



21世纪全国高职高专
计算机系列实用规划教材

全新推出第**2**版

计算机 专业英语教程 (第2版)

主 编 李 莉 李秀华
副主编 樊晋宁 康丽军



COMPUTER

内容特点:

- 主要介绍计算机英语在常见领域的应用
- 每篇课文后都有典型例句的语法分析
- 从实际出发, 扩大读者计算机专业词汇量, 提高阅读能力



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前 言

计算机专业英语是计算机及相关信息专业的一门专业基础课程，其主要任务是培养学生实际使用英语的能力。通过本课程的学习，使学生掌握一般计算机英语的日常用语，可以借助工具阅读计算机专业书籍并能进行计算机专业英语资料的翻译，为更好地使用计算机打下坚实的基础。

计算机科学技术的迅猛发展使它所包含的学科越来越庞杂，知识更新的速度也越来越快，因此，本书很难全面反映这一领域的基本框架和某些最新发展。尽管如此，在选材时，我们是按照“系统、新颖、实用”的原则，选取了计算机基础、计算机网络、因特网与电子商务、数据库、程序语言、信息安全及图像处理等内容，每章内容相对独立，并分成四节加以阐述，其中每一节包括：

- | | |
|------------------|---------------------|
| 1. Text | 5. Notes |
| 2. Words | 6. Exercises |
| 3. Phrases | 7. Reading material |
| 4. Abbreviations | 8. 正文参考译文 |

因此本教材是以节为基本单元。限于其篇幅，在每节的阅读材料中又补充了相关的内容，以拓宽学生的视野。每节大概需要四课时。

根据编者多年的教学经验，没有给书中的练习题附答案，目的是让学生在学中多动脑筋、多思考，需要参考答案的老师请与出版社联系：pup_6@163.com。对于正文的参考译文，需要说明的是它并不是惟一的，翻译属于二次创作，因此它仅作为参考。

本书由太原城市职业技术学院樊晋宁担任主编，编写第1、2章，山东电力高等专科学校李莉担任主编，编写第5、7章和第6章的第1节，太原大学康丽军担任副主编，编写第3章，山东商业职业技术学院李茜、朱佳参编第4章，聊城职业技术学院黄晓霞参编第6章的2、3、4节。

在本书的编写过程中，得到了北京大学出版社第六事业部同志的大力支持和帮助，在此表示感谢。

由于编者水平有限，缺点和错误在所难免，恳请读者批评指正。

编 者
2005年7月

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主 编 樊晋宁 李 莉
副主编 康丽军
参 编 李 茜 朱 佳 黄晓霞

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内 容 简 介

本书按照“系统、新颖、实用”的原则,从原版的计算机文献中选择了适合高职高专院校学生程度的文章来组成课文,注重所选材料的实用性、广泛性和前瞻性,涵盖了计算机的基础知识、计算机网络、因特网与电子商务、数据库、程序语言和信息安全等诸方面内容。课文后配有生词、短语、专用词语注释和综合练习以巩固对课文的理解。每篇课文后都附有一到两篇较新的阅读文章以拓宽学生的视野。

本书可作为高职高专院校计算机及其他相关信息技术专业的英语教材。

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Chapter1 Computer Fundamentals

1.1 Four Kinds of Computers

Computers are electronic devices that can follow instructions to accept input, process that input, and produce information. There are four types of computers: microcomputers, minicomputers, mainframe computers, and supercomputers.

Microcomputers, also known as personal computers, are small computers that can fit on a desktop. Portable microcomputers can fit in a briefcase or even in the palm of your hand. Microcomputers are used in homes, schools, and industry. Today nearly every field uses microcomputers.

One type of microcomputer that is rapidly growing in popularity is the portable computer, which can be easily carried around. There are four categories of portable computers.

Laptops: laptops, which weigh between 10 and 16 pounds, may be AC-powered, battery-powered, or both. The AC-powered laptop weighs 12 to 16 pounds. The battery-powered laptop weighs 10 to 15 pounds, batteries included, and can be carried on a shoulder strap.

Notebook PCs: notebook personal computers weigh between 5 and 10 pounds and can fit into most briefcases. It is especially valuable in locations where electrical connections are not available. Notebook computers are the most popular portable computers today.

Subnotebooks: subnotebooks are for frequent flyers and life-on-the-road types.^[1] Subnotebooks users give up a full-size display screen and keyboard in exchange for less weight. Weighing between 2 and 6 pounds, these computer fit easily into a briefcase.

Personal Digital Assistants: much smaller than even the subnotebooks. Personal Digital Assistants (PDAs) weigh from 1 to 4 pounds. The typical PDA combines pen input, writing recognition, personal organizational tools, and communication capabilities in a very small package.

Minicomputers, also known as midrange computers, are desk-sized machines.^[2] They fall into between microcomputers and mainframes in their processing speeds and data-storing capacities. Medium-size companies or departments of large companies typically use them for specific purposes. For example, they might use them to do research or to monitor a particular manufacturing process. Smaller-size companies typically use microcomputers for their general data processing needs, such as accounting.

Mainframe computers are larger computers occupying specially wired, air-conditioned rooms and capable of great processing speeds and data storage. They are used by large organizations—business, banks, universities, government agencies—to handle millions of transactions. For example, insurance companies use mainframes to process information about millions of policyholders.

Supercomputers are special, high-capacity computers used by very large organizations principally for research purposes. Among their uses are oil exploration and worldwide weather forecasting.

In general, a computer's type is determined by the following seven factors:

The type of CPU. Microcomputers use microprocessors. The larger computers tend to use CPUs made up of separate, high-speed, sophisticated components.

The amount of main memory the CPU can use. A computer equipped with a large amount of main memory can support more sophisticated programs and can even hold several different programs in memory at the same time.

The capacity of the storage devices. The larger computers systems tend to be equipped with higher capacity storage devices.

The speed of the output devices. ^[3]The speed of microcomputer output devices tends to be rated in terms of the number of characters per second (cps) that can be printed—usually in tens and hundreds of cps. Larger computers' output devices are faster and are usually rated at speeds of hundreds or thousands of lines that can be printed per minute.

The processing speed in millions of instructions per second (mips). The term instruction is used here to describe a basic task the software asks the computer to perform while also identifying the data to be affected. The processing speed of the smaller computers ranges from 7 to 40 mips. The speed of large computers can be 30 to 150 mips or more, and supercomputers can process more than 200 mips. In other words, a mainframe computer can process your data a great deal faster than a microcomputer can.

The number of users that can access the computer at one time. Most small computers can support only a single user, some can support as many as two or three at a time. Large computers can support hundreds of users simultaneously.

The cost of the computer system. Business systems can cost as little as \$500 (for a microcomputer) or as much as \$10 million (for a mainframe)—and much more for supercomputer.

Words

| | | |
|---------------|------|----------------|
| access | v. | 访问, 存取 |
| accounting | n. | 会计学, 统计 |
| agency | n. | 机构, 办事处, 代理店 |
| briefcase | n. | 公文包, 公事包 |
| exploration | n. | 勘探, 发掘, 调查 |
| laptop | n. | 膝上, 便携式电脑 |
| mainframe | n. | 大型计算机 |
| palm | n. | (手) 掌, 手心, 掌状物 |
| policyholder | n. | 投保人, 保险客户 |
| portable | adj. | 手提的, 轻便的, 可携带的 |
| recognition | n. | 认出, 识别, 认可 |
| sophisticated | adj. | 复杂的 |
| strap | n. | (皮, 布) 带 |
| supercomputer | n. | 巨型计算机 |
| typically | adv. | 特有地, 独特地, 典型地 |

Phrases

| | |
|--------------------|---------|
| fall into | 属于 |
| in exchange for | 交换, 来代替 |
| mainframe computer | 大型计算机 |
| portable computer | 便携式计算机 |

Abbreviations

| | |
|----------------------------------|--------|
| AC (Alternating Current) | 交流电 |
| CPU (Central Processing Unit) | 中央处理器 |
| PC (Personal Computer) | 个人计算机 |
| PDA (Personal Digital Assistant) | 个人数字助手 |

Notes

- [1] 例句: Subnotebooks users give up a full size display screen and keyboard in exchange for less weight.

分析: in exchange for less weight 是介词短语作目的状语, 为了换取较小的重量。

译文: 超轻薄笔记本电脑用户为了较轻的重要放弃了完整的显示屏幕和键盘的标准尺寸, 但换来的是重量较轻。

- [2] 例句: They fall in between microcomputers and mainframes in their processing speeds and data-storing capacities.

分析: 句中 They 指的是小型计算机, fall in 是词组, 有介于、属于的意思, in their processing speeds and data-storing capacities 是介词短语作状语。

译文: 小型计算机在处理速度和数据存储能力方面介于微型机和大型机之间。

- [3] 例句: The speed of microcomputer output devices tends to be rated in terms of the number of characters per second (cps) that can be printed—usually in tens and hundreds of cps.

分析: 句中 to be rated 是动词不定式的被动语态作目的状语, in terms of 有依据、用...来表示之意。that can ...是定语从句, 修饰 characters。

译文: 微机输出设备的速度倾向于用每秒钟能打印的字符数(cps)予以度量, 通常为每秒钟几十个、几百个字符。

Exercises

I. Write true or false for the following statements according to the passage.

1. () Computers are electronic devices that can perform tasks automatically.
2. () Portable computers can fit in a briefcase or even in the palm of your hand.
3. () Portable computers are AC-powered, battery-powered, or both.
4. () All portable computers can fit in briefcase.
5. () Subnotebooks have a full-size display screen and keyboard.

6. () The capacity of the storage devices is a main factor that affects the property of computers.
7. () Most microcomputers are single-user systems.
8. () Depending on the passage, supercomputers have the largest capacity storage devices.
9. () The term instruction used in the passage only describe a basic task the software asks the computer to perform.
10. () Ordinary users have chances to contact with supercomputers.

II. Fill in the blanks according to the passage.

1. Computers are _____ devices that can follow _____ to accept input, process that input, and produce information.
2. Portable microcomputers can fit in a _____ or even in the _____ of your hand.
3. There are four types of computers: _____, _____, _____, _____.
4. Minicomputers fall into between microcomputers and mainframes in their _____ speeds and data-storing _____.
5. Mainframe computers are used by large _____.
6. Insurance companies use mainframes to process _____ about millions of _____.
7. Supercomputers are special, _____ computers.
8. Laptops may be _____, _____, or both.
9. The larger computer systems tend to be _____ with higher capacity _____.
10. Large computer can support hundreds of users _____.

III. Translate the following words and expressions into Chinese.

- | | |
|----------------------|------------------------|
| 1. electronic device | 6. portable computer |
| 2. personal computer | 7. writing recognition |
| 3. processing speed | 8. storage device |
| 4. high-capacity | 9. supercomputer |
| 5. battery-powered | 10. mainframe |

1.1.1 Reading Material

Web Harvesting

As the amount of information on the Web grows, that information becomes ever harder to keep track of and use. Search engines are a big help, but they can do only part of the work, and they are hard-pressed to keep up with daily changes.

Consider that even when you use a search engine to locate data, you still have to do the following tasks to capture the information you need: scan the content until you find the information, mark the information (usually by highlighting with a mouse), switch to another application (such as a spreadsheet, database or word processor), paste the information into that application.

A better solution, especially for companies that are aiming to exploit a broad swath of data about markets or competitors, lies with Web harvesting tools.

Web harvesting software automatically extracts information from the Web and picks up where search engines leave off, doing the work the search engine can't. Extraction tools automate the reading, copying and pasting necessary to collect information for analysis, and they have proved useful for pulling together information on competitors, prices and financial data or all types.

There are three ways we can extract more useful information from the Web.

The first technique, Web content harvesting, is concerned directly with the specific content of documents or their descriptions, such as HTML files, images or e-mail messages. Since most text documents are relatively unstructured (at least as far as machine interpretation is concerned), one common approach is to exploit what's already known about the general structure of documents and map this to some data model.

The other approach to Web content harvesting involves trying to improve on the content searches that tools like search engines perform. This type of content harvesting goes beyond keyword extraction and the production of simple statistics relating to words and phrases in documents.

Another technique, Web structure harvesting, takes advantage of the fact that Web pages can reveal more information than just their obvious content. Links from other sources that point to a particular Web page indicate the popularity of that page, while links within a Web page that point to other resources may indicate the richness or variety of topics covered in that page. This is like analyzing bibliographical citations—paper that's often cited in bibliographies and other paper is usually considered to be important.

The third technique, Web usage harvesting, uses data recorded by Web servers about user interactions to help understand user behavior and evaluate the effectiveness of the Web structure.

General access—pattern tracking analyzes Web logs to understand access patterns and trends in order to identify structural issues and resource groupings.

Customized usage tracking analyzes individual trends so that Web sites can be personalized to specific users. Over time, based on access patterns, a site can be dynamically customized for a user in terms of the information displayed, the depth of the site structure and the format of the resource presented.

Words

| | | |
|-----------------|-------------|------------|
| bibliographical | <i>adj.</i> | 书目的, 文献目录的 |
| citation | <i>n.</i> | 引证, 条文 |
| dynamically | <i>adv.</i> | 动态地 |
| exploit | <i>v.</i> | 开发, 利用 |
| extract | <i>v.</i> | 提取, 摘录 |
| harvest | <i>v.</i> | 收获 |

| | | |
|--------|-----------|--------|
| issue | <i>n.</i> | 问题, 出版 |
| reveal | <i>v.</i> | 展现, 显示 |
| swath | <i>n.</i> | 一行, 幅 |

1.1.2 正文参考译文

四类计算机

计算机是根据指令接收输入, 处理输入数据并产生信息的电子设备。有四种类型的计算机: 微型机、小型机、大型机和巨型机。

微型计算机, 亦被称为个人计算机, 是可以放在桌面上的小的计算机。便携式微型机可以放入手提箱, 甚至手掌中。微型机被用于家庭、学校及工业当中。如今几乎每一领域都在使用微型机。

正在迅速普及的一种微型机是便携式计算机, 很易于四处携带。有四种类型的便携式计算机。

膝上电脑: 其重量在 10~16 磅之间, 可以是交流供电, 电池供电或两者均可。交流供电的膝上电脑重量在 12~16 磅之间。电池供电的膝上电脑的重量, 包括电池在内是 10~15 磅之间, 可以用肩带背起来携带。

笔记本个人电脑: 其重量在 5~10 磅之间, 并且可放入大多数公文包中, 它主要是用于连接电源不方便的地方。笔记本电脑是如今最流行的便携式电脑。

超轻薄笔记本电脑: 用于经常出差在路上的一类人。超轻薄笔记本电脑用户为了较轻的重量放弃了完整的显示屏幕和键盘的标准尺寸, 但换来的是重量较轻。其重量在 2~6 磅之间, 可以很容易地放入公文包中。

个人数字助手: 比超轻薄笔记本电脑还要小得多, 其重量在 1~4 磅之间。典型的个人数字助手将钢笔输入、书写识别、个人编排工具和通信功能结合起来放入小包中。

小型计算机, 也被称为中型机, 是像书桌大小的机器。它们的处理速度和数据存储能力介于微型机和大型机之间。中型公司或大型公司的部门一般使用它们用于特殊用途。例如, 可以使用它们作研究或监视某一个生产过程。小型公司一般使用小型机进行总的数据处理, 比如说统计。

大型机是较大的计算机, 放置在具有专线、空调的房间中, 能够具有很快的处理速度和很大的数据存储量。它们通常是由一些大的组织机构使用——商业部门、银行、大学、政府机构——以处理数以百万计的事务。例如, 保险公司使用大型机以处理数以百万计的保险客户的信息。

巨型机是由非常大的机构用于研究的大容量专用计算机。在这些应用当中包括石油勘探和世界范围的天气预报。

一般说来, 计算机的类型是由下列 7 个因素决定的:

CPU 的类型。微型计算机使用微处理器。较大计算机趋向于使用由分开的高速复杂的零部件构成的 CPU。

CPU 能够使用的内存的总量。配备有大容量内存的计算机可以支持更复杂的程序, 并且能同时容纳几个不同的程序。

存储设备的容量。较大计算机系统趋向于配置较大容量的存储设备。

输出设备的速度。微机输出设备的速度趋向于用每秒钟能打印的字符数（cps）予以度量，通常每秒为几十个、几百个字符。较大计算机的输出设备的速度也较快，通常每分钟可打印几百或几千行。

用 mips（每秒钟百万条指令）度量处理速度。在这里用术语“指令”来描述软件要求计算机完成的基本任务，并且标识受到影响的数据。较小计算机的处理速度为 7~40mips。大型计算机的处理速度能达到 30~150mips 或更多。巨型计算机能处理 200 多 mips。换句话说，大型计算机处理数据的能力要比微机快得多。

一次可以访问计算机的用户数量。大多数小型计算机只能支持单个用户，有些计算机一次可以支持两个或三个用户，大型计算机则同时可由几百个用户使用。

计算机系统的价格。商用计算机系统的价格从只值 500 美元（一台微机）到要开支 1,000 万美元（一台大型机），巨型计算机则花费更多。

1.2 Computer Hardware

Computer hardware has four parts: the central processing unit (CPU) and memory, storage hardware, input hardware, and output hardware.

The part of the computer that runs the program is known as the processor or central processing unit (CPU). In a microcomputer, the CPU is on a single electronic component, the microprocessor chip, within the system unit or system cabinet. The CPU itself has two parts: the control unit and the arithmetic-logic unit. In a microcomputer, these are both on the microcomputer chip.

The Control Unit The control unit tells the rest of the computer system how to carry out a program's instructions. It directs the movement of electronic signals between memory and the arithmetic-logic unit. It also directs these control signals between the CPU and input and output devices.

The Arithmetic-Logic Unit The arithmetic-logic unit, usually called the ALU, performs two types of operations—arithmetic and logical. Arithmetic operations are, as you might expect, the fundamental math operations: addition, subtraction, multiplication, and division. Logical operations consist of comparisons. That is, two pieces of data are compared to see whether one is equal to, less than, or greater than the other.

Memory Memory is also known as primary storage, internal storage, it temporarily holds data, program instructions, and information. One of the most important facts to know about memory is that part of its content is held only temporarily. In other words, it is stored only as long as the computer is turned on. When you turn the machine off, the content immediately vanish. The stored contents in memory are volatile and can vanish very quickly.

Storage Hardware ^[1]The purpose of storage hardware is to provide a means of storing computer instructions and data in a form that is relatively permanent, that is, the data is not lost when the power is turned off—and easy to retrieve when needed for processing. There are four kinds of storage hardware: floppy disks, hard disks, optical disk, and magnetic tape.

Floppy Disks Floppy disks are also called diskettes, flexible disks, floppies, or simply

disks. The plastic disk inside the diskette cover is flexible, not rigid. They are flat, circular pieces of mylar plastic that rotate within a jacket. Data and programs are stored as electromagnetic charges on a metal oxide film coating the mylar plastic.

Hard Disks Hard disks consist of metallic rather than plastic platters. They are tightly sealed to prevent any foreign matter from getting inside. Hard disks are extremely sensitive instruments. The read-write head rides on a cushion of air about 0.000001 inch thick. It is so thin that a smoke particle, fingerprint, dust, or human hair could cause what is known as a head crash. A head crash happens when the surface of the read-write head or particles on its surface contact the magnetic disk surface. A head crash is a disaster for a hard disk. It means that some or all of the data on the disk is destroyed. Hard disks are assembled under sterile conditions and sealed from impurities within their permanent containers.

Optical Disks Optical disks are used for storing great quantities of data. An optical disk can hold 650 megabytes of data—the equivalent of hundreds of floppy disks. Moreover, an optical disk makes an immense amount of information available on a microcomputer. In optical-disk technology, a laser beam alters the surface of a plastic or metallic disk to represent data. To read the data, a laser scans these areas and sends the data to a computer chip for conversion.

Magnetic Tape Magnetic tape is an effective way of making a backup, or duplicate, copy of your programs and data. We mentioned the alarming consequences that can happen if a hard disk suffers a head crash. You will lose some or all of your data or programs. Of course, you can always make copies of your hard-disk files on floppy disks. However, this can be time-consuming and may require many floppy disks. Magnetic tape is sequential access storage and can solve the problem mentioned above.

Input Hardware Input devices take data and programs people can read or understand and convert them to a form the computer can process. This is the machine-readable electronic signals of 0s and 1s. Input hardware is of two kinds: keyboard entry and direct entry.

Keyboard Entry Data is input to the computer through a keyboard that looks like a typewriter keyboard but has additional keys. In this method, the user typically reads from an original document called the source document. The user enters that document by typing on the keyboard.

Direct Entry Data is made into machine-readable form as it is entered into the computer, no keyboard is used. Direct entry devices may be categorized into three areas: pointing devices (for example, mouse, touch screen, light pen, digitizer are all pointing devices), scanning devices (for example, image scanner, fax machine, bar-code reader are all scanning devices), and voice-input devices.

Output Hardware Output devices convert machine-readable information into people-readable form. Common output devices are monitors, printers, plotters, and voice output.

Monitors Monitors are also called display screen or video display terminals. Most monitors that sit on desks are built in the same way as television sets, these are called cathode-ray tubes. Another type of monitor is flat-panel display, including liquid-crystal display (LCD), electroluminescent (EL) display

and gas-plasma display. An LCD does not emit light of its own. Rather, it consists of crystal molecules.^[2] An electric field causes the molecules to line up in a way that alters their optical properties. Unfortunately, many LCDs are difficult to read in sunlight or other strong light. A gas-plasma display is the best type of flat screen. Like a neon light bulb, the plasma display uses a gas that emits light in the presence of an electric current.

Printers There are four popular kinds of printers: dot-matrix, laser, ink-jet, and thermal.

Dot-Matrix Printer Dot-matrix printers can produce a page of text in less than 10 seconds and are highly reliable. They form characters or images using a series of small pins on a print head. The pins strike an inked ribbon and create an image on paper. Printers are available with print heads of 9, 18, or 24 pins. One disadvantage of this type of printer is noise.

Laser Printer The laser printer creates dotlike images on a drum, using a laser beam light source.^[3] The characters are treated with a magnetically charged inklike toner and then are transferred from drum to paper. A heat process is used to make the characters adhere. The laser printer produces images with excellent letter and graphics quality.

Ink-Jet Printer An ink-jet printer sprays small droplets of ink at high speed onto the surface of the paper. This process not only produces a letter-quality image but also permits printing to be done in a variety of colors.

Thermal Printer A thermal printer uses heat elements to produce images on heat-sensitive paper. Color thermal printers are not as popular because of their cost and the requirement of specifically treated paper. They are a more special use printer that produces near photographic output. They are widely used in professional art and design work where very high quality color is essential.

Plotters Plotters are special-purpose output devices for producing bar charts, maps, architectural drawings, and even three-dimensional illustrations. Plotters can produce high-quality multicolor documents and also documents that are larger in size than most printers can handle. There are four types of plotters: pen, ink-jet, electrostatic, and direct imaging.

Voice-Output Devices Voice-output devices make sounds that resemble human speech but actually are pre-recorded vocalized sounds. Voice output is used as a reinforcement tool for learning, such as to help students study a foreign language. It is used in many supermarkets at the checkout counter to confirm purchases. Of course, one of the most powerful capabilities is to assist the physically challenged.

Words

| | | |
|---------------|-------------|----------------|
| addition | <i>n.</i> | 加, 增加, 加法 |
| adhere | <i>v.</i> | 粘附, 胶着, 坚持, 坚持 |
| architectural | <i>adj.</i> | 建筑上的, 建筑学的 |
| arithmetic | <i>n.</i> | 算术, 运算 |
| assemble | <i>v.</i> | 集合, 聚集, 装配, 集合 |
| cabinet | <i>n.</i> | 橱柜, 机箱 |

| | | |
|-----------------|-------------|---------------------|
| checkout | <i>n.</i> | 检验, 校验, 收款处 |
| chip | <i>n.</i> | 芯片 |
| crystal | <i>adj.</i> | 结晶状的 |
| | <i>n.</i> | 晶体 |
| cushion | <i>n.</i> | 垫子, 软垫, 衬垫 |
| droplet | <i>n.</i> | 小滴 |
| duplicate | <i>n.</i> | 复制品, 副本 |
| electromagnetic | <i>adj.</i> | 电磁的 |
| flexible | <i>adj.</i> | 柔韧的, 易曲的 |
| impurity | <i>n.</i> | 杂质, 混杂物, 不洁, 不纯 |
| immense | <i>adj.</i> | 极广大的, 无边的 |
| megabyte | <i>n.</i> | 兆字节 |
| metallic | <i>adj.</i> | 金属的 |
| molecule | <i>n.</i> | 分子 |
| multiplication | <i>n.</i> | 乘法, 增加 |
| mylar | <i>n.</i> | 聚脂薄膜 |
| neon | <i>n.</i> | 氖 |
| optical | <i>adj.</i> | 光学的, 眼的, 视力的 |
| oxide | <i>n.</i> | 氧化物 |
| plasma | <i>n.</i> | 等离子体, 等离子区 |
| plotter | <i>n.</i> | 阴谋者, 计划者, 绘图仪 |
| reinforcement | <i>n.</i> | 增援, 加强, 加固, 援军 |
| sensitive | <i>adj.</i> | 敏感的, 灵敏的, 感光的 |
| sterile | <i>adj.</i> | 贫脊的, 不育的, 消过毒的, 无菌的 |
| spray | <i>v.</i> | 喷射, 喷溅 |
| temporarily | <i>adv.</i> | 暂时地, 临时地 |
| thermal | <i>adj.</i> | 热的, 热量的 |
| toner | <i>n.</i> | 调色剂, 调色者, 碳粉 |
| vanish | <i>v.</i> | 突然不见, 消失 |
| vocalized | <i>v.</i> | 成为有声 |
| volatile | <i>adj.</i> | 挥发性的, 可变的, 不稳定的 |

Phrases

| | |
|--------------------|------------------|
| dot-matrix printer | 点阵式打印机 |
| head crash | 磁头划伤 |
| in a way | 在某点上, 在某种程度上, 稍微 |
| ink-jet printer | 喷墨式打印机 |
| laser printer | 激光打印机 |
| line up | 排队, 排成一行, 对齐 |

thermal printer

热敏式打印机

Abbreviations

ALU (Arithmetic-Logic Unit)

算术-逻辑单元

EL (Electroluminescent)

电致发光

LCD (Liquid-Crystal Display)

液晶显示器

Notes

- [1] 例句: The purpose of storage hardware is to provide a means of storing computer instructions and data in a form that is relatively permanent, that is, the data is not lost when the power is turned off—and easy to retrieve when needed for processing.

分析: 句中 means 是方法的意思。that is relatively permanent 是定语从句修饰 form。

译文: 存储硬件的作用是以一种相对持久的方式提供存储计算机指令和数据的方法, 即当切断电源时数据不会丢失, 且当需要处理数据时又容易恢复。

- [2] 例句: An electric field causes the molecules to line up in a way that alters their optical properties.

分析: 句中 line up 是排成一行, that alters their optical properties 是定语从句, 修饰 way。

译文: 电场使得这些分子排成一行, 在某种程度上改变着它们的光学特性。

- [3] 例句: The characters are treated with a magnetically charged inklike toner and then are transferred from drum to paper.

