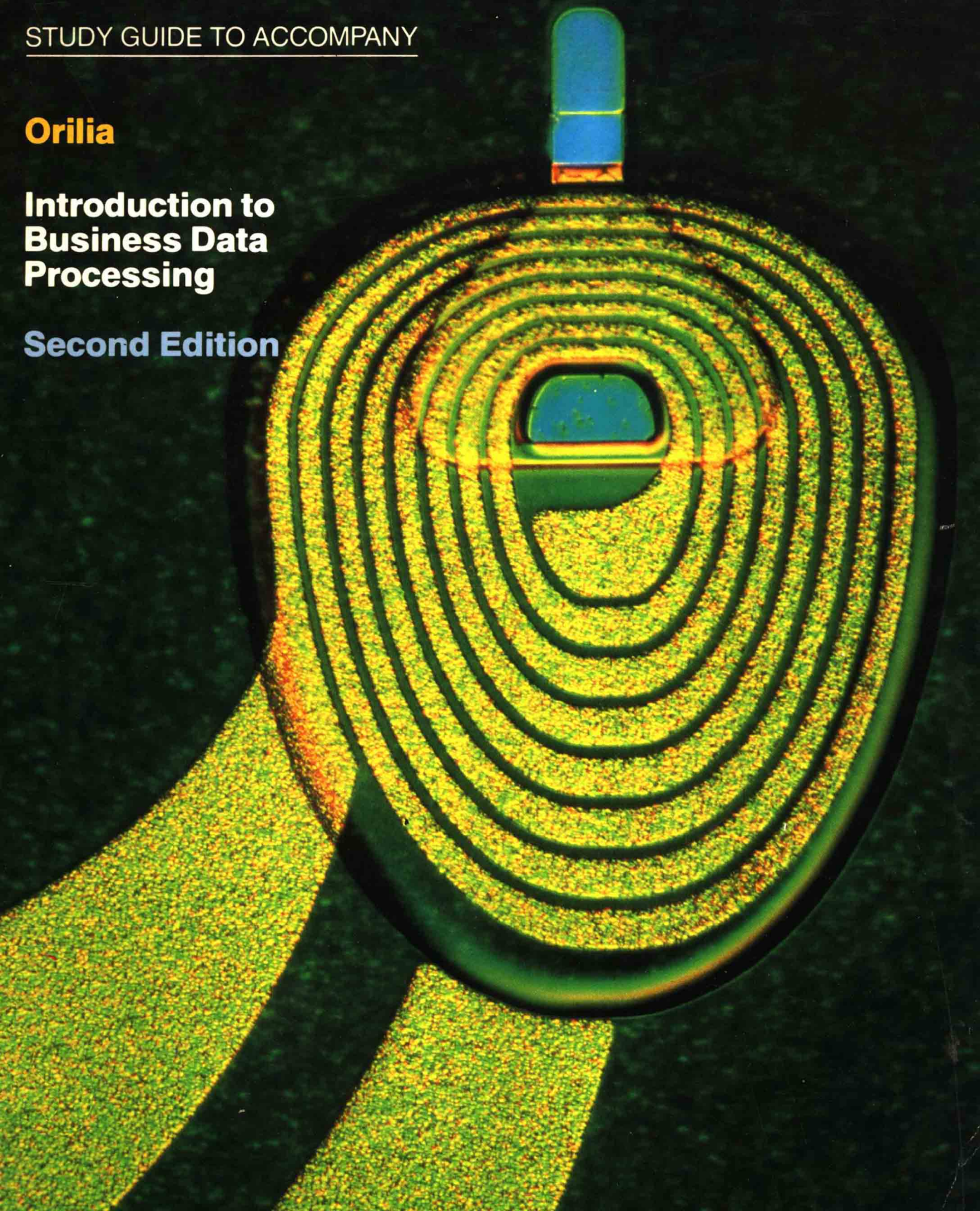
STUDY GUIDE TO ACCOMPANY

Orilia

Introduction to Business Data Processing

Second Edition



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Introduction to Business Data Processing Second Edition

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About the cover

Copper coil of "film" recording head in new IBM 3380 large-system disk file. Head can read and write data at 3 million characters a second—first device in a commercial product to achieve such a rate. (Coil is magnified several hundred times; light refraction from minutely separated film layers produces iridescent color pattern.)

The IBM 3380 was announced in 1980, offering higher disk surface density than any other commercially available disk file, as well as the largest information capacity per disk file—2.5 billion characters. From IBM's 1980 Annual Report.

