Computer Culture Foundation

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Abstract

This book includes 4 chapters. They are basic knowledge of computer, introduction of operating system, Microsoft Office 2003 and computer networks. This book focuses on basic computer concepts, basic principles, basic knowledge and basic application methods of computer. According to the book, students can have a clear understanding of computer.

This book can serve as computer-based English teaching materials for university undergraduate and postgraduate students and international students of all majors. It is also applied to other readers with a certain standard tutorial of English for self-study and reference.

Preface

English is regarded as a special language of computer and IT technologies. It has an important status and role which other languages can not be substituted with. Many computer languages are built on the back of the English language.

As China's educational system being geared to international education standards, society has put forward higher requirements to the cultivation of higher education. In order to meet this international trend, Ministry of Education issued the 4th document in 2001. The document stated clearly: undergraduate education should create conditions for introduction of the original foreign language textbooks and teach public course and specialized course in English. *Computer Culture Foundation* is the first computer course for non-computer science students. This course is closely connected with English and inseparable. As we all know, computer is invented by Americans. Teachers teach the theoretical knowledge and operational skills are mainly based on foreign technology. Computer science is a highly time-sensitive subject. Its developments and updates are very fast. Newer knowledge is emerging endlessly. In this case, how can the problem of inaccurate translation of Chinese materials and knowledge lag be solved? —The most effective way is to get students to learn authentic immersive knowledge, to develop their ability to think and solve problems in English. This book is written in English and uses case teachings. The book helps students master basic theories of computer in a pure English environment, improve their application development skills, establish close contact with computers and English, and lay a strong foundation for further study and English proficiency.

This book has four chapters: Chapter 1 is basic knowledge of computer. It mainly introduces the basic principles of computer and hardware and software systems. Chapter 2 is operating system. It mainly introduces basic operation and practical skills on Windows XP. Chapter 3 is Microsoft Office 2003. It introduces standard operation and techniques of document layout in Word, and focuses on the implementation of typesetting papers. It also introduces application of Excel, including data formats, formulas and functions, and pays attention to data management and analysis. Finally, it introduces presentation production, teaching how to create, beautify, insert and edit the slides systematically, and focuses on animation. Chapter 4 is computer networks. It briefly introduces the basic concepts of

Internet, but excludes the complex, difficult, and highly specialized knowledge, and focuses on applications and services provided by Internet.

This book combines the author's wealth of experience in teaching and related publications at home and abroad. The book seeks to describe clear concept, precise translation, concise and easy to understand content. It can serve as computer-based English teaching materials for university undergraduate and postgraduate students and international students of all majors. It is also applied to other readers with a certain standard tutorial of English for self-study and reference.

This book is written by Li Ying. Thanks gratefully to Prof. Cao Qinghua's guidance and revision. Thanks to the help and support of Harl Vincent Jhon (American), Israel (Ghanaian) and Yu Weiren(Chinese).

Due to the rapid development of computer technology, combined with the author's limitation, there will unavoidably be irregularities on the content, materials and narratives. I welcome criticisms and corrections from experts and readers.

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Li Ying

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Contents

Chapter 1
Basic Knowledge of Computer

1. 1   The Development of Computer

The development of the modern day computer was the result of advances in technologies and man's need to quantify. Papyrus helped early man to record languages and numbers. The abacus was one of the first counting machines.

Some of the earlier mechanical counting machines lacked the technology to make the design work. For instance, some had parts made of wood prior to metal manipulation and manufacturing.

1. 1. 1   The Development of the Electronic Computer

Computers came in 1946. By the outbreak of World War II, several computers were under design and construction. The ENIAC is credited as being the first electronic general-purpose computer. The acronym stands for Electronic Numerical Integrator and Computer. Although earlier machines had many of the same qualities that the ENIAC exhibited, the ENIAC was the first Turing-complete digital computer capable of solving a range of computing questions. However, ENIAC was originally built as a war aid; one of its primary design goals was to aid the military in calculations for missile ballistics. The huge monster which is shown in Figure 1. 1 is an actual picture of ENIAC.

The contract to design and build ENIAC was signed in June of 1943, and construction lasted until the unveiling of the computer on February 14 of 1946. ENIAC was conceived and designed by J. Presper Eckert and John Mauchly of the University of Pennsylvania, and it was built at the University of Pennsylvania's Moore School of Electrical Engineering.

