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科技英语教程

计算机 · 通信 · 数学 (第2版)

马新英 孙学涛 林 易 编著



国防工业出版社

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责任编辑: 许波建 bxju@ndip.cn
责任校对: 钱辉玲
封面设计: 王晓军 xjwang@ndip.cn

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·北京·

内 容 简 介

本书是根据《大学英语教学大纲》中关于“理工科院校的英语教学应在两年的基础训练之后,在第五学期至第七学期开设必修的专业阅读课”的规定,并结合理工科院校的主要专业而编写的一本科技英语教材。本书是第2版。全书共分三大部分,各部分由若干单元构成,分别对计算机、电信、数学等方面的知识进行系统介绍。各单元包括课文、生词表、综合练习和阅读材料四部分。

本书可作为计算机、通信、数学等专业的教材,也可作为相关工程技术人员的参考用书。

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前 言

根据高等学校理工科本科《大学英语教学大纲》的规定：理工科大学的英语教学要在两年的基础训练之后，进行必修的专业阅读训练，以保证英语教学的延续性，并培养学生以英语为工具阅读有关专业书刊，获取专业信息的能力。本书就是依据此规定编写的科技英语教材。本书可作为计算机、通信、数学等专业的教材，也可作为相关工程技术人员的参考用书。

本教材的编写主要着眼于以下三点：首先，选编专业内容尽可能体现出从基础理论到应用的专业知识结构，以扩大学生的专业词汇量；第二，在阅读专业资料的同时，注重阅读、翻译、写作等技能的训练；第三，从科技英语的文体形式的角度选编内容，以便为学生今后进一步扩大阅读范围打下基础。

以上述三点为指导，全书共分三大部分，各部分由若干单元构成，分别对计算机、电信、数学等方面的知识进行系统介绍。各单元包括课文、生词表、综合练习和阅读材料四部分。综合练习主要包括翻译、写作、构词法等方面的内容。阅读部分在专业知识方面与课文紧密相联，每篇阅读材料后都附有生词表。本书的材料均选自英文原版书刊，涉及前言、序论、论文、说明书等多种文体。

这是本书的第2次修订。在本次修订中，更新了一半的阅读材料，以使内容更新、更系统、专业深度更适合，供更多的读者阅读。

本书的第一部分由孙学涛编写，第二部分由马新英编写，第三部分由林易编写。全书由马新英统稿。

因编写时间仓促，编者水平有限，对于书中所出现的缺点、错误，恳请读者批评指正。

编 者
2008年5月

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Part I Computing

Unit One

Text

Choosing a CPU

1 CPUs are one area that causes people a lot of confusion and frustration. Basically, there are two major corporations competing in the PC arena. These are:

2 ♦ AMD

3 ♦ Intel

4 Both AMD and Intel make world class CPUs. Both make CPUs that cover the whole consumer spectrum: budget CPUs, low-power consumption CPUs for mobile devices, midrange CPUs, and high-performance CPUs. Both manufacturers are very popular. So what's the difference?

1. The Difference between CPU Manufacturers

5 The bottom line is that there's in fact very little difference between CPU manufacturers. Just as there are dozens of car companies all selling cars, the same is true of CPUs, but instead of there being dozens of companies manufacturing and selling CPUs, there are only two companies making and selling CPUs for the PC market: AMD and Intel. In fact, it's quite possible that if there were half a dozen or so CPU manufacturers, consumers would be more comfortable with the idea that AMD and Intel are competing manufacturers as opposed to making products that work differently.

6 From a point of view of performance and power, a case can be argued for both AMD and Intel CPUs. Take a look at computer magazines or surf the web for info, and you'll come across reams of reports and tests and comparisons—some independent, some not. Some will conclude that AMD CPUs (or more specifically, a particular AMD CPU) are better than Intel CPUs and that consumers looking for a good deal should choose AMD. Then within minutes, you'll come across another report or test that says that an Intel CPU is best and that's the CPU of choice and everyone should go for an Intel CPU.

7 Opinions are everywhere. The media, web, magazines, and newspapers fill their pages

with them. And most are just that—opinions.