To the Student

There are many instances where the ability to reinforce the ideas taught in the classroom is important. Many students use extra assignments to ensure their comprehension of the material covered, whereas others rely on them as a preexamination tool. The point is clear, however. Additional material should be available for those individuals who elect to use it.

This Study Guide can be of assistance in understanding important concepts, terminology, and the analytic approaches presented in the second edition of ***Introduction to Business Data Processing.*** The Study Guide, designed to parallel the presentation of material in the text, offers students an opportunity to test themselves on the material presented within each chapter of the main text.

ORGANIZATION OF THE STUDY GUIDE

The Study Guide is not intended as busywork, but should be viewed as a review of the chapter. The contents of each chapter include:

- ***An Introduction to the Chapter:*** This section offers an overview and brief description of the chapter's contents. This narrative highlights key points within the chapter that the student should look for.
- ***Chapter Objectives:*** This section provides a restatement of the objectives of each chapter and details the major concepts that the student should understand in the chapter. Included within these objectives is a list of major terms with which students should familiarize themselves. These key terms are reintroduced within the Study Guide to assist the student in developing a firmer understanding of their meaning.
- ***Chapter Summary:*** This section offers a concise review of the chapter's contents. All material presented within the original chapter is rediscussed, with particular emphasis on major concepts and key

terminology. The sequence of material presented parallels that of the main text. New illustrative examples assist in the reinforcement of information. A conversational mode is again used to present material, offering an easily understood and readable format. This approach permits a step-by-step development of the chapter's contents at a pace in which concepts are easily grasped.

- ***Self-Study Questions:*** This section begins the testing portion of the Study Guide. Each chapter contains approximately 40 self-study questions which are keyed to the chapter sections in the main text. These questions permit the students to gauge their mastery of the subject matter covered. If you are uneasy about any questions, re-read the appropriate section in the main text. Self-study questions should prove very helpful to students preparing for an exam.
- ***Chapter Test:*** A test composed of 25 questions appears at the end of each chapter of the Study Guide. This test is composed of 15 true/false and 10 multiple choice questions and offers another testing vehicle to the students. Each question is designed to test for a major concept, key term, or specific point of information. The answers to the chapter test are presented at the end of each chapter in the Study Guide.

SUGGESTIONS TO THE STUDENT

The preparation for a test varies from individual to individual. Each of us has developed some form of operational sequence to prepare for an exam. The following suggestions are made to help you successfully use the Study Guide in these efforts.

1. Read the chapter overview and familiarize yourself with the material to be reviewed.
2. Read the chapter objectives in the Study Guide. These objectives highlight the major points, as you should remember from reading this chapter in the main text.
3. Read down the list of major terms. Jot down any term with which you are uncertain or unfamiliar. Make sure to specifically look for that term when reading the Study Guide.
4. Read the chapter summary of the Study Guide. Compile a list of terms or concepts with which you are not comfortable. Research each of these items in the main text. Remember to use the end-of-chapter glossary, the point-by-point summary, and the specific chapter section where the material in question is covered. At this

point, some students may choose to write an outline of the chapter in their own terms. This technique is employed to fix the order of presentation of material. These notes can then be used as a reference for review.

5 Carefully read through and answer the self-study questions. Reread any section pertaining to material whose questions were difficult for you to answer.

6 Take the Study Guide's chapter test, indicating the answers to each question. Mark the test and assess why you answered a question wrong. Errors relating to the misreading of a question should be checked, whereas incorrect responses resulting from lack of knowledge must be researched. Those students requiring a little additional reinforcement might try retaking the chapter summary test of the main text. Though you probably have taken this test already, this form of review can ensure you ready knowledge of the material and alert you to the many ways the same question may be phrased. Often this simple retest is sufficient to place a student's mind at ease.

ONE FINAL NOTE

It is hoped that you will do well in this course and learn something about the device that will have a considerable impact on your future. The knowledge gained should assist you in all computer-related activities. In writing the text and Study Guide, I have attempted to make your learning experience a rewarding and enjoyable one. I hope this information will be of value to you, if only to make you aware of the computer's capabilities and varied uses. It is truly a remarkable advancement of our technology.

Lawrence S. Orilia

Contents

Portfolio: The History of Data Processing

This portfolio offers a general overview, through photographs and narrative, of the history of data processing and presents a visual reference to the devices and people that have affected the development of computers. This pictorial approach enables a comparison of today's computers with their predecessors. It is also possible to observe the tremendous technological strides computers have made in a relatively short period of time. Already, three generations of computer equipment have been introduced, with a fourth generation on the way. This portfolio provides a glimpse of this everchanging technology.

