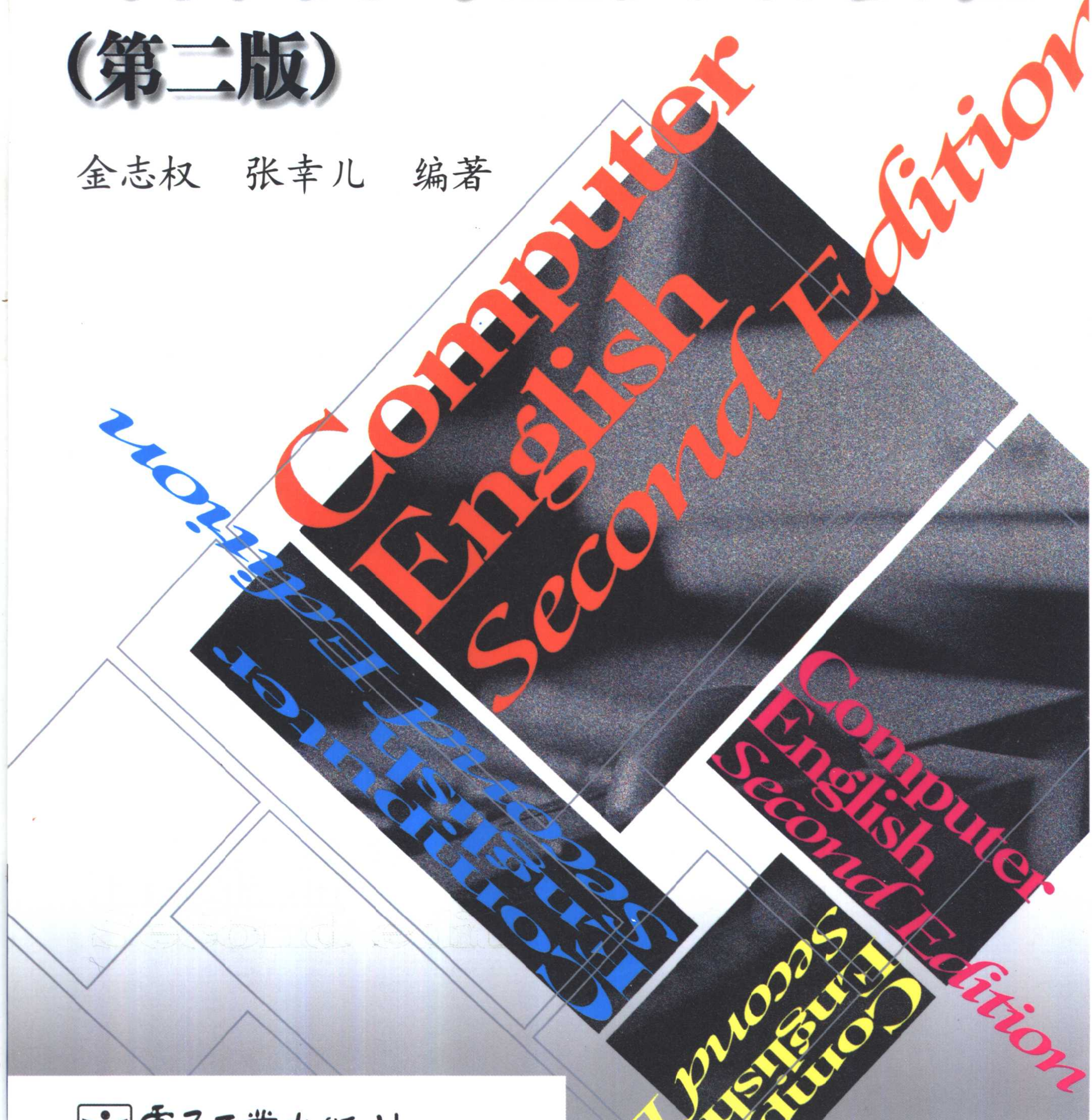
高等学校教材

计算机专业英语教程

（第二版）

金志权　张幸儿　编著



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内容简介

英语是了解国外科技发展动向和进行国际学术交流的重要工具。本书旨在使读者掌握计算机专业英语术语，培养和提高读者阅读和笔译专业英语文献资料的能力，并通过课堂英语交流，提高学生英语口语能力。