- 1 The truth is that both companies make powerful and reliable CPUs. Take two PCs of similar specification, and it's impossible to tell the difference without actually looking at the CPU or using software to tell you what it is.
- 2 The real differences between AMD and Intel CPUs are in the underlying architecture of the CPU. This is the inner circuitry of the CPU, what makes it work.
- 3 A modern CPU is a mind-bogglingly complicated piece of engineering, and it crams a lot of sophisticated technology into a small space. Just as a Ford and Ferrari both have four wheels, have seats, and use an internal combustion engine to take people from A to B and back to A again, AMD and Intel do the same thing, but in different ways.
- 4 You can't take an engine out of a Ford and expect it to fit directly into a Ferrari, and the same is true of AMD and Intel CPUs. One of the main differences between the two manufacturers is that each CPU requires a specific motherboard.

2. What This Means to You

- 5 This means that no matter which CPU brand you choose, you need to make sure that the motherboard is designed to support the CPU. (That brand is, for example, whether you choose an Intel CPU or an AMD one. Each manufacturer will have a number of CPUs available covering the whole range, from budget to high performance.) And not only do you need to get a motherboard that's compatible with the CPU manufacturer you'll need a motherboard that's compatible with the type of CPU that you want.
- 6 If you want to use an Intel CPU then you need an Intel-compatible motherboard. If you go the AMD route, then you'll have to have an AMD-compatible board. There's no point buying a CPU and then buying a random motherboard—there's a good chance it won't be compatible.
- 7 After you know that your CPU brand is compatible with your motherboard, you need to make sure that your CPU model works with your motherboard. This is where things begin to get a little complicated, and you have to be careful so as not to make a mistake that could cost you money. Motherboards are designed to support a particular range of CPUs and no others. This is very specific, and it's important to get it right. Generally, it's not possible to fit an incompatible CPU onto a motherboard, but this doesn't stop people trying and then damaging the CPU, motherboard or both in the process. The main controlling factor is the CPU socket type.
- 8 Both Intel and AMD make motherboards, but don't be restricted by thinking that they are the only ones—there are half a dozen or so good motherboard manufacturers.
- 9 So, you either have to choose a CPU and get a motherboard to match or choose a motherboard and get a matching CPU. We recommend that you choose the CPU first because there are more considerations to take into account when buying a CPU than there are when buying a matching motherboard. Because of this we're now going to move on to examining how to choose the right CPU for you.

3. The Important Differences between CPUs

1 Let's take a look at some of the differences between CPUs that actually make a difference. These include:

- 2 ◆ Speed
- 3 ◆ Socket types
- 4 ◆ Cache (built-in memory)
- 5 ◆ Dual-core/hyper-threading/64-bit processors

3.1 CPU Speed

6 The most significant difference among CPUs is the *speed*. That is, how fast it can process instructions? The faster it can process instructions, the faster we perceive the PC to be.

7 Every PC is regulated by an internal clock. This clock regulates the rate at which instructions are processed by the CPU. This is known as *clock cycles*, and it determines the interval between successive instructions. The smaller the interval, the faster the CPU can process instructions and the faster the perceived speed.

8 A convenient way to measure the speed of a CPU is to say how many clock cycles the CPU can handle per second. A few years back CPUs were capable of millions of clock cycles per second, which was measured in *megahertz* (written as MHz). Mega is short for million (1,000,000) and Hertz or Hz is a shorthand way of saying "cycles per second." But progress has meant that CPUs now have a clock speed that's measured in thousands of millions of clock cycles per second (1,000,000,000), and this is called *gigahertz* (or GHz).

9 So, a CPU that's measured as 500 MHz (meaning the CPU can perform 500,000,000 clock cycles per second) is theoretically six times slower than a CPU that is rated as 3 GHz (3,000,000,000 clock cycles per second). Equally, a 3.6 GHz CPU is faster than a 3 GHz CPU or even a 3.4 GHz CPU.

10 In fact, the faster the CPU the smaller the perceived increases in speed. A 3.6GHz CPU can carry out 200,000,000 more clock cycles per second than a CPU that's measured at 3.4 GHz. That's a difference of 200 MHz . . . it was only a few years ago that 200 MHz CPUs were top of the range!

11 CPU speed also isn't the end of the story. Because of different ways Intel and AMD CPUs work, AMD have decided to abandon CPU speed and instead go for model numbers to designate the CPU speed. This complicates matters when making your choice.

3.2 CPU Sockets

12 Remember how we said that the socket the CPU fits into determines the type of motherboard you can use? The reason for this is because CPUs fit onto the motherboard via a *socket*. The pins on the CPU have to fit into a specific socket on the motherboard. Different CPUs have different pin configurations and, therefore, need to be fitted into a different socket (for example, Socket 754, Socket 478). The socket numbers are significant. These indicate the number of contacts the socket has or, conversely, the number of pins on

the bottom of the CPU. As CPUs become faster, the number of contacts required to connect the CPU to the motherboard also increases.

