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计算机英语

第二版

主编 何英 何丹

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北京出版社

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目 录

Unit 1

Introduction to Information Technology

Overall Objectives

Upon completion of this unit, you should be able to:

- learn key terms about information technology in this unit;
- understand the basic knowledge of information technology.

Tasks Introduction

Task 1.1 Digital Computer

Learning Objectives

After completing this task, you should be able to define what the digital computer is.

Learning Preparation

Key terms—digital computer; hardware; CPU; Memory

Relative specilized knowledge; Internet

Plan and Implement

Step 1 Read Relative Knowledge;

Step 2 Require students to grasp the key terms in this task;

Step 3 Assessment.

Inquiry and Discovery

Von Neumann Architecture has become the factual standard for a long time and is still used today. Try to describe it.

Relative Knowledge

The modern digital computer was invented between 1935 and 1945. The digital computer is an acknowledged symbol of 20th century technology. Digital computers surround us. It's hard to find a field in which digital computers are not being used. The word "digital" implies that the information in the computer is represented by variables that take a limited number of discrete values. The digital computer is also called a electronic computer or computer—a tool that is a programmable, electronic device that accepts input, performs operations or processing on the data, and outputs and stores the results. The relationships between these four main computer operations (input, processing, output and storage) are shown in Figure 1−1.

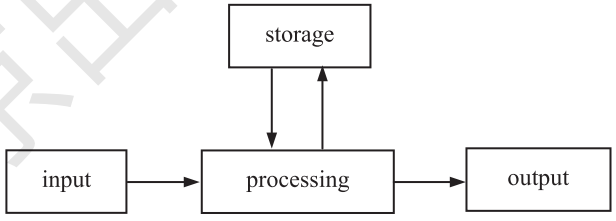

Figure 1–1 The Relationships between Four Main Computer Operations

The actual machinery (wires, transistors, and circuits) is called hardware; the instructions and data are called software. All general-purpose computers require the following hardware components:

Central processing unit (CPU). The heart of the computer, this is the component that actually executes instructions organized in programs ("software") which tell the computer what to do.

Memory (fast, expensive, short-term memory). Enables a computer to store, at least temporarily, data, programs, and intermediate results.

Mass storage device (slower, cheaper, long-term memory). Allows a computer to permanently retain large amounts of data and programs between jobs. Common mass storage devices include disk drives and tape drives.

Input device. Usually a keyboard and mouse, the input device is the conduit through

which data and instructions enter a computer.

Output device. A display screen, printer, or other devices that let you see what the computer has accomplished.

In addition to these components, many others make it possible for the basic components to work together efficiently. For example, every computer requires a bus that transmits data from one part of the computer to another.

Task 1.2 Evolution of Computer

Learning Objectives

After completing this task, you should be able to know the evolution of computer.

Learning Preparation

Key terms—Vacuum Tube; magnetic drum; software; machine language; magnetic disk pack; Integrated Circuit; Minicomputer; mainframe; microprocessor; silicon chip; desktop computer; Artificial Intelligence

Relative specilized knowledge; Internet

Plan and Implement

Step 1 Read Relative Knowledge;

Step 2 Require students to grasp the key terms in this task;

Step 3 Assessment.

Inquiry and Discovery

It seems that today we could not live without computers. So much smaller and more powerful than we might have imagined in 1936! The question is, can we imagine what they will be like in future?

Relative Knowledge

Computers have appeared so rapidly on the modern scene that it is hard to imagine that they have any history at all. Yet they do, and it is a most interesting history indeed. From the first large-scale electronic computer—the Electronic Numerical Integrator and Computer (ENIAC, See Figure 1−2)—was built, computers have developed through five generations.

