



Subject-Based English



普通高等教育“十一五”国家级规划教材

高等学校专业英语教材

计算机

专业英语教程（第6版）

☆ 金志权 张幸儿 主编 ☆

☆ 张景祥 编 ☆



中国工信出版集团



电子工业出版社
PUBLISHING HOUSE OF ELECTRONICS INDUSTRY
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含光盘



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北京·BEIJING

内 容 简 介

本书以计算机学科的各分支为基础,选取分支中的典型素材、新发展的简介以及最新和常用的术语,使读者能通过学习,从英语角度巩固和扩大计算机专业知识,同时及时了解计算机领域的新进展和新术语。

本书配有的注释和练习旨在提高读者阅读与笔译专业英语文献资料的能力,以及提高会看、会听、会说和会写的英语四会能力。

本书素材取自近年来国外计算机科学各领域的最新教材、专著、论文和计算机网络信息,内容新颖、与时俱进、覆盖面广、结构合理、系统性强。为了方便读者,本书配有光盘,内容包含单词汇总、缩略语与术语索引以及部分音频和视频素材等。为了方便教学,另配有教学资源,向采用本书作为教材的教师免费提供,请登录华信教育资源网(www.hxedu.com.cn)注册后下载。

本书可以作为高等院校计算机、软件工程、信息系统、电子商务以及其他相关专业的专业英语教材,也可供计算机专业人员、IT 专业人员或其他有兴趣的读者学习参考。

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第 6 版前言

自本教程第 5 版出版以来,以下几方面的发展无疑需要反映在新的一版中:

- 越来越多的人在他们的路上使用智能手机等移动设备,经由蜂窝网无线访问 Internet 和 Web。
- 云计算和云存储应用已相当普遍。
- 物联网不断发展。
- 可穿戴式设备不断出现。
- 包括上述的种种网络应用,使得最近几年产生了前所未有的巨量数据,这种大数据已超出传统的数据库管理系统的处理能力。
- 3D 打印已广泛应用于航空航天、军工、建筑工程、汽车业、牙科和医疗工业、生物技术、个性化定制等领域。近年来中国先进战机密亮相正是得益于钛合金 3D 打印技术的突飞猛进。该技术在珠宝、鞋类、工业设计、工程和施工(AEC)、教育、地理信息系统、土木工程以及其他领域都有所应用。
- 我国创新技术取得令人瞩目的成绩,在新产品的设计、3D 打印等应用中广泛使用二维、三维图,表明计算机图形学得到更为广泛的应用。
- 微信超过微博成为最受欢迎的平台。过去的博客、维基、Facebook、YouTube、MSN、Skype 等都是美国等开发的,而微信是首款由中国人开发的。

为此,第 6 版增加以下 8 篇课文: Mobile Internet and Mobile Web, Cloud Computing and Cloud Storage, Internet of Things, Big Data, 3D Printing, Computer Graphics, GUI, Integrated Computer Aided Software Engineering, 并附有部分参考译文。

此外,增加如下新术语: smartphone, tablet computer, ultrabook, blu-ray disc, TFT-LCD, Android, WeChat, Web crawler, cellular network, 2G, 3G, 4G, UMTS, AES, WPA, WPA2, PSK, distributed database, intelligent database, granular computing, API, CES, wearable computer 等。

与此同时,把第 5 版的 Bus Interconnection 等 11 篇课文放到本书配有的光盘中,以减少书的篇幅。

为了便于读者查阅,提高听力,第 6 版仍备有光盘,供读者使用,其内容包括

- 单词汇总
- 缩略词、术语索引
- 参考文献
- 视频素材
- 每个 Unit 两篇课文的英文朗读材料
- 前几版中所被删除的课文

本版保持了前五版的编排格式和基本风格。各校教师可根据自己的具体情况,因材施教,在每一个 Unit 里挑选课文进行教学。本书每个 Unit 都给出了看、听、说、写四种练习题。进行英语口语练习时,可结合所列题目,组织学生进行课堂小组讨论或讲述。为了方便教学,本书另

配有教师用资源包,内容包含电子教案、中译英练习题参考答案、视频素材的参考原文、若干课文参考译文以及授课建议,向采纳本书作为教材的教师免费提供(获取方式:登录电子工业出版社华信资源网 www.hxedu.com.cn 或电话联系 010-88254531)。

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限于作者水平,书中难免会有不妥和错误之处,敬请读者批评指正。

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于南京大学



所删课文



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Unit 1 Hardware I

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 *DRAM* (Dynamic Random-Access Memory) technology for primary storage. A *state-of-the-art* DRAM *chip* about one eighth the size of a postage stamp^[2] can store about 256,000,000 bits, or over 25,600,000 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.