ENIAC could perform around 5 000 additions, 357 multiplications, or 38 divisions per

second. Several ballistic problems that previously had taken several days to solve using a desktop calculator took ENIAC less than thirty seconds.
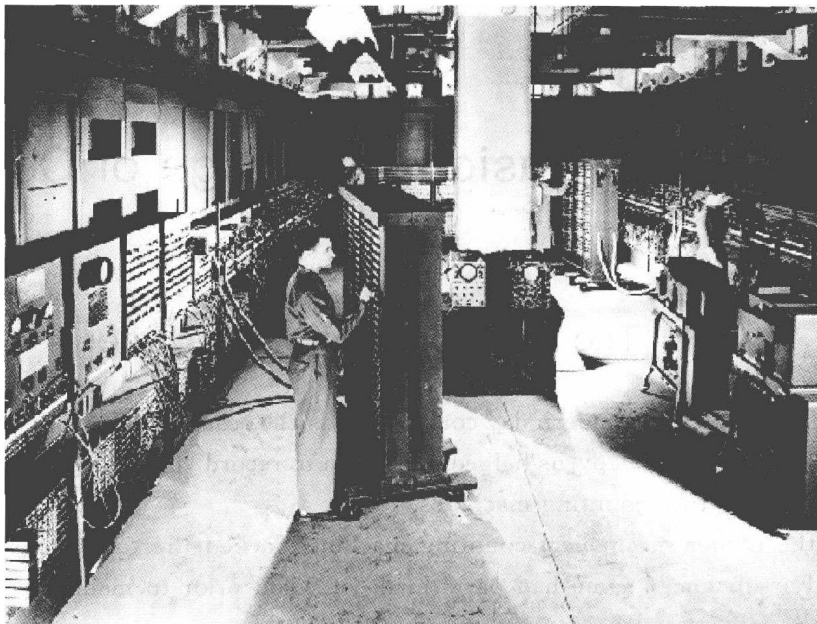
Figure 1. 1   The first electronic digital computer

ENIAC weighed 30 tons, and was roughly 8. 5 feet by 3 feet by 80 feet. Scientists used 17 468 vacuum tubes, 70 000 resisters, 10 000 capacitors and 7 200 crystal diodes to create the ENIAC. It consumed approximately 150 kW of electricity. An IBM card reader and card punch were used for input and output, respectively.

ENIAC made important contributions to computer development. However, ENIAC had several drawbacks that became apparent even before its completion. ENIAC not only used vacuum tubes for computing, but also for temporary storage of computational results. This technique meant fast computations, but led to ENIAC having huge number of vacuum tubes, which in turn resulted in excessive size and cost. Another major drawback of ENIAC concerned its reconfiguration to solve new problems. ENIAC possessed "function table matrices", connected via cables to the rest of the machine, which were composed of switches used to physically configure ENIAC for a particular computation. It could take hours, or even days, to reprogram ENIAC to solve a new problem.

Dr. John von Neumann, world-renowned mathematician and American wartime consultant, recognized the shortcomings of ENIAC. He became involved with the ENIAC

project in 1944 and proposed, along with Mauchly, Eckert, and other engineers, a successor to ENIAC called EDVAC. EDVAC was an important "spin-off" from ENIAC that overcame many of ENIAC's problems. It was the first machine whose design included all the characteristics of a computer. It was not completed, however, until 1951.

There are three features about the von Neumann computer:

① The program and data are stored in the computer in the form of binary.

② The program and data are stored in memory and it can let programs modify themselves while running.

③ The computer consists of Input, Output, Calculator, Controller and Memory.

All computers in use today have the "architecture" von Neumann developed, which makes it possible to store the program, together with data, in working memory.

1.1.2 Computer Generations

The history of computer development is often referred to the different generations of computing devices. Each generation of computer is characterized by a major technological development that fundamentally changed the way computers operate, resulting in increasingly smaller, cheaper, more powerful and more efficient and reliable devices. The four generations of computer are shown in Table 1.1.

Table 1.1 The four generations of computer

Component \ Generations	First generation (1946—1958)	Second generation (1958—1964)	Third generation (1964—1970)	Fourth generation (1971—today)
Device	Vacuum tube	Transistor	Integrated circuits	Microprocessor
Memory	Mercury delay line	Magnetic core memory	Semiconductor memory	Semiconductor memory
External memory	Punch card, paper tape	Magnetic tape	Magnetic tape, magnetic disk	Magnetic disk, optical disk
Process speed (The number of instructions per second)	Thousands	Tens of thousands~ hundreds of thousands	Hundreds of thousands~millions	Ten million~billion

1. First-generation computers: 1946—1958 (The vacuum tube years)

The first generation computers were huge, slow, expensive, and often undependable.

First-generation computers were characterized by the use of vacuum tubes as their principal electronic component. Vacuum tubes are bulky and produce a lot of heat, so first-generation computers were large and required extensive air conditioning to keep them cool. In addition, because vacuum tubes do not operate very fast, these computers were relatively slow.

