A New and Practical Course in English for Computer Studies

新编实用计算机专业英语

主编 庞云阶

吉林大学出版社

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内容提要

本书是为大学本科计算机专业或与计算机相关的人员编写的计算机专业英语教材。内容包括计算机硬件和软件基本知识、流行的微型计算机性能、计算机主要的和新近发展的分支领域知识等，并附有 1991 年～1995 年历届程序员试题及解答。

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前　言

众所周知，计算机领域的基本词汇、术语、概念与各种计算机软件和硬件资料及说明书等，绝大多数都源于英语。因此，学习和熟悉计算机英语词汇及各种计算机技术原理的英语陈述对于学习计算机和使用计算机以及进一步对计算机科学技术进行研究，无疑是非常重要的。

本书编写的目的是使读者学习和掌握计算机基础知识的英语表达，为读者阅读各种计算机方面的英语资料和编写有关的计算机资料打下基础。这对于出国学习和工作将是十分有益的。

本书的英文部分取材于国外出版的计算机读物和文献资料，经编纂加工而成，文字的风格，不同章节有所不同。本书的目的主要不在陈述计算机知识本身，而是为了帮助读者学习计算机英语词汇、术语和表达，因此，选用不同风格的英语原文，未必是坏事。为便于读者理解英语句于，本书的参考译文尽量做到按原文直译面不失于对原文意思的确切表达。

本书共分四个部分，第一、二两部分介绍微型计算机硬件的基本知识和流行的各种最新机型及性能。虽然以微型机有关内容为主，但并不失于在计算机领域中这些知识的通用性。对于大多数计算机使用人员和研究人员，微型计算机是最通用的、最流行的，因此，相关微型机的概念便于理解和接受。第三部分介绍计算机领域的若干研究和应用分支，涉及最近发展起来的各个邻域，包括图象处理、多媒体、计算机病毒、计算机安全、计算机仿真、面向对象技术、计算机图形学、神经元网络、分布式系统、并行处理、人工智能、计算机动画等，使读者能够对这些分支的内容和英语描述有初步的认识。本部分每个单元的选材，梗概地陈述本单元所讨论的内容，尽量涉及与本单元内容相关的主要概念，使具有一定计算机专业知识的人，能掌握本单元主题各个相关的英语术语，而且不感到冗赘乏味；对于想介人和使用计算机的人，能对经常使用的计算机概念，从英文方面了解这些概念的起源及含义，并且特别注意这些概念和术语在实际使用中的意义。这些选材，对于应试计算机专业 GRE 也将是有益的。有些新近的应用分支，如计算机辅助技术、虚拟现实技术等，在阅读材料中还如以补充。第四部分附录了程序员资格考试的英语试题(1991 年～1995 年)及解答。这对于参加程序员应试会有帮助。

本书各章节列出的“重要概念”并不都在课文中出现，有些在课文中没有涉及，但因为“重要”一些而加以补充。此外，阅读材料的选用，扩充了课文的内容，同时，也可使读者增加阅读、自学的能力，有些阅读材料更进一步阐述了有关原理，这对计算机专业人员更为有益。

本书主要供大学计算机专业英语教学使用，但也适合各类计算机工作者、从业人员和翻译人员使用。

由于编写人员水平有限，错谬之处在所难免，竭诚希望批评指正。

编　者

1997 年 11 月

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Part I. Microcomputers — the hardware

Unit 1.1 Microcompnters

A microcomputer, like any computer, is a device capable of input, performing calculations, and output. It also has a large capacity for storing both data and programs.

Input is usually via a keyboard attached to a screen, referred to as a *visual display unit* (VDU). Alternatively, some more direct form of input may be used such as a light pen or joystick device, or a magnetic ink reader.

Output can be to the screen, to a printer, to a more specialised device such as a graph plotter, or even to another computer.