Figure 1-1 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.

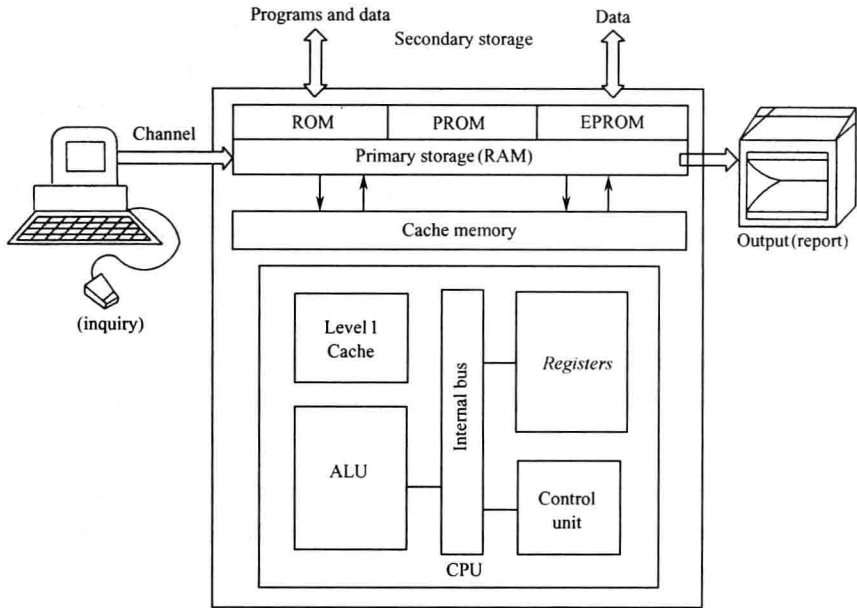


Figure 1-1 Interaction Between Primary Storage and Computer System Components
All programs and data must be transferred from an input device or from secondary storage before programs can be executed and data can be processed. During processing, instructions and data are passed between the various types 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.^[4] However, if you need to be able to revise the contents of PROM, there is **EPROM**, erasable PROM. Before a write operation, all the storage cells must be erased to the same initial state.

A more attractive form of *read-mostly* memory is **electrically erasable programmable read-only memory (EEPROM)**. It can be written into at any time without erasing prior contents; only the byte or bytes addressed are updated.^[5]

The EEPROM combines the advantage of *nonvolatility* with the flexibility of being *updatable in place*,^[6] using ordinary bus control, address, and data lines.

Another form of *semiconductor* memory is **flash memory** (so named because of the speed). Flash memory is intermediate between EPROM and EEPROM in both cost and *functionality*. Like EEPROM, flash memory uses an electrical erasing technology. An entire flash memory can be erased in one or a few seconds, which is much faster than EPROM. In addition, it is possible to erase just blocks of memory rather than an entire chip. However, flash memory does not provide *byte-level* erasure.^[7] Like EPROM, flash memory uses only one transistor per bit, and so achieves the high density of EPROM.

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.^[8] 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 SRAM (Static RAM) 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. Two types of cache memory appear widely in computers. The first is *referred to as internal cache* and is built into the CPU chip. The second, *external cache*, is located on chips placed close to the CPU chip. A computer can have several different levels of cache memory. *Level 1 cache* is *virtually* always built into the chip. *Level 2 cache* used to be external cache but is now typically also built into the CPU like level 1 cache.