3.3 Cache

1 When looking through specifications on CPUs, you will undoubtedly come across mention of “cache,” “on-board cache,” “on-die cache,” or “L1” and “L2” cache. These terms all refer to the amount of memory built into the CPU. The more memory that is built into the CPU, the faster the CPU and the better the performance.

2 The size of the cache varies for different CPUs, from 256 KB for the lower performance budget CPUs to 1 MB for high-performance CPUs such as the AMD Athlon 64.

3.4 Dual-Core/Hyper-Threading/64-Bit Processors

3 AMD and Intel both have a range of processors called “dual-core,” which basically means two CPUs in one that offer greater power. Intel on the other hand has Hyper-Threading Technology; this allows the CPU to run some applications faster because it can run multiple computer instructions in parallel, which increases speed. (This can be a bit hard to understand. Think of it as a person who can carry on two telephone conversations at once and is able to get more done than the person who can only handle only one call at a time.)

4 AMD and Intel both also have a range of 64-bit processors that can run 64-bit applications, which also means greater speed. CPUs incorporating these latest technologies are all much more expensive than standard CPUs and are aimed at high-performance systems or business servers. Be aware that the performance gains you see may or may not justify the hefty price difference.

4. Choosing the Right CPU for You

5 So, how do you go about choosing the right CPU? There are a number of ways you can go about choosing a CPU. Some require a little skill and research; others are quite simple. No matter what method you choose though, shop around before you buy a CPU. Both online and offline there can be a massive difference in price ranges for a particular CPU, within a range (and not a small difference—you might find a 100% difference in price, or possibly more). Don’t just buy the first one you come across!

Adrian W. Kingsley-Hughes, Kathie Kingsley-Hughes. *Build the Ultimate Custom PC*, 2006. pp54-61

Words and Expressions

architecture 体系结构

Athlon 速龙

boggle 犹豫

circuitry 电路

combustion 燃烧

hyper-threading 超线程

interval 间隔

midrange 中等的

motherboard 主板

reams 大量

compatible 兼容的

cram 填满

die 晶片

hefty 沉重的

socket 插座

sophisticated 复杂的

specification 技术规格

surf 冲浪

Exercises

Reading Comprehension

I. Answer the following questions according to the text.

1. Why do CPUs cause us a lot of confusion?
2. What is the real difference between AMD and Intel CPUs?
3. What will happen if your CPU is not compatible with your motherboard?
4. How to measure the speed of a CPU?
5. Why do people choose a dual core processor?
6. Do 64-bit processors run 32-bit applications?
7. How would you choose the right CPU?
8. Are you satisfied with the CPU running in your PC? Why/why not?

Word-building

II. Summarize the following prefixes.

monoflop

unidirectional

ambipolar

bistable

duplex

dipolar

quadratic

tristate

quadrant

Pentium

octal

decimal

hexadecimal

microvolt

nanosecond

kilobyte

megabyte

gigabyte

terabyte

exabyte

Translation

III. Translate the following sentences into English.

1. 很多笔记本电脑都采用低功耗型 CPU，我的也不例外。
2. 现在市场上有很多笔记本电脑，既有价格便宜的，也有性能卓越的。
3. AMD 推出的 64 位皓龙 (Opteron) 处理器是针对 64 位应用的，但也完全兼容 32 位应用。
4. Intel 的安腾 (Itanium) 处理器一次能取 64 位数据，最多可并行执行 20 条指令。
5. 对两台配置相似的电脑，如果不实际运行某个软件，很难说哪台性能更高。
6. 服务器追求高可用性，因此有些部件 (例如硬盘) 是可热插拔的。
7. 在查看 CPU 技术指标时，必然会碰到“二级高速缓存”这个名词。
8. 采用双核、四核等最新技术的 CPU 要比普通 CPU 贵很多，故经常用于商用服务。

器。

IV. Translate the following sentences into Chinese.

1. A data block is the unit of transfer between main memory and auxiliary storage and usually consists of several records.
2. We define a hacker as a “computer enthusiast who enjoys learning everything about a computer system by means of clever programming.”
3. Data structures which change in size once they have been created are called dynamic data structures.
4. As the use of computer networks, especially the Internet, has become pervasive, the concept of computer security has expanded to denote issues pertaining to the networked use of computers and their resources.
5. Multiprogramming means the existence of many programs in different parts of main memory at the same time.
6. In general, integrity refers to maintaining the correctness and consistency of the data.
7. Task management routines, which operate in the supervisor state and are primarily core-resident, are frequently referred to as the supervisor of the operating system.
8. A facility allowing a peripheral device to transfer characters directly to memory without going through the CPU is known as direct memory access (DMA).

