高等院校计算机应用技术系列教材

计算机英语

学生用书

- 计算机系统、组成与体系结构
- 算法与数据结构、程序设计
- 操作系统与应用软件
- 文件和文件处理、数据库系统
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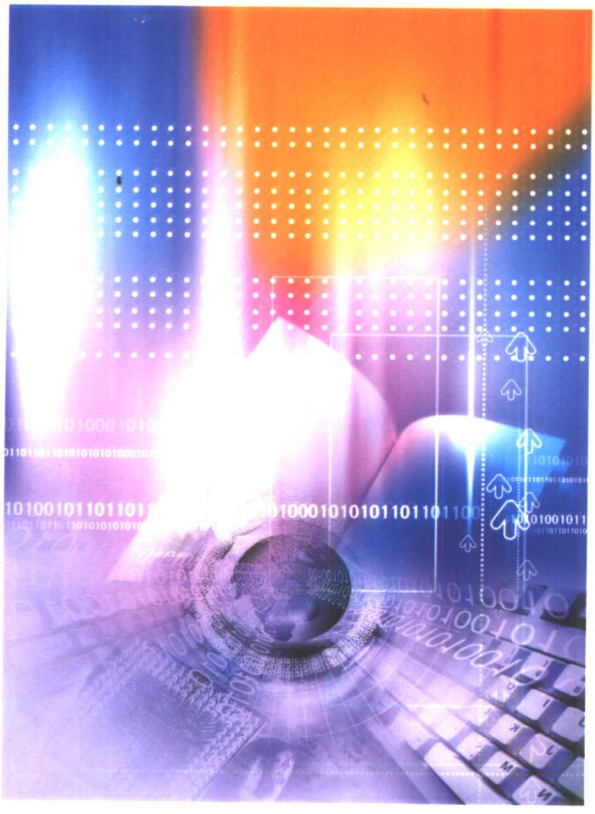

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内 容 简 介

直接阅读外文技术资料和文献是每个计算机技术人员和研究人员必须具备的一种能力。本书旨在使学生能够熟悉并掌握计算机方面的基本专业英文词汇，并提高在计算机专业英文文献方面的阅读能力。

本书共 24 章，汇集了计算机技术各方面的内容，包括计算机硬件、软件、网络与通信、计算机应用等，本书的特点是内容和专业词汇的涵盖面广，选择的文章具有代表性和新颖性，尤其是阅读材料包括了最近 10 年中产生的一些新技术的介绍，从而使教师在选择教学内容方面有极大的灵活性。

本书适合于计算机科学与技术专业、软件工程专业、计算机网络专业、信息管理与信息系统等相关专业的高职、高专、本科学生作为计算机专业英语课程的教材，对于从事计算机方面各种工作的专业技术人员提高计算机专业外文文献的阅读能力也有一定的帮助。

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前　言

随着时代的发展，计算机与网络技术已渗透到人们工作和生活的各个方面。计算机英语也随之独立成为一门专业英语，并在计算机应用中作为人机之间交流的媒介。

一个计算机方面的人才除了要掌握计算机理论和技能以外，更重要的是具备快速获取新的计算机方面知识的能力。而计算机英语(尤其是阅读能力)则是体现这种能力的一个重要方面。本书正是在这样的思想指导下编写的。

1. 编写目的

- 使学生熟悉并掌握计算机方面的基本专业英文词汇；
- 提高学生的计算机专业英文文献的阅读能力。

2. 本书特点

- 系统性：本书涵盖了计算机技术各方面的内容，包括计算机硬件、软件、网络与通信、计算机应用等。
- 新颖性：本书反映了20世纪90年代到21世纪初的最新技术。
- 代表性：本书选择的文章在内容上具有一定的代表性，基本体现了计算机硬件、计算机软件、网络与通信和计算机应用方面典型的技术。
- 广泛性：本书专业词汇的涵盖面广。
- 附赠配套教材：凡选用本书作为教材的教师，均可免费获赠《计算机英语(教师用书)》。具体方法请见书后的“《教师用书》需求信息反馈卡”。