CHAPTER OBJECTIVES

After studying this portfolio, you should be able to:

1. Understand and identify key elements in the history of data processing.
2. Identify and discuss the generations of computer equipment.
3. Identify the accomplishments of Babbage, Hollerith, Atanasoff, Von Neumann, and others.
4. Discuss the following major terms:

Abacus
Babbage's Difference Engine
Bubble memory
ENIAC
First-generation computers
Hollerith's census work
Jacquard's loom
Magnetic disk
Magnetic tape
Mark I
Mass storage system
Microcomputer
Minicomputer
Pascal's Machine Arithmetique
Printing subsystem
Second-generation computers
Third-generation computers
UNIVAC I

CHAPTER SUMMARY

The need to count and record data has existed since prehistoric man. Discoveries have shown that primitive peoples often recorded data by drawing on the walls of caves. However, as mankind traveled to the four corners of the earth, a portable computational means was needed. The abacus is one of the earliest known computing devices, tracing its roots to ancient Babylonia.

In addition to the need for a portable computing device, it was also necessary to develop a notation that could represent quantities and be used in arithmetic operations. The Egyptians developed a series of numerals to represent specific amounts. Our currently used decimal system, based on the number 10, was refined from arabic numerals. Computers employ a binary system, based on the number 2, to represent their data.

As trade expanded and nations evolved, the need for accounting and record-keeping expanded. Similarly, today's businesses also have an expanding need for computational devices. Current computers are capable of analyzing vast quantities of data in a matter of seconds and recording these results in a format directly usable by management.

The effort to develop a computational device has been an ongoing process. In the 1640s, Pascal developed the Machine Arithmetique, a device which functioned as an adding machine. Leibniz further refined this type of device, enabling it to perform other arithmetic operations.

Two revolutionary concepts emerged during the early 1800s. Jacquard developed an automated loom which operated under the control of holes punched onto a continuous series of cards. Years later, Babbage developed a design for a mechanical calculator that could perform complex mathematical operations. However, Babbage was unable to build either his Difference or Analytic Engine although

he devoted many years to this work. A working model of the Difference Engine was eventually built by George P. Schuetz, in 1854. During this time, Babbage encouraged others to carry on research in the area of the processing of data. One person who took this direction was Lady Lovelace. She presented a translation of a paper by L. F. Menabrea and refined many of the concepts developed in that study. It is felt by many that her efforts represented a crude approach to programming.

Hollerith's work for the U.S. Census Bureau, in the 1880s, was a milestone in the history of data processing. Hollerith developed a punched card and code to facilitate the processing of the 1890 census. The tabulating equipment developed to support the handling of the coded census cards was significant because it represented one of the first forms of data processing devices.

The period preceding World War II saw the rapid emergence of the computer. John V. Atanasoff's work at Iowa State University proved to be a starting point for many subsequent discoveries. His development of the first electronic computational device preceded the creation of the first true computer by several years.

In 1937, the Mark I computer was developed at Harvard University by Dr. H. H. Aiken. ENIAC, the first all-electric computer, was developed in 1946. The stored program concept, created by Von Neumann, was incorporated in the EDSAC computer in 1949.

UNIVAC I, the first commercially available computing system, appeared in 1951. It was characteristic of the first generation of computer equipment because it was constructed of vacuum tubes. First-generation computers were big, bulky devices that were relatively difficult to program, were restricted in their uses, and required a controlled environment. The early 1950s also saw the development of magnetic tape, a compact storage medium that permitted the high-speed transfer of data to the computer and the sequential storage of millions of characters of data.

The post-Sputnik era of the late 1950s marked the emergence of the second generation of computers. These devices were considerably smaller than first-generation machines because they were constructed using transistors. Second-generation machines had higher processing speeds and more internal storage and they were applied to a variety of data processing tasks. Magnetic disk was developed and introduced between 1959 and 1965. This device permitted the independent access of data from computer files.

The mid-1960s saw the introduction of the third generation of computer equipment. These computers used microminiaturized integrated circuits to support speeds reaching one-billionth of a second.

Third-generation devices were easier to program, had vast internal storage capabilities, and employed a wide range of input-output devices.

The use of silicon chips in the construction of computers was evident in 1970. Minicomputers also emerged in the early 1970s. These smaller computers offered high-speed computer capabilities at a saving. A spinoff of the minicomputer is the microcomputer, a still smaller device. Microcomputers have specific applications and represent the home computer of the future.

In recent years, computer technology has introduced mass storage systems capable of storing billions of characters of data. Laser printers and other printing devices which combine the resources of a duplicating machine, computer printer, and typesetter have been introduced. Bubble memory, a newer technology, has been incorporated into printing devices and is being refined for use in computer construction.