1. First Generation Computers (1944—1958): Vacuum Tube

The first generation computers used vacuum tubes (See Figure 1−3) for circuitry and magnetic drums (See Figure 1−4) for memory. Because they used vacuum tubes, they were very unreliable, required a lot of power to run, and produced so much heat that adequate air conditioning was critical to protect the computer parts. Compared to today's computers, they had slow input and output devices, were slow in processing, and had small storage capacities. Many of the internal processing functions were measured in thousandths of a second (millisecond). The software (computer program) used on first generation computers was unsophisticated and machine oriented. This meant that the programmers had to code all computer instructions and data in actual machine language. They also had to keep track of where instructions and data were stored in memory. Using such a machine language was efficient for the computer but difficult for the programmer.

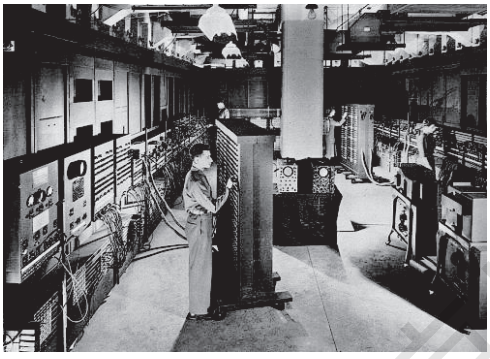

Figure 1–2 ENIAC

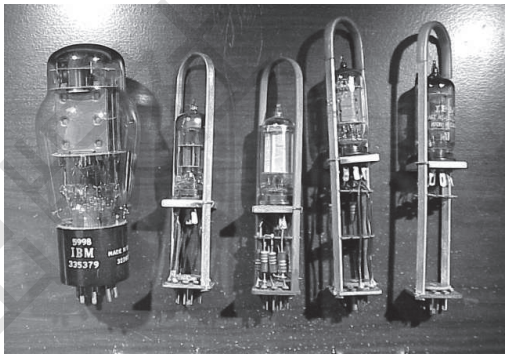

Figure 1–3 Vacuum Tubes

First-generation machines were large, costly to buy, expensive to power and often unreliable.

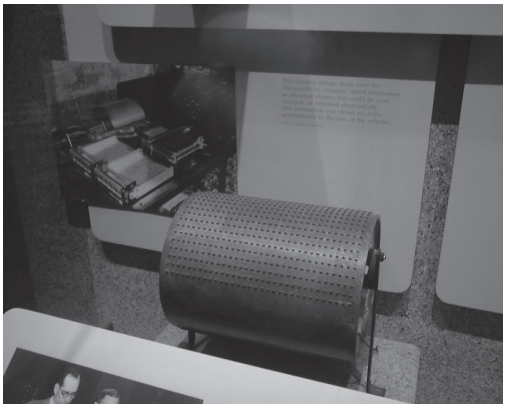

Figure 1–4 Magnetic Drum

2. Second Generation Computers (1959—1963): Transistor

By the early 1960s, transistors (See Figure 1−5) and some other solid-state devices that were much smaller than vacuum tubes were being used for much of the computer. Transistors are smaller and less expensive than vacuum tubes, and they operate faster and produce less heat. The use of small, long lasting transistors also increased processing speeds and reliability. Cost performance also improved. Magnetic cores (See Figure 1−6), which looked like very small metal washers strung together by wires that carried electricity, became the most widely used type of main memory. Removable magnetic disk packs (See Figure 1−7), stacks of disk connected by a common spindle, were

introduced as storage devices. Like the first generation, a particular computer of the second generation was designed to process either scientific or business oriented problems but not both. The software was also improved. Symbolic machine languages or assembly languages were used instead of actual machine languages. This allowed the programmer to use mnemonic operation codes for instruction operations and symbolic names for storage locations or stored variables. Compiler languages were also developed for the second generation computers.