分析: 句中 treat with 是用...处理, then 后面省略了主语 the characters。

译文: 用磁化的带电的像墨一样的碳粉处理这些字符, 然后从磁鼓传送到纸上。

Exercises

I. Write true or false for the following statements according to the passage.

1. () The CPU is the processor of a computer.
2. () The memory of a computer can hold data and information permanently.
3. () Diskettes are flexible, flat, circular pieces of mylar plastic that rotate within a jacket, and they can be bent easily.
4. () Hard disks are extremely sensitive instruments to pollution, so magnetic tape is an effective compensation for making a backup of your programs and data.
5. () Input devices accept people readable data and programs, convert them to machine readable form, output devices reverse the process.
6. () To input data and information into computer, direct entry doesn't need keyboard.
7. () Mouse, touch screen, light pen, digitizer, and plotter are all direct entry devices.
8. () Thermal printer must use specialized paper.
9. () Laser printer can produce images with excellent letter and graphics quality, it can

also print large size documents.

10. () Voice output devices can mimic human speech immediately.

II. Fill in the blanks according to the passage.

1. The CPU itself has two parts: _____ and _____.
2. The ALU performs two operations: _____ and _____.
3. The basic math operations are: _____, _____, _____, _____.
4. Image scanner, fax-machine and bar-code reader are all _____.
5. LCD, EL and gas-plasma are all _____ display.
6. Output devices convert _____ information into _____ form.
7. LCDs are difficult to read in _____ or other _____.
8. One disadvantage of dot-matrix printer is _____.
9. Plotters are special-purpose output devices, for producing _____, _____, _____, and even _____ illustrations.
10. Voice-output devices make sounds that resemble human speech but actually are _____.

III. Translate the following words and expressions into Chinese.

- | | |
|----------------------------|--------------------|
| 1. arithmetic-logic unit | 6. direct entry |
| 2. volatile | 7. voice-input |
| 3. optical disk | 8. inked ribbon |
| 4. electromagnetic charges | 9. letter-quality |
| 5. time-consumig | 10. heat sensitive |

1.2.1 Reading Material 1

Information Appliance

An "information appliance (IA)" is any device that can process information, signals, graphics, animation, video and audio; and can exchange such information with another IA device. Typical devices could be smartphones, smartcard, PDAs, and so on. Digital cameras, ordinary cellular phones, set-top boxes, and LCD TVs are not information appliances unless they become capable of communications and information functions. Information appliances may overlap in definition or are sometimes referred to as smart devices, mobile devices, wireless devices, internet appliances, web appliances, handhelds, handheld devices or smart handheld devices.

Early Appliances For a short while during the middle and late 1980s there were a few models of simple electronic typewriters fitted with screens and some form of memory storage. These devices had some of the attributes of an information appliance. One of these dedicated word processor machines, the Canon Cat was actually designed by Jef Raskin as the forerunner of the idea of the information appliance.

Information appliances tend to be consumer devices that perform only a few targeted tasks and are controlled by a simple touchscreen interface or push buttons on the device's enclosure.

Open Standard Protocols In an ideal world, any true information appliance would be able

to communicate with any other information appliance using open standard protocols and technologies, regardless of the maker of the software or the hardware. The communications aspects and all user interface elements would be designed together so that a user could switch seamlessly from one information appliance to another.

Words

| | | |
|------------|-----------|----------------|
| appliance | <i>n.</i> | 器具, 设备 |
| attribute | <i>n.</i> | 属性, 特性, 标志 |
| forerunner | <i>n.</i> | 预兆, 先锋, 先驱 (者) |

1.2.2 Reading Material 2

Air Floating Displays

Today's display technologies form a field of huge interest as they are evolving with big steps while expanding the range of their applications following the demands of the market. Two new display technologies, which are still in development, impress us mostly for their concept and not so much for their display quality or their potential applications.

Fog Screen

Fog Screen company suggests a screen created by a thick layer of fog, formed in between of two air surfaces of smooth flow. The FogScreen works very much like an ordinary screen in terms of projection properties. It can be used for both backand frontprojection. This kind of screens allow the projection of very impressive images, while the viewer can walk through the screen, walk directly into the images, and through them!

The fog used is dry, so it doesn't make you wet even if you stay under the Fog Screen device for a long time. The fog is made of ordinary water with no chemicals whatsoever. The screen is supported by projectors with brightness of at least 3,000 ANSI Lumens and for the best result, a dark background is highly recommended.

The world premiere demonstration of FogScreen was at the Science Fair in Turku, Finland in October 2002, and its researchers are awarded for their discovery. Its first installations have already been made in museums in France and Finland and it has recently been produced to the U.S.A in the form of interactive screen.

IO2 Technologies

A relevant technology is being developed by the "IO2 Technologies" company. Known by the name "Heliodisplay", this technology uses a device that displays on a bed of air above it. Nothing is added to the air so there is not any harmful gas or liquid emitted from the device, and nothing needs to be refilled. The device produces interactive images, which means it can be used as a "floating touch screen". In the course of developing the technology, Heliodisplays have been built that display images ranging from 5" to 42" and it is estimated that it can reach 150". Like

the FogScreen, Heliodisplay is best viewed in dark backgrounds. Although Heliodisplay is plug-and-play compatible with most video sources (TV, DVD, computer, videogame, etc.) and anything can be projected on the FogScreen, both screen technologies are not meant to substitute computer or television screens. Their basic application fields include projections in board meetings and presentations, trade shows, museum, theme parks etc.

Words

| | | |
|---------------|--------------|----------|
| premiere | <i>n./v.</i> | 首次放映（演出） |
| projection | <i>n.</i> | 喷射，射影 |
| plug-and-play | <i>v.</i> | 即插即用 |

1.2.3 正文参考译文

计算机硬件

计算机硬件具有四部分：中央处理器和内存、存储硬件、输入硬件和输出硬件。

计算机运行程序的部分被称为处理器或中央处理单元。在微型计算机中，CPU 是在一个单独的电子元件上，即微处理器芯片上，它在系统单元内或系统机箱内。CPU 本身具有两个部分：控制单元和算术—逻辑单元。在微型计算机中，这两个部分都在微型机芯片上。

控制单元 控制单元告诉计算机系统的其他部分如何完成程序指令。它指导着内存和算术—逻辑单元之间的电子信号的移动。它也指挥着 CPU 和输入输出设备之间的控制信号。

算术—逻辑单元 算术—逻辑单元，通常被称为 ALU，完成两类运算——算术和逻辑。算术运算，如你所期望的，是基本的数学运算：加、减、乘、除。逻辑运算是由比较（运算）构成的。也就是说，用数据的两部分进行比较，以看其中一个是否是等于、小于或大于另外一个。

内存 内存也被称为主存储器、内部存储器，它临时地存储数据、程序指令和信息。对于内存需要了解的一个最重要的事实是它所保存的内容只是临时的。换句话说，它只在计算机开着时才保存（数据）。当机器被关闭时，其内容会立即消失。在内存中所存储的信息是易失性的并能很快消失。

存储硬件 存储硬件的作用是以一种相对持久的形式提供存储计算机指令和数据的方法，即当切断电源时数据不会丢失——且当需要处理数据时又容易恢复。存储硬件有四种：软盘、硬盘、光盘和磁带。

软盘 软盘又被称为软磁盘、可弯曲磁盘、软盘、或简单地称为磁盘。在磁盘表面内部的塑料盘是柔软的，不是坚硬的。这些塑料盘是平的、在一个套子内部旋转的圆的聚脂塑料片。程序和数据是以电磁荷的形式存储在聚脂塑料外面包着的金属氧化胶片上。

硬盘 硬盘是由金属盘片而不是塑料盘片组成的。它们被紧紧地密封起来，以防止外界东西进入。硬盘是非常灵敏的设备。读写头浮在大约 0.000001 英寸厚的空气气垫上。它是如此的薄，以至于烟粒、指印、灰尘或者头发都可能引起磁头划伤。当读写头的表面或表面上的微粒与磁盘表面接触时就会发生磁头划伤。磁头划伤对于硬盘来讲是灾难，它意味着磁盘上的数据部分或全部丢失。硬盘是在无菌条件下安装并且密封在远离杂质的永久

的容器内。

光盘 光盘用于存储大量的数据。一个光盘可能容纳 650 兆字节的数据——相当于数以百计的软盘。并且，光盘使得大量的信息用于微机上。在光盘技术中，激光束改变塑料或金属盘的表面来代表数据。为了记取数据，激光扫描这些区域并且将这些数据送给计算机芯片以转换。

磁带 磁带是备份，即复制、拷贝程序和数据的有效方法。我们曾提到如果硬盘遭遇磁头划伤就会产生令人担忧的结果，你将会丢失部分或全部的程序或数据。当然，你可以将硬盘上的文件拷贝到软盘上。然而这很耗时，并且需要很多软盘。磁带是顺序访问存储，能够解决上面所提问题。

输入硬件 输入硬件接收人们能读懂的程序和数据并将其转换为计算机能处理的形式。这就是机器可读的电子信号 0 和 1。有两种输入硬件：键盘输入和直接输入。

键盘输入 数据通过形似打字机键盘但有附加键的键盘输入到计算机。用这种方式，用户一般读取被称为是源文件的初始文件。用户通过在键盘上打字而输入那个文件。

直接输入 当数据输入到计算机时，是以机器可读懂的形式输入的，不需要键盘。直接输入设备可以被分成三类：指针设备（如：鼠标、触摸屏、光笔、数字化仪都是指针设备）、扫描设备（如图像扫描仪、传真机、条形码阅读器都是扫描设备）和声音输入设备。

输出硬件 输出设备将机器可读的信息转换为人类可读的形式。一般的输出设备有监视器、打印机、绘图仪和声音输出设备。

监视器 监视器也被称为屏幕显示或视频显示终端。大多数放在桌面上的监视器的制作方法同电视一样，被称为是阴极射线管。另一类监视器是平板显示器，包括液晶显示、光电发光显示和等离子显示。液晶显示自己不发射光，相反，是由晶体分子组成，电场使得这些分子排成一行，在某种程度上改变着它们的光学特性。不幸的是，许多液晶显示器在太阳光或其他强光下很难读到。等离子显示器是平板显示器中最好的一种，像霓虹灯泡，等离子显示器在电流存在的情况下使用一种发光的气体。

打印机 有四种流行的打印机：点阵式、激光式、喷墨式和热敏式。

点阵式打印机 能在不到几秒的时间内打印一页文本并且非常可靠。点阵式打印机利用在打印头上的一系列小针来形成字符或图像。这些针击打喷墨的色带并在纸上产生图像。有 9 针、18 针和 24 针的打印机，这种打印机的一个缺点是它的噪音。

激光打印机 使用激光束光源在磁鼓上产生小点一样的图像，用磁化的带电的像墨一样的碳粉处理这些字符，然后从磁鼓传送到纸上，再使用热处理过程使这些字符粘贴。激光打印机打印的图像字符清晰，图像质量高。

喷墨式打印机 能以很高速度将小点状墨汁喷到纸面上。这一过程不仅印刷高质量的图像，并且能打印彩色图像。

热敏式打印机 使用热元素在热感应纸上产生图像。由于价格以及需要特殊处理的纸张，彩色热敏打印机不是很普及。热敏式打印机是打印逼真输出的特殊打印机。它们被广泛应用在要求高质量彩色输出的专业艺术设计工作中。

绘图仪 是特殊用途的输出设备，用于产生条形图、地图、建筑绘图、甚至三维图表。绘图仪可以输出高质量的多种色彩的文档，并且文档的尺寸比大多数打印机能处理的要大。有四种类型的绘图仪：钢笔、喷墨、静电和直接图像。

声音输出设备 声音输出设备可以发出类似于人类说话的声音，但实际上是事先录制的声音。声音输出被用作学习的加强工具，例如帮助学生学习外语。它被用于许多超市的检验柜台来确认购买。当然，它最强大的功能是用来帮助残障者。

1.3 System Software

Software refers to computer programs. Programs are the instructions that tell the computer how to process data into the form you want. There are two kinds of software: system software and application software.

System software is a collection of programs that enables application software to run on a computer system's hardware devices, it is background software and includes programs that help the computer manage its own internal resources.

Application software is a specialized programs that enables the user to accomplish specific tasks.

In this text, we mainly discuss system software.

System software consists of four kinds of programs: bootstrap loader, diagnostic routines, basic input-output system, and operating system. Among these four parts, the operating system is we most concerned with, whith helps manage computer resources. Most important operating systems are: Windows, Windows NT, OS/2, Macintosh, and Unix.

Windows Windows gets its name because of its ability to run multiple applications at the same time, each in its own window. Windows offers graphical user interface (GUI), presents the user with graphic images of computer functions and data. It provides a standard mechanism for copying or moving information from one program to another. This mechanism, called the Clipboard, means that information created in one context is instantly reusable in another, you don't need to reenter information or work with clumsy data-transfer utilities. Windows also has DDE (dynamic data exchange) and OLE (object linking and embedding) functions. In DDE two or more applications can be linked. This way, data created in one application is automatically entered into the others. OLE, like DDE, links data between applications. Additionally, OLE allows the application receiving the data to directly access the application that created the data.

Windows NT Windows NT is an operating system designed to run on a wide range of powerful computers and microcomputers. It is a very sophisticated and powerful operation system. Developed by Microsoft, Windows NT is not considered a replacement for Windows.^[1]Rather, it is an advanced alternative designed for very powerful microcomputers and networks. Windows NT has two major advantages when compare to Windows:

Multiprocessing It is similar to multitasking except that the applications are run independently at the same time. For instance, you could be printing a word processing document and using a database management program at the same time.^[2]With multitasking, the speed at which the document is printed is affected by the demands of the database management program. With multiprocessing, the demands of the database management program do not affect the printing of the

document.

Networking In many business environments, workers often use computer to communicate with one another and to share software using a network. This is made possible and controlled by special system software. Windows NT has network capabilities and security checks built into the operating system. This makes network installation and use relatively easy.

OS/2 OS/2 stands for Operating System/2. It was developed jointly by IBM and Microsoft Corporation. OS/2 has many similarities with Windows NT. It is designed for very powerful microcomputers and has several advanced features. Some of its advantages over Windows NT include:

Minimum system configuration Like Windows NT, OS/2 requires significant memory and hard disk space. However, OS/2 requires slightly less.

Windows application Like Windows NT, OS/2 does not have a large number of application programs written especially for it. OS/2 can also run Windows programs, but it runs these programs slightly faster than Windows NT.

Common user interface Microcomputer application programs written specifically for Windows NT, as well as for OS/2, have consistent graphics interfaces. Across applications, the user is provided with similar screen displays, menus, and operations. Additionally, OS/2 offers a consistent interface with mainframes, minicomputers, and microcomputers.

Macintosh Operation System The Macintosh Software, which runs only on Macintosh computers, offers a high-quality graphical user interface and is very easy to use. Apple Macintosh System 7.5 designed for Apple computers using Motorola's PowerPC microprocessor, is a significant milestone for Apple. It is a very powerful operating system like Windows NT and OS/2. System 7.5 has network capabilities and can read Windows and OS/2 files. It has several advantages:

Ease of use The graphical user interface has made the Macintosh popular with many newcomers to computing. This because it is easy to learn.

Quality graphics Macintosh has established a high standard for graphics processing. This is a principal reason why the Macintosh is popular for desktop publishing. Users are easily able to merge pictorial and text materials to produce nearly professional-looking newsletters, advertisements, and the like.

Consistent interfaces Macintosh applications have a consistent graphics interface. Across all applications, the user is provided with similar screen displays, menus, and operations.

Multitasking Like Windows, Windows NT, and OS//2, the Macintosh System enables you to do multitasking. That is, several programs can run at the same time.

Communications between programs The Macintosh system allows applications programs to share data and commands with other applications programs.

Unix Unix was originally developed by AT&T for minicomputers and is very good for multitasking. It is also good for networking between computers. Unix initially became popular in industry because for many years AT&T licensed the system to universities for a nominal fee. It is

popular among engineers and technical people, with the arrival of very powerful microcomputers, Unix is becoming a larger player in the microcomputer world. Unix can be used with different types of computer systems, that is, it is a portable operating system. It is used with microcomputers, minicomputers, mainframes, and supercomputers. The other operating systems are designed for microcomputers and are not nearly as portable. It also has the advantages of multitasking, multiprocessing, multiuser, and networking.

Words

| | | |
|---------------|-------------|----------------------|
| accomplish | <i>v.</i> | 完成, 达到, 实现 |
| advertisement | <i>n.</i> | 广告 (启事, 宣传) |
| application | <i>n.</i> | 请求, 应用, 应用程序, 应用软件 |
| background | <i>n.</i> | 背景, 后台 |
| bootstrap | <i>n.</i> | 引导程序, 自展 |
| diagnostic | <i>n.</i> | 诊断 |
| dynamic | <i>adj.</i> | 动态的, 动力 (学) |
| embed | <i>v.</i> | 嵌套, 装入 |
| graphical | <i>n.</i> | 图形 |
| initially | <i>adj.</i> | 最初 |
| interface | <i>n.</i> | 界面接口, 连接 |
| license | <i>v.</i> | 许可, 准许 |
| mechanism | <i>n.</i> | 机械装置, 机构, 机制 |
| merge | <i>v.</i> | 归并, 合并 |
| multiple | <i>adj.</i> | 多 (倍, 路, 重, 道, 次) 的 |
| newsletter | <i>n.</i> | 通信稿 (业务通信, 简讯) |
| nominal | <i>adj.</i> | 名义上的, 有名无实的, 名字的 |
| pictorial | <i>adj.</i> | 图示的, 图像的 |
| refer | <i>v.</i> | 提交, 谈及, 归诸于 |
| security | <i>n.</i> | 安全 (性), 保密 (性), 安全措施 |
| specialized | <i>adj.</i> | 专业的, 专门的 |

Phrases

| | |
|---------------------|--------|
| bootstrap loader | 引导装入程序 |
| diagnostic routines | 诊断例程 |

Abbreviations

| | |
|------------------------------------|---------|
| DDE (Dynamic Data Exchange) | 动态数据交换 |
| OLE (Object Linking and Embedding) | 对象链接和嵌入 |
| OS (Operating System) | 操作系统 |

Notes

[1] 例句: Rather, it is an advanced alternative designed for very powerful microcomputers and networks.

分析: alternative 在这里意为“另一个可供选择的”, designed for very powerful microcomputers and networks 是过去分词短语作定语, 修饰 alternative。

译文: 确切地说, 它是设计给功能非常强大的微型计算机和网络的另外一个可供选择的高级操作系统。

[2] 例句: With multitasking, the speed at which the document is printed is affected by the demands of the database management program.

分析: at which the document is printed 是定语从句, 修饰 speed。

译文: 在这种多任务情况下, 文件打印的速度会受到使用数据库管理程序这要求的影响。

Exercises

I. Write true or false for the following statements according to the passage.

1. () System software is background software, that is, without it, computers can't work.
2. () System software has four kinds of programs: bootstrap loader, diagnostic routines, basic input-output system, and operating system.
3. () One computer can only run one kind of system software.
4. () Windows provides a standard mechanism called Clipboard, it can copy or move data easily.
5. () DDE allows the application receiving the data to directly access the application that created the data.
6. () Windows NT is designed for replacement of Windows.
7. () OS/2 requires the same memory and hard disk space as Windows does.
8. () Macintosh operating system can run on all kinds of computers.
9. () Unix is a portable operating system, that is, it can be used in different kinds of computer systems.
10. () Macintosh computers are designed to use Intel's microprocessor.

II. Fill in the blanks according to the passage.

1. _____ are the instructions that tell the computer how to process data into the form you want.
2. _____ is background software and includes programs that help the computer manage its own _____ resources.
3. System software consists of four kinds of programs: _____, _____, _____, _____.
4. Windows also has DDE (_____) and OLE (_____) functions.

5. _____ is similar to multitasking except that the applications are run independently and at the same time.
6. OS/2 was developed jointly by _____ and _____ Corporation.
7. The Macintosh Software, which runs only on _____ computers, offers a high-quality _____ and is very easy to use.
8. Unix can be used with different types of computer systems, that is, it is a _____ operating system.
9. _____ is a standard mechanism for copying or moving information from one program to another.
10. Unix can be used with different types of computer systems. It also has the advantages of _____, _____, _____, and _____.

III. Translate the following words and expressions into Chinese.

- | | |
|--------------------------|----------------------------|
| 1. background software | 6. security checks |
| 2. internal resources | 7. bootstrap loader |
| 3. standard mechanism | 8. diagnostic routines |
| 4. significant milestone | 9. data-transfer utilities |
| 5. network capabilities | 10. advanced alternative |

1.3.1 Reading Material 1

Embedded System

An "embedded system" is a special-purpose computer system, which is completely encapsulated by the device it controls. An embedded system has specific requirements and performs pre-defined tasks, unlike a general-purpose personal computer.

Characteristics Two major areas of differences are cost and power consumption. Since many embedded systems are produced in the tens of thousands to millions of units range, reducing cost is a major concern. Embedded systems often use a (relatively) slow processor and small memory size to minimize costs. The slowness is not just clock's speed. The whole architecture of the computer is often intentionally simplified to lower costs. For example, embedded systems often use peripherals controlled by synchronous serial interfaces, which are ten to hundreds of times slower than comparable peripherals used in PCs. Programs on an embedded system often must run with real-time constraints with limited hardware resources: often there is no disk drive, operating system, keyboard or screen. A flash drive may replace rotating media, and a small keypad and LCD screen may be used instead of a PC's keyboard and screen. Firmware is the name for software that is embedded in hardware devices, e.g. in one or more ROM Flash memory IC chips. Embedded systems are routinely expected to maintain 100% reliability while running continuously for long periods of time, sometimes measured in years. Firmware is usually developed and tested to much stricter requirements than is general purpose software (which can usually be easily restarted if a problem occurs). In addition, because the

embedded system may be outside the reach of humans (down an oil well borehole, launched into outer space, etc.), embedded firmware must usually be able to self-restart even if some sort of catastrophic data corruption has taken place. This last feature often requires external hardware assistance such as a watchdog timer that can automatically restart the system in the event of a software failure.

Platform There are many different CPU architectures used in embedded designs. This in contrast to the desktop computer market, which as of this writing (2003) is limited to just a few competing architectures, mainly the Intel/AMD x86, and the Apple/Motorola/IBM PowerPC, used in the Apple Macintosh. One common configuration for embedded systems is the system on a chip, an application-specific integrated circuit, for which the CPU was purchased as intellectual property to add to the IC's design.

Words

| | | |
|--------------|-----------|------------|
| borehole | <i>n.</i> | 钻孔 |
| encapsulate | <i>v.</i> | 密封, 封装, 压缩 |
| firmware | <i>n.</i> | 固件 |
| intellectual | <i>a.</i> | 有智力的, 理智的 |
| keypad | <i>n.</i> | 小键盘 |
| watchdog | <i>n.</i> | 监视器, 监控设备 |

1.3.2 Reading Material 2

Real-time operating system

A "Real-Time Operating System" or "RTOS" is an operating system that has been developed for real-time applications. Typically used for embedded applications. Note that this type of operating system does not necessarily have high throughput — the specialized scheduling algorithm and a high clock-interrupt rate can both interfere with throughput. An early example of a large-scale real-time operating system was the so-called "control program" developed by American Airlines and IBM for the Sabre Airline Reservations System. Debate exists about what actually constitutes real-time.

Scheduling In typical designs, a task has three states: running, ready and blocked. Most tasks are blocked for most of the time. Only one task per CPU is running. The ready list is usually short, two or three tasks at most. The real trick is designing the scheduler. Usually the data structure of the ready list in the scheduler is designed, so that search, insertion and deletion require locking interrupts only for small periods of time, when looking at precisely defined parts of the list. This means that other tasks can operate on the list asynchronously, while it is being searched. A typical successful schedule is a bidirectional linked list of ready tasks, sorted in order by priority. Although not fast to search, the time taken is deterministic. Most ready lists are only two or three entries long, so a sequential search is usually the fastest, because it requires little set-up time. The critical response time, sometimes called the "flyback time" is the time it takes to

queue a new ready task, and restore the state of the highest priority task. In a well-designed RTOS, readying a new task will take 3-20 instructions per ready queue entry, and restoration of the highest-priority ready task will take 5-30 instructions. On a 20MHz 68,000 processor, task switch times run about 20 microseconds with two tasks ready. 100 MHz ARM CPUs switch in a few microseconds.

Words

| | | |
|---------------|-----------|-----------------|
| algorithm | <i>n.</i> | 算法, 规则系统 |
| bidirectional | <i>a.</i> | 双向 (作用的) |
| deterministic | <i>a.</i> | 宿命论的, 确定的, 决定性的 |
| flyback | <i>n.</i> | 倒转, 逆行 |
| throughput | <i>n.</i> | (输入输出信息) 通过量 |

1.3.3 正文参考译文

系统软件

软件指的是计算机程序。程序是告诉计算机如何将数据处理成你想要的形式的指令。有两种软件：系统软件和应用软件。

系统软件是指能让应用软件在计算机系统硬件设备上运行的程序的集合，它是后台软件并且包括帮助计算机管理自己内部资源的程序。

应用软件是让用户能够完成特定任务的专门程序。

在这一节中，我们主要讨论系统软件。系统软件由四种程序组成：引导装入程序、诊断例程、基本输入输出系统和操作系统。在这四种当中，操作系统是我们最为关心的，它帮助管理计算机资源。最重要的操作系统有：Windows、Windows NT、OS/2、Macintosh 和 Unix。

Windows 之所以称为窗口是因为它具有能同时运行多个应用程序的能力，并且每一个程序有其自己的窗口。**Windows** 提供图形用户界面，给用户提计算机的功能和数据的图像。它提供标准的机制用于将信息从一个程序拷贝或移动到另一个程序。这个机制被称为剪贴板，意味着在一个文本中产生的信息可以被另外一个文本立即重新使用，而用户不需要重新输入信息或使用繁琐的数据传送实用程序。**Windows** 还具有 DDE (动态数据交换) 和 OLE (对象链接和嵌入) 功能。在 DDE 中两个或更多的应用程序可以被链接。使用这种方法，在一个应用程序中产生的数据可以自动地进入其他的程序。OLE 类似于 DDE，在应用程序之间链接数据。另外，OLE 允许接收数据应用程序可以直接访问建立这个数据的应用程序。

Windows NT 它是一种可以在很大范围内的功能强大的计算机和微型计算机上运行的操作系统。它是非常复杂和功能强大的操作系统。**Windows NT** 由微软公司开发，并不是为了替代 **Windows**，确切地说，它是设计给功能非常强大的微型计算机和网络的另外一个可供选择的高级 (操作系统)。**Windows NT** 和 **Windows** 相比较具有两个主要的优点：

多道处理 除了应用程序是同时独立运行之外，它类似于多任务。比如，你可能正在打印字处理文档并且同时在使用数据库管理程序。在这种多任务操作情况下，文件打印的

速度会受到使用数据库管理程序这一要求的影响。使用多道处理，要求数据库管理程序并不影响打印文档。

网络 在许多商业环境中，工作人员经常使用计算机相互进行交流，并且通过网络共享软件。这是可以通过专门的系统软件来实现和控制的。Windows NT 具有网络功能和嵌入到操作系统内的安全检测功能，这使得网络安装和使用相对容易。

OS/2 OS/2 代表操作系统/2。它是由 IBM 和微软公司联合开发的。OS/2 和 Windows NT 具有许多相似之处。它是设计给功能强大的微型计算机的，并且具有几个先进特点。它优于 Windows NT 的一些优点包括：

最小的系统配置 像 Windows NT 一样，OS/2 需要大的内存和硬盘空间。然而，OS/2 需要的较少。

窗口应用 OS/2 和 Windows NT 一样，没有很多专门为它编写的应用程序。OS/2 同样可以运行 Windows 程序，但它运行这些程序的速度比 Windows NT 更快一些。

共同的用户界面 专门为 Windows NT 以及 OS/2 编写的微型计算机应用程序，具有一致的图形界面。在应用程序里，提供给用户类似的显示、菜单和操作。此外，OS/2 为大型机、小型机和微型机提供一致的界面。

Macintosh 操作系统 它仅运行在 Macintosh 计算机上，提供高质量的图形用户界面，并且很容易使用。Apple Matintosh System 7.5 是为使用 Motorola 公司的 PowerPC 微处理器的 Apple 计算机设计的，对于 Apple 机来说是一个重要的里程碑。它像 Windows NT 和 OS/2 一样是功能强大的操作系统。System 7.5 具有网络功能并能读出 Windows 和 OS/2 文件。它具有几个优点：

容易使用 图形用户界面使得 Macintosh 在许多计算机新手用户中普及，这是因为它容易学习。

高质量的图像 Macintosh 已经建立了高标准的图像处理，这就是为什么 Macintosh 在桌面印刷系统流行的主要原因。用户可以很容易地将图片和文字材料组织成比较专业的通信稿、广告等。

一致的界面 Macintosh 应用程序具有一致的图形界面。在所有的应用程序中，提供给用户相似的屏幕显示、菜单和操作。

多任务 像 Windows、Windows NT 和 OS/2 一样，Macintosh 系统使得你实现多任务，即几个程序可同时运行。

程序之间的通信 Macintosh 系统允许应用程序之间共享数据和命令。

Unix 它起初是由 AT&T 为微型机开发的，非常适于执行多任务处理。它也适合于计算机之间的网络链接。由于多年来 AT&T 一直将系统以象征性的费用提供给大学使用，因此 Unix 起初就在工业领域很普及。它在工程师和技术人员中很普及，随着功能强大的微型计算机的到来，Unix 正成为微机世界的大玩家。Unix 可被用于不同类型的计算机系统，也就是说它是便携式的操作系统。它可用于微型机、小型机、大型机和巨型机上。其他的操作系统被设计用于微型机上且几乎不可移植。Unix 也具有多任务、多道处理、多用户和网络功能的优点。

1.4 Application Software

Application software might be described as end-user software. Application software performs useful work on general-purpose tasks such as word processing and cost estimating. There are certain general-purpose programs that are widely used in nearly all career areas. They are: word processing, electronic spreadsheets, graphic programs and so on. They are also called basic tools and have some common features.