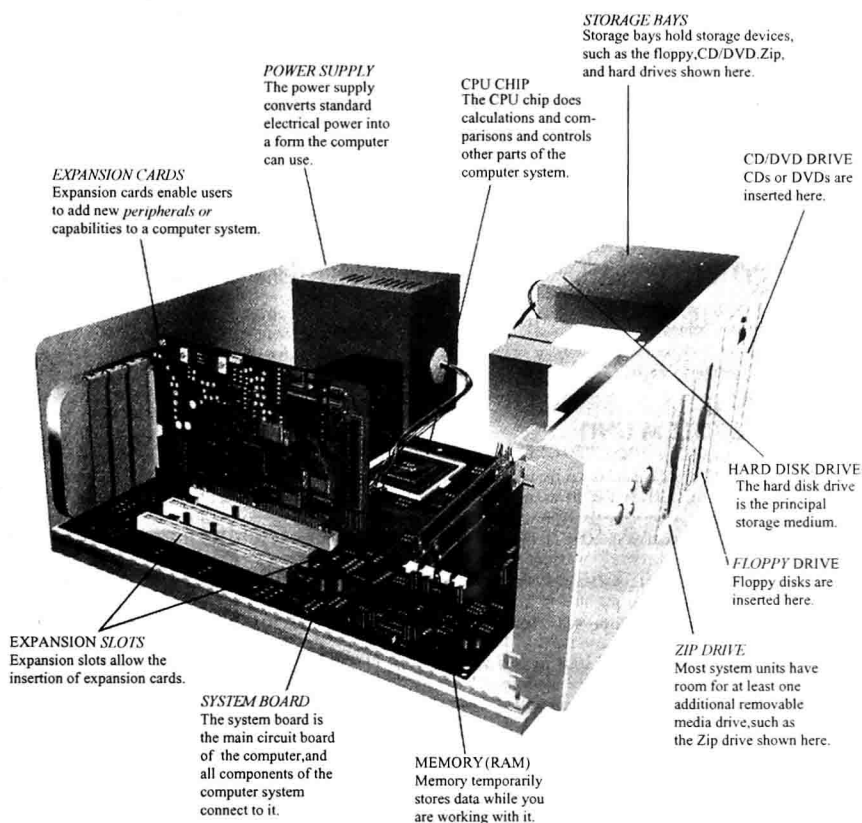


Figure 1-2 Inside a typical PC system unit. The system unit *houses* the CPU, memory, and other important pieces of hardware

Words and Expressions

processor ['prəusesə] *n.* 处理器

primary storage 主存储器

bit [bit] *n.* 位, 二进制位, 比特

hearsay ['hiəsei] *n.* 传闻, 谣传

scores of 许多

CPU (Central Processing Unit) 中央处理机

control unit 控制部件, 控制器

arithmetic and logic unit 算术逻辑部件

integral parts 不可缺的部分, 组成部分

tape and disk 磁带和磁盘

DRAM (Dynamic RAM) 动态随机存取存储器;

SRAM (Static RAM) 静态随机存取存储器

a state of the art (the state of the art) 目前工艺水平, 最新发展水平

chip [tʃip] *n.* 芯片

VDT (Video Display Terminal) 视频显示终端

secondary storage 辅助存储器, 二级存储器
 at a premium 非常珍贵
 reallocate [ri:'æləkeɪt] *v.* 重新分配
 capacity [kə'pæsɪti] *n.* 容量
 coaxial cable 同轴电缆
 program and data 程序和数据
 instruction [ɪn'strʌkʃən] *n.* 指令
 register ['redʒɪstə] *n.* 寄存器, 记录, 登记簿, 登记, 注册
 location [ləu'keɪʃən] *n.* 单元, 位置
 RAM (Random Access Memory) 随机存取存储器; ROM (Read Only Memory) 只读存储器
 hardwired ['hɑ:d'waɪəd] *adj.* 硬接线的, 实线的, 硬件(线路)实现的
 EPROM (Erasable PROM) 可擦可编程只读存储器
 PROM (Programmable Read-Only Memory) 可编程 ROM
 read-mostly *adj.* 以读为主的, 大多数为读的
 EEPROM (Electrically Erasable Programmable ROM) 电可擦可编程 ROM
 nonvolatility [nɒn'vələ'tɪləti] *n.* 非易失性
 updatable ['ʌp'deɪtəbl] *adj.* 可修改的
 in place 在适当的地方, 存在
 semiconductor [semɪkən'dʌktə] *n.* 半导体
 flash memory 闪存
 functionality ['fʌŋkʃəneɪləti] *n.* 功能, 功能性, 函数性
 byte-level 字节级
 cache [kæʃ] *n.* 高速缓存, 隐藏
 throughput [θru:(ɪ)'put] *n.* 吞吐量, 生产量, 生产能力
 be referred to as 称作, 叫作
 virtually ['vɜ:tʃuəli] *adv.* 事实上, 实际上
 house [haus] *vt.* 存放, 给……房子住
 expansion [ɪks'pænjən] *n.* 扩充, 开展
 peripheral [pə'rɪfərəl] *adj.* 外围的; *n.* 外围设备, 外设
 slot [slɒt] *n.* 插槽, 槽
 power supply 电源, 供电
 system board 系统板 = mother board 主板
 storage bay 存储机架
 floppy ['flɒpi] *n.* 软盘, floppy drive 软盘驱动器
 Zip drive *n.* Zip 驱动器