本书素材取自国外最近几年计算机科学各个领域的最新教材、专著、论文和计算机网络信息，内容涉及计算机科学各领域当前的状况和最新发展。本书附有部分译文，并附有取材所用的参考文献。本书特点是：内容新颖、覆盖面广、系统性强、可读性好，是学习计算机英语实用教材。

本书可供大专院校计算机专业师生使用，也可作为计算机专业人员及其他有兴趣人员的学习参考读物。

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第二版前言

感谢众多读者对本书的支持，使得第二版在第一版出版后一年左右的时间便与大家见面。正如第一版前言所讲："计算机科学发展迅猛，新名词、新术语层出不穷"，因此需要及时更新和完善本书的内容。

本书第二版增加两章：第5章"网络通信"和第12章"计算机应用II"。因为IT技术包括计算机和通信两部分，两者都有硬件和软件，因此在本版次中，第4章是网络通信软件方面的内容，第5章则侧重网络通信的硬件知识。新增加的第12章，内容主要涉及电子商务、远程教育和虚拟现实等方面的内容。其他章节也有部分调整，这里就不再一一介绍了。

整个教材是在教学实践基础上，参考了大量的国内外最新教材、专著、论文以及Internet上的网络信息编写而成的。所选内容遍及计算机科学的众多领域，大致可分为4类：1.读者已熟悉的计算机基础知识，2.侧重于笔译的短文，3.介绍新概念、新技术和新知识的资料，4.报道类或评论类文章等。

全书对课文中的计算机术语、缩略语和不常见英语词汇给出了基本含义的中文解释，对课文中典型的和较难分析和翻译的句子作了注释，对部分课文给出了参考译文。

第二版保持了第一版的编排格式和基本风格，每一章的第一篇通常都是读者熟悉的内容。对于英语水平较好的读者，可以泛读或跳过该节，而对初学者，建议精读这一篇。教师可根据各章标题或各篇中最后一个注释给出的该篇简短说明，在每一章中挑选若干篇课文进行教学。作为练习，可选择若干章节让学生笔译，并进行课堂讨论。

鉴于英语口语越来越重要，专业英语课程应提供一种英语环境来提高学生的英语口语能力。我们建议在教学过程中，教师可对每一章选择几个题目，让学生事先准备好用自己的语言来表达相关内容，然后分小组进行讨论，再推派代表在课堂上交流。

第二版全书共分十四章，第1、3、4、5、7、9、14章由金志权编写，第2、6、8、10、11、12、13章由张幸儿编写，彼此进行了互审。

十分感谢第一版编辑邓露林，他的意见促使我们不失时机地完成第二版。同时感谢杨丽娟编辑对第二版的辛勤工作，使本书能及时出版。在本书的编写过程中，南京大学陈佩佩、李存珠、陆锺楠等老师，南京师范大学顾铁成老师，南京大学张福炎、陈贵海、李宣东、潘树陆、杨献春等老师，南京大学外国语学院的王守仁、杨治中、侯焕谬、张子清等老师，以及韩杰同志为本书的编写给予大力支持和帮助，在此，我们一并表示诚挚的感谢！

限于作者水平，书中难免存在不妥和错误之处，敬请读者批评指正。

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于南京大学

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Chapter 1 Hardware

1.1 A Closer Look at the Processor and Primary Storage

We have learned that all computers have similar capabilities and perform essentially the same functions, although some might be faster than others. We have also learned that a computer system has input, output, storage, and processing components; that the processor is the "intelligence" of a computer system; and that a single computer system may have several processors. We have discussed how data are represented inside a computer system in electronic states called bits. We are now ready to expose the inner workings of the nucleus of the computer system——the processor.

