MELVIN BERGER 著

詹尔震 译

生活中使用的计算机

北京科学技术出版社

COMPUTERS IN YOUR LIFE

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（英汉对照）

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内 容 提 要

本书简单地回顾了计算机的历史、阐述了其基本工作原理，以翔实的事例，生动的笔触，着重介绍了电子计算机在各个领域中的应用。读后不仅可对计算机有初步的了解，对它在实现现代化中的作用和所处的战略地位有比较清晰的认识，而且还能帮助读者增长知识。

本书内容丰富，日常用语较多，可供理工科院校学生和具有同等英语程度的科技人员、计算机操作人员学习英语之用。

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译者的话

近些年来，计算机科学发展十分迅速。如今，无论在工商业系统、文教卫生单位、科学研究机关，还是在国防建设中，到处都离不开计算机。计算机正在进入人类生活的各个领域，揭开了新的科学技术革命和工业革命的序幕。因此应用计算机和发展计算机科学是我国实现四个现代化的一个很重要的方面。为了普及计算机知识和帮助读者提高阅读计算机方面的英语书刊的能力，特译注了《生活中使用的计算机》一书。

本书原文选自 Melvin Berger 所著的《COMPUTERS IN YOUR LIFE》一书，1981年版。作者用生动的语言简要地回顾了计算机的历史，阐述了其基本工作原理，并以大量的篇幅，翔实的事例，着重介绍了计算机在各个领域中的应用，读后不仅可对计算机有一个初步的认识，而且还可以了解国外计算机应用的情况，以及其发展趋势。

本书专业内容浅近易懂，附有注释和参考译文，适合于作为自学读物。

由于译者水平有限，错误和不当之处在所难免，请读者批评指正。

译者

1986年11月

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1 COMPUTERS IN ACTION[1]

The mother rushes her three-year-old son to the hospital's emergency room.

"My baby has a very high fever[2]," she explains. "He is shaking all over[3]."

The doctor examines the boy right away. He draws a sample of blood from the boy's arm, and rushes it over to the laboratory. The lab worker places it in a large machine with a built-in computer.[4]

In less than a minute the machine tests the blood and prints out the results. The doctor reads the findings. They tell him what is wrong with the child.[5] He gives the youngster an injection. Half an hour later, the boy is playing and smiling.

To the police officers in the patrol car, it looks like a typical case of a car passing a red light. They put on their flashing lights, and speed up to catch the car. But the other driver begins going even faster.

"This might mean trouble," says one of the officers. "Check the license on the computer. See what you get."

His partner types the car's license number on the tiny computer mounted on the dashboard of the police car. Green letters start to spell out words on the small screen. "Stolen car.[6] Used in armed robbery. Dangerous. Proceed with caution."

The police car pulls ahead. It forces the other car to stop.[7] The two officers come out with drawn pistols. They arrest the driver, and bring him to the police station for questioning.

Four times a year,[8] all the classes at Kennedy High School[9] were dismissed at noon. The teachers spent those afternoons entering grades on the students' report cards.[10]

Now there is no early dismissal[11] at the end of each marking period. The teachers mark the students by filling in little boxes on computer cards. The computer then automatically reads each card, and prints out report cards for the entire student body.

Carla and three of her friends decide to go to a New York Jets football game[12] one Sunday afternoon. But no one has any money. All the banks are closed.

Carla, though, has a special bank card. She goes to the closed bank office. Placing her card in a slot on the outside of the bank, she types in various numbers on the keyboard below.

The keyboard sends a message to the bank's computer. The computer automatically takes the money from her account. It pushes out the bills[13] through another opening in the wall.

Computers help to save lives and catch criminals. They are used to fill out report cards and transact bank business after hours. In hospitals and in police work, in schools and banks, in homes and airports, in factories and stores, in outer space and on the highways, in laboratories and on farms—computers are changing the way we live. In fact, no matter what you do, or where you do it, you can be sure that there is a computer in your life!

2 WHAT IS A COMPUTER?

A PROBLEM SOLVER

A computer is a human tool. Like other tools, it helps people work better. A computer can perform a number of operations at very high speeds. It can add, subtract, multiply, and divide. It can compare numbers, and decide which is bigger and which is smaller. It can arrange and organize long lists of separate items in any order. It can store any number of facts. And it can communicate with its human users.