3. 本书的结构及内容

本书从内容上可分5篇。第1篇——计算机硬件基础，包括第1章——计算机系统概述；第2章——计算机系统的组成；第3章——计算机体系结构。第2篇——计算机软件基础，包括第4章——算法与数据结构；第5章——程序设计与语言；第6章——操作系统；第7章——应用软件；第8章——文件和文件处理；第9章——数据库系统概论；第10章——软件工程；第11章——面向对象技术。第3篇——计算机网络与通信，包括第12章——计算机网络概述；第13章——OSI参考模型和TCP/IP参考模型；第14章——局域网和城域网；第15章——广域网；第16章——INTERNET；第17章——网络安全。第4篇——其他计算机技术，包括第18章——多媒体技术；第19章——数字图像处理；第20章——人工智能与专家系统。第5篇——计算机应用，包括第21章——计算机信息系统；第22章——企业资源规划；第23章——电子商务；第24章——CAD/CAM/CIMS。

每章除了正文外，还列举出本章的专业词汇对照表、重点词汇的详细说明，正文后还附有练习题，可作为对学生学习情况的检测。每章最后的阅读材料是对正文内容的补充，反映了最新的技术，可作为学生课后阅读的内容，加深对正文内容的理解。

4. 读者对象

本书主要读者对象是计算机专业及相关专业的高职、高专、本科学生和从事计算机相关工作的专业人员。

本书由姜同强主编。参加编写的人员包括(按章节顺序排列)：王雯、罗代洪编写第1章、第2章、第3章、第4章、第5章和第6章，姜同强、杨冰编写第7章、第8章、第9章、第10章和第11章，孔凡航、吕燕编写第12章、第13章、第14章、第15章、第16章、第17章和第18章，赵守香编写第19章、第20章、第21章、第22章、第23章和第24章。王振玲对全书内容进行了审校。

在本书的编写和出版过程中，清华大学出版社的同志为使本书尽快出版付出了辛勤劳动，在此表示感谢。

由于作者水平有限，加之时间仓促，对于本书中出现的错误，欢迎广大读者批评指正。

编　　者

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Chapter 1

Computer System Overview

Digital computer is also called electronic computer or computer. Computers surround us. It's hard to find a field in which computers are not being used.[1] In this chapter we will introduce digital computer, data types, the evolution of computers, and types of computers.

1.1 Digital Computer

The digital computer is a digital system that performs various computational tasks. The word "digital" implies that the information in the computer is represented by variables that take a limited number of discrete values.[2] These values are processed internally by components that can maintain a limited number of discrete states. The decimal digits 0,1,2,… 9, for example, provide 10 discrete values. The first electronic digital computers, developed in the late 1940s, were used primarily for numerical computations.[3] In this case[4] the discrete elements are the digits. From this application the term digital computer has emerged.[5] In practice, digital computer function more reliably if only two states are used. Because of the physical restriction of components, and because human logic tends to be binary, digital components that are constrained to take discrete values are further constrained to take only two values and are said to be binary.[6]

Digital computers use the binary number system, which has two digits: 0 and 1.[7] A binary digit is called bit. Information is represented in digital computer in groups of bits. By using various coding techniques, groups of bits can be made to represent not only binary numbers but also other discrete symbols, such as decimal digits or letters of the alphabet.[8] For example, ASCII (American Standard Code for Information Interchange) originally used 7 bits to form a character. By judicious use of binary arrangements and by using various coding techniques, the groups of bits are used to develop complete sets of instructions for performing various types of computations. In contrast to[9] the common decimal numbers that employ the base 10 system, binary numbers use a base 2 system with two digits: 0 and 1.The decimal equivalent of a binary number can be found by expanding it into a power series with a base of 2.[10]