Insert Point The insert point or cursor shows you where you can enter data next. Typically, it is a blinking vertical bar on the screen. You can move it around using a mouse or the directional arrow keys on many keyboards.

Menus Almost all software packages have menus. Typically, the menus are displayed in a menu bar at the top of the screen. When one of these is selected, a pull-down menu appears. This is a list of commands associated with the selected menu.

Help For most applications, one of the menus on the menu bar is Help. When selected, the Help options appear. ^[1]These options typically include a table of contents, a search feature to locate reference information about specific commands, and central options to move around.

Button Bars Button bars typically are below the menu bar. They contain icons or graphic representations for commonly used commands. This offers the user a graphic approach to selecting commands. It is an example of a graphic user interface in which graphic objects rather than menus can be used to select commands.

Dialog Box Dialog boxes frequently appear after selecting a command from a pull-down menu. These boxes are used to specify additional command options.

Scroll Bars Scroll bars are usually located on the right and/or the bottom of the screen. They enable you to display additional information not currently visible on the screen.

WYSIWYG Pronounced "wizzy-wig", WYSIWYG stands for "What You See Is What You Get." This means that the image on the screen display looks the same as the final printed document. Application programs without WYSIWYG cannot always display an exact representation of the final printed document. The WYSIWYG feature allows the user to preview the document's appearance before it is printed out.

Function Keys Function keys are labeled F1, F2, and so on. These keys are positioned along the left side or along the top of the keyboard. They are used for commands or tasks that are performed frequently, such as underlining. These keys do different things in different software packages.

Now let's introduce respectively the most common used application software: word processing, and spreadsheets.

Word processing software is used to create, edit, save, and print documents. Documents can be any kind of text material. With word processing, you view the words you type on a monitor instead of on a piece of paper. After you finish your typing, save your words on diskettes or hard

disk, and print the results on paper.

The beauty of this method is that you can make changes or corrections—before printing out the document. Even after your document is printed out, you can easily go back and make changes. You can then print it out again. Want to change a report from double spaced to single spaced? Alter the width of the margins on the left and right? Delete some paragraphs and add some others from yet another document? A word processor allows you to do all these with ease. Indeed, deleting, inserting, and replacing—the principal correcting activities—can be done just by pressing keys on the keyboard. Popular word processing software are Word , WPS and so on. They have some common features.

Word Wrap and the Enter Key One basic word processing feature is word wrap. When you finish a line, a word processor decides for you and automatically moves the insertion point to the next lines. To begin a new paragraph or leave a blank line, you press the Enter key.

Search and Replace A search or find command allows you to locate any character, word, or phrase in your document. When you search, the insertion point moves to the first place the item appears. If you want, the program will continue to search for all other locations where the item appears. The replace command automatically replaces the word you search for with another word. The search and replace commands are useful for finding and fixing errors.

Cut, Copy, and Paste With a word processor, you select the portion of text to be moved by highlighting it. Using either the menu or button bar, choose the command to cut the selected text. The selected text disappears from your screen. Then move the insertion point to the new location and choose the paste command to reinsert the text into the document. In a similar manner, you can copy selected portions of text from one location to another.

Spreadsheet A spreadsheet is an electronic worksheet used to organize and manipulate numbers and display options for analysis. Spreadsheets are used by financial analysts, accountants, contractors, and others concerned with manipulating numeric data. Spreadsheets allow you to try out various "what-if" kinds of possibilities. That is a powerful feature. You can manipulate numbers by using stored formulas and calculate different outcomes.

A spreadsheet has several parts. The worksheet area of the spreadsheet has letters for column headings across the top. It also has numbers for row headings down the left side. The intersection of a column and row is called a cell. The cell holds a single unit of information. The position of a cell is called the cell address. For example, "A1" is the cell address of the first position on a spreadsheet, the topmost and leftmost position. A cell pointer—also known as the cell selector—indicates where data is to be entered or changed in the spreadsheet. The cell pointer can be moved around in much the same way that you move the insertion pointer in a word processing program. Excel is the most common spreadsheet software. It has some common features of spreadsheet programs.

Format Label is often used to identify information in a worksheet, it is usually a word or symbol. A number in cell is called a value. Labels and values can be displayed or formatted in different ways. A label can be centered in the cell or positioned to the left or right. A value can be

displayed to show decimal places, dollars, or percent. The number of decimal positions can be altered, and the width of columns can be changed.

Formulas One of the benefits of spreadsheets is that you can manipulate data through the use of formulas. Formulas are instructions for calculations. They make connections between numbers in particular cells.

Functions Functions are built-in formulas that perform calculations automatically.

Recalculation Recalculation or what-if analysis is one of the most important features of spreadsheets. If you change one or more numbers in your spreadsheet, all related formulas will recalculate automatically. Thus you can substitute one value for another in the cells affected by your formula and recalculate the results. For more complex problems, recalculation enables you to store long, complicated formulas and many changing values and quickly produce alternatives.

Words

| | | |
|-----------------|-------------|------------------|
| accountant | <i>n.</i> | 会计员（出纳员） |
| activity | <i>n.</i> | 活动 |
| approach | <i>n.</i> | 方法，手段 |
| associate | <i>v.</i> | 联合，联系，联想 |
| blink | <i>v.</i> | 闪烁 |
| built-in | <i>n.</i> | 内部 |
| contractor | <i>n.</i> | 订约人，承包者；收敛部分；压力机 |
| decimal | <i>adj.</i> | 十进的 |
| document | <i>n.</i> | 文档，文件 |
| end-user | <i>n.</i> | 最终用户 |
| estimate | <i>v.</i> | 估计，估算 |
| formula | <i>n.</i> | 公式 |
| general-purpose | <i>adj.</i> | 通用的 |
| graphic | <i>adj.</i> | 图形 |
| highlight | <i>v.</i> | 使突出 |
| icon | <i>n.</i> | 图标；肖像 |
| intersection | <i>n.</i> | 相交 |
| manipulate | <i>v.</i> | 操作 |
| margin | <i>n.</i> | 页边空白 |
| outcome | <i>n.</i> | 结果，成果 |
| package | <i>n.</i> | 程序包，数据包 |
| reference | <i>n.</i> | 参考，引用 |
| respectively | <i>adv.</i> | 分别（各自地，分别地） |
| spreadsheet | <i>n.</i> | 电子表格，电子数据表；伸展表 |
| underline | <i>v.</i> | 在……下划线 |
| vertical | <i>adj.</i> | 垂直（并排），纵向的 |
| wrap | <i>v.</i> | 换行 |

Phrases

| | |
|------------------|------|
| pull-down menu | 下拉菜单 |
| software package | 软件包 |

Abbreviations

| | |
|--|-------|
| WPS (Word Processing System) | 字处理系统 |
| WYSIWYG (What You See Is What You Get) | 所见即所得 |

Notes

- [1] 例句: These options typically include a table of contents, a search feature to locate reference information about specific commands, and central options to move around.

分析: 句中 about specific commands 是介词短语修饰 information, to move around 是动词不定式作定语修饰 options.

译文: 这些选项一般包含一个表的内容, 查询有关特殊命令的说明信息和可以到处移动的集中选项。

Exercises

I. Write true or false for the following statements according to the passage.

- () Application software includes some general-purpose programs that are widely used in nearly all career areas and some specialized programs that are used in special fields.
- () The insertion point or cursor indicates where you may enter data next.
- () Button bars and menus are all methods for users to pick up, with button bars are more directly to users.
- () With WISYWIG, users can obtain representation of the exactly final results they want.
- () Function keys do the same things in different software programs.
- () Word wrap is a feature common to spreadsheet.
- () A cell in spreadsheet can hold several units of information.
- () Users can make connections among numbers in some cells through formulas.
- () Recalculation makes related formulas alter easy in spreadsheet when one number in a cell is changed.
- () Spreadsheet programs are typically used to store and retrieve records quickly.

II. Fill in the blanks according to the passage.

- The insert point or _____ shows you where you can enter data next.
- _____ menu is a list of commands associated with a selected menu.
- Button bars typically are below the menu bar and contain _____ or _____ representations for commonly used commands.

4. The _____ feature allows the user to preview the document's appearance before it is printed out.
5. The search and replace commands are useful for _____ and _____ errors.
6. The intersection of a column and row in a spreadsheet is called a _____.
7. _____ are instructions for calculations.
8. The worksheet area of the spreadsheet has letters for column _____.
9. _____ enable you to display additional information not currently visible on the screen.
10. A search or find command allows you to locate any _____, _____, or _____ in your document.

III. Translate the following words and expressions into Chinese.

- | | |
|----------------------------|-------------------|
| 1. general-purpose | 6. manipulate |
| 2. electronic spreadsheets | 7. recalculation |
| 3. button bars | 8. margin |
| 4. word wrap | 9. text material |
| 5. pull-down menu | 10. paste command |

1.4.1 Reading Material

Software Development Kit

A "Software Development Kit", or "SDK" for short, is typically a set of development tools that allows a software engineer to create applications for a certain software package, software framework, hardware platform, computer system, operating system or similar. It may be something as simple as an application programming interface in the form of some files to interface to a particular programming language, or include sophisticated hardware to communicate with a certain embedded system. Common tools include debugging aids and other utilities. SDKs also frequently include sample code and supporting technical notes or other supporting documentation to help clarify points from the primary reference material. A software engineer typically receives the SDK from the target system developer. Oftentimes, the SDK can be downloaded directly via the Internet. Many SDKs are provided for free to encourage developers to use the system or language. Sometimes this is used as a marketing tool. For example, "Foo Products" might provide the "Widget SDK" for free to encourage people to use it. Thus, more people will be encouraged to buy more of their widgets since they can program them for free. SDKs may have attached licenses that make them unsuitable for building software intended to be developed under an incompatible license. For example, a proprietary SDK will likely be incompatible with Free software development. And a GPL licensed SDK will "likely" be incompatible with proprietary software development. LGPL SDKs are typically safe for proprietary development. An SDK for an operating system add-on (for instance, QuickTime for Mac OS) may include the add-on software itself, to be used for development purposes, if not necessarily for redistribution. An interesting situation arises here between platforms where it is possible to develop applications

that can at least start up on a system configuration without the add-on installed, and use a Gestalt-style run-time "environment query" to determine if the add-on is present, and ones where the application will simply fail to start. In other words, it is possible to build a single binary that will run on configurations with and without the add-on present, albeit operating with reduced functionality in the latter situation.

Words

| | | |
|-------------|--------------|--------------|
| add-on | <i>n.</i> | 添加件, 外接式附件 |
| albeit | <i>conj.</i> | 虽然, 即使 |
| embed | <i>v.</i> | 放入, 嵌入 |
| kit | <i>n.</i> | 工具包, 成套用具 |
| proprietary | <i>a.</i> | 专利的, 有专利权的 |
| widget | <i>n.</i> | (某公司的) 典型小产品 |

1.4.2 正文参考译文

应用软件

应用软件可被指定为最终用户软件。应用软件完成有用的通用任务, 例如字处理和价格评估。有些是被广泛用于几乎所有行业领域的通用程序。它们是: 字处理、电子表格和图像程序等。它们也被称为基本工具, 并且具有一些共同的特性。

插入点 插入点或光标显示标示着用户接下来可以输入数据的地方。一般来说, 它是屏幕上闪动的竖直条。用户可以使用鼠标或键盘上的方向键移动它。

菜单 几乎所有的软件都有菜单。一般地, 菜单显示在屏幕顶部的菜单栏中。当其中之一被选中, 就会出现下拉式菜单。这是和所选菜单相关的一系列命令。

帮助 对于大多数应用程序, 菜单栏中的都有一个“帮助”菜单。当被选中, 帮助选项出现。这些选项一般包含一个表的内容, 查询有关特殊命令的说明信息和可以到处移动的集中选项。

工具栏 工具栏一般位于菜单栏的下面。它们包含图标或普通命令的图像表示符。这就使得用户可以通过图像符号来选择命令。工具栏就是图形用户界面的一个例子, 在图形用户界面中使用图像目标而不是菜单来选择命令。

对话框 通常在下拉式菜单中选择一个命令之后就会出现对话框。这些对话框用来说明附加的命令选项。

滚动条 滚动条通常位于屏幕的右边或底部。它们通常能够显示在当前屏幕上看不到的附加信息。

WYSIWYG 发“wizzy-wig”音, WYSIWYG 代表“所见即所得”。这就意味着在屏幕上显示的图像和最终打印出来的文档是一样的。没有 WYSIWYG 的应用程序, 就不能显示最终打印文档的精确表示。WYSIWYG 特性允许用户在文档打印之前预览文档的全貌。

功能键 功能键被标为 F1、F2 等等, 这些键位于键盘的左边或顶部。它们用于需经常完成的命令或任务, 比如下划线。这些键在不同的软件包内完成不同的事情。

现在分别介绍最常使用的应用软件: 字处理和电子表格。

字处理软件被用于建立、编辑、保存和打印文档。文档可以是任何类型的文本材料。使用字处理，可以浏览打在显示器而不是纸上的文字。打印完毕后，可以将文字存放在软盘或硬盘上，并且可以将结果打印在纸上。

这种方式的精美之处在于在用户打印文档之前可以进行修改，即使文档已打印出来，也可以很容易地返回去并进行修改，然后再打印出来。你想把一个报告的行距从双倍改成单倍吗？你想改变左右边距的宽度吗？你想删除一些段落并插入其他文档的一些段落吗？字处理可以很容易地帮你完成这些事情。事实上，删除、插入和替换——几种主要的修改任务——只要按键盘上的键就可以完成。流行的字处理软件是 Word、WPS 等。它们具有一些共同的特性。

字换行和回车键 字处理的一个基本特点是换行。当完成一行时，字处理器就会决定并且自动地将插入点移动到下一行。若要开始一个新段或空一段，可以按回车键。

查找和替换 查找命令允许在文档中寻找任何字符、词或短语。查找时，插入点就会移动到所查项目首次出现的位置。如果还想查，程序就会继续寻找所查项目出现的所有地方。替换命令会自动地用另外的字来替换所搜寻的那个字。寻找和替换命令对于发现和修改错误是非常有用的。

剪切、拷贝和粘贴 使用字处理，通过醒目显示选择要移动的文本部分。使用菜单或工具栏，选择命令来剪切所选的文本，这样所选择的文本就会在屏幕上消失。然后移动插入点到新的位置，选择粘贴命令，把剪切的内容重新插入到文本。用类似的方法，可以复制选中的文本到另外一个地方。

电子表格 电子表格是用于组织和管理数字并且显示选项以供分析的电子工作表。电子表格是由金融分析师、会计师、项目承包人以及其他和操纵数字数据有关的人员来使用的。电子表格允许用户尝试各种假设分析的可能性。这是一个很有用的特性。可以通过使用存储的公式处理数字，并且计算出不同的结果。

电子表格具有几个部分。电子表格的工作表区域在顶部有列标的字母，在左边有行标的数字。行和列的交点，被称为单元格。单元格存有单一的信息。单元格的位置被称为是单元格地址。例如，“A1”就是电子表格的首位置，即最顶部和最左边的位置。单元格指针——也被称为是选择器——指示在表格中数据在那里输入及修改。单元格指针可以到处移动，其移动方式非常像在字处理程序中移动插入点的方式。Excel 是最常见的电子表格软件，它具有一些电子表格程序共同的特性。

格式 标号通常用于标记工作表中的信息，通常是一个字或符号。单元格中的数字被称为是值。标号和值可以用不同的方式显示和格式化。标号可以在单元格内居中或居左、居右。值可被显示小数的位置、美元或百分数。小数位数可以被改变，列的宽度也可以被改变。

公式 电子表格的优点之一是可以通过使用公式来处理数据。公式是计算的指令，它们能使特殊单元格内的数字之间建立联系。

函数 函数是自动完成计算的内部公式。

重新计算 重新计算或“what-if”分析是电子表格最重要的特性之一。如果改变了表格中的一个或多个数字，所有相关的公式将会自动地重新计算。这样就可以替换由公式改变的单元格内的值，并且重新计算结果。对于较复杂的问题，重新计算让用户能够存储长的、复杂的公式和许多改变的值，并且很快地产生替换。

Chapter 2 Computer Network

2.1 Introduction to Computer Network

Computer network is a system connecting two or more computers. A computer network allows user to exchange data quickly, access and share resources including equipments, application software, and information.

Data communications systems are the electronic systems that transmit data over communications lines from one location to another. You might use data communications through your microcomputer to send information to a friend using another computer. You might work for an organization whose computer system is spread throughout a building, or even throughout the country or world. That is, all the parts—input and output units, processor, and storage devices—are in different places and linked by communications. Or you might use telecommunications lines—telephone lines—to tap into information located in an outside data bank. You could then transmit it to your microcomputer for your own reworking and analysis.

To attach to a network, a special-purpose hardware component is used to handle all the transmission. The hardware is called a network adapter card or network interface card (NIC), it is a printed circuit board plugged into a computer's bus, and a cable connects it to a network medium.

Communications networks differ in geographical size. There are three important types: LANs, MANs, and WANs.

Local Area Networks Networks with computers and peripheral devices in close physical proximity—within the same building, for instance—are called local area networks (LANs). Linked by cable-telephone, coaxial, or fiber optic. LANs often use a bus form organization. In a LAN, people can share different equipments, which lower the cost of equipments. LAN may be linked to other LANs or to larger networks by using a network gateway. With the gateway, one LAN may be connected to the LAN of another LAN of another office group. It may also be connected to others in the wide world, even if their configurations are different. Alternatively, a network bridge would be used to connect networks with the same configurations.

There is a newly development for LANs: WLAN. A wireless LAN (WLAN) is a flexible data communication system implemented as an extension to, or as an alternative for, a wired LAN within a building or campus. Using electromagnetic waves, WLANs transmit and receive data over the air, minimizing the need for wired connections. Thus, WLANs combine data connectivity with user mobility, and, through simplified configuration, enable movable LANs.

Over the recent several years, WLANs have gained strong popularity in a number of vertical markets, including the health-care, retail, manufacturing, warehousing, and academic arenas.

^[1]These industries have profited from the productivity gains of using hand-held terminals and notebook computers to transmit real-time information to centralized hosts for processing. Today

WLANs are becoming more widely recognized as a general-purpose connectivity alternative for a broad range of business customers.

Applications for Wireless LANs ^[2]Wireless LANs frequently augment rather than replace wired LAN networks—often providing the final few meters of connectivity between a backbone network and the mobile user. The following list describes some of the many applications made possible through the power and flexibility of wireless LANs:

- Doctors and nurses in hospitals are more productive because hand-held or notebook computers with wireless LAN capability deliver patient information instantly.
- Consulting or accounting audit engagement teams or small workgroups increase productivity with quick network setup.
- Network managers in dynamic environments minimize the overhead of moves, adds, and changes with wireless LANs, thereby reducing the cost of LAN ownership.
- Training sites at corporations and students at universities use wireless connectivity to facilitate access to information, information exchanges, and learning.
- Network managers installing networked computers in older buildings find that wireless LANs are a cost-effective network infrastructure solution.
- Retail store owners use wireless networks to simplify frequent network reconfiguration.
- Trade show and branch office workers minimize setup requirements by installing preconfigured wireless LANs needing no local MIS support.
- Warehouse workers use wireless LANs to exchange information with central databases and increase their productivity.
- Network managers implement wireless LANs to provide backup for mission-critical applications running on wired networks.
- Senior executives in conference rooms make quicker decisions because they have real-time information at their fingertips.

The increasingly mobile user also becomes a clear candidate for a wireless LAN. Portable access to wireless networks can be achieved using laptop computers and wireless NICs. This enables the user to travel to various locations—meeting rooms, hallways, lobbies, cafeterias, classrooms, etc.—and still have access to their networked data. Without wireless access, the user would have to carry clumsy cabling and find a network tap to plug into.

Metropolitan Area Networks These networks are used as links between office buildings in a city. Cellular phone systems expand the flexibility of MAN by allowing links to car phones and portable phones.

Wide Area Networks Wide area networks are countrywide and worldwide networks. Among other kinds of channels, they use microwave relays and satellites to reach users over long distances. One of the most widely used WANs is Internet, which allows users to connect to other users and facilities worldwide.

Words

| | | |
|----------------|-------------|------------------|
| alternatively | <i>adv.</i> | 二中择一地, 换句话说 |
| attach | <i>v.</i> | 附上, 连接 |
| audit | <i>v.</i> | 审计, 会计检查, 查账, 核查 |
| augment | <i>v.</i> | 增大; 增加 |
| backbone | <i>n.</i> | 构架, 中心, 中枢, 主干线 |
| cafeteria | <i>n.</i> | 自助食堂 |
| candidate | <i>n.</i> | 选择物, 候选人 |
| clumsy | <i>adj.</i> | 笨拙的 |
| engagement | <i>n.</i> | 约定 |
| exchange | <i>v.</i> | 交换, 调换 |
| facilitate | <i>v.</i> | 易于, 便于, 助长 |
| cost-effective | <i>adj.</i> | 划算的 |
| gateway | <i>n.</i> | 网关 |
| halfway | <i>adj.</i> | 中途的, 一半的长度 |
| implement | <i>v.</i> | 履行 |
| infrastructure | <i>n.</i> | 下部结构, 永久性基地, 基础 |
| lobby | <i>n.</i> | 门廊, 休息室 |
| metropolitan | <i>adj.</i> | 大城市的 |
| mission | <i>n.</i> | 使命, 任务, 代表团 |
| | <i>v.</i> | 派遣 |
| mobility | <i>n.</i> | 灵活性, 移动性, 可动性 |
| overhead | <i>adj.</i> | 过顶的, 头上的, 经常的 |
| peripheral | <i>n.</i> | 外部设备, 辅助设备 |
| plug | <i>n.</i> | 插头, 插塞 |
| profit | <i>v.</i> | 有利于, 获益 |
| proximity | <i>n.</i> | 接近, 近似, 近程 |
| retail | <i>n.</i> | 零售 |
| warehouse | <i>n.</i> | 仓库 |

Abbreviations

| | |
|-------------------------------------|--------|
| LAN (Local Area Network) | 局域网 |
| MAN (Metropolitan Area Network) | 城际网 |
| MIS (Management Information System) | 管理信息系统 |
| NIC (Network Interface Card) | 网络接口卡 |
| WAN (Wide Area Network) | 广域网 |
| WLAN (Wireless Local Area Network) | 无线局域网 |

Notes

- [1] 例句: These industries have profited from the productivity gains of using hand-held terminals and notebook computers to transmit real-time information to centralized hosts for processing.

分析: using 引导的动名词短语用 and 连接作介词 of 的宾语, 此句虽然较长, 但是一个简单句。

译文: 这些工业通过手提终端和笔记本电脑将实时信息传送到中央主机进行处理, 从获得的生产率中已获益匪浅。

- [2] 例句: Wireless LANs frequently augment rather than replace wired LAN networks—often providing the final few meters of connectivity between a backbone network and the mobile user.

分析: rather than 而不是, often providing...是分词短语作状语, between...介词短语作定语修饰 connectivity。

译文: 无线局域网通常是增加而不是代替有线局域网的功能, 通常是在中枢网络和移动用户之间提供最后几米的连接。

Exercises

I . Write true or false for the following statements according to the passage.

1. () A computer network is only connected by cable lines, such as telephone lines.
2. () The three types of network mainly differ in their geographical size.
3. () With a network gateway, a LAN can connect another LAN that has the same configuration.
4. () A network bridge and gateway are connectors that are used to connect two LANs or more.
5. () WLAN is replacement for LAN.
6. () NIC is an electric circuit board that is necessary hardware component for computer network.
7. () WLANs transmit data through the air and they needn't NICs.
8. () A metropolitan area network connects two or more computers within a city.
9. () Internet is the most often used WAN of today.
10. () With WLANs, it is possible for users to connect with networks at any corner of the world.

II . Fill in the blanks according to the passage.

1. A computer network allows user to _____ data quickly, _____ and _____ resources.
2. WLAN stands for _____.
3. Wireless LANs frequently _____ rather than _____ wired LAN networks.
4. _____ phone systems expand the flexibility of MAN by allowing links to car phones

and portable phones.

5. Network managers in _____ environments _____ the overhead of moves, adds, and changes with wireless LANs, thereby reducing the _____ of LAN ownership.

6. Wide area networks are _____ and _____ networks.

7. Data communications systems are the electronic systems that transmit data over _____ from one location to another.

8. Senior executives in conference rooms make quicker decisions because they have _____ information at their fingertips.

9. A wireless LAN is a flexible data communication system implemented as an _____ to, or as an _____ for, a wired LAN within a building or campus.

10. A network bridge would be used to connect networks with the same _____.

III. Translate the following words and expressions into Chinese.

1. telecommunications lines

6. hand-held

2. network interface card

7. clumsy cabling

3. geographical size

8. peripheral devices

4. electromagnetic wave

9. information exchanges

5. gateway

10. flexibility

2.1.1 Reading Material 1

What is a Firewall?

