STUDY GUIDE

for use with

COMPUTERS
TOOLS FOR KNOWLEDGE WORKERS

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Preface

This Study Guide is intended to assist you in understanding and using the concepts presented in **Computers: Tools for Knowledge Workers** by Jack Rochester. You can use this guide both before and after reading the corresponding chapter in the text. For example, you may use some of the questions as a pre-test, and use the remaining questions as a post-test. These exercises will give you an indication of your competency with the new terms and ideas associated with learning about computers.

Each chapter of the study guide includes:

- -Chapter Outline
- -Learning Objectives
- -Learning Outline, or overview of topics covered in the chapter
- -List of key terms
- -Study exercises, including True/False, Multiple Choice, Matching, and Short Answer questions
- -Answer Key

Computer literacy is so important, not just for computer science or related majors, but for every field of study. Once you begin to learn about computers, you'll be amazed by the places you notice them used or see them mentioned. These machines, these tools, seem to be everywhere. And if they are not there yet, they soon will be.

I'd like to add a short thank you to my mother, Anita B. Gulledge, for her encouragement and her courage, and to my husband, Bobby, for limitless patience.

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Learning Objectives

After reading and studying the corresponding chapter in the text, and completing the exercises in this study guide, you should be able to:

-Explain the many uses for computers in modern life
-Describe the characteristics of knowledge workers
-Describe the components that make up all computers
-Name and identify the different types of computers
-Understand the difference between data and instructions
-Describe the five data processing steps
-Name the two types of software

Learning Outline

I. Computers are Everywhere

Computers are present today in virtually every industry, business or endeavor that humans undertake . You encounter computers, or operations or items that are computerized, all during the course of your daily life. Computers are used in grocery

stores, automatic teller machines (ATMs), and even in your car and VCR. Computers provide speed in processing that is vital to a variety of industries. These machines also provide massive storage capacity, giving almost instant access to data. Today, computers are used not just to improve efficiency or to decrease costs. These machines also improve communications in many ways that benefit not just one or two companies, but society as a whole. Examples of this are computers that are used for world-wide stock market trading, law enforcement, and newspaper and magazine publishing. Other uses that benefit society are computerized mapping and computer modeling for weather and climate forecasting.

We rely on computers, but there are risks associated with this reliance. For example, while computers give us speed in transacting business or performing calculations, accuracy is actually a function of the people who use the computer system. As computer users, we should not place total confidence is numbers generated by a computer without a thorough understanding of how a computer works. Another risk associated with the increased reliance on computers is the possibility of abuse of the data stored in a computer system. Yet another is unauthorized access to and use of a computer. Often a computer is a tool in "white collar" crime, costing us billions of dollars each year. Many proposed changes to our current Federal laws would help create a more uniform means of categorizing and prosecuting computer crime.

Computer Literacy is becoming a requirement for workers today. A person who is computer literate is knowledgeable about the computer and how it can be used, and is able responsibly to use a computer himself. A computer literate workforce is often cited as a requirement for the **Information Age.** Western society is in the Information Age, as it has these three characteristics:

1. information is a commodity
2. information has value
3. information is bought and sold

II. The Knowledge Worker

Knowledge Workers are people who routinely use the computer to conduct their work. Knowledge workers are, by definition, computer literate. Another term for knowledge worker is computer user. The need for knowledge workers is expected to steadily increase in the coming decade, as information-intensive jobs increase. Knowledge workers are one of the primary components of a computer system. Those components are **people, data, procedures, software and hardware.** Computer systems are used by knowledge workers to produce **documents**, or works that can be saved as files and retrieved for later use. Documents contain data that has a use. They can exist electronically, or can be printed to paper.

III. What is a Computer?

A **computer** is an electronic device that is used to accept, process, and store data. Processing data involves performing the logical or arithmetic operations that will manipulate or change data in the desired way. Computers are grouped into four types: personal computers, minicomputers, mainframe computers, and supercomputers.

The **personal computer** is also called the **microcomputer**. It is used by a single person. Personal computers as we know them were introduced in 1977 by Apple Computer and Radio Shack. Personal computers, like their larger counterparts, contain a system unit, a keyboard, a monitor, and a printer. The **system unit** is where the electronic processing components are contained. The **keyboard** is used to enter data or instructions. The **monitor**, or video display screen, is used to display your work and the results of processing. The **printer** produces a paper copy of your work or the processed information.

The main differences between personal computers and other, larger computer system are physical size and processing speed. **Minicomputers** are mid-sized computers that may be used for a variety of tasks. The first minicomputer was the DEC PDP-1, introduced in 1959. Minicomputers today are difficult to define by size, but in general are more powerful than a personal computer, but less powerful than a mainframe computer.

Mainframe computers, or mainframes, are very large computers typically used for high-speed business data processing. Hundreds or thousands of people can use a mainframe. The most popular mainframe ever produced is the IBM System/360, which was introduced in 1964. Although many businesses have invested in minicomputers and microcomputers, the need for mainframes is still strong. Today, mainframes commonly act as repositories for data. Computer systems today may actually be a combination of several types of computers, working together to provide information.