New research is providing breakthroughs in computer technology. The newer systems operate more efficiently than did the prior systems, using only one-fourth the energy previously required, offering four times the speed, and providing massive amounts of internal storage. The addition of supporting computer devices is readily accomplished, as these devices were developed with this feature in mind.

Technology is also expected to increase the internal speeds of future computers. Research is underway to refine the use of the Josephson tunneling switching device, which has experimentally shown speeds in the trillionths of a second. These efforts will result in computers that can process data faster than pioneers in the field of computer technology ever dreamed possible.

The historical portfolio offers an introduction to many topics that will be reviewed at length in later chapters. The questions that follow will help reinforce the material presented within this introduction.

SELF-STUDY QUESTIONS

Fill in the appropriate word or words to complete the sentence.

abacus

1 One of the earliest known computational devices is the _____ .

ten (10)

two (2)

2 The decimal system, normally used in most computations, is based on the number _____, whereas the binary system utilized with computers, employs a base of _____ .

Fra Luca Pacciola

3 Double-entry bookkeeping was developed by the fourteenth-century monk, _____ .

tally stick

4 The English _____ served as a tax receipt and record of who paid taxes.

odometer

5 Pascal's Machine Arithmetique was constructed of interlocking gears and operated in a manner similar to an automobile _____ .

punched cards

6 Jacquard's automated loom employed a series of _____ to control weaving.

Charles Babbage

7 The Difference and Analytic Engines were attributed to _____ .

Lady Lovelace

8 One of the first crude attempts at solving a problem using a form of programlike logic was employed by _____ in England in the 1840s.

Hollerith

9 To complete the 1890 census, _____ designed and used a punched card, code, and tabulating equipment to process the data.

Dr. John Atanasoff's

10 In the 1930s, _____ work at Iowa State University led to the development of many of the future computer devices.

all-electric

stored program

11 ENIAC was the first _____ computer, whereas EDSAC was the first computer to employ the _____ concept.

first-

vacuum tubes

12 UNIVAC I, an example of a _____ generation computer, was constructed of _____ .

transistors

13 Second-generation computers were constructed using _____ .

microminiaturized

14 Third-generation computers employed _____ circuits for their construction.

silicon

15 The initial use of _____ chips in the construction of computers occurred in 1970.

minicomputers

16 Though physically smaller than conventional computers, _____ possess many of the same characteristics attributed to larger systems.

Microcomputers

17 _____ are small, highly specialized computers which may be applied to specific business tasks.

billions

18 Mass storage systems are designed to store _____ of characters of data and make these data available to the computer.

bubble memory

19 Magnetic _____ is now used in portable printing devices, although research on its use in computer construction is continuing.

20 Newer computer systems are proving more efficient to operate, using less

energy, higher

_____ and offering _____ processing speeds.

tunneling switching device

21 The Josephson _____ has experimentally shown internal processing speeds in the trillionths of a second.

TRUE/FALSE QUESTIONS

Circle T if the statement is true. Circle F if the statement is false.

T F **1** The abacus is a computational device that was developed only a few hundred years ago in the Orient.

T F **2** The necessity to count and record data has faced humanity since primitive times.

T F **3** The binary number system, used by computers to represent data, is based on the number 2.

T F **4** The majority of work related to development of the computer was performed prior to World War II.

T F **5** First-generation computers, constructed using vacuum tubes, were large, bulky devices that were difficult to program and did not require a controlled, air-conditioned room.

T F **6** Research on computer prototypes was performed by Dr. Atanasoff at Iowa State University in the early 1930s.

T F **7** The first crude attempts at programming are associated with the countess Lady Lovelace in the 1940s in England.

T F **8** Magnetic tape, introduced in the mid-1950s, permitted the nonsequential storage of data.

T F **9** The IBM 360 is an example of a second-generation computer.

T F **10** Modern computers, such as the IBM 370, are constructed using silicon chips.

T F **11** Mass storage systems permit the computer to access billions of characters of data.

T F **12** Magnetic bubble memory, once a laboratory concept, is now incorporated into the construction of printing devices.

T F **13** Microcomputers will find great acceptance as home computers, but will find little use in the educational environment.

T F **14** Newer computer systems, such as the IBM 4300 Series, are proving to be energy efficient but are not showing any increases in actual processing speeds.

T F **15** It is estimated that future computers will operate at internal speeds in the trillionths of a second.

MULTIPLE CHOICE QUESTIONS

Enter in the left-hand margin the letter that best completes the sentence.