A computer system consists of [11] hardware system and software system. The hardware system is the physical equipment that you can see and touch, such as the disks and the screen. The software system is the intangible "control" that governs the computer; it is the total of all the programs that can be run on the computer. A program is a list of instructions. Programs

tell the hardware what to do. The hardware of the computer is usually divided into three major parts: input and output devices (I/O devices), a central processing unit (CPU), and memory. They are described in more detail in Chapter 2. Software can be classified according to its purpose. Application software is designed to accomplish real-world tasks in fields such as accounting, entertainment, and engineering.[12] If you've ever played a video game or typed a paper on a word processor, you've already had some experience with application software programs. System software, on the other hand, controls the computer system itself. System software includes not only the complex programs used by technicians to create application software in the first place but also the organizational programs needed to start up the computer and govern its use of other programs.[13] They are described in more detail in Chapter 2 and Chapter 6.

1.2 Data Types

Binary information in digital computers is stored in memory or processor registers. Registers contain either data or control information. Control information is a bit or a group of bits used to specify the sequence of command signals needed for manipulation of the data in other registers.[14] Data are numbers and other binary-code information that are operated on to achieve required computational results. Now we present the most common types of data found in digital computers and show how the various data types are represented in binary-code form in computer registers.

The data types found in the registers of digital computers may be classified as being one of the following categories:

- Numeric data can often be represented as integers. In unsigned integers, an *n*-bit value can range from 0 to $2^n - 1$.[15] An *n*-bit signed integer can have any value between -2^{n-1} and $2^{n-1} - 1$, inclusive. Both formats can be used in arithmetic algorithms. Some numeric data cannot be represented as integers. These values, which typically include fractional portions, are represented in floating point format in computers. A computer may have special registers and instructions exclusively for floating point data.
- The Boolean values TRUE and FALSE are used often enough to warrant having their own data type, Boolean, and assembly language instructions.[16] Typically, a data value is set to zero to represent FALSE and any nonzero value for TRUE. Boolean assembly language instructions can perform logical operations on these values. Unlike logical instructions, which generate one result per bit of the operands, Boolean instructions generate only one result. To illustrate the difference, consider the case in which A=0000 0010 and B=0000 0001.[17] The logical AND of these binary values produces the result 0000 0000. However, if they are Boolean values, A

and B are both TRUE, since they are both nonzero.[18] Their Boolean AND must produce a result of TRUE, represented by a nonzero value.

- Computers must also deal with character data. The characters are stored as binary values encoded using ASCII, EBCDIC, UNICODE, or some other character encoding standards. Rather than arithmetically or logically manipulating characters, a computer may concatenate strings of characters, replace some characters with others, or otherwise manipulate character strings.[19] Some assembly language instruction sets include instructions to directly manipulate character data. Others use routines constructed from other instructions to achieve the same result.

1.3 The Evolution of Computer

The first large-scale electronic computer was the Electronic Numerical Integrator and Computer (ENIAC), which became operational in 1946. From that start, computer have developed through four so-called generations, or stages, each one characterized by smaller size, and less expense than its predecessor.[20]

1. First Generation (1944—1958)

In the earliest general-purpose[21] computer, most input and output media were punched cards and magnetic tape. Main memory was almost exclusively made up of hundreds of vacuum tubes—— although one computer used a magnetic drum for main memory. These computers were somewhat unreliable because the vacuum tubes failed frequently. They were also slower than any microcomputer used today, produced a tremendous amount of[22] heat, and were very large. They could run only one program at a time.

2. Second Generation (1959—1963)

By the early 1960s, transistors and some other solid-state devices that were much smaller than vacuum tubes were being used for much of the computer. Magnetic cores, which looked like very small metal washers strung together by wires that carried electricity, became the most widely used type of main memory.[23] Removable magnetic disk packs, stacks of disks connected by a common spindle, were introduced as storage devices.[24] Second-generation machines tended to be smaller, more reliable, and significantly faster than first-generation computers.