The internal operation of a computer is interesting, but there really is no mystery to it. The mystery is in the minds of those who listen to hearsay and believe science-fiction writer. The computer is a nonthinking electronic device that has to be plugged into an electrical power source, just like a toaster or a lamp.

Literally hundreds of different types of computers are marketed by scores of manufacturers[1]. The complexity of each type may vary considerably, but in the end each processor, sometimes called the **central processing unit or CPU**, has only two fundamental sections: the control unit and the arithmetic and logic unit. Primary storage also plays an integral part in the internal operation of a processor. These three——primary storage, the control unit, and the arithmetic and logic unit—— work together. Let's look at their functions and the relationships between them.

Unlike magnetic secondary storage devices, such as tape and disk, primary storage has no moving parts. With no mechanical movement, data can be accessed from primary storage at electronic speeds, or close to the speed of light. Most of today's computers use CMOS (Complementary Metal-Oxide Semiconductor) technology for primary storage. A state-of-the-art CMOS memory chip about one eighth the size of a postage stamp[2] can store about 4,000,000 bits, or over 400,000 characters of data!

Primary storage, or main memory, provides the processor with temporary storage for programs and data. All programs and data must be transferred to primary storage from an input device (such as a VDT) or from secondary storage (such as a disk) before programs can be executed or data can be processed. Primary storage space is always at a premium; therefore, after a program has been executed, the storage space it occupied is reallocated to another program awaiting execution.

Figure1-1 illustrates how all input/output (I/O) is "read to" or "written from" primary storage. In the figure, an inquiry (input) is made on a VDT. The inquiry, in the form of a message, is routed to primary storage over a channel (such as a coaxial cable). The message is interpreted, and the processor initiates action to retrieve the appropriate program and data from secondary storage[3]. The program and data are "loaded", or moved, to primary storage from secondary storage. This is a nondestructive read process. That is, the program and data that are read reside in both primary storage (temporarily) and secondary storage (permanently). The data are manipulated according to program instructions, and a report is written from primary storage to a printer.

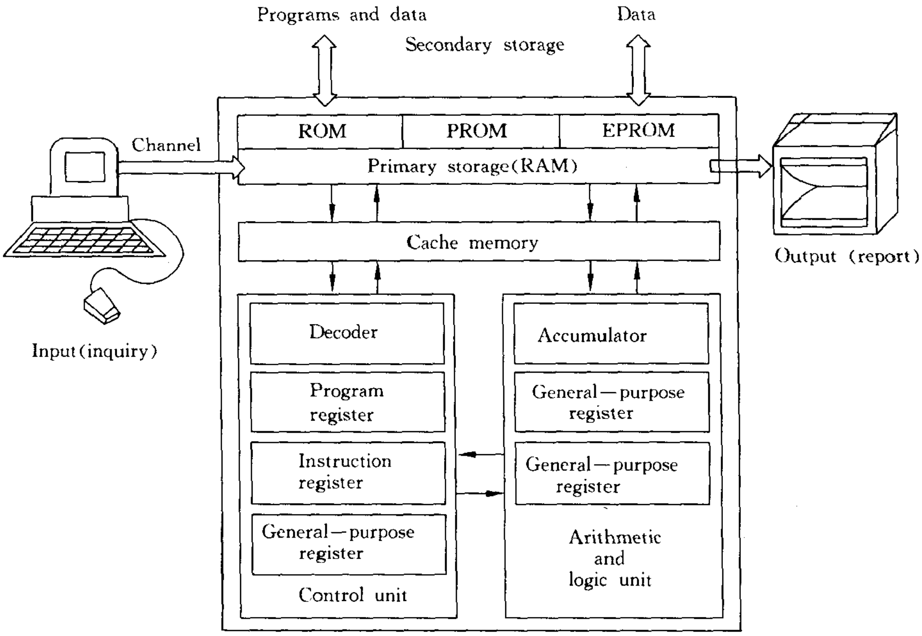

Figure1-1 **Interaction Between Primary Storage and Computer System Components**
All programs and data must be transferred from an input device or from secondary storage before programs can be executed and data can be processed. During processing, instructions and data are passed between the various types of internal memories, the control unit, and the arithmetic and logic unit. Output is transferred to the printer from primary storage.