The calculations that can be performed by a microcomputer are actually individually very limited. It can simply add, subtract, multiply and divide numbers, and compare two numbers; but the ability to make decisions, based upon comparisons, is an extremely powerful one. This implies' being able to jump to different points in the computer program logic depending on whether two numbers are equal or not equal, or to jump only if one number is greater than the other. This enables the computer system, for example, to refuse to issue an invoice if the item requested is currently out of stock or if the customer concerned has already exceeded his credit limit.

The control function of the computer (to determine what operation is next) and the arithmetic function (to perform calculations) are both carried out by the *central processing unit* (CPU). The CPU accesses the *memory*, which provides immediate storage for holding programs and data.

Memory is limited in size, and erasable. Hence, *backing storage* is also needed, to provide more permanent storage for both computer programs and data. The backing storage can be a magnetic cassette, but on a micro computer it will be a magnetic disk of some kind.

Figure 1.1.1 shows a typical configuration for a single-user microcomputer system.

Computers are made up of two-state devices, i. e., devices that have two possible states which can be used to represent either 0 or 1; the smallest unit of storage is called a *bit* (binary digit). A *byte* is the most commonly used unit of storage for a computer, and is equal to eight bits. A byte can store a number from 0 to 255, or it will store one char-

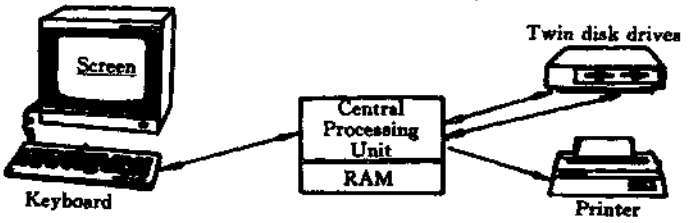

Figure 1.1.1 Typical single-user microcomputer system. The central processing unit and disk drives may be in the same case.

acter, coded as a number. Table 1.1.1 shows some character codings from ASCII, which is the most commonly used coding system.

Table 1.1.1 Some ASCII codes for storing characters

Character	Code	Character	Code
A	65	+	43
Z	90	?	63
a	97	;	59
z	122	=	61

Much of the data stored on commercial systems is in text form (for example, customers' names and addresses), and hence a byte is a convenient unit to refer to. It becomes relatively easy to calculate how much disk capacity is needed to store the data files for a business application. Disk capacities are given in 'K', 1K being approximately on thousand bytes (actually 2^{10} or 1024). Larger campacities are measured in megabytes (1Mbyte ≒ one million bytes). Typical calculations for disk requirements for various applications are shown in the relevant chapters of this book.

Hardware, softwafe and firmware

Hardware is the physical equipment that makes up the computer system, such as the visual display unit, processor, disk drives and printer.

To carry out any task, the computer requires a set of logical instructions, referred to as a computer *program*. Computer programs are frequently referred to as computer *software*, and companies specialising in writing computer programs are known as 'software houses'. Often, manufacturers concentrate on hardware design and get a software company to produce applications programs. Good hardware and software are both essential to produce a 'user-friendly' microcomputer system.

If a microcomputer often looks sophisticated, even capable of making decisions or playing a good game of chess, this is not because of any creative intelligence. Instead, what is being demonstrated is tbe ability to store a complex sequence of instructions and to execute this program as relevant. The creative intelligence lies not with the computer but with the programmer who wrote the software.

Most microcomputer software is stored on magnetic disk or cassette and loaded from there as needed. Sometimes, programs are supplied etched into a microchip. This is referred to as *firmware*.

This chapter describes the hardware that makes up the microcomputer, while the next chapter describes the system software that is essential to make the microcomputer easily usable. Most of the remaining chapters discuss different types of applications software availahle on microcomputers. It is necessary to understand what the hardware does, but the major priority in choosing a business microcomouter must be the correct choice of software.

Microcomputer hardware

Internally, microcomputers consist of a number of printed circuit boards (PCB) on which are mounted 'microchips'. These contain integrated circuits etched into a chip, usually of silicon and metal oxide semiconductor. The chip is enclosed in a block of epoxy resin and metal.