The term "firewall" illustrates a system that protects a network and the machines on them from various types of attack. Firewalls are geared towards keeping the server up all the time and protecting the entire network.

The primary goal of a firewall is to implement a desired security policy; controlling access in both directions through the firewall, and to protect the firewall itself from compromise. It wards off intrusion attempts, Trojans and other malicious attacks.

Personal Firewalls

They are meant for the home user in a networked environment. They aim to block simple attacks, unlike the enterprise level firewalls that the corporate world uses at the server or router end. There are many ways to implement a firewall, each with specific advantages and disadvantages.

Are they really needed?

Nowadays organizations and professionals use Internet technology to establish their online presence and showcase their products and services globally. Their endeavor is to leverage digital technology to make their business work for them.

All the organizations and professionals are shifting from Dialup to broadband and getting a fixed IP. It has led to an increase in security attacks, bugs in everyday working. This does not

mean that Dialup being anonymous dynamic link or the firewall of the ISP network make you pretty safe.

Now if your machine was under attack, you must have wondered what went wrong making your system crash suddenly. It is not necessary for anyone to actually know about you or your IP address to gain access to your system.

If your system is infected or prone to intrusions, then beyond the anonymity of your Dialup connection or a dynamic IP, your system can be hacked.

Types of Attacks

Intrusion There are many ways to gain unauthorized access to a system. Operating system vulnerabilities, cracked or guessed passwords are some of the more common. Once access is attained, the intruder can send email, tamper with data, or use the system privileges to attack another system.

Information Theft and Tampering Data theft and tampering do not always require that the system be compromised. There have been many bugs with FTP servers that allow attackers to download password files or upload Trojan horses.

A Service Attacks Any attack that keeps the intended user from being able to use the services provided by their servers is considered a denial of service attack. There are many types of denial of service attacks, and unfortunately are very difficult to defend against. "Mail bombs" are one example in which an attacker repeatedly sends large mail files in the attempt at filling the server's disk file system thus preventing legitimate mail from being received.

Types of Attackers

Joyrider Not all attacks on computer systems are malicious. Joyriders are just looking for fun. Your system may be broken into just because it was easy, or to use the machine as a platform to attack others. It may be difficult to detect intrusion on a system that is used for this purpose. If the log files are modified, and if everything appears to be working, you may never know.

Vandals A vandal is malicious. They break in to delete files or crash computer systems either because they don't like you, or because they enjoy destroying things. If a vandal breaks into your computer, you will know about it right away. Vandals may also steal secrets and target your privacy.

Spies Spies are out to get secret information. It may be difficult to detect break-ins by spies since they will probably leave no trace if they get what they are looking for.

A personal firewall, therefore, is one of the methods you can use to deny such intrusions.

Words

| | | |
|-----------|---------------|--------|
| anonymity | <i>n.</i> | 无名, 匿名 |
| endeavor | <i>n./ v.</i> | 努力, 试图 |
| hack | <i>v.</i> | 劈, 砍 |

| | | |
|---------------|-------------|-------------------|
| legitimate | <i>adj.</i> | 合法的, 正当的, (被) 允许的 |
| leverage | <i>n.</i> | 力量, 影响 |
| malicious | <i>adj.</i> | 恶意的, 蓄意的, 预谋的 |
| presence | <i>n.</i> | 出席, 在场 |
| prone | <i>adj.</i> | 有……倾向的, 易于……的 |
| tamper | <i>v.</i> | 篡改, 干预, 损害 |
| vandal | <i>n.</i> | 破坏者 |
| vulnerability | <i>n.</i> | 易损性, 要害, 致命性 |

phrases

ward off 避开, 防止

2.1.2 Reading Material 2

How Firewalls work?

Firewalls basically work as a filter between your application and network connection. They act as gatekeepers and as per your settings, show a port as open or closed for communication. You can grant rights for different applications to gain access to the internet and also in a reverse manner by blocking outside applications trying to use ports and protocols and preventing attacks. Hence you can block ports that you don't use or even block common ports used by Trojans.

Using Firewalls you can also block protocols, so restricting access to NetBIOS will prevent computers on the network from accessing your data. Firewalls often use a combination of ports, protocols, and application level security to give you the desired security.

Firewalls are configured to discard packets with particular attributes such as:

- Specific source or destination IP addresses.
- Specific protocol types.
- TCP flags set/clear in the packet header.

Choosing a Firewall

Choose the firewalls which have the ability to ward off all intrusion attempts, control applications that can access the internet, preventing the malicious scripts or controls from stealing information or uploading files and prevent Trojans and other backdoor agents from running as servers.

The purpose of having a firewall cannot be diminished in order to gain speed. However, secure, high-performance firewalls are required to remove the bottleneck when using high speed Internet connections. The World-Wide-Web makes possible the generation of enormous amounts of traffic at the click of a mouse.

Most of these firewalls are free for personal use or offer a free trial period. All the personal firewalls available can't ensure 100% security for your machine. Regular maintenance of the machine is needed for ensuring safety.

2.1.3 正文参考译文

计算机网络介绍

计算机网络是连接两个或多个计算机的系统，它允许用户快速地交换数据，访问和共享包括设备、应用软件和信息在内的资源。

数据通信系统是通过通信线路将数据从一个地方传送到另外一个地方的电子系统。你可以使用数据通信通过你的微机将信息发送给使用另外一台机器的朋友。你有可能在为一家公司工作，其计算机系统遍布一座大楼，或者甚至是全国乃至世界。也就是说，所有的部分——输入和输出单元、处理器和存储设备——都在不同的地方，是通过通信连接起来的。或者你可能使用远程通信线——电话线——接进位于外部数据单元的信息。然后你可能将信息传送到自己的微机上用于重新工作和分析。

为了连接到网络上，需要使用特殊用途的硬件部件来处理所有的传送。这个硬件被称为是网络适配卡或网络接口卡，它是插入到计算机总线上的印刷电路板，由电缆将它连接到网络介质。

通信网络由于其占据的地理范围大小而不同。有三种重要的类型：局域网、城市网和广域网。

局域网 计算机和外部设备在很近的物理范围内的网络被称为是局域网，例如在一座大楼内，由电缆连接——电话线、同轴电缆或光缆。局域网通常使用总线型的结构。在局域网中人们可以共享不同的设备，这样可以降低设备的费用。局域网可以通过使用网关连接到另外一个局域网或者更大的网。使用网关，一个局域网可以被连接到另一个办公团体的局域网上，它也可被连接到世界范围的其他局域网上，即使它们的配置不同。另外一种方法是用网桥来连接具有相同配置的网络。

对于局域网有一个新开发的网络：无线局域网。无线局域网是灵活的数据传输系统，实现了大楼或校园内有线局域网的延伸或替换。无线局域网使用电磁波通过空气传送和接收数据，最低限度地减少了有线连接。这样，无线局域网把数据连接和用户移动性结合起来，通过简化的配置，形成了移动的局域网。

随着近几年的发展，无线局域网在一些市场领域已经获得了广泛的普及，其中包括健康保健、零售业、制造业、仓储业和学术界。这些工业通过手提终端和笔记本电脑将实时信息传送到中央主机进行处理，从获得的生产率中已获益非浅。如今，对于广泛的商业客户来说，无线局域网正成为公认的通用连接的替代品。

无线局域网的应用 无线局域网通常是增加而不是代替有线局域网的功能——通常是在中枢网络和移动用户间提供最后几米的连接。通过无线局域网的灵活性和功能，以下所列描述了可能实现的许多应用当中的一些：

- 医院的医生和护士利用手提或笔记本电脑与无线局域网连接的性能，及时传递了病人的信息，提高了效率。
- 顾问或会计审计事务组或一些小的工作组使用快速搭建的网络提高了工作效率。
- 在动态环境下的网络管理者使用无线局域网最大限度地减少了经常的移动、添加和修改工作，从而降低了局域网所有者的费用。
- 公司的培训点和大学的学生使用无线连接便于访问信息，进行信息交换以及学习。

- 在旧的建筑物内安装网络计算机的网络管理员发现无线局域网是划算的网络基础结构的解决方案。
- 零售商店的老板使用无线局域网简化经常性的网络重新配置（问题）。
- 贸易展览部门工作人员通过安装预先配置的无线局域网最大限度地降低了配置需求，而不需要当地信息管理系统的支持。
- 仓储工人使用无线局域网和中心数据库交换信息提高了生产率。
- 网络管理员使用无线局域网提供运行在有线网络上的关键应用程序的备份。
- 在会议室的高级行政官因为手头有实时信息可供使用，因此可以做出快速的决定。

日益增长的移动用户也成为无线局域网的坚实的后备力量。使用膝上电脑和无线网络接口卡就可实现移动访问无线局域网，这就使得用户可以在不同的地方穿梭——会议室、门厅、休息室、自助食堂、教室等地方——仍然可以访问其网络数据。假如没有无线局域网，用户就不得不携带笨重的电缆寻找网络插头。

大城市网 这些网络用于一个城市内的建筑物之间的连接。移动电话系统通过允许将汽车电话和移动电话接入而扩展了大城市网的灵活性。

宽域网 宽域网是国家和世界范围内的网络。在其他的信道种类中，宽域网使用微波中继和卫星通信远距离到达用户。使用最广泛的宽域网是 Internet，它允许在世界范围内用户和用户及设备的连接。

2.2 Data Communications Channels

To get here to there, data must move through something. A telephone line, cable, or the atmosphere are all transmission media, or channels. But before the data can be communicated, it must be converted into a form suitable for communication.

Data communications lines can be connected in two types of configurations: point-to-point and multidrop. A point-to-point line directly connects the sending and the receiving devices, and a multidrop line connects many devices, not just one sending device and one receiving device.

The two ways of connecting microcomputers with each other and with other equipments are through the cable and through the air. There are three basic forms into which data can be converted for communication: electrical pulses or charges, electromagnetic waves, and pulses of light.

Specifically, five kinds of technology are used to transmit data. These are telephone lines (twisted pair), coaxial cable, fiber-optic cable, microwave, and satellite.

Telephone Lines ^[1] Inexpensive, multiple-conductor cable comprised of one or more pairs of 18 to 24 gauge copper strands. The strands are twisted to improve protection against electromagnetic and radio frequency interference. The cable, which may be either shielded or unshielded, is used in low-speed communications, as telephone cable. It is used only in baseband networks because of its narrow bandwidth. Most telephone lines you see strung on poles consist of cables made up of hundreds of copper wires are twisted pairs. Twisted pairs are susceptible to a variety of types of electrical interference (noise), which limits the practical distance that data

can be transmitted without being garbled. Twisted pairs have been used for years for voice and data transmission, however they are now being phased out by more technically advanced and reliable media.

Coaxial Cable Coaxial cable is a type of thickly insulated copper wire that can carry a larger volume of data—about 100 million bits per second, the insulation is composed of a nonconductive material covered by a layer of woven wire mesh and heavy-duty rubber or plastic. In terms of number of telephone connections, a coaxial cable has 80 times the transmission capacity of twisted pair. Coaxial cables are most often used as the primary communications medium for local connected network in which all computer communication is within a limited geographic area, such as in the same building.

Coaxial cable is also used for undersea telephone lines.

Fiber-Optic Cable ^[2]A transmission medium composed of a central glass optical fiber cable surrounded by cladding and an outer protective sheath. It transmits digital signals in the form of modulated light from a laser or LED (light-emitting diode). In fiber-optic cable, data is transmitted as pulses of light through tubes of glass. In terms of number of telephone connections, fiber-optic cable has 20,000 times the transmission capacity of twisted pair. However, it is significantly smaller. Indeed, a fiber-optic tube can be half the diameter of a human hair. Although limited in the distance they can carry information, fiber-optic cables have several advantages. Such cables are immune to electronic interference, which makes them more secure. They are also lighter and less expensive than coaxial cable and are more reliable at transmitting data. They transmit information using beams of light at light speeds instead of pulses of electricity, making them far faster than copper cable. Fiber-optic cable is rapidly replacing twisted-pair telephone lines.

Microwave Instead of using wire or cables, microwave systems can use the atmosphere as the medium through which to transmit signals. Microwaves are high-frequency radio waves that travel in straight lines through the air. Because the waves cannot bend with the curvature of the earth, they can be transmitted only over short distances. Thus, microwave is a good medium for sending data between buildings in a city or on a large college campus. For longer distances, the waves must be relayed by means of "dishes", or antennas. These can be installed on towers, high buildings, and mountaintops. Each tower facility receives incoming traffic, boosts the signal strength, and sends the signal to the next station.

Satellites ^[3]Satellite communications refers to the utilization of geostationary orbiting satellites to relay the transmission received from one earth station to one or more earth stations. They are the outcome of research in the area of communications whose objective is to achieve ever-increasing ranges and capacities with the lowest possible costs. Orbiting about 22,000 miles above the earth, satellites rotate at a precise point and speed above the earth. This makes them appear stationary so they can amplify and relay microwave signals from one transmitter on the ground to another. The primary advantage of satellite communication is the amount of area that can be covered by a single satellite. It also has other features: long communication distance, and the

cost of station building is independent of the communication distance, operating in broadcasting mode, easy for multiple access, sustaining heavy traffic, able to transport different types of service, independent sending and receiving, and monitoring. Three satellites placed in particular orbits can cover the entire surface of the earth, with some overlap. Their only drawback is that bad weather can sometimes interrupt the flow of data.

Words

| | | |
|--------------------|-------------|-----------------|
| antenna | <i>n.</i> | 天线 |
| axis | <i>n.</i> | 轴心, 中轴 |
| baseband | <i>n.</i> | 基带 |
| boost | <i>v.</i> | 增加, 放大 |
| cable | <i>n.</i> | 电缆 |
| charge | <i>n.</i> | 电荷 |
| cladding | <i>n.</i> | 金属包层, 外罩 |
| coaxial | <i>adj.</i> | 同轴的, 共轴的 |
| configuration | <i>n.</i> | 配置, 结构, 布局, 格局 |
| curvature | <i>n.</i> | 弯曲, 曲度, 弧度 |
| electromagnetic | <i>adj.</i> | 电磁的 |
| fiber-optic | <i>n.</i> | 光纤 |
| garble | <i>v.</i> | 精选, 筛去……的杂质, 误解 |
| gauge | <i>n.</i> | 规格, 标准 |
| geostationary | <i>adj.</i> | 与地球相对位置保持不动的 |
| interference | <i>n.</i> | 干扰, 干涉 |
| immune | <i>adj.</i> | 免疫的 |
| multidrop | <i>n.</i> | 多点 |
| multiple-conductor | <i>n.</i> | 多重导体 |
| outcome | <i>n.</i> | 结果, 产量, 出口 |
| phase | <i>v.</i> | 逐步采用 |
| pole | <i>n.</i> | 极(点); 杆; 电极 |
| pulse | <i>n.</i> | 脉冲 |
| relay | <i>v.</i> | 中继, 转播 |
| sheath | <i>n.</i> | 外皮, 外层覆盖物 |
| shield | <i>n.</i> | 屏, 保护; 防护, 屏蔽 |
| strand | <i>n.</i> | 绳股, 绞合线 |
| susceptible | <i>adj.</i> | 灵敏的, 敏感的 |
| twisted | <i>n.</i> | 扭绞的 |
| utilization | <i>n.</i> | 应用, 利用 |
| woven | <i>adj.</i> | 纺织的, 编织的 |

Phrases

| | |
|----------------------------------|----------|
| coaxial cable | 同轴电缆 |
| fiber-optic cable | 光缆 |
| geostationary orbiting satellite | 轨道通信卫星 |
| phase out | (逐步) 取消 |
| twisted pair | 双绞线 |
| woven wire | 钢丝网, 铁丝网 |

Abbreviations

| | |
|----------------------------|-------|
| LED (Light-Emitting Diode) | 发光二极管 |
|----------------------------|-------|

Notes

- [1] 例句: Inexpensive, multiple-conductor cable comprised of one or more pairs of 18 to 24 gauge copper strands.
 分析: 这句话实际上是个名词解释, 由过去分词短语 comprised of ...作定语, 修饰 cable。
 译文: 由一对或多对 18 到 24 规格的铜线组成的便宜的多重导体电缆。
- [2] 例句: A transmission medium composed of a central glass optical fiber cable surrounded by cladding and an outer protective sheath.
 分析: 这句话也是一个名词解释, 由过去分词短语 composed of...作定语, 修饰 medium, 同样过去分词短语 surrounded by...作定语, 修饰 cable。
 译文: 由金属包裹层和外层保护层包裹着的中央玻璃光导纤维绳组成的一种传输介质。
- [3] 例句: Satellite communications refers to the utilization of geostationary orbiting satellites to relay the transmission received from one earth station to one or more earth stations.
 分析: 句中 to relay 是动词不定式作目的状语; 过去分词短语 received from...作定语修饰 transimssion。
 译文: 卫星通信指的是利用轨道通信卫星传送从一个地面站发来的信息到另外一个或多个地面站。

Exercises

I . Write true or false for the following statements according to the passage.

- () Air can be used to transmit data.
- () Point-to-poiing and multidrop are two types of configuration for communications lines connecting.
- () Twisted pairs are susceptible to noise, which limits the practical distance they can transmit.

4. () Coaxial cable and twisted pairs are all high-frequency transmission cables.
5. () Optic-fiber cables can transmit both electrical and light signals.
6. () Optic-fiber cables are more secure because they are not susceptible to electrical interference.
7. () Microwave can transmit data over long distances.
8. () The primary advantage of satellite communication is the long distance a single satellite can cover.
9. () Three satellites placed in random orbits can cover the entire surface of the earth.
10. () Of all the five kinds of communications channels, because they all have their own advantages and disadvantages, so they can not replace with each other.

II. Fill in the blanks according to the passage.

1. The two ways of connecting microcomputers with each other and with other equipments are through the _____ and through the _____.
2. Data communications lines can be connected in two types of configurations: _____ and _____.
3. Twisted pairs are _____ to a variety of types of electrical interference (noise), which limits the practical distance that data can be transmitted without being _____.
4. _____ transmits digital signals in the form of modulated light from a laser or LED.
5. _____ systems can use the atmosphere as the medium through which to transmit signals.
6. Microwaves cannot bend with the _____ of the earth, they can be transmitted only over short distances.
7. Satellite communications refers to the _____ of geostationary orbiting satellites to _____ the transmission received from one earth station to one or more earth stations.
8. Three satellites placed in particular orbits can cover the entire surface of the earth, with some _____.
9. Fiber-optic cables are _____ to electronic interference, which makes them more secure.
10. In order to transmit longer distance, microwave must be relayed by means of _____.

III. Translate the following words and expressions into Chinese.

- | | |
|----------------------------|-----------------------------|
| 1. communications channels | 6. electromagnetic waves |
| 2. multiple-conductor | 7. pulses of light |
| 3. facility | 8. light-emitting diode |
| 4. stationary | 9. a solid wire conductor |
| 5. transmission capacity | 10. electrical interference |

2.2.1 Reading Material

Simple Introduction to VSAT

What is VSAT ? VSAT stands for Very Small Aperture Terminal—it's a catchy acronym

and as such it's been adopted by all and sundry for every type of satellite product from small components of a system to complete systems. Because the term really hinges around the small size of the antenna it has been used to describe both one-way and interactive systems. Specifically, we in the industry, isolate television broadcast receivers because counting these as well would simply distort the numbers in the marketplace, but data, audio and, to some extent, voice systems are included. Generally, these systems operate in the Ku-band and C-band frequencies. As a rule of thumb C-band (which suffers less from rain attenuation, but requires larger antennas) is used in Asia, Africa and Latin America whilst Ku-band (which can use smaller antennas, but suffers from rain fade in a monsoon-like downpour) is used in Europe and North America. Typically, interactive Ku-band antenna sizes range from 75 centimetres to 1.8 metres and C-band from 1.8 metres to 2.4 metres. One way systems can use antennas as small as 45 centimetres.

What does a network look like? VSAT networks come in various shapes and sizes ranging from star data system users with one site connected to an operator's shared hub to many thousands based on a dedicated facility located at their own site. Mesh systems have traditionally been somewhat smaller in size than star systems——5 to 30 sites used to be a good rule of thumb - but the average size of orders has risen as prices have come down and some rural telephony networks now comprise as many as several hundred or even thousands of sites.

What is One-way Satellite ? One way systems rely on a transmitting station which transmits one or more carriers to the satellite which re-broadcasts the signal over its coverage area. All receive-only VSATs under the satellite footprint can then receive the signal or the user/operator is able to define groups of VSATs from one to all on the network. Broadcast systems are used for data and audio. The most popular application for data is the transmission of financial feeds——Reuters, Telerate and KnightRidder are good examples of companies with large data broadcasting networks——however, there are many other uses, such as software downloads, file transfers, transmission of press agency news items (with pictures) and the broadcast of paging messages for terrestrial transmission to the pagers themselves.

Who uses VSAT ? You name it really, car dealerships, gas stations, lottery systems, banks, insurance companies, drug stores, general stores, supermarkets, healthcare companies, manufacturers, couriers, hotel chains, car rental businesses, food manufacturers, heavy industries, mines, electrical utilities, oil and gas pipelines, energy production and exploration, timber companies, plantations, various government departments and agencies ... any others you can think of, just add to the list.

Words

| | | |
|-------------|-------------|----------------|
| acronym | <i>n.</i> | 首字母缩写, 简称 |
| attenuation | <i>n.</i> | 衰减, 减弱 |
| catchy | <i>adj.</i> | 吸引人的, 令人难解的 |
| distort | <i>v.</i> | 变形, 改变, 失真 |
| hinge | <i>v.</i> | 依赖 |
| sundry | <i>adj.</i> | 各式各样的, 杂的, 种种的 |

Phrases

all and sundry

所有的人，每人

as a rule of thumb

根据经验

2.2.2 正文参考译文

数据通信信道

数据为了传递，必须通过一些东西：电话线、电缆或空气都是传输介质，即信道。但是在数据被传送前，它必须被转化成适于通信的形式。

数据通信线路可以以两种配置方式连接：点到点和多点线路连接。点到点线路直接连接发送和接收设备，而多点线路连接多个设备，而不仅仅是一个发送方设备和一个接收方设备。

微型机之间以及与其他设备连接有两种方法：通过电缆和空气。数据可以被转化为通信的三种基本形式是：电脉冲或电荷，电磁波和光波。

具体地，有五种技术可用来传送数据。它们是：电话线（双绞线）、同轴电缆、光缆、微波和卫星。

电话线 由一对或多对 18 到 24 规格的铜线组成的便宜的多重导体电缆。铜线绞合着以提高防止电磁和无线电频率干扰的能力。这些电缆，可以是屏蔽的或非屏蔽的，作为电话线用于低速通信中。由于其窄的带宽，它仅被用于基带网络中。你看到的架在电线杆上的绝大多数电话线是双绞线，它们是由数以百计的铜线组成的电缆。双绞线对于各类电的干扰很敏感，这就限制了数据不被窜改而传送的实际距离。双绞线被用于传递声音和数据已有好多年了，然而它们正被更技术先进和可靠的介质所逐步代替。

同轴电缆 同轴电缆是一种有厚绝缘层的铜线，可以携带大量的数据——大约每秒 100 万位。这个绝缘层是由一层金属筛网和厚的橡胶或塑料的绝缘材料组成。根据连接的电话的数目，同轴电缆的传输容量是双绞线的 80 倍。同轴电缆是局域网最常用的主要的通信介质，而局域网中所有计算机间的通信是局限在有限的地理区域内，比如一座大楼。

同轴电缆也用于海底电话线。

光缆 由金属包裹层和外层保护层包裹着的中央玻璃光导纤维绳组成的一种传输介质。它是以调制的从激光或光发射二极管中发射的光的形式来传递数字信号。在光缆中，当光脉冲通过玻璃管时数据就被传送。根据可连接的电话数目，光缆的传输容量是双绞线的 2 万倍，然而它却非常小。实际上，光缆管的直径仅仅是人的头发丝的一半。尽管受传送信息距离的限制，光缆还是具有一些优点。这样的光缆不受电子的干扰，这就使得它们更安全。它们比同轴电缆轻还便宜，而且传输数据更可靠。光缆用光束以光的速度而不是电脉冲的速度传输数据，这就使得它们比铜缆快得多。光缆正迅速地取代双绞线的电话线。

微波 不使用电线或电缆，微波系统使用大气作为传输介质传送信号。微波是以直线穿过空气的高频率的无线电波。由于微波不能随地球表面的弯曲度弯曲，因此只能传送很短的距离。这样，对于一个城市中或者是一个大学校园内的两个大楼之间，微波是很好的传送数据的介质。对于较长距离，微波必须通过“盘子”，即天线放大。这些天线可以被安装在塔上，高楼上，以及山顶上。每个塔的设备接收进来的信号，增强信号的强度然后

将信号发送给下一站。

卫星 卫星通信指的是利用轨道通信卫星传送从一个地面站发来的信息到另外一个或多个地面站。卫星通信是通信领域的研究成果，其目的就是以尽可能少的代价获得不断增加的范围和容量。卫星在地球表面 22,000 英里的轨道上以精确位置和速度旋转着。这就使得它们看起来是静止的，因此可以将一个地面站转发器发送来的信息放大和传送到下一站。通信卫星的主要优点是一个卫星可以覆盖的面积的数量。它也具有其他的特点：远距离通信，转发站的费用独立于通信距离，以广播方式运作，易于多路访问，承受大量的信息，能够传送不同类型的服务，独立的发送、接收和监控。在特定轨道放置三颗卫星就可覆盖整个地球表面，而且还有些重叠。其惟一缺点是恶劣的天气有时可影响数据的传送。

2.3 Main Factors Affecting Data Transmission

There are several factors that affect data transmission. They include speed or bandwidth, serial or parallel transmission, direction of data flow, modes of transmission data, and protocols.

Bandwidth The different communications channels have different data transmission speeds. This bit-per-second transmission capability of a channel is called its bandwidth. Bandwidth may be of three types: voiceband, medium band, and broadband. Voiceband is the bandwidth of a standard telephone line and used often for microcomputer transmission, the bps is 300-9600. Medium band is the bandwidth of special leased lines used mainly with minicomputers and mainframe computers, the bps is 56,000—264 million. Broadband is the bandwidth that includes microwave, satellite, coaxial cable, and fiber-optic channels. It is used for very high-speed computers whose processors communicate directly with each other. It is in the range of 56,000—30 billion bps.

Serial or Parallel Transmission Data travels in two ways: serially and in parallel. In serial data transmission, bits flow in a serial or continuous stream, like cars crossing a one-lane bridge. Each bit travels on its own communications line.^[1] Serial transmission is the way most data is sent over telephone lines. Thus, the plug-in board making up the serial connector in a microcomputer's modem is usually called a serial port. More technical names for the serial port are RS-232C connector and asynchronous communications port. With parallel data transmission, bits flow through separate lines simultaneously. In other words, they resemble cars moving together at the same speed on a multilane freeway. Parallel transmission is typically limited to communications over short distances and is not used over telephone lines. It is, however, a standard method of sending data from a computer's CPU to a printer.

Direction of Data Transmission There are three directions or modes of data flow in a data communications system: simplex communication, half-duplex communication, and full-duplex communication. Simplex communication resembles the movement of cars on a one-way street. Data travels in one direction only. It is not frequently used in data communication systems today. One instance in which it is used may be in point-of sale (POS) terminals in which data is being entered only. In half-duplex communication, data flows in both directions, but not simultaneously. That is, data flows in only one direction at any one time. This resembles traffic on a one-lane

bridge. Half-duplex is very common and is frequently used for linking microcomputers by telephone lines to other microcomputers, minicomputers, and mainframes. Thus, when you dial into an electronic bulletin board through your microcomputer, you may well be using half-duplex communication. In full-duplex communication, data is transmitted back and forth at the same time, like traffic on a two-way street. It is clearly the fastest and most efficient form of two-way communication. However, it requires special equipment and is used primarily for mainframe communications. An example is the weekly sales figures that a supermarket or regional office sends to its corporate headquarters in another place.