The **supercomputer** is a special type of large, high-speed computer system that is generally dedicated to a single kind of complex, scientific processing. These computers are used in governmental and scientific research in military weapons development, atmospheric and earth science research and oil and gas exploration. Supercomputers require special environments (including a stable base made of concrete and separate, efficient air conditioning) to operate. Current supercomputer manufacturers include Cray Research, Inc., IBM and Fujitsu.

All modern computers have several characteristics in common. First, they are **electronic**, requiring some type of electrical circuit. Next, computers are **digital**, using binary numbers for processing. Binary numbers are 0 and 1. The **binary system** is used because the digits can represent the two electrical states on and off. **ENIAC**, developed at the University of Pennsylvania by John Mauchly and Presper Eckert, was the first electronic digital computer. In contrast to a computer, many other electronic devices are analog, meaning they do not use digits, but work by measurement and comparison. An example of an analog device is a radio that has a knob that controls the position of an indicator, while a digital radio is tuned by precise numbers.

IV. How Computers Do Their Work

Computers perform work by processing very specific instructions. An **instruction** is a group of characters that a computer understands. Directing a computer to perform a task usually involves many separate instructions. These instructions are in the form of **programs**. Computers process data through two kinds of operations, **arithmetic**

operations and **logical operations**. Arithmetic operations include the basic math operations addition, subtraction, multiplication and division. Logical operations are comparisons, such as greater than, less than and equal to.

There are five specific steps in data processing. These steps are those which the computer must be directed to perform in order to provide the kinds of complex information we generally require. The first step is **input**, or giving the computer some data or instructions. The computer undertakes **processing**, during which it performs calculations or comparisons on the data. These calculations produce the next step, or **output**. Most often we will want to save this output, as well as the data and instructions that produces it. This step is called **storage.** The last step is to produce **results**, or information that a person can use. Results are produced most often as output on a printer or video monitor.

Another term for a program or set of programs is **software.** Software is written by a **programmer**. Programmers must understand both the nature of the task the computer is to perform, as well as a language that the computer understands. There are two different kinds of software, **systems software** and **applications software**. Systems software instruct and control the computer itself, and allow a person to use the computer. Applications software allows a person to perform some task. There are many kinds of applications software. The most popular kinds of software are word processing, database management, and spreadsheet.

Application software is created by programmers to provide sets of instructions for specific uses. These programs allow us to perform tasks using **procedures**, or clearly defined steps. There are three application software types that are used in a variety of settings. Those applications are **word processing**, **spreadsheet**, and **database management system** software. Word processing software lets the user create and edit written documents. Spreadsheet software is used for accounting, statistics and other mathematical purposes. Database management software allows us to collect and organize data.

Computers are described by Dr. Louis Lucky as a tool for organizing data into four levels, data, information, knowledge and wisdom. **Data** are raw facts that are not organized. Processing data results in **information**, which is defined as organized, useable data. Application software accepts data, and produces information. Knowledge workers can organize information even more, producing knowledge, and eventually leading to wisdom. The computer gives us a very powerful tool with which we can conduct our search for knowledge. This knowledge, and the people who can work with it, are becoming more vital to business and industry. In the future we will see an increase in service industries which provide information, and an increase in the need for knowledge workers.

V. Information Age Ethics

The Information Age has produced some new concerns about our personal privacy. Among those concerns are the risks related to the use and potential abuse of computers. Government computers warehouse a vast amount of data about each of us, as do banks, credit bureaus and insurance companies. This data can be used to

gain information about us without our knowledge or consent, although there are a number of laws in the United States designed to protect us. Other laws, which more specifically deal with computers and computer abuse are currently being considered in various states and the Federal government.

Key Terms to Define

analog

application software

arithmetic operation

computer

computer literacy

computer system

data

database management system

data processing

digital

document

electronic

information age

input

instruction

keyboard

knowledge worker

logical operation

mainframe

minicomputer

monitor

output

personal computer

printer processing

program

programmer

programming

results

software

spreadsheet

storage

system software

system unit

word processing

Chapter One Study Questions

True/False: Mark each answer by circling the appropriate letter:

T F 1. To be computer literate, you must be a programmer.
T F 2. Radios with dials are analog devices.
T F 3. ENIAC was the first electronic digital computer.
T F 4. The binary system uses 1s and 2s.
T F 5. Personal computers are bigger and more expensive than minicomputers.
T F 6. System software allows you to perform tasks such as word processing and database management.