The computer was invented long, long ago. The inventor's name is unknown, but whoever it was,[1] he or she was the first person to use fingers as a counting machine.

Over the following centuries,[2] many mechanical counting machines[3] were invented They all had moving parts. The ancient Chinese abacus, for example, has moving beads on a frame. Herman Hollerith's 1890 tabulating machine[4] has metal rods that punch holes in cards.

FIRST GENERATION COMPUTERS

The modern age of computers began in 1946. That was when the first electronic computer was built.[5] It did not have any moving parts. Calculations were done by controlling the flow of electricity. It was a giant step forward compared to all of the mechanical devices used before.[6]

This computer, called ENIAC (Electronic Numerical Integrator and Computer) was huge. It weighed thirty tons and covered fifteen hundred square feet. The flow of electrons was controlled by vacuum tubes. The tubes looked like twenty thousand glowing light bulbs.

All of the computers built in the 1950s relied on vacuum tubes. The tubes took up[7] a lot of space, used a lot of electricity, produced a lot of heat, and were not very reliable. That is why[8], in 1959, engineers welcomed the invention of small, solid electronic devices called transistors. Transistors could be used instead of the vacuum tubes

SECOND AND THIRD GENERATION COMPUTERS

When transistors replaced the vacuum tubes in computers, they lowered the price of computers about 85 percent. What's more[9], they ran a thousand times faster. Computers became cheaper, faster, smaller, and more reliable. Transistor-based computers, built during the 1960s, were called second generation machines.

The third generation of computers arrived in the mid-1970s.[10] Miniature integrated circuits were introduced around that time. They are called miniature because the electronic parts are tiny or microscopic in size. They are called integrated because all of these parts are built onto a single chip no larger than your fingernail, made of the mineral silicon.[11] Silicon is a very abundant chemical element found in sand. And they are called circuits because the flow of electrons through these devices performs all the work of the computer. These third generation computers are one-tenth the size of second generation computers. They are also about one hundred times faster and one thousand times cheaper to run.[12]

Miniature integrated circuits are also being used to make new kinds of small computers. They are called either microcomputers or microprocessors. All sorts of modern devices, from pocket calculators to automatic cameras to TV games are based on microprocessors.

The future of computers looks very bright indeed. Computer builders are searching for ways to improve their products.[13] Computer experts are finding new uses for this great problem solver. Who knows what uses they will find for a silicon chip that can solve problems in a fraction of a second.[14]

A computerized medical network may be set up to recognize the symptoms and prescribe the treatment for known diseases. A computer attached to your telephone may allow you to send a written letter to distant points on earth in a few seconds. Industrial computers may be used to run the machines in factories so that human workers will be freed from[15] many dull and dangerous jobs.

Fewer errors will be made on future computers. Errors that are made will be easier to correct than today. As[16] more and more people use computers, computers may become as much a part of our lives as[17] television. Some day[18] computers may be as numerous as telephones.

MEET THE COMPUTER

The computer is an electronic machine. It is a machine that solves problems much as[19] you do. As an example, let's trace the way you would add two numbers.[20] Then, let's see how a computer would do it.

Step 1. You collect information. That is, you either see or hear the numbers to be added.[21]

Step 2. You find a method to solve the problem. In this case, you remember how to do addition.

Step 3. You bring together the information (the two numbers), and the method (addition).

Step 4. You perform the operation, adding the two numbers.

Step 5. You report the results of your work, either by writing down the answer, or by saying it out loud.

All computers go through[22] five similar steps.

Step 1. The computer receives information, or data, from the outside. It changes the data into electronic language, called *input*.

Step 2. The computer has been given a program containing instructions for solving the problem. The instructions are found in the *storage* or memory.

Step 3. The computer brings together the data from the input and the instructions from the storage. This is done by the computer's *control*.

Step 4. The computer goes through the steps of the instructions on the data; this is called *processing*.

Step 5. The computer changes the results from electronic language to human language. It presents the results in print or sound[23], called *output*.