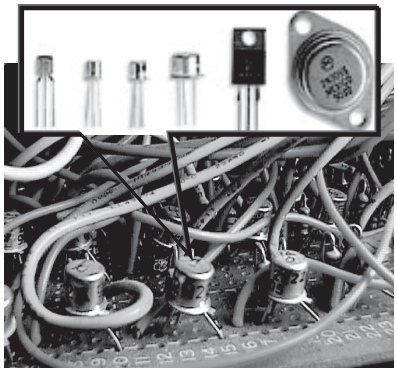

Figure 1–5 Transistors

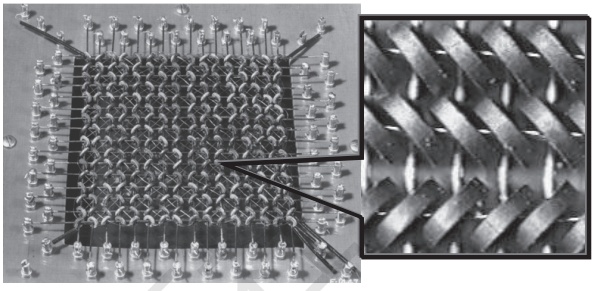

Figure 1–6 Magnetic Cores

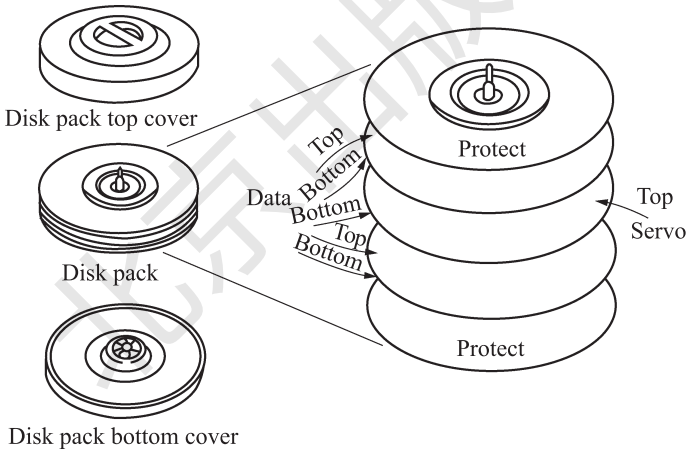

Figure 1–7 Magnetic Disk Packs

Second-generation machines tended to be smaller, more reliable, and significantly faster than first-generation computers.

3. Third Generation Computers (1964—1970): Integrated Circuits

On April 7, 1964, IBM announced the System/360 all-purpose computer. It was considered to be the most important event in the history of computers. It is the beginning of the third generation of computers, which was characterized by the integrated circuits or IC (See Figure 1−8). Integrated circuits are cost-effective because individual components don't need to be wired directly to the computer's system board.

The use of magnetic disks for secondary data storage became widespread, and computers

began to support such capabilities as multiprogramming and timesharing. Minicomputers were being widely used by the early 1970s and were taking some of the business away from the established mainframe market. Processing that formerly required the processing power of mainframe could now be done on a minicomputer.

4. Fourth Generation Computers(1971—Present): VLSI Integrated Circuits

Very-large-scale integration (VLSI, See Figure 1−9) is the process of creating integrated circuits by combining thousands of transistor-based circuits into a single chip. VLSI began in the 1970s when complex semiconductor and communication technologies were being developed. The microprocessor is a VLSI device. The term is no longer as common as it once was, as chips have increased in complexity into the hundreds of millions of transistors.