3. Third Generation (1964—1970)

In the third period, the integrated circuit (IC)—— a complete electronic circuit that packages transistors and other electronic components on a small silicon chip—— replaced traditional transistorized circuitry. 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 (processing several programs simultaneously)[25] and timesharing (people using the same computer simultaneously). 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 a mainframe could now be done on a minicomputer.

4. Fourth Generation (1971—Now)

Large-scale integrated(LSI) and very-large-scale integrated(VLSI) circuits were developed that contained hundreds to millions of transistors on a tiny chip.[26] In 1971 Ted Hoff of Intel developed the microprocessor, which packaged an entire CPU, complete with memory, logic, and control circuits, on a single chip.[27] The microprocessor and VLSI circuit technology caused radical changes in computers —— in their size, appearance, cost, availability and capability, and they started the process of miniaturization —— the development of smaller and smaller computers.

Also during this time, computer's main memory capacity increased, and its cost decreased, which directly affected the types and usefulness of software that could be used.[28] Software applications like word processing, electronic spreadsheets, database management programs, painting and drawing programs, desktop publishing, and so forth became commercially available, giving more people reasons to use a computer.[29]

1.4 Types of Computers

Computers are usually classified into four broad categories:microcomputers, minicomputers, mainframe computers, and supercomputers. It's hard to give a precise definition to each type because computer speeds and storage capacities change rapidly. Nevertheless[30], the following definitions will suffice:

1. Microcomputers

Microcomputers, also called personal computers (PC), are small computers that can fit next to a desk or on a desktop, or can be carried around. Microcomputers are either used as stand-alone computer or connected to a network, such as a local area network. A local area network (LAN) connects, usually by special cable, a group of desktop personal computers and peripheral devices in an office or a building.

2. Minicomputers

Minicomputers are designed to support many time-sharing terminals at *once*[31]. Minicomputers operate faster and are more expensive than microcomputers. Often, a minicomputer satisfies the general-purpose computing needs of a department or small

business. Other minicomputers are dedicated[32] to specific applications. For example, a minicomputer may be used to control an assembly line in a factory, recode data in a research laboratory, or help programmers develop programs for other computers.

3. Mainframe computers

Mainframe computers are larger, faster, and more expensive than minicomputers. Mainframe computers also have many processors. They are found in banks, insurance companies, airlines, large corporations, and government organizations. Mainframes often serve hundreds of time-sharing users at once. Mainframes are ideal for problems requiring extensive mathematical calculations or for sharing large volumes of information among many people.

4. Supercomputers

First developed in the 1970s, Supercomputers are the fastest and highest-capacity computers. Their cost ranges from several hundreds of thousands to millions of dollars. They may occupy special air-conditioned rooms and are often used for research. Among their uses are worldwide weather forecasting and analysis of weather phenomena, oil exploration, aircraft design, evaluation of aging nuclear weapons systems, and mathematical research.[33] Unlike microcomputers, which generally have only one central processing unit, Supercomputers have hundreds to thousands of processors and can perform trillions of calculations per second.

Basic Technical Words and Expressions

digital computer	数字计算机
decimal digits	十进制数字
binary	二进制
bit	位；比特
ASCII	美国国家信息交换标准代码
coding techniques	编码技术
computer system	计算机系统
hardware system	硬件系统
software system	软件系统
I/O devices	输入/输出设备
central processing unit(CPU)	中央处理器(CPU)
memory	存储器
application software	应用软件
video game	视频游戏
system software	系统软件
register	寄存器