Microchips are standard circuits in effect building blocks, from which complete computer circuits can be built up. It is the cheap availability of microchips in large numbers which has led to tbe microcomputer revolution. Thus Apple, now a huge American public corporation, started originally in a garage in California with the two founders soldering chips on to printed circuit boards. There are still new companies starting to manufacture microcomputers, and it is still quite possible for a company with just a few employees to produce six microcomputers a week, and to make a healthy profit.

Processor chips are referred to as 8-bit, 16-bit or 32-bit, depending on the number of bits they can process simultaneously. In principle, a 16-bit (or 32-bit) microcomputer is likely to run faster than an 8-bit machine, but we shall see that having a faster processor is not enough in itself to make a computer perform impressively.

Most older 8-bit machines are hased on one of three possible chips (or their later variants): MOS Technology 6502, Intel 8080 or Zilog Z80. For example, the BBC-B, Apple II and Commodore PET all use the 6502 chip; the Superbrain, LS1-M3 and others use Zilog Z80 or Z80A chips; a few microcomputers such as the Rair Black Box and Panasonic use the Intel 8085 or 8085A.

Newer 16-bit or 32-bit machines use mainly the Motorola 6809 or one of the Intel 8086 family (which includes the 8088 and the more powerful 80X86). Of these, Intel are probably the most used, if only because the 8088 has been adopted for the IBM PC. Some recent microcomputers use the Motorola 68000 chip, which is partly 32-bit. These include the Apple Lisa and Macintosh, as well as the very cheap Sinclair QL business machine.

词　汇

microcomputer ['maikroukəmˌpju:tə] *n*. 微型电子计算机
calculation [ˌkælkju'leiʃən] *n*. 计算
capacity [kə'pæsiti] *n*. 容量，能力
input ['in-put] *n*. 输入；
vt. 把…输入
output ['autput] *n*. 输出，产量
keyboard ['ki:bɔ:d] *n*. 键盘；
v. 用键盘排字
attach [ə'tætʃ] *v*. 溥，系，附加
visual ['vizjuəl] *a*. 看的，可视的，视觉的
display [dis'plei] *vt*. 显示；
n. 陈列，展示
joystick ['dʒɔistik] *n*. 操纵杆
graph [græf, gra:f] *vt*. 用图表示出来；
n. 图，图表
reader ['ri:də] *n*. 读入器
program ['prougræm] *n*. 程序
logic ['lɔdʒik] *n*. 逻辑
invoic ['invɔis] *n*. 发票，装货清单；
v. (把…)开清单，开发票
credit ['kredit] *n*. 信用
carry out 执行，进行
memory ['meməri] *n*. 存储器
backing storage 后备存储器
bit [bit] *n*. 位，"比特"
binary ['bainəri] *a*. 二进制的
byte ['bait] *n*. 字节，位组
hardware ['hɑ:dweə] *n*. 硬件
software ['sɔftweə] *n*. 软件
firmware ['fə:mweə] *n*. 固件
drive ['draiv] *v*. & *n*. 驱动，驱动器
software house 软件公司
user-friendly 用户友好的
etch [etʃ] *v*. 蚀刻
microchip [ˌmaikrə'tʃip] *n*. 微芯片
priority [prai'ɔriti] *n*. 优先，优先权
printed circuit board 印刷电路板
chip [tʃip] *n*. 芯片
integrated circuit 集成电路
silicon ['silikən] *n*. 硅
oxide ['ɔksaid] *n*. 氧化物
semiconductor ['semikən'dʌktə] *n*. 半导体
epoxy [e'pɔksi] *a*. 环氧的
resin ['rezin] *n*. 树脂
simultaneously [ˌsiməl'teinjəsli] *ad*. 同时发生地，并发地
lead [li:d] *n*. 导线
peripheral [pə'rifərəl] *a*. &*n*. 外围的，外围设备

注　释

[1] Mos Technology, Intel, Zilog, Rair Black Box Panasonic 都是公司名字。BBC-B, Apple Ⅱ, Commedore PET, Superbrain, LS1-M2 是计算机型号，6502, 8080, Z80, Z80A, 8085, 8085A 都是处理器芯片型号，在芯片前也常冠以生产公司的名字。