Reading

A Buyer's Guide to Ethernet Hardware

- 1 If you're looking to purchase new ethernet hardware, whether you're starting from scratch or looking to upgrade your existing equipment, the buying process is not always easy because you often face a thicket of jargon terms and a list of product specifications that seems to require an advanced degree in electrical engineering to figure out. To make it easier to choose the right ethernet hardware, the next few sections give you a few pointers on what to look for and what to avoid when purchasing the four main hardware types: NICs (Network Interface Cards), cables, switches, and routers.
- 2 Before getting to those specific tips, I should mention that when it comes to Ethernet hardware, quality counts. That is, whenever possible, you should purchase only devices manufactured by reputable companies because that's the closest you can come to a guarantee that the products will be reliable, will conform to ethernet standards, will have device drivers that work with Windows Vista, and will provide good support, either on the Web or via phone. Yes, you can save a dollar or three on devices made by obscure manufacturers, but my experience has been that it's simply not worth the grief of buying an inferior product. Here's a list of networking companies that manufacture quality ethernet devices suitable for the home, home office, or small office:
- 3 Belkin (belkin.com)

- 1 Cables To Go (cablestogo.com)
- 2 Cables Unlimited (cablesunlimited.com)
- 3 D-Link (dlink.com)
- 4 Hewlett-Packard (hp.com)
- 5 Intel (intel.com)
- 6 Linksys (linksys.com)
- 7 NETGEAR (netgear.com)
- 8 TRENDnet (trendnet.com)
- 9 Zonet (zonetusa.com)

1. Purchasing a NIC

- 10 Here are a few pointers to bear in mind when shopping for a new NIC:
- 11 **Internal or external?** If you're looking for a NIC to go with a desktop computer, your first decision is whether to go for an internal adapter card or an external USB device. The USB NIC is obviously much easier to install; so, if your network uses Fast Ethernet (USB NICs are too slow to support Gigabit Ethernet) and your computer has lots of free USB ports, USB is definitely the way to go.
- 12 **Get USB 2.0.** If you do go the USB route, check the NIC's specifications carefully to make sure you're getting a USB 2.0 NIC. USB 1.1 has a maximum data transfer rate of only 12Mbps, so it's only useful for 10BASE-T connections; if your network uses Fast Ethernet, you need USB 2.0, which supports data transfer rates of up to 480Mbps.
- 13 **Fast Ethernet or Gigabit Ethernet?** Your next major decision is which Ethernet standard to use: Fast Ethernet or Gigabit Ethernet (don't even consider 10BASE-T). Fast Ethernet NICs are cheaper than their Gigabit Ethernet cousins; so, if your budget is tight, go with the former. On the other hand, you're really only looking at spending a few more dollars for a Gigabit Ethernet NIC, and those few measly dollars buy you 10 times the performance. The downside with Gigabit Ethernet is that you must purchase an internal adapter card, which is harder to install.
- 14 **Check your available bus slots.** Internal NICs insert into a slot on the computer's bus. The most common type of bus is PCI, but some older systems have one or more ISA slots and some newer systems have one or more PCIe slots. Make sure the internal NIC you buy matches your computer's bus, and make sure that your computer has at least one slot available to hold the NIC.
- 15 **Make sure it's Vista-ready.** You should only purchase a NIC that displays the Certified for Windows Vista logo on the box. This guarantees that the NIC's drivers work with Vista, so the device will install automatically and should work properly right out of the box.

2. Purchasing Cables

- 16 Network cables might seem like the simplest of all networking hardware to purchase, but you do need to consider a few things. Here are a few pointers:

- 1 **Get the right cable category.** Make sure the cable you buy matches your ethernet standard. If you're setting up a Fast Ethernet network, you need Cat 5 cable; if you're going with Gigabit Ethernet, load up on Cat 6 cable (or Cat 5e if you can't find Cat 6).
- 2 **Shielded or unshielded?** For a small network, *shielded twisted-pair* (STP) cable is probably overkill, so in most cases you'll be fine with *unshielded twisted-pair* (UTP) cable. The exception to this is when you know that the cable will be running near a source of electromagnetic radiation such as an electronic device, a power line, an air conditioner, fluorescent lights, or a motor.
- 3 **Get the right length.** You can reduce cable clutter in your home or office by not purchasing cables that are excessively too long. For example, if you know that a computer is 8 feet from the switch or router, don't purchase a 25-foot cable for that computer. Instead, examine the available cable lengths and buy one that's a bit longer than what you need. (A bit of slack on the cable is a good idea because it reduces the pressure on the RJ-45 connectors.) The most typical cable lengths are as follows, in feet: 1, 3, 5, 7, 10, 14, 25, and 50.
- 4 **Mix your colors.** Color might not seem like an important consideration when purchasing cable, but it can actually be extremely handy. The basic idea is that you buy your cables using the widest variety of colors possible: ideally, a different color for each device that you'll be connecting to the switch or router. That way, later on when you need to, say, swap out a computer's network cable for a new one, you know immediately which cable to disconnect from the switch or router.
- 5 **Go snagless.** All RJ-45 connectors come with a plastic tab that snaps into place when you insert the connector into an RJ-45 port. This prevents the cable from falling out of the port, because you need to hold down the plastic tab to remove the connector. Unfortunately, that plastic tab has a nasty habit of snagging on whatever's under your desk when you try to pull out a loose cable. Tugging on the cable usually breaks the plastic tab, which renders the cable useless. To avoid this problem, get cables that have *snagless* connectors, which include a rounded bit of rubber just behind or on either side of the plastic tab. The rubber helps the connector slide over any obstacles, thus preventing the plastic tab from snagging. This extra bit of rubber is called, variously, the *cable boot*, the *connector boot*, the *mold boot*, or just the *boot*.

3. Purchasing a Switch

- 6 The technical specifications for most switches are a maze of impenetrable jargon, acronyms, and abbreviations. People who build massive networks need to know all that minutiae; but for your small network, you need to concern yourself with only four things:
- 7 **The number of ports.** Purchasing a switch is usually a trade-off between price and the number of ports. That is, the more ports a switch has, the more expensive it usually is. The minimum number of ports you need is, obviously, the same as the number of ethernet devices you'll be connecting to the switch. However, networks do have a habit of growing

over time, so it's almost always a good idea to get a switch that has at least a few extra ports. On the other hand, if you think it's extremely unlikely that you'll ever need more than about a half dozen ports or so, don't waste your money buying a 16-port switch.

1 The port speed. As the central connection point for your network, the Ethernet standard supported by the switch is crucial. For example, even if you have nothing but Gigabit Ethernet cards and Cat 6 cable, it won't matter a bit if your switch's ports only operate at Fast Ethernet speeds. If you want gigabit performance, get a gigabit switch. If you're slowly making your way from Fast Ethernet to Gigabit Ethernet, you can ease the transition by getting a switch that supports 10/100/1000.

2 Does the switch support Auto Crossover? If you think you might expand your network down the road by adding a second switch, make sure the first switch supports Auto Crossover (Auto MDI/MDI-X). This enables you to add a second switch to the network just by running a regular network cable between the two switches.

3 Do you even need a dedicated switch? As mentioned earlier, most routers nowadays come with a built-in switch, so you might be able to get away with using the router as your network's central connection point. This is usually only the case with small networks, because most routers come with 4-port switches (although 8- and 16-port routers are available).

4. Purchasing a Router

4 Most home and small offices now have Internet access via a broadband modem, and to share that access among the network computers and devices requires a router. Here are a few ideas to keep in mind when you need to purchase a router for your network:

5 Do you need a separate router? Some broadband modems come with a built-in router; so, if you need only basic connectivity, you can forego a separate router. The downside to the modem-as-router is that they only rarely include some kind of interface for configuring the router, usually because these are barebones routers without much to configure. Getting the most out of a router almost always means accessing the router's setup program, so I recommend a dedicated router for most small networks.

6 Do you want to use the router as a switch? If your network is small, you can save a few bucks by using the router as the network switch. Most modern routers have the capability, but double-check the product specifications to make sure. Check the ethernet standards supported by the router, and get the largest number of ports that you can afford.

7 Do you need wireless access? If you want to access your network with a wireless connection, then your router will also need to include a wireless access point. I discuss this in more detail in Chapter 2.

8 Make sure it has a firewall. All routers support NAT for security, but for maximum safety make sure the router comes with a dedicated firewall that you can configure. This will help keep out Internet intruders.

9 Do you need VPN? If you think you'll need to make secure virtual private network