Modes of Transmitting Data Data may be sent by asynchronous or synchronous transmission. In asynchronous transmission, the method frequently used with microcomputers, data is sent and received one byte at a time. Asynchronous transmission is often used for terminals with slow speeds. Its advantage is that the data can be transmitted whenever convenient for the sender. Its disadvantage is a relatively slow rate of data transfer. Synchronous transmission is used to transfer great quantities of information by sending several bytes or a block at a time. For the data transmission to occur, the sending and receiving of the blocks of bytes must occur at carefully timed intervals. Thus, the system requires a synchronized clock. Its advantage is that data can be sent very quickly. Its disadvantage is the cost of the required equipment.

Protocols For data transmission to be successful, sender and receiver must follow a set of communication rules for the exchange of information. These rules for exchanging data between computers are known as the line protocol. A communication software package like Crosstalk helps define the protocol, such as speeds and modes, for connecting with another microcomputer. TCP/IP (Transmission Control Protocol and Internet Protocol) are the two standard protocols for communications on the Internet.

TCP/IP is the "language" of the Internet. It is a networking technology developed by the United States Government Defense Advanced Research Project Agency (DARPA) in the 1970s. It is most commonly employed to provide access to the Internet but can be and is used by many people to create a LAN that may or may not connect to the Internet. In many aspects TCP/IP is a client/server-type LAN, but many manufacturers of TCP/IP software have applications that allow the "clients" to serve files or even applications. TCP/IP is truly an open systems protocol. This means that no one manufacturer creates the product—any computer running TCP/IP software can connect to anyone else who has TCP/IP software (provided the user has an account and security permissions), regardless of who made the particular version of software.

When different types of microcomputers are connected in a network, the protocols can become very complex. Obviously, for the connections to work, these network protocols must adhere to certain standards. The first commercially available set of standards was IBM's Systems Network Architecture (SNA). This works for IBM's own equipment, but other machines won't necessarily communicate with them. The International Standards Organization has defined a set of communications protocols called the Open Systems Interconnection (OSI). The purpose of the OSI model is to identify functions provided by any network.^[2] It separates each network's functions into

seven "layers" of protocols, or communication rules. When two network systems communicate, their corresponding layers may exchange data. ^[3] This assumes that the microcomputers and other equipment on each network have implemented the same functions and interfaces.

Words

| | | |
|----------------|-------------|--------------|
| Adhere | <i>v.</i> | 粘着于（坚持，追随）…… |
| assume | <i>v.</i> | 假定，设想，采取，呈现 |
| asynchronous | <i>adj.</i> | 异步的 |
| broadband | <i>n.</i> | 宽频带，宽波段 |
| bulletin | <i>n.</i> | 公报，通报，告示 |
| duplex | <i>n.</i> | 双的 |
| implement | <i>v.</i> | 实现，完成 |
| interface | <i>n.</i> | 界面 |
| layer | <i>n.</i> | 层 |
| parallel | <i>adj.</i> | 平行的，并联的 |
| protocol | <i>n.</i> | 协议 |
| serial | <i>adj.</i> | 连续的，串联的 |
| simplex | <i>adj.</i> | 单工，单向 |
| simultaneously | <i>adv.</i> | 同时地 |
| voiceband | <i>n.</i> | 话音频带 |

Phrases

| | |
|----------------------|--------|
| dial into | 拨入 |
| open system protocol | 开放系统协议 |

Abbreviations

| | |
|--|--------------|
| OSI (Open Systems Interconnection) | 开放系统互连 |
| POS (Point-Of-Sale) | 零售点 |
| SNA (Systems Network Architecture) | 系统网络结构 |
| TCP/IP (Transmission Control Protocol and Internet Protocol) | 传输控制协议和因特网协议 |

Notes

- [1] 例句: Serial transmission is the way most data is sent over telephones lines.
 分析: most data is sent over telephones lines 是定语从句, 修饰 way。
 译文: 串行传输是绝大多数数据通过电话线的方式。
- [2] 例句: It separates each network's functions into seven "layers" of protocols, or communication rules.

分析: 短语 separate...into...是把...分成...的意思。

译文: 它把每个网络的功能分成七层协议, 即通信规则。

- [3] 例句: This assumes that the microcomputers and other equipment on each network have implemented the same functions and interfaces.

分析: that 引导的是宾语从句; 介词短语 on each network 作定语修饰 equipment。

译文: 这种情况是假设每一个网络中的微机和其他设备完成了同样的功能和具有同样的界面。

Exercises

I . Write true or false for the following statements according to the passage.

1. () Protocols is the main factor that affects data communication.
2. () Broadband is suitable for all kinds of communication channels and is mainly used for high-speed computers.
3. () Serial and parallel transmission are the two ways of data traveling, they can't be replaced with each other.
4. () In asynchronous transmission, the method frequently used with microcomputers, data is sent and received several bytes a time.
5. () Simplex communication is very common and is frequently used for linking microcomputers by telephone lines to other microcomputers, minicomputers, and mainframes.
6. () TCP/IP is the "language" of the Internet, which can only be used on internet.
7. () Protocols are a set of communication rules for sender and receiver to exchange data.
8. () An open system protocol means that no special product will be needed, only those obey the protocol will be admitted and can share resources.
9. () The purpose of the OSI model is to identify functions provided by any network.
10. () OSI model assumes that the microcomputers and other equipment on each network have implemented the same functions and interfaces.

II . Fill in the blanks according to the passage.

1. There are several factors that affect data transmission. They include speed or _____, serial or _____ transmission, _____ of data flow, modes of transmission data, and _____.
2. In serial data transmission, bits flow in a serial or _____ stream.
3. With parallel data transmission, bit flow through _____ lines simultaneously.
4. _____ is very common and is frequently used for linking microcomputers by telephone lines to other microcomputers, minicomputers, and mainframes.
5. In _____ communication, data is transmitted back and forth at the same time.
6. Asynchronous transmission is often used for terminals with _____.
7. Synchronous transmission requires a _____ clock.
8. TCP/IP (Transmission Control Protocol and Internet Protocol) are the two standard protocols for communications on the _____.

9. The OSI model separates each network's functions into seven "layers" of _____, or communication rules.

10. TCP/IP is truly an open systems protocol. This means that no one manufacturer creates the product—any computer running TCP/IP software can _____ to anyone else who has _____ software regardless of who made the particular version of software.

III. Translate the following words and expressions into Chinese.

- | | |
|----------------------------------|------------------------------|
| 1. protocol | 6. full-duplex communication |
| 2. modes of transmission data | 7. point-of sale terminal |
| 3. transmission control protocol | 8. broadband |
| 4. asynchronous | 9. electronic bulletin board |
| 5. serial transmission | 10. channel |

2.3.1 Reading Material

Computer System Security

Please notice that the term computer system here includes hardware, software, network transmission paths, and people who interact with these components. By this definition, everything from a desktop workstation to the Internet qualifies as a computer system.

Types Of Computer System Attackers

An attacker is a person who tries to gain an advantage by exploiting a security hole. Attackers are misfeasors, masqueraders, or clandestine users.

Misfeasors These authorized users gain additional but unauthorized access to resources on a system or otherwise misuse their authorization. Examples include programmers who use their accounts to exploit operating system (OS) vulnerabilities and gain administrative privileges, or accountants who embezzle money by falsifying records in a database to which they have regular access. A misfeisor is an "inside" person, someone within an organization who introduces a security risk or poses a threat.

Masqueraders These people use authorized user access privileges to enter a system and then, posing as that user, attack the system. Examples include hackers who obtain usernames and passwords by cracking password files, and then use that information to gain entry to the system. Masqueraders are usually persons outside the organization.

Clandestine Users These individuals are insiders or outsiders who obtain their own, distinct unauthorized access to a system. Examples include hackers who obtain administrative access to a system long enough to create their own user accounts for subsequent access.

The concepts of access and authorization are not necessarily limited to user accounts within an OS. Physical access to an equipment closet or authorization to place orders for new telephony service are examples of other types of access and authorization. All persons who have any degree of physical or logical interaction with a system, its components, or its processes are capable of compromising system security.

Common Goals of Security Attackers

The goals of an attacker range from innocuous to severely damaging:

Trophy Grabbing Most thrill-seeking attackers are trophy grabbing. Their intent is not to disrupt or damage a system, but to prove that they can enter the system. Such accomplishments are badges of achievement in the hacker community.

Information Theft The most common goal of a security attack is information theft. Intruders seek sensitive information such as credit card numbers, usernames, passwords, and medical records.

Service Theft This type of attack involves attackers who use computer resources without paying for them. Software pirates who crack systems to host stolen software, or warez, for others to download are guilty of service theft. Clandestine users also commit service theft by having unauthorized accounts on a server.

Identity Theft This is the act of illegally assuming the identity of another person, or masquerading, to gain control of that person's resources (usually computer and economic privileges). An example of this is an attacker who uses stolen social security numbers and credit histories to establish and exercise unauthorized lines of credit. Identity theft does not necessarily involve information theft. For example, an attacker can commit e-mail forgery without stealing sensitive information about the e-mail address owner.

Tampering This attack is more serious than information theft because the attacker alters data rather than simply copying it. A student who changes a grade in a university registrar's database is tampering. This example is stealthy tampering—the attack is not intended to draw attention. A more extreme form of tampering is defacement, in which a hacker alters a system in a very noticeable way, usually to make a personal or political statement. The disgruntled computer operator who, upon dismissal, embeds nasty messages about management in a login script, or the activist group that hacks into a corporate Web site are typical examples.

Denial of Service (DoS) DoS can be the most damaging type of security attack. It diminishes server capacity for authorized clients and temporarily disrupts access to the system. In the worst cases, DoS attacks render a system unusable for a protracted period by destroying not only its ability to communicate, but also any data that has been entrusted to it. DoS also can occur as an unintentional side effect of service theft. For example, hosting pirated warez can bring down a system because of the excessive download activity.

Vulnerabilities that Attackers Prey upon

Although attackers continue to create new methods for violating computer system security, the vulnerabilities they exploit remain the same. These vulnerabilities can be divided into five types:

Implicit Trust The unquestioning, unchecked acceptance of a person or agent. Attacks that exploit this vulnerability include: compromised system utilities, e-mail forgery, IP spoofing, keystroke monitoring, logic bomb, masquerading, shoulder surfing, social engineering, Trojan horse, trapdoor.

Configuration Error An error in configuration or a failure to replace a default configuration with a more secure one. Attacks include: backdoor, bacteria, e-mail relay, IP spoofing, network, scanning, ping flooding, shell escapes, smurfing, war dialing.

Public Information Leveraging well-known or easily obtainable information to expose weaknesses or to facilitate an attack. Attacks include: DNS hijack, packet sniffing, security audit tools, traffic analysis, van Eck attack, worm.

Weak design A process or system that was not designed with security as a goal. Attacks include: buffer overrun, DNS hijack, IP spoofing, mail bombing, masquerading, network scanning, ping flooding, replay attack, shell escape, smurfing, SYN flooding, virus, worm.

Carelessness Failure to observe procedures and regimens that would foster a secure environment, such as staying current with software patches or choosing good passwords. Attacks include: backdoor, buffer overrun, password cracking, shoulder surfing, war dialing, virus.

Defending a System Against Security Attacks

A defense is a countermeasure for dealing with security attacks. Administrators can employ five types of defenses:

Obfuscation Confusing the attacker by obscuring publicly available information that exposes vulnerability. Examples include: anonymity, encryption, packet stuffing, public key cryptography, shielding, steganography, trash disposal.

Authentication and Authorization Ensuring that a person or system claiming an identity is the real owner of the identity, and granting access on a "must have" basis. Examples include: badges and cards, biometrics, password, shared secret, signature, watermark.

Monitoring and Auditing Observing system vulnerabilities, either in real time or through audit tools, to detect attacks. Examples include: filtering, firewall, integrity check, intrusion detection, misuse detection, password checker, peer review, process review, security audit tools, virus detection.

Currency Consistently using tested software updates and periodically reviewing human processes and procedures. Examples include: patching, process review, upgrading.

Education and Enforcement Effectively equipping system designers and users with knowledge of security risks, and then enforcing application of this knowledge. Examples include: reminders, tip of the day, training.

The key to preventing security attacks from diminishing system performance is knowledge. IT administrators can develop their security strategies by studying historical and contemporary attacks, appropriate defenses, and the evolving trends in the computer security industry.

Words

| | | |
|-------------|-----------|----------|
| badge | <i>n.</i> | 徽章, 符号 |
| biometrics | <i>n.</i> | 生物统计学 |
| clandestine | <i>a.</i> | 秘密的, 暗中的 |

| | | |
|---------------|----|----------------|
| crack | v. | 毁损 |
| defacement | n. | 毁损, 磨损 |
| embezzle | v. | 盗(挪)用(公款) |
| entrust | v. | 委托, 托付 |
| equip | v. | 装备 |
| exploit | v. | 开发, 剥削 |
| falsify | v. | 伪造, 歪曲, 误用 |
| forgery | n. | 伪造 |
| innocuous | a. | 无害的 |
| nasty | n. | 很脏的, 险恶的, 难应付的 |
| patching | n. | 接线 |
| pose | v. | 伪装成 |
| protract | v. | 拖延, 突出 |
| qualify | v. | 使具有资格 |
| vulnerability | n. | 易损性, 要害, 致命性 |

2.3.2 正文参考译文

影响数据传送的主要因素

有几个影响数据传送的因素, 包括速度或带宽、串行或并行传送数据流的方向、数据传送的方式及协议。

带宽 不同的通信信道有不同的数据传送速度。信道每秒钟能传送的能力被称为带宽。带宽可以是三种类型: 话音频带, 中速带宽和宽带。话音频带是标准电话线的带宽, 通常被用于微型机的传送, 其每秒钟传送的位数是 300 到 9 600。中带带宽主要是由小型机和大型机使用的特殊连接线的带宽, 其每秒钟传送的位数是 5 6000 到 264 百万位。宽带包括微波、卫星、同轴电缆和光缆的信道的带宽。它主要用于处理器之间直接进行交流的高速计算机中, 其每秒钟传送的位数在 56 000 到 300 亿位。

串行或并行传输 数据以两种方式传送: 串行和并行。在串行数据传输中, 数据位的流动是一串或连续的流量, 就像汽车通过只有一个车道的桥。每一位在自己的通信线路上流动。串行传输是绝大多数数据通过电话线的方式。因此, 构成微型计算机的调制解调器的串行连接器的插入板通常被称为是串行口。对于串行口, 其技术的名称是 RS-232C 连接器和异步通信端口。对于并行数据传输, 数据位是通过分离的线路同时流动的。换句话说, 它们类似于汽车一起以同样的速度通过多道快车道。并行传送主要局限于短距离的传送, 并不通过电话线。然而, 它都是从计算机的 CPU 到打印机的数据传送的标准方式。

数据传输的方向 在数据通信系统中有三种方向式方式的数据流: 单工通信、半双工通信和全双工通信。单工通信类似于汽车在单向的街上行驶。数据仅以一个方向传送。它并不经常用于现在的数据通信系统中。它被使用的一个例子是数据仅仅被输入的零售点终端。在半双工通信中, 数据是以两个方向流动, 但不是同时。也就是说, 数据在任何时候都只以一个方向流动, 这类似于只有一个车道的桥上的交通。半双工很普遍, 经常被用于电话线连接的微型机之间以及微型机和小型机及大型机之间的通信。因此, 当你通过微机

拨入到电子公告牌，你也许会使用半双工通信。在全双工通信中，数据同时来回地传送，像双向街上的交通。很显然它是双向通信中最快最有效的形式。然而它需要特殊的设备并且主要用于大型机的通信。其应用的一个例子是超市或区域办公室每周将其销售的数据发送给在另一个地方的公司总部。

数据传送方式 数据能以异步或同步方式传送。在异步传送方式下，一次只能发送和接收一个字节，是微型机经常使用的方法。异步传送也常用于速度慢的终端设备。其优点是发送方方便就可以传送数据。缺点是相对较慢的数据传送速率。同步传送用于一次发送几个字节或数据块的大量的信息传送。为了实现数据传送，发送方和接收方的字节块必须以精确的时间间隔出现。因此，系统需要一个同步时钟。其优点是数据可以被很快地传送，缺点是需要花费所需的设备。

协议 为了成功的传送数据，发送方和接收方必须遵循用以交换信息的一套通信规则。这些用于计算机之间交换数据的规则被称为是线路协议。为了和其他微机连接，像 Crosstalk 这样的通信软件包就帮助定义协议，诸如速度和方式。TCP/IP（传输控制协议和因特网协议）就是 Internet 上的用于通信的两个标准协议。

TCP/IP 是 Internet 的“语言”，它是由美国政府防御高级研究项目机构在 20 世纪 70 年代开发的网络技术。它最常用于提供访问 Internet，但也被许多人用于建立与 Internet 相联或不联的局域网。在许多方面，TCP/IP 是客户服务器类型的局域网，但许多 TCP/IP 软件的生产商具有允许“客户机”提供文件甚至应用的应用软件。TCP/IP 是一个真正的开放系统协议。这就意味着没有一个生产商生产这个产品——任何运行 TCP/IP 软件的计算机都可以和另一个具有 TCP/IP 软件的任一机器相联（假设该用户具有账号和安全口令），而不管是谁制定的这个指定版本的软件。

当不同类型的微机在网络中相联时，协议是非常复杂的。显然，为了实现通信，这些网络协议必须坚持一定的标准。第一套商业可用标准是 IBM 公司的系统网络结构，该标准只用于 IBM 自己的设备，不过，其他的机器不需要与它们交流。国际标准化组织已经制定了一套被称为开放系统互联的通信协议。开放系统互联模式的目的是判别由任一网络提供的功能。它把每个网络的功能分成七层协议，即通信规则。当两个网络系统通信时，它们对应层可以交换数据。这种情况是假设每一个网络中的微机和其他的设备完成了同样的功能和具有同样的界面。

2.4 Network Architecture

Network architecture describes how computer network is arranged and how computer resources are shared.

There are a number of specialized terms that describes computer network. Some terms often used with networks are: node, client, server, network operating system, distributed processing and host computer.

A node is any device that is connected to a network. It could be a computer, printer, or communication or data storage device.

A client is a node that requests and uses resources available from other nodes. Typically, a

client is a user's microcomputer.

A server is a node that shares resources with other nodes. Depending on the resources shared, it may be called a file server, printer server, communication server, or database server.

Network operating system like Windows, it controls and coordinate the activities between computers on a network. These activities include electronic communication, information, and resource sharing.

In a distributed processing system, computing power is located and shared at different locations. ^[1]This type of system is common in decentralized organizations where divisional offices have their own computer systems. The computer systems in the divisional offices are networked to the organization's main or centralized computer.

Host computer is a large centralized computer, usually a minicomputer or a mainframe.

A network may consist only of microcomputers, or it may integrate microcomputers or other devices with large computers. ^[2]Networks can be controlled by all nodes working together equally or by specialized nodes coordinating and supplying all resources. Networks may be simple or complex, self-contained or dispersed over a large geographical area.

Configuration A network can be arranged or configured in several different ways. The four principal configurations are star, bus, ring, and hierarchical.

In a star network, a number of small computers or peripheral devices are linked to a central unit. This central unit may be a host computer or a file server. All communications pass through this central unit. Control is maintained by polling. That is, each connecting device is asked whether it has a message to send. Each device is then in turn allowed to send its message. One particular advantage of the star form of network is that it can be used to provide a time-sharing system. That is, several users can share resources ("time") on a central computer. The star is a common arrangement for linking several microcomputers to a mainframe that allows access to an organization's database.

In a bus network, each device in the network handles its own communications control. There is no host computer. All communications travel along a common connecting cable called a bus. As the information passes along the bus, it's examined by each device to see if the information is intended for it. The bus network is typically used when only a few microcomputers are to be linked together. This arrangement is common in systems for electronic mail or for sharing data stored on different microcomputers. The bus network is not as efficient as the star network for sharing common resources. (This is because the bus network is not a direct link to the resource.) However, a bus network is less expensive and is in very common use.

In a ring network, each device is connected to two other devices, forming a ring. There is no central file server or computer. Message are passed around the ring until they reach the correct destination. With microcomputers, the ring arrangement is the least frequently used of the four networks. However, it often is used to link mainframes, especially over wide geographical areas. These mainframes tend to operate fairly autonomously. They perform most or all of their own processing and only occasionally share data and programs with other mainframes. A ring

network is useful in a decentralized organization because it makes possible a distributed data processing system. That is, computers can perform processing tasks at their own dispersed locations. However, they can also share programs, data and other resources with each other.

The hierarchical network consists of several computers linked to a central host computer, just like a star network. However, these other computers are also hosts to other, smaller computers or to peripheral devices. Thus, the host at the top of the hierarchy could be a mainframe. The computers below the mainframe could be minicomputers, and those below, microcomputers. The hierarchical network—also called a hybrid network—allows various computers to share databases, processing power, and different output devices. A hierarchical network is useful in centralized organizations. For example, different departments within an organization may have individual microcomputers connected to departmental minicomputers. The minicomputers in turn may be connected to the corporation's mainframe, which contains data and programs accessible to all.

Strategies Every network has a strategy or way of coordinating the sharing of information and resources. The most common network strategies are peer-to-peer and client/server systems.

In a peer-to-peer network system nodes can act as both servers and clients. For example, one microcomputer can obtain files located on another microcomputer and can also provide files to other microcomputers. A typical configuration for a peer-to-peer system is the bus network. Commonly used net operating systems are Apple's Macintosh Peer-to-Peer LANs, Novell's Netware Lite, and Microsoft's Windows for Workgroups. There are several advantages to using this type of strategy. The networks are inexpensive and easy to install, and they usually work well for smaller systems with less than ten nodes. As the number of nodes increases, however, the performance of the network declines. Another disadvantage is the lack of powerful management software to effectively monitor a large network's activities. For these reasons, peer-to-peer network are typically used by small networks.

Client/server network systems use one powerful computer to coordinate and supply services to all other nodes on the network. This strategy is based on specialization. Server nodes coordinate and supply specialized services, and client nodes request the services. Commonly used net operating systems are Novell's Netware, Microsoft's LAN and Windows NT. One advantage of client/server network systems is their ability to handle very large networks efficiently. Another advantage is the powerful network management software that monitors and controls the network's activities. The major disadvantages are the cost of installation and maintenance.

Words

| | | |
|---------------|-------------|----------------|
| architecture | <i>n.</i> | 体系结构, 总体, 层次结构 |
| autonomously | <i>adv.</i> | 自主地 |
| centralized | <i>adj.</i> | 集中的, 中央集权的 |
| destination | <i>n.</i> | 目的地, 目标, 指定 |
| decentralized | <i>adj.</i> | 分散(型)的 |

| | | |
|----------------|-------------|---------------|
| dispersed | <i>adj.</i> | 分散的, 漫布的, 细分的 |
| divisional | <i>adj.</i> | 分开的 |
| evolve | <i>v.</i> | 进化, 开展 |
| hierarchical | <i>adj.</i> | 分层的 |
| hose | <i>n.</i> | 软管 |
| | <i>v.</i> | 接以软管 |
| hybrid | <i>adj.</i> | 混合式的 |
| integrate | <i>v.</i> | 使……结合, 使……完整 |
| maintenance | <i>n.</i> | 维护, 保持, 保养 |
| node | <i>n.</i> | 节点, 分支 |
| peer-to-peer | <i>n.</i> | 对等, 对等网络 |
| polling | <i>n.</i> | 轮询, 探询, 查询 |
| self-contained | <i>adj.</i> | 独立的, 配套的 |
| specialization | <i>n.</i> | 专门, 专业化 |
| strategy | <i>n.</i> | 战略 |

Phrases

| | |
|-------------------------------|---------|
| distributed processing system | 分布式处理系统 |
| file server | 文件服务器 |
| host computer | 主机 |
| in turn | 轮流, 依次 |
| resource sharing | 资源共享 |
| time sharing | 分时 |

Notes

- [1] 例句: This type of system is common in decentralized organizations where divisional offices have their own computer systems.
 分析: 句中 **where** 引导的是地点状语从句, 用来修饰 **organizations**。
 译文: 这类系统在分散型机构中是很常见的, 其分开的办公室具有他们自己的计算机系统。
- [2] 例句: Networks can be controlled by all nodes working together equally or by specialized nodes coordinating and supplying all resources.
 分析: 分词短语 **working together equally** 作定语修饰 **nodes**。
 译文: 网络可以由一起平等工作的所有节点来控制, 或者是由协调和提供所有资源的专用节点控制。

Exercises

I . Write true or false for the following statements according to the passage.

1. () Network architecture describes how computer network is arranged, that is topology.
2. () In a distributed processing system, computing power is located and shared at the same locations.
3. () In a star network, each device can require to send message simultaneously.
4. () In a bus network, as information passes through the bus, every node can receive it.
5. () With microcomputers, the ring arrangement is the most frequently used of the four networks.
6. () A hierarchical network is useful in distributed organizations.
7. () In a peer-to-peer network system nodes can act as both servers and clients, that is, the nodes can exchange the roles.
8. () In a client/server system, each node on the network has equal responsibility for coordinating the network's activities.
9. () Client/server system has powerful network management software.
10. () One organization can only have one network configuration.

II. Fill in the blanks according to the passage.

1. Network architecture describes how computer network is _____ and how computer resources are _____.
2. A _____ is any device that is connected to a network.
3. Network operating system _____ and _____ electronic communication, information, and resource sharing.
4. In a star network, control is maintained by _____.
5. In a ring network, each device is connected to two other devices, forming a _____.
6. A ring network is useful in a _____ organization because it makes possible a _____ data processing system.
7. _____ network systems use one powerful computer to coordinate and supply services to all other nodes on the network.
8. The most common network strategies are _____ and client/server systems.
9. Every network has a _____ or way of coordinating the sharing of information and resources.
10. The hierarchical network consists of several computers linked to a _____ host computer, just like a star network.

III. Translate the following words and expressions into Chinese.

- | | |
|----------------------------------|-------------------------------|
| 1. distributed processing system | 6. host computer |
| 2. network architecture | 7. peripheral device |
| 3. peer-to-peer system | 8. decentralized organization |
| 4. strategy | 9. self-contained |
| 5. hierarchical network | 10. configuration |

2.4.1 Reading Material

Video Conference and H.323

Internet is nowadays widely used in the world, it provides numerous services, such as on-line booking, BtoB (business to business) services, databases accesses to the companies. But all these services are asynchronous, which means that there is a delay between an action from the user and the response from the service (it's a client/server architecture; a computer provides a service which is used by one or several clients). The new generation of network communication tools tries to reach the real time level, which means that there is no delay between the action of the user and the response.

Real time chats, or for instance video on demand, are the new services provided by the Internet today. These applications appeared recently and are still in development. One really interesting applications for these technologies is video conference.

Video conference is a technology which allows people to communicate through computer networks using an audio stream and a video stream. In a few words, people using video conference can hear and see their correspondents.