At the same time that hardware was evolving, software was developing. The first computers were programmed in machine language, but during the first computer generation, the idea of programming language translation and high-level languages occurred. Much of the credit for these ideas went to Grace Hopper, who, as a Navy lieutenant in 1945, learned to program the Harvard Mark I. In 1952, she developed the first programming language translator, followed by others in later years. She also developed a language called Flow-Matic in 1957, which formed the basis for COBOL, the most commonly used business programming language today.

Other software developments during the first computer generation include the design of the FORTRAN programming language in 1957. This language became the first widely used high-level language. Also, the first simple operating systems became available with first-generation computers.

2. Second-generation computers: 1958—1964 (The era of the transistor)

In the second generation of computers, transistors replaced vacuum tubes. Although invented in 1948, the first all-transistor computer did not become available until 1959. Transistors are smaller and less expensive than vacuum tubes, and they operate faster and produce less heat. Hence, with second-generation computers, the size and cost of computers decreased, their speed increased, and their air-conditioning needs were reduced.

Software also continued to develop during this time. Many new programming languages were designed, including COBOL in 1960. More and more businesses and organizations were beginning to use computers for their data processing needs.

3. Third-generation computers:1964—1970 (Integrated circuits—miniaturizing the computer)

The technical development that marks the third generation of computers is the use of integrated circuits or ICs in computers. An integrated circuit is a piece of silicon (a chip)

containing numerous transistors. One IC replaces many transistors in a computer and results in a continuation of the trends begun in the second generation. These trends include reduced size, reduced cost, increased speed, and reduced need for air conditioning.

The principal software development during the third computer generation was the increased sophistication of operating systems. Although simple operating systems were developed for first- and second-generation computers, many of the features of modern operating systems first appeared during the third generation. These include multiprogramming, virtual memory, and time-sharing. The first operating systems were mainly batch systems, but during the third generation, interactive systems, especially on minicomputers, became common. The BASIC programming language was designed in 1964 and became popular during the third computer generation because of its interactive nature.

4. Fourth-generation computers: 1971—today (The microprocessor)

The fourth generation of computers is more difficult to define than the other three generations. This generation is characterized by more and more transistors being contained on a silicon chip. First there was Large Scale Integration (LSI), with hundreds and thousands of transistors per chip. Then came Very Large Scale Integration (VLSI), with tens of thousands and hundreds of thousands of transistors. The trend continues today.

Software development during the fourth computer generation started off with little change from the third generation. Operating systems were gradually improved, and new languages were designed. Database software became widely used during this time. The most important trend, however, resulted from the microcomputer revolution. Packaged software became widely available for microcomputers so that today most software is purchased, not developed from scratch.

1. 1. 3   The Features and Applications of Computers

A computer is an electronic device, which executes software programs. It consists of 2 parts—hardware and software. The computer processes input through input devices like mouse and keyboard. The computer displays output through output devices like color monitor and printer. The size of a computer varies considerably from very big to very small. The speed of computers also has a very large range. Computers have become indispensable in today's world. Millions of people use computers all over the world.

1. Features

(1) High-speed, precision and operational capability

The fastest computer in the world can execute approximately 100 million instructions per second. High-speed computers have a high data-processing capacity and play an important part in geology, energy, meteorology, aerospace and so on.

(2) Accurate logical judgment

Digital computers are used to make logic decisions about matters that can be decided logically. You may think that they can "think". Although computers do not have thought like humans, but scientist are working hard on it. The most common use of logical judgment is for information retrieval.

(3) Powerful storage capacity

Computers can store many kinds of information, such as data, text, video, image and so on. Computer storage ability is not only a strong performance in capacity, but also in long-term preservation.

(4) Automation

Computers can work automatically and can run programs repeatedly.

(5) Network communication function

Many computers can build a network to share resources.

2. Applications of computers

(1) Word processing

Word processing software automatically corrects spelling and grammar mistakes. If the content of a document repeats, you don't have to type it each time. You can use the copy and paste features. You can printout documents and make several copies. It is easier to read a word-processed document than a handwritten one. You can also add images to your documents.

(2) Internet

It is a network of almost all the computers in the world. You can browse through much more information than you could in a library. That is because computers can store enormous amounts of information. You also have very fast and convenient access to information. Through e-mail you can communicate with a person sitting thousands of miles away in seconds. There are chat softwares which enable one to chat with another person on a real-time basis. Video conferencing tools are also becoming readily available to the common man.