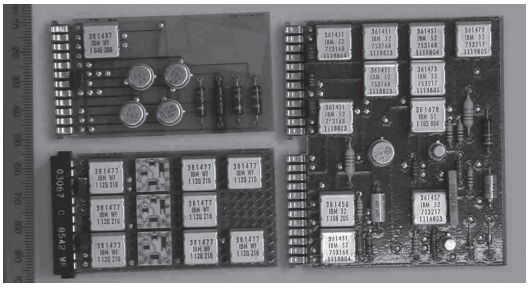

Figure 1−8 Integrated Circuit

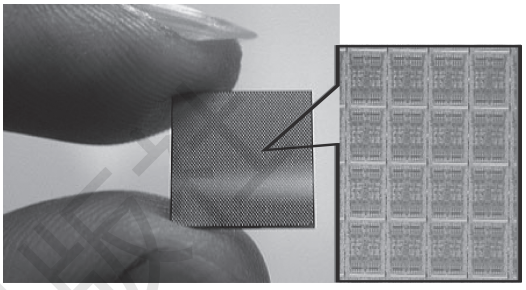

Figure 1−9 VLSI

The microprocessor brought the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip. What in the first generation filled an entire room could now fit in the palm of the hand. In 1971, Gilbert Hyatt at Micro Computer Co. patented the microprocessor; Ted Hoff at Intel in February introduced the 4-bit 4004 (See Figure 1−10), a VLSI of 2300 components, which packaged an entire CPU, complete with memory, logic, and control circuits.

In 1981, IBM introduced its first computer for the home user, and in 1984 Apple Computer introduced the Macintosh personal computer. Microprocessor also moved out of the realm of desktop computers and into many areas of life as more and more everyday products began to use microprocessors.

5. Fifth Generation Computers (Present and Beyond): Artificial Intelligence

The fifth generation computing devices, based on artificial intelligence, are still in development. The use of parallel processing and superconductors is helping to make artificial intelligence a reality. The goal of fifth-generation computing is to develop devices that respond to natural language input and are capable of learning and self-organization.

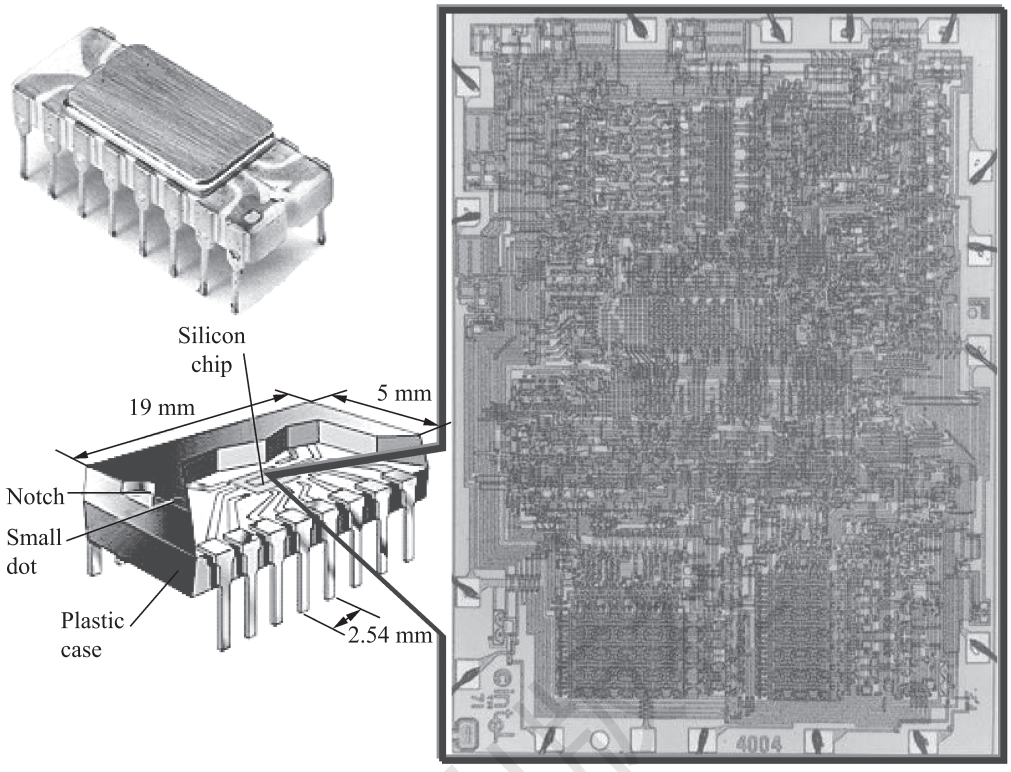

Figure 1–10 Microprocessor 4004

Task 1.3 Types of Computers

Learning Objectives

After completing this task, you should be able to describe the five types of computers.