Video conference has been very popular only over ISDN (dedicated digital phone lines). These days, packet-switched networks, such as IP networks, have opened the door to newer protocols including H.323. The computing power of the desktop systems, the kind of computers that can be found in the companies or at home, allows the use of video conference applications.

Moreover, webcams, these little low resolution cameras that can be plugged on a regular computer, are becoming cheaper and cheaper, and almost every computer has now audio capabilities.

H.323 is the standard for video conference. It can be used over IP (Internet Protocol), and possibly over all kinds of switched-packet networks (LAN—Local Area Network, MAN—Metropolitan Area Network, and WAN—Wide Area Network, including the Internet). It was defined by the ITU (it is the leading publisher of telecommunication technology, regulatory and standards information) in 1996. It is updated almost every year, to fit the new progresses in network capabilities and computing power. The latest version is H.323.5. It was defined in 2003.

The scope of H.323 covers real-time voice, video and data communication over packet-switched networks. It has multipoint capabilities (several people can communicate with several other people at the same time) voice and video conferencing capabilities.

The H.323 protocol can be defined as an "umbrella" specification, which means that the protocol includes several other protocols. In the H.323, the H.225.0, the H.245, the H.450.x, the T.120 protocols are also defined. In addition to these protocols H.323 uses audio codecs (H.261 and H.263), video codecs (G.711, G.722, G.723.1, G.728 and G.729), and a real-time transport layer called RTP/RTCP (Real-time Protocol and Real-time Control Protocol). All these protocols cover a different aspect of the video conference system.

Video conference is one of the most exciting communication media, and will certainly take

a bigger and bigger place in our future. H.323 is a mature protocol that can be safely used for this purpose. It is widely used by telecom companies, and offers interesting alternatives to the regular telephone. With the growing power of Internet and the need of world wide communications, there is no doubt that video conference will be tomorrow for our society what telephone is nowadays.

Words

| | | |
|---------------|-------------|-----|
| asynchronous | <i>adj.</i> | 异步的 |
| correspondent | <i>n.</i> | 通信员 |
| regulatory | <i>adj.</i> | 管理的 |

Phrases

| | |
|-----------------|------|
| audio stream | 音频流 |
| video stream | 视频流 |
| packet-switched | 分组交换 |

2.4.2 正文参考译文

网络体系结构

网络体系结构描述计算机网络是如何连接以及计算机资源是如何共享的。

有一些用来描述计算机网络的专业术语。经常用于网络的术语有：节点、客户机、服务器、网络操作系统、分布处理及主计算机。

节点是连接到网络的任一设备，它可以是计算机、打印机、通信或数据存储设备。

客户机是请求和使用其他节点资源的节点。一般来说，客户机就是用户的微机。

服务器是和其他节点共享资源的节点。根据所共享的资源，可以被称为文件服务器，打印机服务器，通信服务器或数据库服务器。

网络操作系统像 Windows，它控制和协调网络中计算机间的活动。这些活动包括电子通信、信息以及资源共享。

在分布式处理系统中，计算能力被分布在不同的地方共享。这类系统在分散型机构中是很常见的，其分开的办公室具有他们自己的计算机系统。这些分开的办公室的计算机系统联网到该组织的主或中央计算机。

主计算机是大的中央计算机，通常是小型机或大型机。

网络可以仅仅由微机组成，或者可以是微机或其他设备与较大计算机结合起来的。网络可以由一起平等工作的所有节点来控制，或者是由协调和供应所有资源的专用节点控制。网络可以是简单的或复杂的，独立的或分散在大的地理区域内的。

结构 网络可以用几种不同的方式排列或连接。四种主要的结构是星型、总线型、环型和层次型。

在星型网络中，一些小的计算机或外部设备被连接到一个中心设备。这个中心设备可以是主计算机或文件服务器，所有的通信都通过这个中心设备。控制是由轮询实现的。也

就是说，每一个连接的设备都被询问是否有信息发送，然后每个设备被轮流允许发送其信息。星型网络最特殊的优点是它能用于提供分时系统，即几个用户可以在一个中心计算机上共享资源（“时间”）。为了将几个微机连接到大型机上，该机允许访问一个机构的数据库，那么星型结构是常见的排列。

在总线型网络中，网络中的每一个设备处理自己的通信控制而没有主计算机。所有的通信沿着共同连接的被称为是总线的电缆上传送。当有信息通过总线，它就被每一个设备检验以判定该信息是否是给自己的。当只有几个微机需要连接在一起时，一般使用总线型网络。这种结构常见于发送电子邮件或共享存储在不同微机上的数据的系统。对于共享共同的资源，总线型网络没有星型的效率高（这是因为总线型网络不是直接连接到资源上的）然而，总线型网络不贵而且很常用。

在环形网络中，每一个设备被连接到其他两个设备形成环路。没有中央文件服务器或计算机。信息通过环路直到到达正确的目的地。对于微型机来讲，环形结构是这四种网络当中使用最少的。然而它经常被用于连接到大型机，尤其在跨度很大的地理区域。这些大型机趋向于非常自主的运作，它们完成自己绝大多数或全部的处理任务，偶尔与其他大型机共享数据和程序。环型网络在分散型机构中是很有用的，因为这使得分布式数据处理系统成为可能，即计算机在它们自己分散的位置就可以完成处理任务。然而，它们也可以相互共享程序、数据以及其他的资源。

层次网络是由连接到中心计算机的几个计算机构成，就像星型网络。然而，这些其他的计算机对于其他较小的计算机或外部设备来说又是主计算机。这样，在层次顶部的主计算机就可能是大型机，在大型机下面的可能是小型机，小型机下面是微机。层次网络——也被称为混合网络——允许各种计算机共享数据库、处理资源及不同的输出设备。层次网络适合于集中的机构。例如，一个机构内部的不同部门可以有连接到部门小型机上的单个微机，这个小型机依次可以连接到公司的大型机，它包含所有机器可以访问的程序和数据。

策略 每一个网络都有协调信息和资源的策略或方法。最常用的网络策略是对等和客户/服务器系统。

在对等网络系统中，节点既可以是服务器也可以是客户。例如，一个微机可以获得位于另一个微机上的文件并且也给其他的微机可以提供文件。对等系统的典型结构是总线型网络。通常使用的网络操作系统有 Apple 公司的 Macintosh Peer-to-peer LANS, Novell 公司的 Netware Lite 和 Microsoft 公司的 Windows for Workgroups。使用这类策略有几个优点。这种网络不贵且易于安装，对于少于 10 个节点的较小的系统运作得很好。然而，当节点的数目增加时，网络的性能就会降低。另一个缺点是缺乏强大的管理软件以有效地监控大的网络活动。由于这些原因，对等网络一般用于小型网络中。

客户/服务器网络系统使用一个功能强大的计算机来协调并为网络上的其他节点提供服务。这一策略是基于专业化的。服务器节点协调和提供专门的服务，客户节点请示服务。通常使用的网络操作系统有:Novell 公司的 Netware, Microsoft 公司的 LAN 和 Windows NT。客户/服务器网络系统的一个优点是能够有效地处理大的网络活动。另一个优点是它的监视和控制网络活动的强有力的网络管理软件。其主要缺点是安装和维护的费用较高。

Chapter 3 Internet and E-commerce

3.1 Browsers and Communications

Want to communicate with a friend across town, in another province, or even in another country? The Internet and the WEB are the 21st-Century information resources designed for all of us to use.

Browsers are programs that provide access to Web resources. This software connects you to remote computers, opens and transfers files, displays text and images, and provides in one tool an uncomplicated interface to the Internet and Web documents. Two well-known browsers are Netscape Navigator and Microsoft Internet Explorer. For browsers to connect to other resources, the location or address of the resources must be specified. These addresses are called Uniform Resources Locators (URLs). Following the Domain Name System (DNS), all URLs have at least three basic parts. The first part presents the protocol used to connect to the resource. The protocol `http://` is by far the most common. The second part presents the domain name or the name of the server where the resource is located. The server is identified as `www.aol.com`. (Many URLs have additional parts specifying directory paths, file names, and pointers.) The last part of the domain name following the dot (.) is the domain code. It identifies the type of organization. For example, `com` indicated a commercial site.

The URL `http://www.aol.com` connects your computer to a computer that provides information about America Online (AOL). These informational locations on the Web are called Web sites. Moving from one Web site to another is called surfing.

Once the browser has connected to a Web site, a document file is sent to your computer. This document contains Hypertext Markup Language (HTML) commands. The browser interprets the HTML commands and displays the document as a Web page. Typically, the first page of a Web site is referred to as its home page. ^[1]The home page presents information about the site along with references and hyperlinks, or connections to other documents that contain related information such as text files, graphic images, audio, and video clips.

These documents may be located on a nearby computer system or on one halfway around the world. The references appear as underlined and colored text and /or images on the Web page. To access the referenced material, all you do is click on the highlighted text or image. A link is automatically made to the computer containing the material, and the referenced material appears.

Communication is the most popular Internet activity. The impact of electronic communication cannot be overestimated. At a personal level, friends and family can stay in contact with one another even when separated by thousands of miles. ^[2]At a business level, electronic communication has become standard and many times preferred way to stay in touch with suppliers, employees, and customers.

You can communicate with anyone in the world who has an Internet address or e-mail

account with a system connected to the Internet. All you need is access to the Internet and an e-mail program. Two of the most widely used e-mail programs are Microsoft's Outlook Express and Netscape's Navigator.

Suppose that you have a friend, Anny, who is going to the University of Southern California. You and Anny have been planning a trip for the upcoming break. You have heard there are some inexpensive airfare deals online. To save money, you and Anny agree to research these offers and e-mail each other your findings.

A typical e-mail message has three basic elements: header, message and signature. The header appears first and typically includes the following information:

- Addresses: Addresses of the persons sending, receiving, and, optionally, anyone else who is to receive copies.
- Subject: A one-line description, used to present the topic of the message. Subject lines typically are displayed when a person checks his or her mail-box.
- Attachments: Many e-mail programs allow you to attach files such as documents and worksheets. If a message has an attachment, the file name appears on the attachment line.

The letter or message comes next. It is typically short and to the point. Finally, the signature line provides additional information about the sender. Typically, this information includes the sender's name, address, and telephone number.

Following the domain name system discussed earlier, e-mail addresses have two basic parts. The first part is the user's name and the second part is the domain name, which includes the domain code.

You can also use e-mail to communicate with people you do not know but with whom you wish to share ideas and interests. You can participate in discussions and debates that range from general topics like current events and movies to specialized forums like computer troubleshooting and Star Trek.

Mailing lists allow members of a mailing list to communicate by sending messages to a list address. Each message is then copied and sent via e-mail to every member of the mailing list. To participate in a mailing list, you must first subscribe by sending an e-mail request to the mailing list subscription address. Once you are a member of a list, you can expect to receive e-mail from other on the list. You may find the number of messages to be overwhelming. If you want to cancel a mailing list, send an e-mail request to "unsubscribe" to the subscription address.

Newsgroups, unlike mailing lists, use a special network of computers called the Usenet. Each of these computers maintains the newsgroups listing. There are over 10,000 different newsgroups organized into major topic areas that are further subdivided into subtopics. Contributions to a particular newsgroup are sent to one of the computers on the Usenet. This computer saves the messages on its system and periodically shares all its recent messages with the other computers on the Usenet. Unlike mailing lists, a copy of each message is not sent to each member of a list. Rather, interested individuals check contributions to a particular

newsgroup, reading only those of interest. There are thousands of newsgroups covering a wide variety of topic areas.

Chat groups allow direct "live" communication. To participate, you join a chat group, select a channel or topic, and communicate live with others by typing words on your computer. Other members of your channel immediately see those words on their computers and can respond in the same manner. One popular chat service is called Internet Relay Chat (IRC). This software is available free from several locations on the Internet. Using the chat-client software, you log on to the server, select a channel or topic in which you are interested, and begin chatting. To participate, you need access to a server or computer that supports IRC. This is done using special chat-client software.

Instant messaging, like chat groups, allows one or more people to communicate via direct, "live" communication. Instant messaging, however, provides greater control and flexibility than chat groups. To use instant messaging, you specify a list of friends, or "buddies", and register with an instant messaging server. Whenever you connect to the Internet, you use special software to tell your messaging server that you are online too. It notifies you if any of your buddies are online. At the same time, it notifies your buddies that you are online. You can then send messages back and forth to one another instantly.

Before you submit a contribution to a discussion group, it is recommended that you observe or read the communications from others. This is called lurking. By lurking, you can learn about the culture of a discussion group. For example, you can observe the level and style of the discussions. You may decide that a particular discussion group is not what you were looking for—in which case, unsubscribe. If the discussions are appropriate and you wish to participate, try to fit into the prevailing culture. Remember that your contributions will likely be read by hundreds of people.

Words

| | | |
|--------------|-------------|--------------|
| airfare | <i>n.</i> | 机票 |
| attachment | <i>n.</i> | 附件 |
| available | <i>adj.</i> | 可提供的, 可用的 |
| buddy | <i>n.</i> | (俗语) 伙伴, 小男孩 |
| contribution | <i>n.</i> | 贡献, 捐献 |
| culture | <i>n.</i> | 文化 |
| debate | <i>v.</i> | 辩论 |
| document | <i>n.</i> | 文件, 公文, 证件 |
| domain | <i>n.</i> | 域, 领域 |
| flexibility | <i>n.</i> | 灵活性 |
| forum | <i>n.</i> | 论坛 |
| halfway | <i>adv.</i> | 半途 |
| hyperlink | <i>n.</i> | 超链接 |

| | | |
|--------------|------|-----------------|
| identify | v. | 认出, 识别, 鉴定 |
| impact | v. | 影响 |
| indicate | v. | 显示, 象征, 指示, 指出 |
| inexpensive | adj. | 不贵的, 便宜的 |
| institution | n. | 机构 |
| interpret | v. | 解释, 翻译, 理解 |
| lurk | v. | 潜伏 (作为旁观者不参加讨论) |
| newsgroups | n. | 新闻组 |
| overestimate | v. | 过高估计 |
| overwhelm | v. | 压倒, 使不知所措 |
| participate | v. | 参加 |
| periodically | adj. | 周期性的 |
| protocol | n. | 协议, 草案 |
| register | v. | 记录, 登记 |
| signature | v. | 签名 |
| specify | v. | 指定 |
| subject | n. | 主题 |
| subscription | n. | 预约, 用户, 订阅费 |
| surfing | v. | 冲浪 |
| upcoming | adj. | 将要到来的 |
| well-known | adj. | 著名的, 有名的 |

Phrases

| | |
|-----------------------------------|-------------|
| a wide variety of | 各种各样的 |
| at least | 至少 |
| along with | 和……一起, 伴随…… |
| at the same time | 同时 |
| access to | 进入 |
| back and forth | (前后) 来回地往返 |
| by far | 到目前为止 |
| chat groups | 聊天组 |
| connect to | 与……相连 |
| in touch | 联系, 接触 |
| log on | 登录到 |
| on the Usenet | 在新闻组网上 |
| to the point | 中肯; 扼要 |
| University of Southern California | 南加州大学 |

Abbreviations

| | |
|----------------------------------|---------|
| AOL (America Online) | 美国在线 |
| DNS (the Domain Name System) | 域名系统 |
| HTML (Hypertext Markup Language) | 超文本语言 |
| IRC (Internet Relay Chat) | 在线聊天系统 |
| URL (Uniform Resource Locator) | 统一资源定位符 |

Notes

- [1] 例句: The home page presents information about the site along with references and hyperlinks, or connections to other documents that contain related information such as text files, graphic images, audio, and video clips.

分析: 本句是复合句, presents 和 connections 是并列谓语, that contain ...是定语从句, 修饰 documents。

译文: 主页代表着有关索引和超级链接的站点信息, 或者与包含相关信息诸如文件夹、图像、音频和视频的其他文件相链接。

- [2] 例句: At a business level, electronic communication has become standard and many times preferred way to stay in touch with suppliers, employees, and customers.

分析: 本句是简单句, 一般现在时。

译文: 在交易中, 电子通信已经成为标准, 很多企业选择这样的方法保持与供应者、雇员和用户的联系。

Exercises

I . Write true or false for the following statements according to the passage.

1. () Domain code identifies the location of the resources.
2. () URL is the same as domain name.
3. () HTML commands are commands that display Web pages.
4. () A typical e-mail message has three basic elements: addresses, message and signature.
5. () Following the domain name system e-mail addresses have two basic parts, the first is the user's name and the second is the domain name.
6. () To participate in a mailing list at the first time, you just directly send messages to a list address.
7. () To participate in a chat group, you must communicate live with others.
8. () Like mailing lists, newsgroups allow members to communicate by sending messages to one of the computers on the UseNet, and each message is then copied and sent to each member of a list.
9. () One popular chat service is called URL which is available free from several locations on the Internet.

10. () Instant messaging provides greater control and flexibility than chat groups.

II. Fill in the blanks according to the passage.

1. _____ are programs that provide access to Web resources.
2. URLs have at least two basic parts, they are _____ and _____.
3. Moving from one Web site to another is called _____.
4. Communication is the most popular Internet activity. Two categories are _____ and _____.
5. Two of the most widely used e-mail programs are _____ and _____.
6. _____ are ways to communicate electronically with one or more individuals.
7. Unlike mailing list, _____ are organized by major topic areas and use the Usenet network.
8. Newsgroup hierarchy consists of three parts, namely major topic, _____ and further division of subtopic.
9. _____ is that you observe or read the communications from others without participating.
10. To participate, you join a chat group, select a _____ or topic, and communicate live with others by typing words on your computer.

III. Translate the following words and expressions into Chinese.

- | | |
|-------------|--------------------------|
| 1. browser | 6. DNS |
| 2. URL | 7. hyperlinks |
| 3. protocol | 8. log on |
| 4. lurking | 9. surfing |
| 5. HTML | 10. subscription address |

3.1.1 Reading Material 1

WAP and Bluetooth

What is WAP?

- (1) Have you heard the hype about the wireless Web?

Either way, WAP—an acronym for wireless application protocol—is making the wireless Internet a reality, and even if it isn't successful right now, this industry is expecting enormous growth. Market researcher IDC predicts that 1.3 billion wireless Internet users will have WAP-enabled devices by 2004.

- (2) Where did WAP come from?

An industry consortium called the WAP Forum promotes WAP. The WAP forum was founded in 1997 by Ericson, Motorola, Nokia and Phone.com after Phone.com developed a server and browser for AT&T's PocketNet.

- (3) What exactly is WAP?

WAP is a set of protocols used to transfer data to wireless devices. WAP-enabled devices provide wireless users with a limited version of the Web designed to work on the small black and

white screens of phones and PADs.

Websites accessed by WAP phones must be re-written to satisfy the wireless application protocol; in order to do that, Web pages written in HTML must be transferred to the WAP markup language (WML). Internet browsers like Netscape and Internet Explorer read pages in HTML, while a micro-browser on a WAP-enabled device reads pages in WML.

Major websites like Yahoo and Amazon.com have carefully designed their WAP sites to look and feel much like their wired counterparts, while search engines like Google are transferring pages from HTML to WML so they can be accessed by wireless users.

(4) What's the problem with WAP?

WAP faces bandwidth constraints that limit the amount of data that can be transferred to the devices. On the wireless Internet, users are presented with a fraction of information available on the traditional version.

And while WAP is the leading wireless protocol now, that doesn't mean that isn't here to stay. When a better version of the wireless Web becomes available, WAP could very well become obsolete.

One potential competitor is NTT DoCoMo, a Japanese company which has developed a hugely successful wireless data service called i-mode and expects to tap the U.S. market toward the end of 2001.

What is Bluetooth?

Blue-tooth is a technology that connects electronic devices—from camcorders to PDAs to computers—without using wires. Consumers began to see Bluetooth in action when Toshiba starting selling a Bluetooth-enabled PC card over their website in September 2000 for \$199. Other vendors plan to follow with devices ranging from PDAs to mobile phones.

A Bluetooth device uses radio signal to send information from one Bluetooth device to another though the air. For example, if you are trying to transfer a PC's address book to a PDA, first the data in an address book is translated into a language that the PDA can understand by a conduit. The data goes through the conduit to the Bluetooth device. The Bluetooth device is made up of a base-band processor, a radio, and an antenna. The base-band processor transfers the data into signals that the radio can understand, and the radio puts out signals in a frequency (2.4 gigahertz) that the antenna transmits through the air to another Bluetooth device within 30-feet. The other device receives the data and processes it in the reverse order.

Bluetooth is supported by a Special Interest Group (SIG), which was founded in 1998 and has approximately 2000 members, all of whom have access to Bluetooth specifications the information needed to make a Bluetooth product. The SIG includes IBM, Intel, Microsoft and Nokia, and works to develop and promote the Blue-tooth technology.

But Bluetooth, like many new technologies, may not be an instant hit. There are still plenty of questions about the ability of these devices to speak the same language. So while devices produced by the same company could communicate with each other easily, integration may be

difficult when multiple vendors are involved. And while consultants at Forrester Research expect Bluetooth's popularity to grow, the firm said in a brief that many businesses won't buy in, "until user pressure forces them to in 2003".

Words

| | | |
|------------|-------------|-----------------|
| airwaves | <i>n.</i> | 电源, (无线电或电视) 广播 |
| Bluetooth | <i>n.</i> | 蓝牙技术 |
| consortium | <i>n.</i> | 联合企业, 联盟 |
| consultant | <i>n.</i> | 顾问, 会诊医生, 专科 |
| enormous | <i>adj.</i> | 巨大的 |
| frequency | <i>n.</i> | 频率 |
| instant | <i>adj.</i> | 瞬间, 时刻, |
| plug | <i>n.</i> | 插头 |

Phrases

| | |
|-----------------|-----------------|
| buy in | 大宗买进 |
| in brief | 简单地说 |
| Mac (Macintosh) | 苹果公司生产的一种型号的计算机 |
| multiple user | 多用户 |

Abbreviations

| | |
|---|--------------|
| IDC (International Data Corporation) | 国际数据公司 |
| IEEE (Institute of Electrical and Electronics Engineers) | 美国电气和电子工程师协会 |
| WAP(Wireless Application Protocol) | 无线应用协议 |

3.1.2 Reading Material 2

VoIP Phone and IP PBX

A VoIP phone is designed specifically for use in a voice over IP(VoIP)system by converting standard telephone audio into a digital format that can be transmitted over the Internet, and by converting incoming digital phone signals from the Internet to standard telephone audio. A VoIP phone allows the user to take advantage of VoIP technology without involving a personal computer, although an Internet connection is required. Physically, a VoIP phone set resembles a traditional hard wired or cordless telephone set. Some VoIP phone sets offer enhanced quality audio, comparable to that on compact disc (CD). A few VoIP phone sets allow for the transmission and reception of image data during calls, so they can be considered video telephones.

An IP PBX is a private branch exchange (telephone switching system within an enterprise) that switches calls between VoIP users on local lines while allowing all users to share a certain

number of external phone lines. The typical IP PBX can also switch calls between a VoIP user and a traditional telephone user, or between two traditional telephone user in the same way that a conventional PBX does. With a conventional PBX, separate networks are necessary for voice and data communications. One of the main advantages of an IP PBX is the fact that it employs converged data and voice networks. This means that Internet access, as well as VoIP communications and traditional telephone communications, are all possible using a single line to each user. This provide flexibility as an enterprise grows, and can also reduce long-term operation and maintenance costs.

Ear and mouth (E&M) is a technology in voice over IP (VoIP) that uses a traditional telephone handset with an earphone (or earpiece) for listening to incoming audio and a microphone (or mouthpiece) for transmitting audio. Calls using an E&M interface can be made from, received from , or disconnected by a private banch exchange (PBX) as well as from a VoIP-capable computer.

The main advantage of E&M is the fact that it allows a PBX to reliably detect disconnect (hang-up) signals. This eliminates problems that can otherwise occur with locked computer ports at the terminations of calls, and thus minimizes the risk of needlessly consuming network resources.

Words

| | | |
|--------------|-------------|----------|
| conventional | <i>adj.</i> | 普通的, 习惯的 |
| converge | <i>v.</i> | 使聚集, 整合 |
| disconnect | <i>n.</i> | 断线 |
| enterprise | <i>n.</i> | 企业, 事业 |
| handset | <i>n.</i> | 电话听筒 |
| hang-up | <i>v.</i> | 挂机 |
| incoming | <i>adj.</i> | 新来的 |
| specifically | <i>adv.</i> | 特别地, 明确地 |
| termination | <i>n.</i> | 终端 |
| transmit | <i>v.</i> | 传输 |

Abbreviations

| | |
|-------------------------------|--------|
| PBX (Private Branch Exchange) | 专用小交换机 |
| E&M | 耳嘴接口 |
| VoIP | 网络电话 |

3.1.3 正文参考译文

浏览器和通信

想要跨城市、省甚至国家与一位朋友进行信息交流么? Internet 和 Web 是为此设计的

21 世纪信息资源。

浏览器是提供访问 Web 资源的程序。它把你和远程计算机连接起来，打开并且传送文件，显示正文和图像，并且给 Internet 和 Web 资源提供了一个并不复杂的接口。Netscape 公司 Navigator 和微软公司的 IE 是两个著名的浏览器。对链接其他资源的浏览器来说，资源的位置或地址必须被指定。这些地址称为统一资源定位符（URL）。继域名系统（DNS）之后，所有的 URL 至少有三个基本部分。第一个部分表示链接资源的协议。协议 `http://` 是当今最普遍的。第二部分表示资源所在的域名或服务器名。一个服务器可能被标识为 `www.aol.com` 的形式。（很多 URL 有附加部分，用于指定目录路径、文件名和指针。）在圆点之后的最后一个部分是域名。它标明公司类型。例如，`com` 是商业网站。

URL “`http://www.aol.com`” 把用户计算机和提供关于“美国在线”Anny 信息的计算机连接起来。在 Web 上的这些信息的位置被叫做网站。从一个网站移到另一个称为“冲浪”。

一旦浏览器连接上一个网站，就会有文档发送到你的计算机。这个文档包含 HTML 命令。浏览器解释 HTML 命令并以网页的形式显示。通常，一个网站的第一页被称为主页。主页显示本网站的信息，另外还包含超链接的信息，或者有关的信息如正文文件、图表图像、音频和录像剪辑等资料的链接。

这些文档可能位于你附近的计算机系统，也可能在世界各地的任何一个角落。链接在 Web 页中是以加下划线的指定颜色的文本或图片来标识的，单击文本和图片的热点即可访问链接的页面，链接可以自动地定位计算机所含包含的信息并且显示。

通信是 Internet 最流行的活动之一。电子通信的影响不可低估。在普通用户级别，朋友和家人能够远隔千里而联络。在企业用户级别中电子通信已经成为供应商、员工和客户保持联系的标准手段或首选手段。

你只需访问 Internet 和邮件程序，就能够和世界上任何一个拥有 Internet 地址或者 E-mail 账户的联网的人交流。两个最常用的邮件程序是微软的 Outlook Express 和 Netscape 的 Navigator。

设想你有个朋友 Anny，她即将去南加州大学。你和 Anny 为即将的分别计划一次旅行。你听说有一些廉价的机票在线销售，为了省钱，你和 Anny 决定查询这些消息并且用邮件互相交流彼此的发现。

E-mail 信息有三个主要构成部分：抬头、信息和签名。抬头出现在 E-mail 最前面，主要包含以下的信息：

地址：收信和发信人的地址，也可以加上抄送人的地址。

主题：一行信息用于描述主题，主要用于查看邮箱内容。

附件：许多邮件程序允许携带文本和工作表附件，如果有附件，其文件名会在附件行中显示。

下面就是信件或信息，一般比较简短并且切入主题，最后签名部分提供一些发送者的附加信息，主要包含发送者的姓名、地址和电话号码。

我们前面介绍过域名地址，E-mail 地址由两个基本部分组成。第一部分是用户名，第二部分是域名，包括域代码。

你也可以使用 E-mail 和一个虽然不认识但愿意与之交流思想和兴趣爱好的人通信，可以加入讨论组就当前时事或电影的普通话题到诸如计算机检修和 Star Trek 网络游戏的专门

论坛开展辩论。

邮件列表允许列表用户通过向一组列表地址发送信息来交流。每条信息可以复制并通过 E-mail 发往列表中的每个成员。想加入邮件列表,必须先向预定地址通过 E-mail 提交申请预定。一旦成为列表成员,你就会收到从其他列表发送的 E-mail。你也可能发现许多信息令人不知所措。如果想取消邮件列表,则必须向预定地址发送 E-mail 取消预定。

新闻组和邮件列表不同,它使用一种叫做世界性的新闻组网络(Usenet)的特殊计算机系统。每个计算机中都包含新闻组列表,有超过一万个不同的新闻组按照主题进而按照下一级主题分组。特定新闻组中的内容被发送到 Usenet 中的一台计算机中,这台计算机中保存着这些信息并定期和 Usenet 中的其他计算机分享最新的信息。与邮件列表不同,不是将每条信息的副本发送到列表成员,而是感兴趣的用户访问特定的新闻组,查看他们感兴趣的内容,有上千个新闻组覆盖着许多不同的领域。

聊天组允许在线交流。可以选择一个主题通过打字和其他用户在线交流,其他相同主题下的用户可以即时地看到你的文字并以同种方法做出回应。一个很受欢迎的聊天服务是 Internet 中继聊天(IRC),是 Internet 上一个世界范围内的免费实时交谈工具。使用聊天程序客户端软件可以登陆到服务器,选择不同的主题开始聊天,前提是用户要访问支持 IRC 的服务器,这需要一个专用的客户端软件。

即时消息和聊天组一样允许多用户在线交流,但是它提供了更多的控制手段和灵活性。使用即时消息可以指定朋友或同伴列表,在服务器上注册。无论何时你连接到 Internet 都可以通过即时消息软件告诉服务器你在线,这样如果你的朋友在线会即时通知你,反之亦然,然后就可以来回地发送消息了。

在向讨论组提交信息之前,建议你先观察和阅读其他用户的信息,这叫“潜伏”(指在 Usenet 上作为旁观者,不参加讨论),通过潜伏,你可以获得关于讨论组的文化素养信息。例如,你能观察到其讨论的水平和风格,会发现一些讨论组并不是你所期待寻找的因此不去预定,如果有适合的讨论组你希望加入,那应当尝试去适应它。记住,你的言论可能被上百个人阅读到。

3.2 Search Tools

The Web can be an incredible resource providing information on nearly any topic imaginable. Are you planning a trip? Writing an Economics paper? Looking for a movie review? Trying to locate a long-lost friend? Information sources related to these questions, and much, much more are available on the Web.