Sometimes the five parts of a computer—input, storage, control, processor, and output—are together in one large unit. Other times they are far apart[24] and connected by wires. Often, large computers have one control and processing unit, with a number of separate memory, input, and output devices.

INPUT: TAKING IN[25] INFORMATION

Computers get most of their input from human beings. Computer operators feed data to[26] the computer through an input device. The most popular input device is the terminal. It looks like an electric typewriter, with a connected television screen.

When you want to enter data into the computer, you type the letters and numbers on the typewriter keyboard. Inside the terminal, the letters and numbers are changed into electrical signals. These signals make up computer language.

Computer language is based on the binary system. It uses only two symbols, on and off.[27] Either the electricity is flowing or it is not flowing. All the letters and numbers have their own special pattern of ons and offs. It is like the Morse code, which also has only two symbols—dots and dashes—to stand for[28] all the letters and numbers.

The television screen is a cathode ray tube, or CRT. It lets you see, in ordinary letters and numbers,[29] what you are typing into the computer input.

Very often there are several terminals connected to one central processing unit. That[30] lets many people use the central processing unit at the same time. All the terminals used by the tellers in a bank or clerks in an airport, for example, are connected to a central process ing unit that may be hundreds of miles away.

Although terminals are very popular, they are not the only input device. Cards, with rows of punched-out holes,[31] can be fed into a machine that reads the pattern of holes, and sends the information, in computer language, to the input. Other devices can actually read printed letters or numbers. Some advanced inputs can even recognize human speech!

Computer experts feed two kinds of information to the computer's input. First, they instruct the computer on how to solve particular problems and perform certain tasks. This is called the computer's program. The program for a bank computer, for instance, instructs the computer on how to keep track of[32] people's accounts, how to add on interest, and how to bring bank books up to date[33]. The program of an airline computer, on the other hand, reserves seats for the different flights, and prints out the tickets.

Second, experts feed the computer the data, the particular facts and figures to be used in its calculations.[34] The bank computer is fed the exact amount of each deposit or withdrawal from an account. And the airline computer is given the name of every passenger that reserves a seat on a plane.

From the input, the program and the data go to the storage part of the computer.

STORAGE, REMEMBERING FACTS, REMEMBERING METHODS

The program and data are kept in the computer's storage, or memory, until they are needed. Every part of the program and every item of data is stored in a specific place, known as an address.[35] That is how the computer can quickly get back, or retrieve, any bit of information that is needed [36]

Usually the program is kept in the main memory. Until recently, the main memory of most computers used tiny metal doughnuts, called cores. The cores were strung on a grid of criss-crossed wires.[37] Each core was magnetized in one direction or the other. One direction was the same as on[38]. The other direction was the same as off. The entire program and all the data were stored on these magnetized cores.

A more advanced memory system stores the information as electrical charges on tiny silicon chips. Each chip, about one-tenth-of-an-inch-square[39] (0.6 sq.cm), holds about sixty-four thousand on or off electrical charges, called bits. The capacity is expected to[40] become even greater in the future.

The most advanced main memory uses tiny magnetic spots, or bubbles, in a thin film of magnetic material. The bubbles are so small that one million of them could fit on a film the size of a silver dollar[41]! Each bubble is magnetized in one direction or the other to carry the information.

The data fed to a computer[42] are most often stored in a separate memory, called the auxiliary memory section.[43] Usually, this is done by magnetism. The most popular devices are the magnetic tape, magnetic drum, and magnetic disk. In all of these, points on the sur face are either magnetized or not. This works the same as electricity on, or electricity off.

CONTROL: BRINGING INFORMATION TOGETHER

Part of the program of instructions given to a computer goes to the control unit. The control is the traffic cop[44] of the computer.

On the basis of[45] the orders in the program, the control unit decides when to send information from the input to storage and when to send it to the processor. It decides when to call up[46] a program and data from storage. It decides when to accept data from one terminal and when from another terminal. And it decides when the results of the computer's work should go to the output.

Just as a good police officer keeps a smooth flow of traffic[47] on a busy road, so[48] a well-programmed control unit keeps a computer working smoothly.

PROCESSING: DOING THE JOB

The processing section, or the CPU (central processing unit), is the heart of the computer. This section car