T F 7. Data processing has five steps: input, output, processing, storage and results.
T F 8. Use of a computer guarantees accuracy of information.
T F 9. The Information Age has ended.
T F 10. A computer system is made up of people, data, procedures, software and hardware.
T F 11. The need for knowledge workers will decrease in the coming decade.
T F 12. Collecting information about individuals without their consent is not a problem unless that information is sold or published.
T F 13. A mainframe is a mid-sized computer.
T F 14. Supercomputers usually work on one type of complex problem.
T F 15. Data are raw material for information.
T F 16. A program is a set of instructions.
T F 17. Computers process data through arithmetic and logical operations.
T F 18. Programmers design computer hardware.
T F 19. System software controls a computer's primary operations.
T F 20. Procedures are clearly defined steps.
T F 21. Information is organized data.
T F 22. U.S. laws always protect individuals against computer abuse.
T F 23. The system unit contains the computer's electronic components.
T F 24. Output is the result of processing.
T F 25. Every time you use an ATM or a credit card, your transaction is recorded in a computer.

Fill-In-the-Blanks

1. _____ software is used to produce useful work.

2. _____ software controls a computer's operations.

3. The _____ computer is a large, general use computer commonly used in business.

4. The _____ computer is also called the personal computer.

5. Instructions or data we give a computer are called _____.

6. _____ provides a finished copy of the results of processing.

7. Computers are used to enhance _____.

8. The first digital, electronic computer was the _____.

9. Banks commonly use _____ as a way for customers to access their larger computer systems.

10. The "post-industrial society" is also called the _____ .

11. A _____ is a self-contained work that can be saved and retrieved.

12. A computer performs _____ and _____ operations.

13. The _____ is used to enter data and instructions

14. Personal computers are typically used by _____ person(s).

15. The _____ is the best known supercomputer.

Short Answer

1. What are the two primary characteristics of the "modern computer"?

2. What exactly is "data processing"? What are the steps involved?

3. What are the three most commonly used types of application programs?

4. What is the difference between an instruction and a program?

5. Why should you become "Computer Literate"?

Matching

1. _____ binary	A. using the digits one and zero
2. _____ input	B. basic math, including addition, subtraction, multiplication and division
3. _____ output	C. raw facts that are not organized
4. _____ analog	D. organized facts
5. _____ digital	E. a set of programs
6. _____ data processing	F. set of instructions for the computer
7. _____ information	G. software that instructs and controls the computer
8. _____ program	H. software that allows a person to perform some task
9. _____ software	
10. _____ arithmetic operation	
11. _____ logical operation	

12. ____ data
13. ____ application software
14. ____ systems software
15. ____ system unit

I. using binary numbers for processing
J. the product of processing
K. using measurements and comparison for processing
L. giving the computer some data or instructions
M. using the computer to turn data into information
N. the part of the computer that does the work
O. making comparisons such as greater than or equal to

Multiple Choice

1. Physical equipment in a computer system is called:
   a. Hardware
   b Information
   c. Software
   d. peripheral

2. Mainframe computers:
   a. are the same as supercomputers
   b. are slower than microcomputers
   c. have less storage than minicomputers
   d. none of these answers

3. Operations common to the processing of data include all the following EXCEPT:
   a. input
   b. storage
   c output
   d. retrieve

4. Which of the following computers is generally the smallest and least expensive?
   a. supercomputer
   b. personal computer
   c. mainframe
   d. minicomputer

5. Data is defined as:
   a. information
   b. results of processing
   c. facts and numbers
   d. output

6. Information is defined as:
   a. input
   b. results of processing
   c. instructions
   d. raw material for processing

7. _____ software contains instructions to control a computer's primary operation.
   a. applications
   b. control
   c. systems
   d. database management

8. Supercomputers are commonly found in all except:
   a. engineering
   b. banking
   c. research
   d. weather and climate forecasting

9. Electronic devices have components such as:
   a. silicon chips
   b. system units
   c. transistors
   d. a and c
   e. a and b

10. ENIAC was originally developed to perform:
   a. census statistics
   b. nuclear engineering
   c. ballistics trajectories
   d. election tabulating

11. Which of the following is NOT a common component of a computer?
   a. system unit
   b. monitor
   c. keyboard
   d. optical disk drives

12. Minicomputers were originally designed for use in:
   a. general tasks
   b. special purpose tasks
   c. business applications
   d. none of these answers

13. The most popular minicomputer is made by:
   a. IBM
   b. Cray Computer
   c. Digital Equipment Corporation
   d. Control Data Corporation

14. Risks associated with the use of and dependence upon computers include all of the following except:
   a. programmer error
   b. unauthorized use
   c. misuse of information
   d. computer literacy

15. Components of a computer system as we have come to use the term include all except:
   a. people
   b. productivity
   c. data
   d. hardware

16. Characteristics of the personal computer do not include:
   a. used by 2 or more people
   b. small enough for a desktop
   c. affordable
   d. less powerful than a minicomputer

17. A set of programs that permits the computer to manage its own resources is a(n):
   a. supervisor
   b. operating system
   c. manager
   d. none of these answer

18. A computer programmer:
   a. fixes the CPU
   b. writes hardware
   c. writes software
   d. designs computers

19. Software that allows the user to conduct useful work is called:
   a. program software
   b. systems software
   c. application software
   d. user software