With over two billion pages and more being added daily, the Web is a massive collection of interrelated pages. With so much available information, locating the precise information you need can be difficult. Fortunately, a number of organizations called search services or search providers can help you locate the information you need. They maintain huge databases relating to information provided on the Web and the Internet. The information stored at these databases includes addresses, content descriptions or classifications, and keywords appearing on Web pages and other Internet informational resources. Special programs called agents, spiders, or bots

continually look for new information and update the search services databases. Additionally, search services provide special programs called search engines that you can use to locate specific information of the Web.

Search Engines?

[1]Search engines are specialized programs that assist you in locating information on the Web and the Internet. To find information, you go to the search service's Web site and use their search engine. Yahoo's search engine, like most others, provides two different search approaches.

- Keyword Search

In a keyword search, you enter a keyword or phrase reflecting the information you want. The search engine compares your entry against its database and returns a list of hits or sites that contain the keywords. Each hit includes a hyperlink to the referenced Web page (or other resource) along with a brief discussion of the information contained at that location. Many searches result in a large number of hits. For example, if you were to enter the keyword travel, you would get over a thousand hits. [2]Search engines order the hits according to those sites that most likely contain the information requested and present the list to you in that order, usually in groups of ten.

- Directory Search

Most search engines also provide a directory or list of categories or topics such as Arts & Humanities, Business & Economics, Computers & Internet. In a directory search, also known as index search. You select a category that fits the information that you want. Another list of subtopics relates to the topic you selected appears. You select the subtopic that best relates to your topic and another subtopic list appears. You continue to narrow your search in this manner until a list of Web sites appears. This list corresponds to the hit list previously discussed.

As a general rule, if you are searching for general information, use the directory search approach. For example, to find general information about music, use a directory search beginning with the category Arts & Humanities. If you are searching for specific information, use the key word approach. For example, if you were looking for a specific MP3 file, use a key word search entering the album title and/or the artist's name in the text selection box.

A recent study by the NEC Research Institute found that any one search engine includes only a fraction of the informational sources on the Web. Therefore, it is highly recommended that you use more than one search engine when researching important topics. Or, you could use a special type of search engine called a metasearch engine.

Metasearch Engines

One way to research a topic is to visit the Web site for several individual search engines. At each site, enter the search instructions, wait for the hits to appear, review the list, and visit selected sites. This process can be quite time-consuming and duplicate responses from different search engines are inevitable. Metasearch engines offer an alternative.

Metasearch engines are programs that automatically submit your search request to several

search engines simultaneously. The metasearch engine receives the results, eliminates duplicates, orders the hits, and then provides the edited list to you. There are several metasearch sites available on the Web. One of the best known is Metacrawler.

Specialized Search Engines

Specialized search engines focus on subject-specific Web sites. Specialized sites can potentially save you time by narrowing your search. For example, let's say you are researching a paper about the fashion industry. You could begin with a general search engine like Yahoo! Or, you could go to a search engine that specialized specifically in fashion.

Words

| | | |
|----------------|-------------|---------------------|
| agent | <i>n.</i> | 代理人, 情报人 |
| album | <i>n.</i> | 专辑唱片簿, 相片簿 |
| brief | <i>adj.</i> | 简短的, 短暂的 |
| correspond | <i>v.</i> | 符合, 一致 |
| database | <i>n.</i> | 数据库 |
| duplicate | <i>n.</i> | 完全相同的副本 |
| entry | <i>n.</i> | 进入, 登记, 条目 |
| fraction | <i>n.</i> | 小部分, 片断, 分数 |
| hit | <i>n.</i> | 命中 (指两个数据项的成功比较或匹配) |
| | <i>v.</i> | 打, 击中 |
| huge | <i>adj.</i> | 巨大的, 庞大的 |
| hyperlink | <i>n.</i> | 超链接 |
| imaginable | <i>adj.</i> | 可能的, 可想像的 |
| incredible | <i>adj.</i> | 难以置信的 |
| keyword | <i>n.</i> | 关键字, 关键词 |
| maintain | <i>v.</i> | 保持, 维持, 维修 |
| massive | <i>adj.</i> | 粗大的, 巨大的 |
| precise | <i>adj.</i> | 精确的, 准确的 |
| simultaneously | <i>adv.</i> | 同时地 |
| spider | <i>n.</i> | 蜘蛛 |
| specific | <i>adj.</i> | 清楚的, 明确的 |
| update | <i>v.</i> | 升级 |

Phrases

| | |
|------------------|-------------|
| as a rule | 通常, 一般 (说来) |
| assist in | 帮助……参加…… |
| compare against | 和……相比较 |
| fashion industry | 时装工业 |

| | |
|-----------|---------------|
| get over | 克服（困难等） |
| look for | 搜索 |
| relate to | 与……有关，涉及到 |
| result in | 引起，导致，产生……的结果 |

Abbreviations

| | |
|-------------------------------|----------|
| MP3 | 一种音频压缩格式 |
| NEC (Nippon Electric Company) | 日本电器公司 |

Notes

- [1] 例句: Search engines are specialized programs that assist you in locating information on the Web and the Internet.
分析: 这句话是主语从句, 主语是 search engines, 谓语动词是 assist in 词组。用 that 取代前面提到的主语 search engines, 避免重复。
译文: 搜索引擎是专用的程序, 帮助用户定位 Web 和 Internet 上的信息。
- [2] 例句: Search engines order the hits according to those sites that most likely contain the information requested and present the list to you in that order, usually in groups of ten.
分析: 本句是复杂句, order 和 present 是并列的谓语动词, 在句中包含一个定语从句 that most likely..., 修饰 sites。
译文: 搜索引擎根据与需求信息最匹配的内容进行排序, 并且按照这个顺序将相关信息列出来, 每组 10 个。

Exercises

I . Write true or false for the following statements according to the passage.

1. () Usually, many searches result in a large number of hits, and search engines list them randomly on the Web site.
2. () Bots are also known as agents and spiders.
3. () Most search engines provide only one search approach, namely keyword search.
4. () Keyword search is more convenient than directory search.
5. () Search engines help you to locate information on the Web.
6. () Specialized search engines focus on subject-specific Web sites.
7. () Each hit includes a hyperlink to the referenced Web page along with a brief discussion of the information contained at that location.
8. () In order to use keyword search, you only need to enter word like "music", and search engine will list all interrelated information from databases.
9. () In a keyword search, a keyword is entered and a list of hits or sites containing the keywords is presented, usually those duplicate sites are already eliminated.
10. () Say, you are researching a paper about the cooking, you'd better begin with a search

engine that specializes in that, for it may save time than with a general search engine like Yahoo!

II. Fill in the blanks according to the passage.

1. The _____ can be an incredible resource providing information on nearly any topic imaginable.
2. Bots are used for looking for new information and _____ the search services' databases.
3. _____ are specialized programs that assist you in locating information on the Web and the Internet.
4. In a directory or _____ search, you select a category that fits the information you want.
5. As a general rule, keyword search is good for _____ information, while directory search is good for _____ information.
6. _____ engines are programs that automatically submit search requests to several search engines simultaneously.
7. _____ are the list of sites that contain the keywords of a keyword search.
8. Metasearch engine receives the results, _____ duplicate sites, _____ hits, and then provides the edited list to you.
9. Search services maintain _____ and provide search engines to _____ information.
10. Search services maintain huge _____ relating to information provided on the Web and the Internet.

III. Translate the following words and expressions into Chinese.

- | | |
|------------------------------|---------------------|
| 1. search engine | 6. spider |
| 2. keyword search | 7. NEC |
| 3. directory search | 8. fashion industry |
| 4. duplicate | 9. update |
| 5. specialized search engine | 10. bot |

3.2.1 Reading Material 1

Understanding the World Wide Web

The World Wide Web is a system of Internet servers that supports hypertext to access several Internet protocols on single interface. The World Wide Web is often abbreviated as the Web or WWW.

The World Wide Web was developed in 1989 by Tim Berners-Lee of the European Particle Physics Lab (CERN) in Switzerland. The initial purpose of the Web was to use networked hypertext to facilitate communication among its members, who were located in several countries. Word was soon spread beyond CERN, and a rapid growth in the number of both developers and users ensued. In addition to hypertext, the Web began to incorporate graphics, video and sound. The use of the Web has now reached global proportions.

Almost every protocol type available on the Internet is accessible on the Web. Internet

protocols are sets of rules that allow for intermachine communication on the Internet. The following major protocols are accessible on the Web:

E-mail (Simple Mail Transport Protocol or SMTP): Distributes electronic messages and files to one or more electronic mailboxes

Telnet (Telnet Protocol): Facilitates login to a computer host to execute commands

FTP (File Transfer Protocol): Transfers text or binary files between an FTP server and client

Usenet (Network News Transfer Protocol or NNTP): Distributes Usenet news articles derived from topical discussions on newsgroups

HTTP (HyperText Transfer Protocol): Transmits hypertext over networks. This is the protocol of the WWW.

Many other protocols are available on the Web. To name just one example, the Voice over Internet Protocol (VoIP) allows users to place a telephone call over the Web.

The World Wide Web provides a single interface for accessing all these protocols. This creates a convenient and user-friendly environment. It is no longer necessary to be conversant in these protocols within separate command-level environments. The Web gathers together these protocols into a single system. Because of this feature and because of the Web's ability to work with multimedia and advanced programming languages, the World Wide Web is the fastest-growing component of the Internet.

Hypertext: the Motion of the Web

The operation of the Web relies primarily on hypertext as its means of information retrieval. HyperText is a document containing words that connect to other documents. These words are called links and are selectable by the user. A single hypertext document can contain links to many documents. In the context of the Web, words or graphics may serve as links to other documents, images, video and sound. Links may or may not follow a logical path, as each connection is programmed by the creator of the source document. Overall, the WWW contains a complex virtual Web of connections among a vast number of documents, graphics, videos and sounds.

Producing hypertext for the Web is accomplished by creating documents with a language called HyperText Markup Language, or HTML. With HTML, tags are placed within the text to accomplish document formatting, visual features such as font size, italics and bold, and the creation of hypertext links. Graphics may also be incorporated into an HTML document. HTML is an evolving language, with new tags being added as each upgrade of the language is developed and released. The World Wide Web Consortium, led by Tim Berners-Lee, coordinates the efforts of standardizing HTML.

Pages on the Web

The World Wide Web consists of files called pages or Web pages, containing information and links to resources throughout the Internet.

Web pages can be created by user activity. For example, if you visit a Web search engine and enter keywords on the topic of your choice, a page will be created containing the results of

your search. In fact, an increasing amount of information found on the Web today is served from databases, creating temporary Web pages "on the fly" in response to user queries. Access to Web pages may be accomplished by:

- Entering an Internet address and retrieving a page directly.
- Browsing through pages and selecting links to move from one page to another.
- Searching through subject directories linked to organized collections of Web pages.
- Entering a search statement at a search engine to retrieve pages on the topic of your choice.

the Experience of the Web

Today's World Wide Web presents an ever-diversified experience of multimedia, programming languages and real-time communication. There is no question that it is a challenge to keep up with the rapid pace of developments. The following presents a brief description of some of the more important trends to watch.

The Web has become a broadcast medium. It is possible to listen to audio and video over the Web both pre-recorded and live. For example, you can visit the sites of various news organizations and view the same videos shown on the nightly television news. Several plug-ins are available for viewing these videos. For example, Apple's Quick Time Player downloads files with the .mov extension and displayed these as "movies" in a small window on your computer screen. Quick Time files can be quite large, and it may take patience to wait for the entire movie to download into your computer before you can view it.

The problem if slow download times has been answered by a revolutionary development in multimedia capability: Streaming media. In this case, audio or video files are played as they are downloading or streaming into your computer. Only a small wait, called buffering, is necessary before the file begins to play. The RealPlayer plug-in plays streaming audio and video files. Extensive files such as interviews, speeches and hearings work very well with the RealPlayer. The RealPlayer is also ideal for the broadcast of real-time events. These may include press conferences, live radio and television broadcasts, concerts, etc. The Windows Media Player is another streaming media player. Many sites offer the option to use one player or the other. A list of sites that make use of these programs is available on the page, Multimedia on the Web.

Shockwave presents another multimedia experience. Shockwave allows for the creation and implementation of an entire multimedia display combining graphics, animation and sound.

Sound files, including music, may also be heard on the Web. It is not uncommon to visit a Web page and hear background music. Sound files are also available for downloading independent of Web page visits. Sound files of many types are supported by the Web with the appropriate plug-ins. The MP3 file format, and the choice of supporting plug-ins, is the latest music trend to sweep the Web. The famous Napster site allows for the exchange of MP3 files.

Live cams are another aspect of the multimedia experience available on the Web. Live cams are video cameras that send their data in real time to a Web server. These cams may appear in all

kinds of locations, both serious and whimsical: an office, on top of a building, a scenic locale, a special event, and so on.

The use of existing and new programming languages has extended the capabilities of the Web. What follows is a basic guide to a group of the more common languages and functions in use on the Web today.

CGI, Active Server Pages: CGI (Common Gateway Interface) refers to a specification by which programs can communicate with a Web server. A CGI program, or script, is any program designed to accept and return data that conforms to the CGI specification. The program can be written in any programming language, including C, Perl, and Visual Basic Script. A common use for a CGI script is to process an interactive form on a Web page. For example, you might fill out a form ordering a book through Interlibrary Loan. The script processes your information and sends it to a designated e-mail address in the Interlibrary Loan department.

Another type of dynamically generated Web page is called Active Server Pages (ASP). Developed by Microsoft, ASPs are HTML pages that include scripting and create interactive Web server applications. The scripts run on the server, rather than on the Web browser, to generate the HTML pages sent to browsers. Visual Basic and JScript (a subset of JavaScript) are often used for the scripting. ASPs end in the file extension .asp.

Java/Java Applets: Java is probably the most famous of the programming languages of the Web. Java is an object-oriented programming language similar to C++. Developed by Sun Microsystems, the aim of Java is to create programs that will be platform independent. The Java motto is, "Write once, run anywhere." A perfect Java program should work equally well on a PC, Macintosh, Unix, and so on, without any additional programming. This goal has yet to be realized. Java can be used to write applications for both Web and non-Web use.

Web-based Java applications are usually in the form of Java applets. These are small Java programs called from an HTML page that can be downloaded from a Web server and run on a Java-compatible Web browser. A few examples include live newsfeeds, moving images with sound, calculators, charts and spreadsheets, and interactive visual displays. Java applets can tend to load slowly, but programming improvements should lead to a shortened loading time.

JavaScript/JScript: JavaScript is a programming language created by Netscape Communications. Small programs written in this language are embedded within an HTML page, or called externally from the page, to enhance the page's functionality. Examples of JavaScript include moving tickers, drop-down menus, real-time calendars and clocks, and mouse-over interactions. JScript is a similar language developed by Microsoft and works with the company's Internet Explorer browser.

VRML: VRML (Virtual Reality Modeling Language) allows for the creation of three-dimensional worlds. These may be linked from Web pages and displayed with a VRML viewer. Netscape Communicator comes with the Cosmo viewer for experiencing these three-dimensional worlds. One of the most interesting aspects of VRML is the option to "enter" the world and control your movements within the world.

XML: XML (eXtensible Markup Language) is a Web page creation language that enables

designers to create their own customized tags to provide functionality not available with HTML. XML is a language of data structure and exchange, and allows developers to separate form from content. At present, this language is little used as Web browsers are only beginning to support it. In May 1999, however, the W3 Consortium announced that HTML 4.0 has been recast as an XML application called XHTML. This move will have a significant impact on the future of both XML and HTML.

Text, audio and video communication can occur in real time on the Web. This capability allows people to conference and collaborate in real time. In general, the faster the Internet connection, the more successful the experience.

At its simplest, chat programs allow multiple users to type to each other in real time. Internet Relay Chat and America Online's Instant Messenger are prime examples of this type of program. The development of a messaging protocol is underway. Such a protocol would allow for the expansion of this capability throughout the Internet.

More enhanced real-time communication offers an audio and/or video component. CU-See Me is one of the most popular software programs of this type. Even more elaborate are programs that allow for true real-time collaboration. Microsoft's NetMeeting and Netscape's Conference (available with Communicator) are good examples of this.

Featured collaboration tools include:

- audio: conduct a telephone conversation on the Web;
- video: view your audience;
- file transfer: send files back and forth among participants;
- chat: type in real time;
- whiteboard: draw, mark up, and save images on a shared window or board.
- document/application sharing: view and use a program on another's desktop machine.
- collaborative Web browsing: visit Web pages together.

Currently no standard exists that will work among all conferencing programs.

Push: Push refers to a technology that sends data to a program without the program's request. This is the opposite of the typical "pull" of the Web, in which the user clicks on a link to request a file from a server. With push, the data is sent automatically. Content is sent through a "channel". The early Web-based implementation of push was commercial. Push can also be used to deliver software upgrades to a desktop machine.

Words

| | | |
|--------------|-------------|------------------|
| alphanumeric | <i>adj.</i> | 字母数字混合编制的, 字母数字的 |
| conversant | <i>adj.</i> | 熟悉的, 通晓的 |
| hypertext | <i>n.</i> | 超文本 |
| plug-in | <i>n.</i> | 插件程序 |
| release | <i>v.</i> | 发表, 发布 |
| retrieval | <i>n.</i> | 取回, 补偿 |

| | | |
|---------------|-------------|-----------------|
| script | <i>n.</i> | 脚本 |
| topical | <i>adj.</i> | 专题的, 总论的, 当前有关的 |
| user-friendly | <i>adj.</i> | 用户界面友好的 |
| whiteboard | <i>n.</i> | 白板 |

Phrases

| | |
|--------------------------------|------------|
| derive from | 来自, 源自, 出自 |
| end user | 终端用户 |
| intermachine communication | 机器间通信 |
| Network News Transfer Protocol | 网络消息传输协议 |
| Telnet Protocol | 远程网协议 |

Abbreviations

| | |
|---|-------------------|
| ASP (Active Server Pages) | 动态服务器页面 |
| CERN (European Particle Physics Lab) | 欧洲粒子物理实验室 |
| CGI (Common Gateway Interface) | 通用网关接口 |
| MIME (Multimedia Internet Mail Extension) | 多媒体 Internet 邮件扩展 |
| NNTP (Network News Transfer Protocol) | 网络新闻传送协议 |
| PDF (Portable Document Format) | 便携文件格式 |
| PPP (Peer-Peer Protocol) | 端对端协议 |
| SMTP (Simple Mail Transport Protocol) | 简单邮件传送协议 |
| Telnet (Telecommunication Network) | 远程通信网 |
| TLDs (Top-Level Domains) | 顶级域名 |
| VRML (Virtual Reality Modeling Language) | 虚拟现实模型语言 |

3.2.2 Reading Material 2

RosettaNet

Remember the promise of the paperless office? Computers communicating electronically with one another were going to replace the tons of paperwork that characterized business-to-business interaction: purchase orders, invoices, payments, confirmations, documentation. The list was nearly endless. Electronic document interchange (EDI) was going to be the savior or our systems and protector of our forests.

It didn't happen. EDI never met the challenges of connecting scores of proprietary and mission-critical applications. Now a new success of is stepping up to the challenge.

RosettaNet is both a set of standards and a global consortium of more than 500 electronic components, IT and semiconductor manufacturing companies working to create, implement and promote open e-business process standards. Founded in 1998, RisettaNet aims to align specific business processes among trading partners by defining and standardizing up to 100 e-business

transaction processes so that two companies' back-end systems can talk directly to each other.

RosettaNet takes its name from the Rosetta stone, which a soldier in Napoleon's army discovered in Egypt in 1799. Since it contained parallel inscriptions in both Greek characters and Egyptian hieroglyphics, it provided a key to deciphering ancient Egyptian writing.

This modern electronic translator speaks the contemporary languages of computer interoperability—XML and SOAP—which should allow disparate systems and business processes from different organizations to understand and exchange data with one another.

The consortium began its Herculean task by looking at supply chain processes. Members used business-process modeling to identify the elements of a working business process and create a clearly defined model of current trading partner interfaces. After extensively researching every level of the supply chain, as well as analyzing misalignments and inefficiencies, they developed a set of generic, standardized processes that could serve as the basis for real-world business-to-business alignment.

These Partner Interface Processes (PIP) are specialized system-to-system, XML-based dialogues. Each PIP specification includes a business document and a detailed business process that includes interaction, data transmission, security and error-handling requirements.

PIPs use two data dictionaries—one for business properties and another for technical properties—that help different companies define the same produce in exactly the same way. The Rosettanet Implementation Framework defines an exchange protocol, and the Message Guidelines instruct implementers on how to encode individual PIPs into specific packages.

Such efforts at standardizing generic processes have been tried before and failed. RosettaNet, however, seems more carefully grounded in the real world, and its PIPs are tested by consortium members. After consortium partners have agreed through a voting process that a PIP meets industry needs, it is then published on the RosettaNet Web site and is available for anyone to use.

Words

| | | |
|---------------|----|-------------|
| align | v. | 调整, 校正, 使合作 |
| characterize | v. | 体现, 以……为特征 |
| consortium | n. | 国际协会, 共同体 |
| encode | v. | 把……编码 |
| hieroglyphic | n. | 象形文字 |
| implement | v. | 履行, 制定, 实行 |
| inefficiency | n. | 低效 |
| inscription | n. | 题字, 碑铭, 记载 |
| invoice | n. | 发票 |
| package | n. | 包裹, 软件包 |
| semiconductor | n. | 半导体 |
| standardize | v. | 使符合标准, 使标准化 |

Phrases

| | |
|-----------------|--------------|
| purchase orders | 订购单 |
| scores of | 众多的, 很多的 |
| step up to sth. | 出来面对……, 出来迎接 |

Abbreviations

| | |
|---------------------------------------|--------|
| EDI (Electronic Document Interchange) | 电子文档交换 |
| PIP (Partner Interface Processes) | 伙伴界面过程 |
| RosettaNet | 络世达网 |

3.2.3 正文参考译文

搜索工具

网络拥有令人难以置信的雄厚资源, 只要你能想到的主题, 它都可以给你提供相关的信息。你想要旅行吗? 或是写一篇经济论文? 或是查找影讯? 寻觅多年失去联系的老朋友? 与这些问题相关的信息, 或是更多的其他信息都会由网络提供给你。

以每天超过 20 亿新网页发布的速度, Web 已经成为了一个汇集众多相关网页的巨大宝库。那么, 有了这么多信息, 想要精确的找到你所需要的信息就显得非常困难了。幸运的是, 我们拥有很多能提供搜索服务的公司。它们可以帮你定位你所需的信息。它们拥有一个庞大的数据库, 所有存储在数据库中的数据都是 Web 或互联网提供的信息, 包括地址, 内容概述或分类, 以及出现在 Web 页面和其他网络资源中的关键字。一些专用的程序, 如代理程序、网络蜘蛛程序或网络机器人, 它们能够不断地寻找新信息, 并升级搜索服务的数据库。总之, 搜索服务提供的专用程序叫搜索引擎, 你能利用它定位网页中的信息。

搜索引擎

搜索引擎是专用的程序, 帮助用户定位 Web 和 Internet 上的信息。你可以进入提供搜索服务的 Web 站点使用其搜索引擎来查找信息。例如 Yahoo 的搜索引擎, 和其他大多数网站一样, 提供两种不同的搜索方式。

- 关键词搜索引擎

在关键词搜索引擎当中, 输入可以反映所查信息的一个关键字或关键词, 搜索引擎通过和数据库中的信息进行比较返回与其匹配的热点链接或者站点。每个热点包含一个带有简要介绍的链接 Web 页或其他资源。许多搜索都会返回大量的热点链接。例如, 如果输入关键字“旅游”, 你会得到一千多个热点。搜索引擎根据与需求信息最匹配的内容进行排序, 并且按照这个顺序将相关信息列出来, 每组 10 个。

- 目录式搜索引擎

大多数搜索引擎也提供诸如人文艺术、商业经济和计算机 Internet 的目录的分类主题列表。在目录式搜索引擎 (也称之为索引式搜索) 中, 选择了一个与你想要的信息相匹配的类别, 与之相关的子类别列表会显示。用户可以继续以这种方式缩小搜索范围直到列出一系列站点, 这种目录式分类列表是预先设计好的。

通常来说,如果你搜索一般的信息,使用目录式搜索引擎。例如,查询关于音乐的信息,以目录式搜索引擎的人文艺术类开始。如果搜索专用的信息,使用关键词搜索引擎。例如,查询一个专用的 MP3 文件,在文本选择框中输入专辑名称和/或艺术家姓名进行关键词搜索。

最近一项由 NEC 研究机构的调查表明,任何一个搜索引擎都仅包含 Web 信息资源的一部分。因此,当你检索一个重要的主题时,极力推荐使用多个搜索引擎。或者使用一个称之为 Metasearch 的搜索引擎。

Metasearch 搜索引擎

有一种搜寻某一主题的方法是访问包含多个独立的搜索引擎 Web 站点。在每个站点输入搜索指令,等待反馈的热点链接信息,这样会占用很多时间,并且不同的搜索引擎返回重复的信息也是不可避免的。Metasearch 搜索引擎提供了另外一种方案。

Metasearch 搜索引擎是一个自动同时提交搜索信息给多个搜索引擎的程序,可以接收搜索结果,去除多余部分并且将热点链接排序,最后将编辑好的结果提交给用户。在 Web 上有多个 Metasearch 站点,其中最著名的一个是 Metacrawler。

专用搜索引擎

专用搜索引擎重点查询专用主题的 Web 站点,通过缩小搜索范围来自动节省用户时间。例如,你正研究一篇关于时装工业的论文,你可以从像 Yahoo 一样的普通搜索引擎开始。或者,你可以进入到关于时装的专用搜索引擎。

3.3 Definitions and Content of the Electronic Commerce

Electronic Commerce over the Internet is a new concept. In recent years, it has become so broadly used that it is often left undifferentiated from other current trends which rely on automation, such as concurrent engineering and just in time manufacturing. Many companies, including CyberCash, Dig Cash, First Virtual, and Open Market had provided a variety of electronic commerce services.