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 DRAM 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（如同轴电缆）发送到主存储器。
4. it is seldom, if ever, changed 中插入的 if ever 是常见用法，可译为“它简直从不改变”。
5. only the byte or bytes addressed 中 addressed 修饰前面的 the byte or bytes。本句可译为：EEPROM 在任何时候都可写入，不需擦除原先内容，且只更新寻址到的字节或多个字节。
6. being updatable in place 是 of 的介词短语。in place 是指需要更新的地方，因此短语的含义是“可更新、需要更新的字节”。本句可译为：EEPROM 把非易失性优点和可更新、需更新的地方的灵活性结合起来，修改时使用普通的总线控制线、地址线 and 数据线。
7. 本句说的“闪存不提供字节级的擦除”（flash memory does not provide byte-level erasure）是针对 EEPROM 可对字节修改，即提供字节级的擦除；而 EPROM 若要修改字节，则必须先擦除整块 EPROM 的原先内容，所以三种存储的擦除单位分别是：

EPROM	整个存储器
Flash memory	块(类似于硬盘)
EEPROM	字节(可能多个字节)

目前的移动 U 盘，数码相机等的闪存卡：CF 卡(Compact Flash)，Smart Media 卡，xD 卡(eXtreme Digital)，记忆棒(Memory Stick)，SD 卡(Secure Digital) 等都用了闪存。

8. 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：从磁盘存储器中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。

注：本节主要介绍计算机的 CPU，主存及闪存等内容。

1.2 Integrated Circuit—Moore's Law

The basic elements of a digital computer, as we know, must perform storage, movement, processing, and control functions. Only two fundamental types of components are required (Figure 1-3): *gates* and *memory cells*. A gate is a device that implements a simple *Boolean* or logical function, such as IF A AND B ARE TRUE THEN C IS TRUE (AND gate). Such devices are called gates because they control data flow in much the same way that canal gates do. ^[1] The memory cell is a device that can store one bit of data; that is, the device can be in one of two stable states at any time. By interconnecting large numbers of these fundamental devices, we can construct a computer.

Thus, a computer consists of gates, memory cells, and interconnections among these elements. The gates and memory cells are, in turn, constructed of simple digital *electronic components*.

The integrated circuit *exploits* the fact that such components as *transistors*, *resistors*, and *conductors* can be *fabricated* from a semiconductor such as *silicon*. It is merely an extension of the solid-state art to fabricate an entire circuit in a tiny piece of silicon rather than assemble *discrete* components made from separate pieces of silicon into the same circuit.^[2] Many transistors can be produced at the same time on a single wafer of silicon. Equally important, these transistors can be connected with a process of *metallization* to form circuits.^[3]

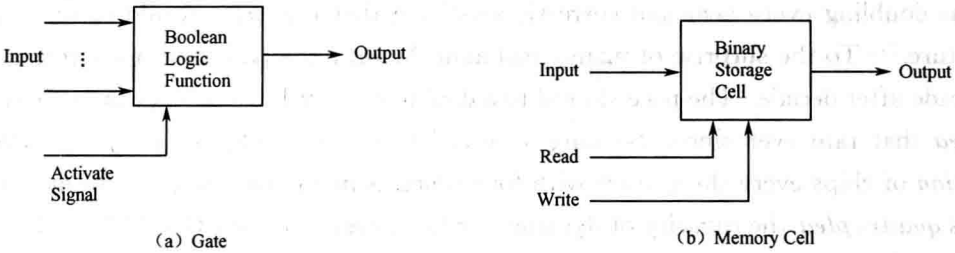


Figure 1-3 Fundamental Computer Elements

Figure 1-4 depicts the key concepts in an integrated circuit. A thin *wafer* of silicon is divided into a *matrix* of small areas, each a few millimeters square.^[4] The identical circuit pattern is fabricated in each area, and the wafer is broken up into chips. Each chip consists of many gates and/or memory cells plus a number of input and output attachment points. This chip is then *packaged* in *housing* that protects it and provides *pins* for attachment to devices beyond the chip.^[5] A number of these packages can then be interconnected on a *printed circuit board* to produce larger and more complex circuits.