data types	数据类型
numeric data	数字数据
floating point data	浮点数据
Boolean	布尔值，布尔
character data	字符数据
EBCDIC	扩充的二-十进制交换码
punched cards	穿孔卡片
magnetic tape	磁带
main memory	主存
vacuum tubes	电子管
magnetic drum	磁鼓
transistors	晶体管
solid-state devices	固态器件
magnetic cores	磁芯
integrated circuit (IC)	集成电路
silicon chip	硅芯片
multiprogramming	多道程序设计
timesharing	分时，分时技术
minicomputers	小型计算机
mainframe	大型计算机
large-scale integrated (LSI)	大规模集成
very-large-scale integrated(VLSI)	超大规模集成
word processing	文字处理
electronic spreadsheets	电子表格
database management programs	数据库管理程序
desktop publishing	桌面印刷
personal computers (PC)	个人计算机
microcomputers	微(型计算)机
storage capacities	存储容量
stand-alone computer	独立计算机
local area network(LAN)	局域网
peripheral devices	外部设备
assembly line	流水线，生产线
supercomputer	巨型计算机

Notes

(1) digital computer，数字计算机。能执行数学计算和逻辑运算，其值通常用二进制数字来表示的一种计算机。

(2) binary，二进制。以 2 为基数的一种固定基数计数系统。

例 1：The binary system of numbers is used in digital computers.数字计算机都使用二进制数字系统。

例 2：Binary code，二进制码。

(3) bit，(二进制)位，比特。

- 在纯二进制计数系统中，数字 0 和 1 中的任何一个。同 binary digit。
- 存储设备中的最小信息容量单位。binary digit 的缩写。

例如：bits per second，缩写为 bps，指每秒钟传输的位数。

(4) ASCII，美国国家信息交换标准码，是 American National Standard Code for Information Interchange 的缩写。一种在不同厂家生产的设备之间为信息交换而定义编码的标准。这种编码使用由 7 位编码字符(如为 8 位，则包括奇偶校验)组成的编码字符集，用于数据处理系统、数据通信系统和有关设备之间的信息交换。ASCII 字符集由 128 个代码组成，其中 96 个是大小写字母、数字和符号，32 个为控制符。

(5) coding，编码(方法，技术)；程序。coding techniques，编码技术；binary coding，二进制编码。

(6) video game，电子游戏。

(7) register，寄存器。一种存储装置，具有规定的存储容量，如一个位、一个字节或一个计算机字，通常有特定的用途。

(8) unsigned integer，无符号整数。常见的表达方式有：signed integer，带符号整数；signless integer，无符号整数，正整数。

(9) data types，数据类型。可由程序设计语言直接说明的数据的结构特性、特点和特征。例如，FORTRAN 语言中的整数和实数。

(10) floating point，浮点(数)，可缩写成 FLP 或 FP。一种表示数的形式，数目可表示为一个数乘以基数的幂次，例如，十进制数 397 可写成 3.97×10^2 或 0.397×10^3。

(11) Boolean，布尔值，布尔。有真(用 True 表示)和假(用 False 表示)两个值。

(12) assembly language，汇编语言。一种非常接近于二进制机器指令的程序语言。

(13) operand，操作数，运算数，运算对象；运算域。

(14) EBCDIC，扩充二-十进制交换码。是 Extended Binary Coded Decimal Interchan-ge Code 的缩写。一种由 8 位编码字符组成的编码字符集。

(15) UNICODE，统一的字符编码标准，采用双字节对字符进行编码。

(16) routine，例行程序，例程。设计用来执行一项特定且有限的任务的一套程序指令。

(17) ENIAC，电子数字积分计算机，是 Electronic Numerical Integrator And Calculator[Computer]的缩写，是世界上第一台通用计算机的名称，1946 年由美国制造。

(18) punched card，穿孔卡。在字(词)处理技术中，其上用穿孔行来代表文本及程序指令的一种卡片。

(19) magnetic tape，磁带。一种具有可磁化表面层的带状物，可以磁记录方式在其上存储数据。

(20) vacuum tube，真空管，可缩写为 VT。一种内部空气全部或部分抽空的电子管，