Learning Preparation

Key terms—Supercomputer; Mainframe Computer; Minicomputer; Microcomputer; notebook computer; personal digital assistant

Relative specilized knowledge; Internet

Plan and Implement

Step 1 Read Relative Knowledge;

Step 2 Require students to grasp the key terms in this task;

Step 3 Assessment.

Inquiry and Discovery

Computers can be broadly classified by their speed and computing power. Try to fill out the table below.

Types of Computer	Descriptions
Supercomputers	
Mainframe Computers	
Minicomputers	
Microcomputers	

Relative Knowledge

Computers can be generally classified by size and power as follows (See Figure 1−11), though there is considerable overlap:

Figure 1−11 Types of Computers

1. Supercomputers

The supercomputer (See Figure 1−12) is the top of the heap in power and expense. This type of computer usually costs hundreds of thousands or even millions of dollars.

Figure 1−12 Supercomputer: IBM Roadrunner, the World's Fastest Computer from 2008 to 2009

A supercomputer is a computer that is at the frontline of current processing capacity, particularly speed of calculation. Supercomputers introduced in the 1960s were designed primarily by Seymour Cray at Control Data Corporation (CDC), and led the market into the 1970s until Cray left to form his own company, Cray Research. He then took over the supercomputer market with his new designs, holding the top spot in supercomputing for five years (1985—1990). In the 1980s a large number of smaller competitors entered the market, in parallel to the creation of the minicomputer market a decade earlier, but many of these disappeared in the mid-1990s "supercomputer market crash".

Today, supercomputers are typically one-of-a-kind custom designs produced by

"traditional" companies such as Cray, IBM and Hewlett-Packard, who had purchased many of the 1980s companies to gain their experience. As of May 2008, the IBM Roadrunner, located at Los Alamos National Laboratory, is the fastest supercomputer in the world.

The term supercomputer itself is rather fluid, and today's supercomputer tends to become tomorrow's ordinary computer. CDC's early machines were simply very fast scalar processors, some ten times the speed of the fastest machines offered by other companies. In the 1970s most supercomputers were dedicated to running a vector processor, and many of the newer players developed their own such processors at a lower price to enter the market. The early and mid-1980s saw machines with a modest number of vector processors working in parallel to become the standard. Typical numbers of processors were in the range of four to sixteen. In the later 1980s and 1990s, attention turned from vector processors to massive parallel processing systems with thousands of "ordinary" CPUs, some being off the shelf units and others being custom designs. Today, parallel designs are based on "off the shelf" server-class microprocessors, such as the PowerPC, Opteron, or Xeon, and most modern supercomputers are now highly-tuned computer clusters using commodity processors combined with custom interconnects.

Supercomputers are used for highly calculation-intensive tasks such as problems involving weather forecasting, climate research, molecular modeling (computing the structures and properties of chemical compounds, biological macromolecules, polymers, and crystals), physical simulations (such as simulation of airplanes in wind tunnels), cryptanalysis, and the like. Major universities, military agencies and scientific research laboratories are heavy users.

2. Mainframe Computers

The mainframe computer is a powerful multi-user computer capable of supporting many hundreds or thousands of users simultaneously. The term probably had originated from the early mainframes, as they were housed in enormous, room-sized metal boxes or frames. Later the term was used to distinguish high-end commercial machines from less powerful units.

Figure 1–13 Mainframe Computer IBM System z10 was Announced on February 26, 2008

Today in practice, the term usually refers to computers compatible with the IBM System/360 line, first introduced in 1965. IBM System z10 is the latest incarnation (See Figure 1−13). Otherwise, large systems that are not based on the System/360 are referred to as either "servers" or "supercomputers". However, "server" "supercomputer" and "mainframe" are not synonymous.