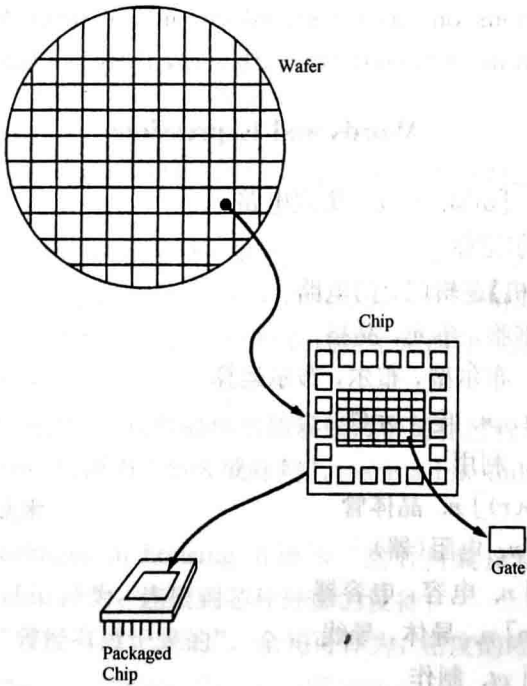


Figure 1-4 Relationship between Wafer, Chip, and Gate

Initially, only a few gates or memory cells could be reliably manufactured and packaged together. These early integrated circuits are referred to as small-scale integration (SSI). As time went on, it became possible to pack more and more components on the same chip. The growth in density is one of the most remarkable technological trends ever recorded.^[6] It reflects the famous Moore's law, which was *propounded* by Gordon Moore, *cofounder* of Intel, in 1965. Moore observed that the number of transistors that could be put on a single chip was doubling every year and correctly predicted that this *pace* would continue into the near future.^[7] To the surprise of many, including Moore, the pace continued year after year and decade after decade. The pace slowed to a doubling every 18 months in the 1970s, but has *sustained* that rate ever since. So long as this law holds, *chipmakers* can *unleash* a new *generation* of chips every three years with four times as many transistors.^[8] In memory chip, this has *quadrupled* the capacity of dynamic random-access memory (DRAM), still the basic technology for computer main memory, every three years.^[9]

The consequences of Moore's law are *profound*:

1. The cost of a chip has remained virtually unchanged during this period of rapid growth in density. This means that the cost of computer logic and memory *circuitry* has fallen at a dramatic rate.^[10]
2. Because logic and memory elements are placed closer together on more densely packed chips^[11], the electrical path length is shortened, increasing operating speed.
3. The computer becomes smaller, make it more convenient to place in a variety of environments.
4. The interconnections on the integrated circuit are much more reliable than *solder* connections. With more circuitry on each chip, there are fewer *interchip* connections.

Words and Expressions

integrated circuit (IC [ai'si:]) *n.* 集成电路

Moore's law *n.* 摩尔定律

gate [geit] *n.* 【计算机】逻辑门, 门电路

cell [sel] *n.* 位元, 细胞, 单元, 晶格

Boolean ['bu:liən] *n.* 布尔型, 布尔, 布尔运算

electronic component *n.* 电子元件

exploit [ik'splɔit] *vt.* 利用

transistor [træn'sistə(r)] *n.* 晶体管

resistor [ri'zistə(r)] *n.* 电阻(器)

capacitor [kə'pæsitə] *n.* 电容, 电容器

conductor [kən'dʌktə] *n.* 导体, 导线

fabricate ['fæbrikeit] *vt.* 制作

silicon ['silikən] *n.* 硅

discrete [di'skri:t] *adj.* 分立的, 分离的, 离散的