[2] Motorola，公司名字；Motorola 6809 是处理器型号，Intel 8086 family，指 8086 处理器系列。

[3] if only，只要，要是…就好。全句意思是：关于这些，只是由于 8088 被 IBM PC 采用了，Intel 的芯片大概是最多被使用的。

参考译文

1.1 微型计算机

微型计算机和任何计算机一样，是能输入、执行计算和输出的一种设备。它还有很大的存储数据和程序的存储容量。

输入通常通过**键盘**进行，键盘连结着屏幕——被称为**可视显示设备**(VDU)。可供选择的输入方式还有某些其它更直接的输入形式，比方光笔、操纵杆设备或磁墨读入器。

输出可以向屏幕、向打印机、向更专门的设备如图形笔绘仪或甚至向另一个计算机进行。

微型计算机可以执行的计算实际上是独立地很有限的。它可以简单地进行加、减、乘和除一些数以及比较两个数；但是基于两个数比较而做出决定的能力却是一个很强有力的功能。这包含，依据两个数相等或不等在计算机程序逻辑中通过不同的一些点，或者仅根据如果一个数大于另一个而跳过一些点。例如，这可以使计算机系统拒绝发出货单，如果所需要的物品当前已没有库存，或者如果所涉及的顾主已超出了他的信用限额。

计算机的控制功能(决定下一个操作是什么)和算术功能(执行计算)两者都是由叫做**中央处理器**(CPU)的部件实行的。CPU 对**存储器**进行访问(存取)，存储器为保存程序和数据提供直接的存储。

存储器是受大小和可擦性限制的。因而，**后备存储**也是很有必要的，它可以对计算机程序和数据提供更永久性的储存。后备存储器可以是盒式磁带，但在微型计算机上，它将是某种磁盘。

图 1.1.1 展示了一个单用户微机系统的典型配置。

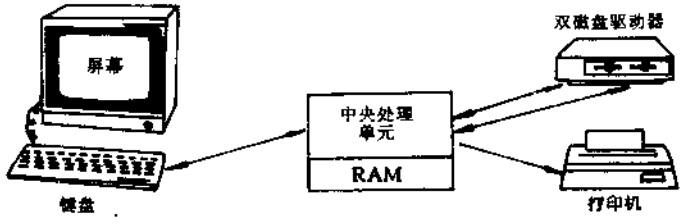

图 1.1.1 典型的单用户微型计算机系统. 中央处理单元和磁盘驱动器可以装在同一机箱中.

计算机是由两个状态的设备做成的，也就是说这些设备有两种可能的状态，可以用来表示 0 或 1；存储的最小单位叫做“比特”(二进数字)。**字节**是计算机最通用的存储单位，它等于八位彼特，一个字节可以存储一个数(从 0 到 255)，它也可以存一个字符，每个字可以被编作一个数码。表 1.1.1 表示用 ASCII 编码方案编制的某些字符码，ASCII 码是最通用的编码系统。

表 1.1.1 某些 ASCII 存储字符的码

字 符	编码	字 符	编码
A	65	+	43
Z	90	?	63
a	97	;	59
z	122	=	61

在商务系统中，大多数数据是文本形式(例如，顾主的名字和地址)，因而一个字节是一个方便的查寻单位，它对于商务应用中计算需要多少磁盘容量以存储数据文件，相对是容易的。磁盘容量是以"K"为单位给定的，1K 近似是 1 千字节(实际上是 2^{10}或 1024)。大容量的存储用"兆"来计量(1 兆 = 1 百万字节)。

硬件、软件和固件

硬件是做成计算机的物理设备，像可视显示器、处理器、磁盘驱动器和打印机等。

为实现任何一项任务，计算机需要一套逻辑指令，这套指令被叫做计算机**程序**。计算机程序经常被称作计算机**软件**，一些专门编写计算机程序的公司就是众所周知的**软件工厂**。通常，制造厂集中于硬件设计而让软件公司去制作应用程序。好的硬件和软件对于生产"用户友好的"微型计算机系统都是重要的。