Nowadays a mainframe is a very large and expensive computer capable of supporting hundreds, or even thousands, of users simultaneously. The chief difference between a

supercomputer and a mainframe is that a supercomputer channels all its power into executing a few programs as fast as possible, whereas a mainframe uses its power to execute many programs concurrently. In some ways, mainframes are more powerful than supercomputers because they support more simultaneous programs. But supercomputers can execute a single program faster than a mainframe.

Mainframes are computers used mainly by large organizations for critical applications, typically bulk data processing such as census, industry and consumer statistics, ERP, and financial transaction processing.

3. Minicomputers

It is a midsize computer (See Figure 1−14). The term "mini computer" evolved in the 1960s to describe the "small" third generation computers that became possible with the use of transistor and core memory technologies. They usually took up one or a few cabinets the size of a large refrigerator or two, compared with mainframes that would usually fill a room.

Figure 1−14 The AS/400 Released in 1988 and still in Production in October 1998

1960s: Origin; 1970s: Market entrenchment. The first successful minicomputer was IBM's 16-bit IBM 1130, which cost from US$32,280 upwards when launched February 11, 1965. As microcomputers developed in the 1970s and 1980s, minicomputers filled the mid-range area between low powered microcomputers and high capacity mainframes. The decline of the minis happened due to the lower cost of microprocessor based hardware, the emergence of inexpensive and easily deployable local area network systems, the emergence of the 80286 and the 80386 microprocessors, and the desire of end-users to be less reliant on inflexible minicomputer manufacturers and IT departments/"data centers"—with the result that minicomputers and dumb terminals were replaced by networked workstations and servers and PCs in the latter half of the 1980s.

Mid-1980s, 1990s: The minis give way to the micros. As microprocessors have become more powerful, CPUs built up from multiple components—once the distinguishing feature differentiating mainframes and midrange systems from microcomputers—have become increasingly obsolete, even in the largest mainframe computers.

And although today's PCs and servers are clearly microcomputers physically, architecturally their CPUs and operating systems have evolved largely by integrating features from minicomputers.

4. Microcomputers

Microcomputers are the least powerful, yet are the most widely used and fastest-growing type of computer. A microcomputer is a computer with a microprocessor as its

central processing unit. Another general characteristic of these computers is that they occupy physically small amounts of space when compared to mainframes and minicomputers. Many microcomputers (when equipped with a keyboard and screen for input and output) are also personal computers (in the generic sense). Categories of microcomputer (See Figure 1−15) include desktop, notebook, and personal digital assistant (PDA).

Desktop Notebook PDA

Figure 1−15 Microcomputers

Desktop computer. Desktop computers are designed to fit comfortably on top of a desk, typically with the monitor sitting on top of the computer.

Notebook computer. Notebook computers typically weigh less than 6 pounds and are small enough to fit easily in a briefcase.

PDA. A PDA is a handheld device that combines computing, telephone/fax and networking features.

Task 1.4 Data and Information Systems

Learning Objectives

After completing this task, you should be able to:

- know the several types of data;
- explain the five parts of an information system.

Learning Preparation

Key terms—Data; Information; Procedure; Hardware; Software

Relative specilized knowledge; Internet

Plan and Implement

Step 1 Read Relative Knowledge;

Step 2 Require students to grasp the key terms in this task;

Step 3 Assessment.

Inquiry and Discovery

Computer is an advanced electronic device that takes raw data as an input from the user and processes it under the control of a set of instructions (called program), produces a result (output), and saves it for future use. What is data? What is information?

Relative Knowledge

Data is used to describe facts about something. When stored electronically in files, data can be used directly as input for the information system. Data is represented with the help of characters such as alphabets (A−Z, a−z), digits (0~9) or special characters (+, −, /, *, <, >, = etc.)