_____ **16** The arabic number system, employed in most of our normal computations, is based on the number:
- ***a.*** two
- ***b.*** eight
- ***c.*** ten
- ***d.*** twenty

_____ **17** The Machine Arithmetique was developed by:
- ***a.*** Leibniz
- ***b.*** Babbage
- ***c.*** Von Neumann
- ***d.*** Pascal

_____ **18** Jacquard's automated loom controlled its weaving of fabric through the use of:
- ***a.*** holes punched onto a series of cards
- ***b.*** holes punched onto a string of paper tapes
- ***c.*** holes on punched cards manually fed to the loom
- ***d.*** all the above

_____ **19** The developer of the Difference Engine was:
- ***a.*** Leibniz
- ***b.*** Babbage
- ***c.*** Von Neumann
- ***d.*** Pascal

_____ **20** To speed the processing of the 1890 census, Hollerith developed:
- ***a.*** the punched card
- ***b.*** a punched card code
- ***c.*** tab equipment to process cards
- ***d.*** all the above

_____ **21** The stored program concept is attributed to:
- ***a.*** Leibniz
- ***b.*** Babbage
- ***c.*** Von Neumann
- ***d.*** Atanasoff

_____ **22** The first all-electric computer was:
- ***a.*** Mark I
- ***b.*** ENIAC
- ***c.*** EDSAC
- ***d.*** SOMAC

_____ **23** Second-generation computers were constructed of:
- ***a.*** vacuum tubes
- ***b.*** transistors
- ***c.*** magnetic cards
- ***d.*** silicon chips

_____ **24** Third-generation computers were capable of:
- ***a.*** operating speeds approaching one-billionth of a second
- ***b.*** improved input and output capabilities
- ***c.*** vast internal storage
- ***d.*** all the above

_____ **25** A computer system which may be programmed for a specific task and found in the home is the:
- ***a.*** minicomputer
- ***b.*** microcomputer
- ***c.*** megocomputer
- ***d.*** all the above

ANSWER KEY

1 F	**2** T	**3** T	**4** F	**5** F
6 T	**7** F	**8** F	**9** F	**10** T
11 T	**12** T	**13** F	**14** F	**15** T
16 C	**17** D	**18** A	**19** B	**20** D
21 C	**22** B	**23** B	**24** D	**25** B

One

The Impact of Computers

Many people are unaware of the influence exerted on our lives by computers; a large number of the services we receive are computer supported. This chapter enables us to discuss and broaden our understanding of computers and the impact that they have on our existence.

Initially, society's need for counting and the research related to developing a computer is examined. The computer's effect on society is the next topic of discussion; here we look at the computer's ability to affect mankind adversely and examine the government's use of computers, computerized analysis and the impersonality of records, and computer-related jobs. The issue of the computer's invasion of privacy and the importance of data security measures are reviewed.

A discussion of computerized crimes precedes an examination of the computer's involvement in the arts. Actual cases of computer-related crime illustrate how this high-speed device can be an unwitting ally to criminals. A review of how films have reflected society's opinions of computerized activities is presented.

Factors that provide a rationale for adoption of a computer system are discussed. An overview of an actual payroll system provides a perspective on the steps composing a data processing application.

CHAPTER OBJECTIVES

After studying this chapter, you should be able to:

1. Understand how the need for data provided the impetus to develop a computational device like the computer.
2. Discuss how the computer's vast processing potential may be used to assist or suppress mankind.
3. Discuss how the computer might be involved in criminal activities.
4. Cite examples of roles created for the computer in literature and the movies.
5. Understand how speed, accuracy, and reliability might be important factors in deciding to use a computer.
6. Describe the automated processing of data through a payroll system.
7. Understand the following major terms:

Accuracy	Password
Collection of data	Processing
Controls	Program
File	Reliability
Frequency	Speed
Input	Update
Output	Volume

CHAPTER SUMMARY

The advent of the computer represents the result of efforts to develop an automated device capable of high computational speeds, the storage of large amounts of data, and the generation of reports. Though computer technology has made rapid strides forward in the past decades, the desire for such a device has existed for many centuries.

Even the lonely shepherd had a need for counting. Counting was the method used to monitor the size of the flock. As trade increased between nations, the necessity for merchants to maintain records was even more evident. The exchange of monies for goods received was a matter of great importance, as the ability to corner the market on a special commodity might result in instant financial success. The industrial revolution added additional impetus to the computer's development. The axiom "time is money" became the byword of industry. Business people in possession of timely information could control the destiny of their companies and rule the marketplace.