A program instruction or a piece of data is stored in a specific primary storage location called an **address**. Addresses permit program instructions and data to be located, accessed, and processed. The content of each address is constantly changing as different programs are executed and new data are processed.

Another name for primary storage is random-access memory, or RAM. A special type of primary storage, **called read-only memory (ROM)**, cannot be altered by the programmer. The contents of ROM are "hard-wired" (designed into the logic of the memory chip) by the manufacturer and can be "read only". When you turn on a microcomputer system, a program in ROM automatically readies the computer system for use. Then the ROM program produces the initial display screen prompt.

A variation of ROM is **programmable read-only memory (PROM)**. PROM is ROM into which you, the user, can load "read-only" programs and data. Once a program is loaded to PROM, it is seldom, if ever, changed. However, if you need to be able to revise the contents of PROM, there is **EPROM**, erasable PROM.

Cache Memory

Program and data are loaded to RAM from secondary storage because the time required to access a program instruction or piece of data from RAM is significantly less than from secondary storage. Thousands of instructions or pieces of data can be accessed from RAM in the time it would take to access a single piece of data from disk storage[4]. RAM is essentially a high-speed holding area for data and programs. In fact, nothing really happens in a computer system until the program instructions and data are moved to the processor. This transfer of instructions and data to the processor can be time-consuming, even at microsecond speeds. To facilitate an even faster transfer of instructions and data to the processor, most computers are designed with **cache memory**. Cache memory is employed by computer designers to increase the computer system **throughput** (the rate at which work is performed).

Like RAM, cache is a high-speed holding area for program instructions and data. However, cache memory uses a technology that is about 10 times faster than RAM and about 100 times more expensive. With only a fraction of the capacity of RAM, cache memory holds only those instructions and data that are likely to be needed next by the processor.

Words

processor	处理机
bit	位，二进制位
scores of	许多
control unit	控制部件
integral parts	不可缺的部分，组成部分
CMOS	互补金属氧化物半导体
chip	芯片
VDT(Video Display Terminal)	视频显示终端
at a premium	非常珍贵
capacity	容量
program and data	程序和数据
location	单元，位置
ROM	只读存储器
EPROM	可擦可编程只读存储器
throughput	吞吐量
primary storage	主存储器
hearsay	传闻，谣传
CPU	中央处理机
arithmetic and logic unit	算术逻辑部件
tape and disk	磁带和磁盘
a state of the art	目前工艺水平
(the state of the art)	最新发展水平
secondary storage	辅助存储器，二级存储器
reallocate	重新分配
coaxial cable	同轴电缆
instruction	指令
RAM	随机存取存储器
hard-wired	固化，硬件实现的
cache	高速缓存

Notes

1. 这里 are marketed 意为"被销售",literally 译为"不加夸张地讲,确实地"。全句可译为:
   不加夸张地讲,市场上有几百种不同类型的计算机在销售。
2. about one eighth the size of a postage stamp 是介词短语,修饰前面的 CMOS memory chip,即约 1/8 邮票大小(的)。
3. retrieve the appropriate…意为"取出所需的……",initiate 译为"启动,初始化"。本句译为:
   消息被解释,处理机从辅助存储器取出所需的程序和数据。
   本句的上一句中 route 译为"发送,路由"。全句译为:
   查询以消息的形式通过通道(像同轴电缆)发送到主存储器。
4. it would take to access…是定语从句,修饰前面的 the time,其前面省略了关系代词 that。it 是引导词,作形式主语,真实主语是动词不定式 to access…。access 译为"访问,存取"。全句译为:
   从磁盘存储器上存取单个数据所花的时间,可以从 RAM 中存取几千条指令或数据。

1.2 RAID Technology

In an industry where there are few breakthroughs, disk array technology may be an exception.