通常一台微型机看起来似乎很高级，甚至能做出判断或下很好的象棋，这不是因为它有任何创造性智能，代之的是，它所表现的仅是存储复杂的一系列指令并执行相关的这种程序的能力，创造性智能不是来自计算机而是编写软件的程序员。

大多数微型计算机软件是存储在磁盘上或盒式磁带上，并且在需要时把软件从那些存储磁盘或磁带装到计算机中去，有时程序是由蚀刻的微芯片供给的，这被叫做**"固件"**。

了解硬件做什么工作是必要的，但是，在选择一台微机时，主要优先考虑的是必须选择合适的软件。

微型计算机硬件

微型计算机内部是由若干印刷电路板(PCB)组成，在这些电路板上装着一些"微芯片"。这些芯片包含着蚀刻在芯片上的集成电路，芯片通常是硅或金属氧化半导体，芯片封装在环氧树脂和金属做成的块内。

微芯片实际上是在功能上相当于积木块的一些标准电路，完整的计算机电路可以用这些芯片做成。由于有大量的价格日益下降的微机芯片，导致了微型计算机的革命性进展。例如"苹果"公司，现在是巨大的美国公众公司，最初是由两个创建者在加里弗尼亚的一个车房里把芯片焊在印刷电路板上开始制作"苹果"牌微机而起家的。现在仍然有一些新的计算机公司开始制造微型计算机，而且，对于只有几个顾员的公司在一周内做出 6 台微机仍然是相当可能的，并可获得很高的利润。

处理器芯片可归为 8 位、16 位或 32 位等等几种规格，这取决于它们能同时处理的位数。原理上，16 位(或 32 位)微机很可能比 8 位机器运行速度快一些，但是，我们将会

看到，仅有较快的处理器，对于使计算机完成很漂亮的工作不是充分的。

大多数较早的 8 位机器是基于三种可能芯片(或它们的后来的变种)之一；MOS Technology 6502，Intel (8080)或 Zilog Z80。例如，BBC-B，“苹果Ⅱ”和 Commodore PET 都使用 6502 芯片；Superbrain，LS1-M3 和其它使用 Zilogz80 或 Z80A 芯片，少数微机，如 Rair Black Box 和 Panasonic 使用 Intel 8085 或 8085A。

新近的 16 位或 32 位机器主要使用 Motorola 6809 或 Intel 8086 系列之一(其中包括 8088 以及更强功能的 80X86)。在这些芯片中，特别 Intel 大概是使用最多的，这是因为 8088 已被 IBM PC 所采用了。某些新近的微机使用 Motorola 68000 芯片，它部分是 32 位的。它们包括 Apple lisa 和 Macintosh，以及非常廉价的 Sinclair QL 商用机器。

重要概念

microcomputer A small computer consisting of a microprocessor on a single silicon chip, togeter with chips containing the internal memory, a keyboard for the entry of data and programs, a screen for display purpoces, and interfaces for connecting peripherals such as cassette units, disc handlers and printer.

微型计算机 一种小型计算机，它是由在单硅片上的微处理器以及包含内存储器的一些芯片、用于输入数据和程序的键盘、用于显示目的的屏幕和用于连结外围设备，如盒式磁带设备、磁盘操作设备和打印机等的一些接口组成。

data[①] The term is both a singular and plural term which describes a single unit or a collction of facts. Data represent facts, concepts, or instructions in a formalized manner suitabe for communication, interpretation, or processing by human or compnters. Sometimes, programs and instructions are excluded from data. However, in the usual sense of the word, data Include programs and instructions.

数据 这个术语即是单数也是复数，表示单个的或集合的事实。数据用某一规律化的方式表达事实、概念或指令，适于人或计算机进行通讯、解释或处理。有时，程序和指令不被包含在数据之内，然而，这个词在通常的意义下，包含程序和指令。

input May be defined as a verb describing the activity of transfering data into a computer for processing. Also used to describe the data to be processed.