Information is organized or classified data, which has some meaningful values for the receiver. Information is the processed data on which decisions and actions are based.

When you think of a microcomputer, perhaps you think of just the equipment itself. That is, you think of the monitor or the keyboard. There is more to it than that. The way to think about a microcomputer is as part of an information system. An information system has five parts: people, procedure, software, hardware, and data (See Figure 1−16).

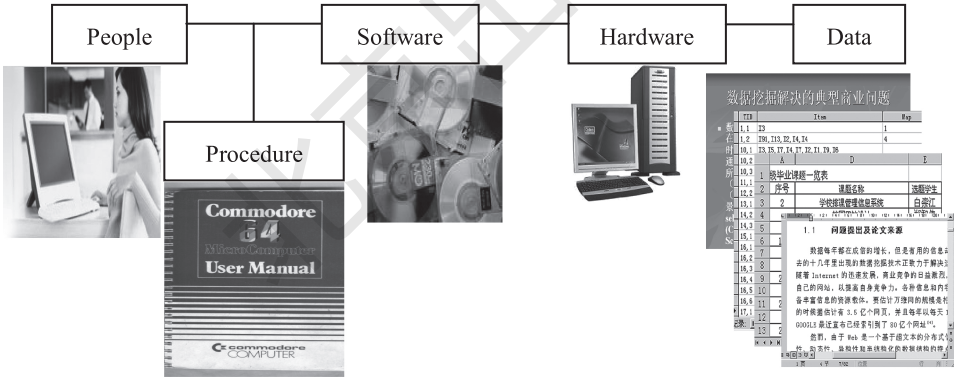

Figure 1−16 Information System

People. It is easy to overlook people as one of the five parts of a microcomputer system. Yet this is what microcomputers are all about making people, more productive.

Procedure. The rules or guidelines people follow when using software, hardware, and data are procedures. Typically, these procedures are documented in manuals written by computer specialists. Software and hardware manufacturers provide manuals with their products.

Software. Software is a general term used to describe a collection of computer programs, procedures and documentation that perform some tasks on a computer system. In the first 35 years of computer history the emphasis was on hardware developments, but now the emphasis has shifted more toward human concerns. As late as the mid-1950's, 90 percent of application

costs were devoted to hardware, but now 90 percent of the costs are software. Software can be divided into two general classes: system software and application software.

Hardware. Hardware means the physical components of a computer system. It includes the keyboard, mouse, monitor, system unit, and other devices. Hardware is controlled by software.

Data. The raw, unprocessed facts, including text, numbers, images, and sounds are called data. After data is processed through the computer, it is usually called information.

Key Terms

digital computer ['dɪdʒɪtl kəm'pju:tə] 数字计算机
input ['ɪnpʊt] 输入
process [prəʊ'ses] 加工，处理
output ['aʊtpʊt] 输出
storage ['stɒrɪdʒ] 存储器
vacuum tube ['vækjʊəm 'tju:b] 真空管，电子管
magnetic drum [mæg'netɪk drʌm] 磁鼓
memory ['meməri] 存储器，内存
machine language [mə'ʃi:n 'læŋgwɪdʒ] 机器语言
transistor [træn'zɪstə] 晶体管
magnetic core [mæg'netɪk kɔ:] 磁芯
magnetic disk pack [mæg'netɪk dɪsk pæk] 磁盘组
integrated circuit ['ɪntɪgreɪtɪd 'sɜ:kɪt] 集成电路
mainframe ['meɪnfreɪm] 大型机
minicomputer ['mɪnɪkəmˌpju:tə] 小型计算机
microprocessor [ˌmaɪkrəʊ'prəʊsesə(r)] 微处理器
silicon chip [ˌsɪlɪkən tʃɪp] 硅片
hardware ['hɑ:dweə] 硬件
software ['sɒftweə] 软件
CPU (central processing unit) 中央处理器
desktop computer ['desktɒp kəm'pju:tə] 台式电脑
artificial intelligence [ˌɑ:tɪ'fɪʃəl ɪn'telɪdʒəns] 人工智能
supercomputer [ˌsju:pəkəm'pju:tə] 超级计算机
notebook ['nəʊtbʊk] 笔记本
personal digital assistant ['pɜ:sənl 'dɪdʒɪtl ə'sɪstənt] 个人数字助理
procedure [prə'si:dʒə] 规程