Users looking to downsize[1] their operations from departmental minicomputers or enterprisewide mainframes will need the sheer size and data security just now being offered by PC drive manufacturers.

Disk array technology can provide two benefits: high performance and data security. Most of these development efforts are based on a paper originated by the University of California at Berkeley which called the technology RAID(Redundant Arrays of Inexpensive Drives)[2].

Researchers at U. C. Berkeley performed analysis comparing high performance drives designed for PC/AT systems to those used by mainframes and minicomputers. While the inexpensive PC drives had comparable data transfer rates and approximately equal average access speeds, their failure rates were also much higher.

However, the U. C. Berkeley researchers speculated that use of arrays of the inexpensive drives can provide similar performance and capacities to those[3] provided by the much more costly mainframe and minicomputer drives, but at a much lower cost.

Overcoming the relatively high failure rate of the PC drives was approached through the concept of redundancy. Although five levels of RAID were delineated, each level provides security by splitting up the data across an array of drives, instead of putting all the data on one drive.

Level One RAID is the simplest form of array technology. Its primary benefit is data security, along with some performance advantages.

Basically, Level One RAID uses two drives for mirroring. What is written to one drive is written at the same time to the second drive. If one drive fails, all the data, up to and including that which was being written at the time of drive failure, will be found on the drive still running normally.[4]

In addition to the data security provided by a mirrored drive, performance can be boosted for data reads. Because the data is located in the same place on both drives, an intelligent controller can take advantage of redundancy and can position the read head of the unused drive in anticipation of a read request.

Intelligently positioning the heads on the two drives can significantly reduce the time it takes for a drive head to locate the data to be read.[5]

The addition of a third drive to a simple two-drive, Level One RAID architecture adds to the complexity of the system design. when a third drive is added, the actual usable capacity of the array doubles that of a one-or two-drive array. Thus, a two-drive array using 30 gigabyte drives provides a capacity of 30 gigabytes, while a three-drive array provides a total capacity of 60 gigabytes.

Instead of mirroring a single drive, data is distributed across the three drives. In theory, one third of the three-drive array is in use for data backup, parity, and error-correction data. If one drive fails, data on the remaining two drives would be adequate to keep the system running, and for reconstructing the failed drive.[6]

Although data, error-correction code, and parity data can be spread across many drives, reducing the risk of data loss to near zero, performance can also be significantly boosted.

With intelligent control of the drive electronics, drive heads can be positioned in anticipation of read requests. Further, data can be written on one drive while it is being read from another drive.

Five levels of RAID have been defined by the group at the University of California at Berkeley, with Level Five providing highest performance and greatest security. In Level Five RAID, more than one drive can be writing concurrently. "In an eight-drive system; you can do four simultaneous writes," said Mike Anderson, director of engineering for the storage systems division at Micropolis Corp.

Management of Level Five is complex. "Each drive has data and parity, and you have to figure on the fly[7] where everything is, and how to update it," Anderson said. "Many people think Level Five is only for transaction processing, it's also for network servers. When you configure Level Five properly, it can also supply a very high data rate," Anderson said.

Today's drive array architectures lack any clear standards. Although several vendors offer RAID Level Five, the means of implementing the arrays varies from manufacturer to manufacturer.

For large systems, HIPPI (high performance parallel interface) has been proposed as an ANSI standard. Currently, HIPPI systems require dedicated drive controllers and can use ESDI or other high-performance hard disk drives.

Levels RAID

Level 1: provides disk mirroring. Data written to one disk is mirrored to second disk.