（3）Digital audio or video composition

Audio or video composition and editing have been made much easier by computers. It no longer costs thousands of dollars for equipments to compose music or make a film. Graphics engineers can use computers to generate short- or full-length films or even to create three-dimensional models. Anybody owning a computer can now enter the field of media production. Special effects in science fiction and action movies are created using computers.

（4）Desktop publishing

With desktop publishing, you can create page layouts for entire books on your personal computer.

（5）Computers in medicine

With the help of computers, diseases can be diagnosed and cures can be found. Special softwares are used in magnetic resonance imaging to examine the internal organs of the human body and also used in performing surgery. Computers are also used to store patients' data.

（6）Mathematical calculations

Thanks to computers, which have computing speeds of over a million calculations per second, we can perform the hardest of mathematical calculations.

Computers have leapfrogged the human society into another league. They are used in each and every aspect of human life. They will spearhead the human quest of eradicating social problems like illiteracy and poverty. It is difficult to imagine a world bereft of computers. This revolutionary technology is indeed a boon to the human race. May computers continue to shower their blessings on us.

1. 1. 4 Computer Types

1. Supercomputer

Supercomputer is a broad term for one of the fastest computers currently available. Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations (number crunching). For example, weather forecasting requires a supercomputer. Other uses of supercomputers include scientific simulations, (animated) graphics, fluid dynamic calculations, nuclear energy research, electronic design, and analysis of geological data (e. g. in petrochemical prospecting). Perhaps the best known supercomputer manufacturer is Cray Research.

2. Mainframe

Mainframe was a term originally referring to the cabinet containing the central processor unit or "main frame" of a room-filling Stone Age batch machine. After the emergence of smaller "minicomputer" designed in the early 1970s, the traditional big iron machines were described as "mainframe computers" and eventually just as mainframes. 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.

3. Personal computer

It can be defined as a small, relatively inexpensive computer designed for an individual user. In price, personal computers range anywhere from a few hundred dollars to thousands of dollars. All are based on the microprocessor technology that enables manufacturers to put an entire CPU on one chip. Businesses use personal computers for word processing, accounting, desktop publishing, and for running spreadsheet and database management applications. At home, the most popular use of personal computers is for playing games and recently for surfing the Internet.

Personal computers first appeared in the late 1970s. One of the first and most popular personal computers was the Apple II, introduced in 1977 by Apple Computer. During the late 1970s and early 1980s, new models and competing operating systems seemed to appear daily. Then, in 1981, IBM entered the fray with its first personal computer, known as the IBM PC. The IBM PC quickly became the personal computer of choice, and most other personal computer manufacturers fell by the wayside. In recent years, the term PC has become more and more difficult to pin down. In general, though, it applies to any personal computer based on an Intel microprocessor, or on an Intel-compatible microprocessor. For nearly every other component, including the operating system, there are several options, all of which fall under the rubric of PC. Today, the principal characteristics of personal computers are that they are single-user systems and are based on microprocessors. However, although personal computers are designed as single-user systems, it is common to link them together to form a network. In terms of power, there is great variety. At the high end, the distinction between personal computers and workstations has faded. High-end models of the Macintosh and PC offer the same computing power and graphics capability as low-end

workstations by Sun Microsystems, Hewlett-Packard, and DEC.

4. Workstation

It is a type of computer used for engineering applications (CAD/CAM), desktop publishing, software development, and other types of applications that require a moderate amount of computing power and relatively high quality graphics capabilities. Workstations generally come with a large high-resolution graphics screen, a large amount of RAM, built-in network support, and a graphical user interface. Most workstations also have a mass storage device such as a disk drive, but a special type of workstation, called a diskless workstation, comes without a disk drive. The most common operating systems for workstations are UNIX and Windows NT. Like personal computers, most workstations are single-user computers. However, workstations are typically linked together to form a local-area network, although they can also be used as stand-alone systems.

5. Server

A server is a computer, or series of computers that link other computers or electronic devices together. They often provide essential services across a network waiting for clients to request for information. Most of the servers on the Internet are just standard Pentium computers.

There are some features about servers:

① Only provide services by the client's request.

② The server is transparent to the client. The computer communicating with the server does not know which particular type of the server is being used (e. g. WWW Server, FTP Server, Mail Server and so on.) or what kind of OS the server runs.

③ Strictly speaking, servers belong to the scope of software. A computer which is regarded as a server can play different roles by installing different server softwares.

1. 1. 5　New Technology in Computers

1. Embedded technology

Embedded technology is software or hardware that is hidden, embedded in a large device or system. It typically refers to a fixed function device, as compared to a PC, which runs general-purpose applications.

Embedded technology is nothing new. It's all around us and has been for years. An