Assessment and Feedback

Choice Questions

Circle the letter or fill in the correct answer.

1. The four main computer operations are _____.

a. input　　b. processing

c. output　　d. storage

e. compile

2. All general-purpose computers consist of _____.

a. CPU　　b. memory

c. mass storage device　　d. input device

e. output device

3. The first generation computers used _____ for circuitry and magnetic drums for memory.

a. vacuum tubes　　b. magnetic core

c. transistors　　d. silicon

e. integrated circuit

4. The goal of fifth-generation computing is to develop devices that respond to _____ input and are capable of learning and self-organization.

a. machine language　　b. compile language

c. natural language　　d. c++ language

e. assembly language

5. Computers can be generally classified by size and power as _____.

a. desktop computers　　b. minicomputers

c. microcomputers　　d. mainframes

e. supercomputers

6. Categories of microcomputers include _____.

a. desktop　　b. minicomputers

c. notebooks　　d. PDAs

e. ENIAC

7. Four common types of files are _____.

a. document files　　b. worksheet files

c. database files　　d. presentation files

e. ASCII files

8. An information system has five parts: hardware, data, _____.

a. people　　b. OS

c. keyboards
d. procedures
e. software

9. The raw, unprocessed facts, including text, numbers, _____ are called data.
a. images
b. sounds
c. software
d. process
e. magnetic cores

10. The rules or guidelines people follow when using _____ are procedures.
a. software
b. a and c
c. hardware
d. data
e. none of the above

Matching

Match each numbered item with the most closely related lettered item. Write your answers in the spaces provided.

a. integrated circuits
b. software
c. worksheet files
d. artificial intelligence
e. microcomputers
f. central processing unit
g. an information system
h. presentation files
i. output device
j. hardware

( ) 1. It means the physical components of a computer system.
( ) 2. It is the character of the third generation of computer.
( ) 3. Created by electronic spreadsheets to analyze things like budgets and to predict sales.
( ) 4. A program consists of the step-by-step instructions that tell the computer how to do its work.
( ) 5. The basis of fifth generation computing devices and is still in development.
( ) 6. The heart of the computer, this is the component that actually executes instructions organized in programs ("software") which tell the computer what to do.
( ) 7. The least powerful and the most widely used and fastest-growing type of computer.
( ) 8. Created by presentation graphics programs to save presentation materials.
( ) 9. Has five parts: people, procedures, software, hardware, and data.
( ) 10. A display screen, printer, or other devices that let you see what the computer has accomplished.

Review Questions

On a separate sheet of paper, respond to each question or statement.

1. What is the digital computer?
2. Describe the different types of computers. What is the most common type?

3. Explain the five parts of an information system. What part do people play in this system?

Reading Materials

P-ISM

P-ISM (See Figure 1−17) is a pen-style personal networking gadget package. It seems that information terminals are infinitely getting smaller. However, we will continue to manipulate them with our hands for now. We have visualized the connection between the latest technology and the human, in a form of a pen. P-ISM is a gadget package including five functions: a pen-style cellular phone with a handwriting data input function, virtual keyboard, a very small projector, camera scanner, and personal ID key with cashless pass function. P-ISMs are connected with one another through short-range wireless technology. The whole set is also connected to the Internet through the cellular phone function. This personal gadget in a minimalistic pen style enables the ultimate ubiquitous computing.

Figure 1–17　P-ISM