输入 可以被定义作动词，表达输入数据到计算以便处理的活动，也用于表示被处理的数据。

output The resulta of processing, are whether sent to the screen or printer, stored on disk as a file, or sent to another computer in a network. “Output” is variously used as

① “data”在文法上按复数使用。

noun, adjective, or verb.

输出 处理的结果或被送到屏幕或打印机，或存储在磁盘上作为文件，或在网上送到其它计算机。output 这个词可作为名词、形容词或动词。

chip 芯片，见 Silicon chip。

silicon chip is a small piece of silicon containing a semiconductor device, i.e., a transistor, diode or integrated circuit (IC). It is now possible to have many thousands of trasistors and diodes on a single chip of silicon with dimensions of not more than 5mm square.

硅芯片 是一小片硅，在其上包含有半导体设备，即晶体管、二极管或集成电路(IC)。现在一片面积只有 5 mm 平方的硅片上，可以有成千上万个晶体管和二极管。

阅读材料

Hardware and Software

In examining a computing system the first distinction to be made in its components is that between 'hardware' and 'software'. Hardware consists of the physically solid pieces of the computer containing all of the circuitry and mechanical parta necessary to carry out the system functions. A visitor to a computer installation will see only hardware.

Software is the 'invisible' part of the computer and is the name given to the collection of programs available for use in the system, together with the documentation explaining the use and control of such programs.

A distinction can be made between 'system software' and 'application software'. System software is almost invariably supplied by the computer manufacturer and is used for system control and to aid the development of the application software which, unlike the system software, is specific to a particular problem. Often system software is referred to as 'software' and application software as 'user programs' or, simply, 'programs'.

Despite the relatively short life span of the modern computer, system software is very sophisticated and is capable of protecting the user from individual machine characteristies by providing generalised high level functions which are used as 'building blocks' for the creation of the specialist user programs. In a small number of cases, howeve, a knowledge of the basic machine characteristics is essential.

These latter situations principally involve one or more of the following:

(i) creation of programs to control hardware that is non-standard (in the sense that the computer manufacturer did not supply it);

(ii) provision of programs which need to operate in an environment which is not capable of definition within the generalised functions of the system software;

(iii) use of a system for which little, or no system software is provided.

An example of the first situation given above is where the computer is connedted to some laboratory equipment-either to control such equipment, or to monitor its output. In these cases, both the hardware to connect the device to the compater — the interface — and control software need to be provided.

In example of the second type of situation is where the purchased computer system is needed to respond very quickly to user or equipment demands. Despite containing only standard equipment from the manufacturer it may well be impossible to achieve the desired speeds using the generalised software tools supplied with the computer. Specialist software may need to be provided having due regard to the exact nature of the required system performance and the hasic hardware system characteristics.

The third situation has arisen with the advent of so called 'microcomputers'. These are miniature computing systems which are extremely cheap to produce. They are commonly used as intelligent control devices, where specific software will be developed once and then distributed in many handreds or thousands of units, thereby spreading the software cost which can be prohibitively high for single systems. It is in the form of microprocessors that computers will become household items and, indeed, already have done so in the 'pocket calculator' market. Microprocessors also are a growing area in medical physics computing, bringing the flexibility of the computer to medical equipment. Such systems can provide a set of built-in protocols for control or monitoring purposes, thereby cutting down on the number of individual tasks which an operator needs to perform. Little or no system software is provided with microprocessor 'kits' availaable for development purposes.

When a programmer makes use of the generalised functions provided with the computer, in order to generate applications software, he is said to be using the system at a 'high level'. Conversely, provision of programs which require a knowledge of the hasic machine characteristics forces a user to become involved with the system at a 'lower level'. But it is unnecessary for a high level user to fully understand the lower levels of the system.

习　题

将下列各段文字译成中文。

What is a microprocessor?

A microprocessor is a large scale integrated (LSI) circuit which contains the complex