[1] If you have access to a personal computer (PC) and can connect to the Internet with a browser, you can do business online. No more worries about programming. No more searching for outdated catalogs as a customer or printing catalogs as a merchant. No more looking for phone numbers, paying long-distance to connect, or keeping the store open late into the evening. Just get on the Web, open an online store, and watch your business grow.

The wired world of business, developed technology, human talent, and a new way of doing business make up today's growing worldwide economy. The backbone of this electronic commerce is the Internet. The wired world is not about technology, it is about information, decision making, and communication. The wired world is changing life for everyone, from the single household to the largest corporation. [2] No business can afford to ignore the potential of a connected economy.

Electronic commerce is an emerging concept that describes the process of buying and

selling or exchanging of products, services, and information via computer networks including the Internet. Kalakota and Whinston (1997) define EC from these perspectives:

From a communications perspective, EC is the delivery of information, products/services, or payments over telephone lines, computer networks, or any other electronic means.

From a business process perspective, EC is the application of technology toward the automation of business transactions and work flow.

From a service perspective, EC is a tool that addresses the desire of firms, consumers, and management to cut service costs while improving the quality of goods and increasing the speed of service delivery.

From an on-line perspective, EC provides the capability of buying and selling products and information on the Internet and other on-line services.

The term commerce is viewed by some as transactions conducted between business partners. Therefore, the term electronic commerce seems to be fairly narrow to some people. Thus, many use the term e-business. It refers to a broader definition of EC, not just buying and selling but also servicing customers and collaborating with business partners, and conducting electronic transactions within an organization. According to Lou Gerstner, IBM's CEO: "E-business is all about cycle time, speed, globalization, enhanced productivity, reaching new customers and sharing knowledge across institutions for competitive advantage."

Just like any other type of commerce, electronic commerce involves two parties: businesses and consumers. There are three basic types of electronic commerce.

Business-to-Consumer (B2C): These are retailing transactions with individual shoppers. The typical shopper at Amazon.com is a consumer, or a customer. Oftentimes, this arrangement eliminates the middleman by providing manufacturers direct sales to customers. Other times, retail stores create a presence on the Web as another way to reach customers.

Consumer-to-Consumer (C2C): This category involves individuals selling to individuals. This often takes the form of an electronic version of the classified ads or an auction. Goods are described and interested buyers contact sellers to negotiate prices. ^[3]Unlike traditional sales via classified ads and auctions, buyers and sellers typically never meet face-to-face. Examples are individuals selling in classified ads and selling residential property, cars, and so on. Advertising personal services on the Internet and selling knowledge and expertise is another example of C2C. Several auction sites allow individuals to put items up for auctions. Finally, many individuals are using internal networks to advertise items for sale or service.

Business-to-Business (B2B): This category involves the sale of a product or service from one business to another. This is typically a manufacturer-supplier relationship. For example, a furniture manufacturer requires raw materials such as wood, paint, and varnish. In B2B electronic commerce, manufacturers electronically place orders with suppliers and many times payment is made electronically.

Many people think EC is just having a Web site, but EC is much more than that. There are dozens of applications of EC such as home banking, shopping in on-line stores and malls, buying

stocks, finding a job, conducting an auction, and collaborating electronically on research and development projects. To execute these applications, it is necessary to have supporting information and organizational infrastructure and systems. EC applications are supported by infrastructures, and their implementation is dependent on four major areas: people, public policy, technical standards and protocols, and other organizations. The EC management coordinates the applications, infrastructures, and pillars.

Words

| | | |
|----------------|-------------|------------|
| arrangement | <i>n.</i> | 安排, 准备工作整理 |
| auction | <i>n.</i> | 拍卖 |
| automation | <i>n.</i> | 自动化 |
| backbone | <i>n.</i> | 脊梁 |
| broadly | <i>adv.</i> | 大体说来 |
| browser | <i>n.</i> | 浏览器 |
| catalogs | <i>n.</i> | 目录; 一系列 |
| | <i>v.</i> | 把……编入目录 |
| collaborate | <i>v.</i> | 合作, 协作 |
| concurrent | <i>adj.</i> | 同时的, 和谐的 |
| concept | <i>n.</i> | 概念; 原则 |
| corporation | <i>n.</i> | 公司 |
| coordinate | <i>v.</i> | 使协调 |
| define | <i>v.</i> | 给(某物)下定义 |
| eliminate | <i>v.</i> | 削减, 淘汰 |
| enhance | <i>v.</i> | 增加, 提高 |
| execute | <i>v.</i> | 执行 |
| household | <i>n.</i> | 家庭 |
| | <i>adj.</i> | 家用的, 普通的 |
| ignore | <i>v.</i> | 忽视; 不顾; 不理 |
| implementation | <i>n.</i> | 贯彻, 执行 |
| infrastructure | <i>n.</i> | 基础; 基础结构 |
| negotiate | <i>v.</i> | 议定, 商定 |
| outdate | <i>n.</i> | 过时的 |
| perspective | <i>n.</i> | 远景, 观点 |
| pillars | <i>n.</i> | 积极支持者 |
| potential | <i>adj.</i> | 潜在的; 有可能的 |
| protocols | <i>n.</i> | 外交礼节, 礼仪 |
| share | <i>v.</i> | 分享; 共有; 分担 |
| talent | <i>n.</i> | 天才; 天赋 |
| varnish | <i>n.</i> | 油漆 |

| | | |
|---------|-------------|--------|
| version | <i>n.</i> | 描述, 说法 |
| virtual | <i>adj.</i> | 实质上 |

Phrases

| | |
|----------------|--------------------|
| afford to | 提供, 担负得起 |
| have access to | 有……机会 |
| look for | 寻找 |
| make up | 组成, 构成, 捏造, 补充, 化妆 |
| rely on | 依靠 |

Abbreviations

| | |
|-------------------------------|-------------|
| B2C (Business To Customer) | 企业对顾客 (的贸易) |
| B2B (Business To Business) | 企业对企业 (的贸易) |
| CEO (Chief Executive Officer) | 首席执行官 |
| EC (Electronic Commerce) | 电子贸易 |

Notes

- [1] 例句: If you have access to a personal computer (PC) and can connect to the Internet with a browser, you can do business online.
 分析: 本句是条件状语从句, have access to 和 can connect to 是并列谓语。
 译文: 如果你有机会使用一部个人计算机并且能通过浏览器连接上 Internet, 你就能在线做生意。
- [2] 例句: No business can afford to ignore the potential of a connected economy.
 分析: 本句是简单句, 双重否定。
 译文: 没有企业能忽视互联网经济的潜能。
- [3] 例句: Unlike traditional sales via classified ads and auctions, buyers and sellers typically never meet face-to-face.
 分析: 本句是简单句, classified 是过去分词, 修饰 ads and auctions, 作定语。
 译文: 与通过分类广告和拍卖的传统的销售不同, 买方与卖方通常从未见过面。

Exercises

I. Write true or false for the following statements according to the passage.

- () You can do business online if you have access to Internet.
- () The backbone of this electronic commerce is the PC.
- () Just like any other type of commerce, electronic commerce involves two parties: business and consumer.
- () B2C involves individuals selling to individuals.
- () B2B involves the sale of a product or service from one business to another.

6. () From a communications perspective, EC is the application of technology toward the automation of business transactions and workflow.
7. () From a service perspective, EC is a tool that addresses the desire of firms, consumers, and management.
8. () EC cannot provide the capability of buying and selling information.
9. () EC is a broader definition than EB.
10. () EC is just having a Web site.

II. Fill in the blanks according to the passage.

1. If you have access to a _____ and can connect to the _____ with a browser, you can do business online.
2. The _____ world of business, where technology, human talent, and a new way of doing business make up today's growing worldwide economy.
3. Electronic Commerce involves two parties, they are _____.
4. B2C involves individuals selling to _____.
5. From a _____ perspective, EC is the _____ of information, products/services, or payments over telephone lines, computer networks, or any other electronic means.
6. From a _____ perspective, EC is the _____ of technology toward the automation of business transactions and work flow.
7. The term commerce is viewed by some as _____ conducted between business partners.
8. _____ refers to a broader definition of EC.
9. According to Lou Gerstner, IBM's CEO: "E-business is all about _____, _____, _____ enhanced productivity, teaching new customers and sharing knowledge across institutions for competitive advantage."
10. Many people think EC is just having a _____, but EC is much more than that.

III. Translate the following words and expressions into Chinese.

- | | |
|--|--------------------------|
| 1. the wired world of business | 6. on-line services |
| 2. B2C | 7. CEO |
| 3. manufacturer-supplier | 8. competitive advantage |
| 4. automation of business transactions | 9. Web Site |
| 5. buying and selling products | 10. home banking |

3.3.1 Reading Material 1

EDI, E-business, and ERP

What is EDI?

(1) I thought electronic data interchange (EDI) was an old technology, why am I still hearing about it? EDI refers to the electronic exchange of business information between two

companies using a specific and structured format. The concept has been around since the 1970s and has traditionally been used to automate buyer-seller transactions such as invoices and purchase orders. But as more processes within a company become automated, EDI has expended to areas such as inventory management and product distribution.

(2) How does it work?

EDI relies on standards, or common methods of defining classes of business data, which allow computers to recognize what data belongs to what department in a company. In the early days of EDI, many companies built in-house EDI standards, but as interest grew, industries started to agree on common standards, administered by standards organizations. These standards, which allow computers in different organizations to share information over privately built, closed networks known as value-added networks, led to the use of EDI for corporate purchasing.

(3) What are the benefits?

Consider a very simple non-EDI-based purchase. A buyer decides he needs 365 hammers. He creates a purchase order, prints it out and pops it in the mail. When the supplier gets the order, she types it into her company's computer system. The inventory guy pulls the order and ships out the hammers. Next, the supplier prints out and mails an invoice. It's not hard to imagine that this process could take several days. EDI has the potential to cut massive amounts of time out of the process. Sending documents, such as purchase orders or invoices, electronically takes minutes, not days, and shipments can often go out the day the order comes in. Moreover, the electronic format does not need to be rekeyed upon arrival, which also eliminates the possibility of typos. And EDI reduces costs by cutting down on data input, routing and delivery.

(4) What does all of this have to do with the INTERNET

Building an EDI system has traditionally required a substantial investment in some heavy-duty computers and networking equipment for both parties. Sometimes a large buyer, such as Wal-mart, will require that all its suppliers be EDI-compliant. That puts a burden on smaller suppliers, forcing them to choose between a heavy technical investment and a loss of business. And EDI isn't instantaneous. Because it uses information that frequently resides in mainframes, the quality of information on an EDI network depends on how frequently the data is refreshed from the mainframe.

And that's the promise of the Web, which offers much lower connectivity costs. That, added to the lower costs of PCs and simpler software, makes EDI over the Web a compelling proposition. Moreover, XML, an open standard for sharing data on the Web, is starting to appear as a method of coding EDI standards, which could provide technical clarity across industries.

E-business

(1) That does e-business really mean

The most basic definition of e-business is simply this: using the Internet to connect with customers, partners, and suppliers. But the term also implies the transformation of existing business processes to make them more efficient. To engage in e-business, companies need to be able to unlock

data in their back-end computer systems, so they can share information and conduct electronic transactions with customers, partners, and suppliers via the Internet. And for some companies, engaging in e-business means adopting new web-enabled business models-auctioning off surplus goods, selling products directly to consumers, or joining in online purchasing cooperatives with their competitors. Without a doubt, embarking on an e-business effort requires as much thinking about business strategy as it does about technology.

(2) How is e-business different from e-commerce?

In some instances, the terms are used interchangeably, but to purists, e-commerce refers only to online transactions. The term e-business encompasses online transactions, but it also refers to online exchanges of information, such as a manufacturer letting its suppliers monitor production schedules via an extranet (a secure web site that can be accessed only by authorized parties), or a financial institution letting its customers review their banking, credit card, and mortgage accounts via a single web interface. In this respect, e-business overlaps with the business-technology disciplines of customer relationship management (CRM) and supply chain management (SCM).

(3) Just how much electronic commerce is being conducted via the Net

Despite all the hype, Internet-based e-commerce currently amounts to only a small fraction of the U.S. GDP. But experts predict e-commerce volumes will grow exponentially over the next few years, particularly in business-to-business e-commerce—that is, transactions between businesses and their suppliers, partners, and business customers. Cambridge, Mass.-based market researcher Forrester Research Inc. predicts business-to-business e-commerce in the U.S. will grow from \$406.2 billion in 2000 to \$207 trillion in 2004. By contrast, Forrester predicts that business-to-consumer e-commerce in the U.S. will grow from \$38.8 billion in 2000 to \$184.5 billion in 2004.

(4) Who should be in charge of a company's e-business effort?

In some companies, early web efforts were led by marketing or IT departments as special projects. But that is starting to change, as e-business becomes a higher priority for the business as a whole. A recent survey of large global corporations by Pricewaterhouse Coopers and The Conference Board found that nearly 50 percent of them have full-time units devoted to e-business. A survey of dotcoms and traditional companies by International Data Corp. (a Darwin sister company) found that roughly 50 percent of e-business efforts are headed by CEOs.

(5) Have all companies jumped on the e-business bandwagon?

Not yet. Pricewaterhouse Coopers and The Conference Board found that 70 percent of the global companies they surveyed derive less than 5 percent of their revenues from e-business. Several factors have kept some companies surveyed from rolling out e-business initiatives, including the following: potentially high and uncertain implementation costs; lack of demonstrated ROI within their industry; concern about tax, legal, and privacy issues related to e-business; and scant use of the internet among their customers.

What is ERP?

(1) I'm tired of pretending I know what ERP is

An enterprise resource planning software, or ERP, doesn't live up to its acronym. Forget about planning—it doesn't—and forget about resource, a throwaway term. But remember the enterprise part. This is ERP's true ambition. It attempts to integrate all departments and functions across a company to create a single software program that runs off one database.

That's tall order. Each of those departments, like finance or human resource, typically has its own computer system, each optimized for the particular department. Typically, when a customer places an order, the order begins a mostly paper-based journey from in-basket to in-basket around the company, often being keyed and rekeyed into different computer systems along the way. All that lounging around in in-baskets causes delays and lost orders, and all the keying into different computer systems invites errors. Meanwhile, no one truly knows the order status.

(2) So what can ERP do

ERP automates the tasks necessary to perform a business process—such as order fulfillment, which involves taking an order from a customer, shipping it and billing for it. With ERP, when a customer service representative takes an order, he or she has all the necessary information—the customer's credit rating and order history, the company's inventory levels and the shipping dock's trucking schedule. Everyone else in the company can view the same information and has access to the single database that holds the order. When one department finishes with the order, it is automatically routed via the ERP system to the next department. To find out where the order is at any point, one need only log in to the system. With luck, the order process moves like a bolt of lightning through the organization.

(3) Sounds too good to be true. What's the catch

To do ERP right, your company needs to change the way it does business. And that kind of change doesn't come without pain. It's critical to figure out if your way of doing business will fit within a standard ERP package before signing the check. The move to ERP is a project of breathtaking scope, and the price tags on the front end are enough to make even the most placid CFO a little twitchy. In addition to budgeting for software costs, financial executives should plan to write checks to cover consulting, process rework, integration testing and a long list of other expenses before the benefits of ERP appear. Underestimating the price of teaching users their new job processes can lead to a rude shock, and so can failure to consider data warehouse integration requirements and the cost of extra software to duplicate the old report formats. Oversights in financial planning can send the costs of an ERP project spiraling out of control. The impact will be far greater than any other systems project you have undertaken.

Words

| | | |
|----------|-----------|------------|
| automate | <i>v.</i> | 使自动化, 自动操作 |
| back-end | <i>n.</i> | 后端 |

| | | |
|---------------|-------------|------------------|
| clarity | <i>n.</i> | 透明, 透明度, 清晰度 |
| credit | <i>n.</i> | 信用 |
| delivery | <i>v.</i> | 交付, 交货, 递送 |
| dotcom | <i>n.</i> | .COM 类公司, 指网站类公司 |
| EDI-compliant | <i>adj.</i> | 适应 EDI 的 |
| eliminate | <i>v.</i> | 消除, 排除, 除去 |
| invoice | <i>n.</i> | 发票, 发货单 |
| instantaneous | <i>adj.</i> | 即时, 瞬间, 及时的 |
| project | <i>n.</i> | 项目 |
| refresh | <i>v.</i> | 刷新, 更新 |
| rekey | <i>v.</i> | 再次输入 |
| reside | <i>v.</i> | 驻留 |
| revenue | <i>n.</i> | 收入, 年收入 |
| routing | <i>n.</i> | 路由 |
| scant | <i>adj.</i> | 缺乏, 不足的 |
| shipment | <i>v.</i> | 出货, 装船 |
| typo | <i>n.</i> | 排印错误, 打字错误 |
| undertake | <i>v.</i> | 从事, 承担, 许诺, 保证 |
| unlock | <i>v.</i> | 解锁, 开放 |

Phrases

| | |
|-----------------------|------------|
| as a whole | 总的说来 |
| cut down on | 减少, 减低 |
| electronic format | 电子形式 |
| jump on the bandwagon | 赶时髦, 一窝蜂作风 |
| live up to | 实践, 做到 |
| order fulfillment | 定货履行 |
| product distribution | 产品配送 |
| purchase order | 购货定单 |
| put a burden on | 增加负担 |
| trucking schedule | 货运安排 |

Abbreviations

| | |
|--|--------|
| CFO (Chief Faculty Officer) | 人事总管 |
| CRM (Customer Relationship Management) | 客户关系管理 |
| EDI (Electronic Data Interchange) | 电子数据交换 |
| ERP (Enterprise Resource Plan) | 企业资源计划 |
| SCM (Supply Chain Management) | 供应链管理 |

3.3.2 Reading Material 2

Dial Peer

A dial peer, also known as an addressable call endpoint, is a device that can originate or receive a call in a telephone network. In voice over IP (VoIP), addressable call endpoints can be categorized as either voice-network dial peers or POTS (plain old telephone service) dial peers. Voice-network dial peers include VoIP-capable computers, routers, and gateways within a network. POTS dial peers include traditional phone sets, cell phones, and fax machines.

The term dial peer is sometimes used in reference to a program that matches a specific dialed sequence of digits to an addressable call endpoint. According to this definition, there is one dial peer for each call leg (connection between two addressable call endpoints).

Dial peer hunting is a feature of voice over IP (VoIP) systems in which the device at the originating router attempts to find an alternative addressable call endpoint if it cannot establish a connection to the intended endpoint. For dial peer hunting to work, the originating router must be configured with a list (sequence) of dial peers, all of which can route a call to the same endpoint, but using different destination routers. If the originating router receives an invalid-number or user-busy code from the destination router, the originating router proceeds to the next dial peer in the sequence.

Words

| | | |
|-------------|--------------|------------|
| addressable | <i>adj.</i> | 可寻址的 |
| dial | <i>n./v.</i> | 钟面, 拨号盘, 拨 |
| endpoint | <i>n.</i> | 呼叫端点 |
| gateway | <i>n.</i> | 网关 |
| router | <i>n.</i> | 路由器 |

Phrases

| | |
|------------|----|
| cell phone | 手机 |
|------------|----|

Abbreviations

| | |
|-------------------------------------|--------------|
| POTS (Plain Old Telephone Service) | 普通老式电话服务 |
| VoIP (Voice over Internet Protocol) | 网络电话, 网际音频协议 |

3.3.3 正文参考译文

电子商务的定义和内容

通过 Internet 的电子商务是一个新概念。在近年, 它已经被如此广泛的使用以至于它与当前依靠自动化的其他趋势无差别, 例如工程学和即时生产。很多公司, 包括 CyberCash、Dig Cash、First Virtua 和 Open Market 已经提供多种电子商务服务。

如果你有机会使用一部个人计算机并且能通过浏览连接上 Internet, 你就能在线做生意。不用再为编程担心。客户再也不用寻找过时的目录, 而商家再也不用打印目录。再也不用查询电话号码, 支付长途费用, 或者很晚还开着商店。只要上网, 开一家网上商店, 就可以看你的生意增长。

技术, 人的才能, 和新经营方式构成今天的日益增长的全球经济。电子商务的根基是 Internet。网络世界不仅仅是技术, 它是关于信息、决策和交际的网。这个世界正在改变每个人的生活, 从单个的家庭到大的公司。没有企业能忽视互联网经济的潜能。

电子商务作为新兴的概念, 它描述了通过计算机网络 (包括 Internet) 买卖或交换商品、服务与信息的过程。Kalakota 和 Whinston (1997) 从以下角度定义了电子商务:

从通信角度看, 电子商务是通过电话线路、计算机网络或其他电子方式传递信息、产品、服务或支付。

从商务角度看, 电子商务是为促使商务交易及工作流程自动化而实施的技术应用。

从服务角度看, 电子商务是一种工具, 用来帮助公司、消费者和管理者减少服务成本, 提高产品质量, 加快服务速度。

从在线角度看, 电子商务通过 Internet 及其联机服务, 提供商品与信息的购买和销售。

人们将商务看作商业伙伴之间的交易行为。因此, 对于某些人来说, 电子商务的概念有些偏窄。所以许多人使用 e-business 一词, 即广义的电子商务。广义的电子商务不仅涉及到买与卖, 还包括对客户的服务, 商业伙伴之间的合作以及企业组织内部的电子交易。根据 IBM 公司首席执行官 Lou Gerstner 所言: “广义的电子商务是一个完整的周期, 意味着高速度、全球化、增加产量、获得新的客户、共享竞争优势。”

正如任何其他类型商业一样, 电子商务主要包含两个主体: 企业和消费者。有三种基本的电子商务类型。

企业对消费者 (B2C): 这是一种面向个体购物者的零售交易。诸如亚马逊网站的客户, 就是典型的个体购物者。通常这种模式将产品直接销售给客户, 免去了许多中间环节。另外, 零售商通过 Web 站点和客户建立了另外一个通道。

消费者对消费者 (C2C): 在这一类型中消费者与消费者之间直接进行交易。经常采取分类广告或拍卖的电子形式。货物在网上展示吸引买方与卖方议价。与通过分类广告和拍卖的传统的销售不同, 买方和卖方通常从未见过面。例如, 个人在分类广告中销售房产或轿车等。在 Internet 上提供个人服务广告, 进行专业性的咨询服务是 C2C 的另外一个例证。有几个拍卖网站提供个人的拍卖服务项目。最后, 还有许多人通过内联网提供销售或服务的广告信息。

企业对企业 (B2B): 在这一类型中涉及企业与企业之间进行产品和服务的交易。通常是一种制造商与供应者的关系。例如, 一个家具制造商需要原料 (例如木头, 画, 以及清漆)。在企业对企业电子商务过程中, 制造商以电子方式向供应商订购, 很多次款项都以电子方式支付。

很多人认为电子商务就是有一个网站, 但是电子商务远不止于此。电子商务的应用很广, 如家庭银行业务、在线商店和商业区的购物、买股票、找到一份工作、进行一次拍卖以及在网上合作研发项目等等。为了执行这些应用, 有支持信息和机构化的基础结构和系统是必要的。基础设施支持电子商务应用, 并且它们的实施依赖于四个主要方面: 人民、

国家政策，技术标准和协议以及其他组织。电子商务管理协调应用，基础设施和支柱。

3.4 Value Chains in E-commerce

In e-commerce, a number of business process and activities go unnoticed by the consumer and are often taken for granted. With an online merchant's business, value-added activities work together to make the business-to-consumer interface operational.

In 1985 Michael Porter wrote a book called *Competitive Advantage*, in which he introduced the concept of the value chain. Businesses receive raw materials as input, add value to them through various processes, and sell the finished product as output to customers.

^[1]Competitive advantage is achieved when an organization links the activities in its value chain more cheaply and more effectively than its competitors. For example, the purchasing function assists the production activity to ensure that raw materials and other supplies are available on time and meet the requirements of the products to be manufactured. The manufacturing function, in turn, has the responsibility to produce quality products that the sales staff can depend on. The human resource function must hire, retain, and develop the right personnel to ensure continuity in manufacturing, sale, and other areas of the business. Bringing in qualified people contributes to stability, continuity, and integrity of operations throughout the firm.

^[2]There is no time sequence or special sequence of activities before a business is considered successful or effective. The idea is to link different activities in such a way that the value-added (output) of one activity (department, process, etc.) contributes to the input of another activity. The integration of these activities results in an organization fine-tuned for profitability and growth.

According to Porter, the primary activities of a business are:

Inbound logistics. These are procurement activities vendor selection, comparative shopping, negotiating supply contracts, and just-in-time arrival of goods. They represent the supply side of the business. In e-commerce, the business must be capable of exchanging data with suppliers quickly, regardless of the electronic format.

Operations. This is the actual conversion of raw materials received into finished products. It includes fabrication, assembly, testing, and packaging the product. This production activity provides added value for the marketing function. Operational activities are the point in the value chain where the value is added. These happen in the back-office where the pizza is baked, the PCs are assembled, or the stock trades are executed. Data are shared at maximum network speed among internal and external partners involved in the value-adding processes.

Outbound logistics. This activity represents the actual storing, distributing, and shipping of the final product. It involves warehousing, materials handling, shipping, and timely delivery to the ultimate retailer or customer. The output of this activity ties in directly with marketing and sales.

Marketing and sales. This activity deals with the ultimate customer. It includes advertising,

product promotion, sales management, identifying the product's customer base, and distribution channels. The output of this activity could trigger increased production, more advertising, etc.

Service. This activity focuses on after-sale service to the customer. It includes testing, maintenance, repairs, warranty work, and replacement parts. The output of this activity means satisfied customers, improved image of the product and the business, and potential for increased production, sale, etc.

Primary activities are not enough. A business unit needs support activities to make sure the primary activities are carried out. Imagine, for example, a manufacturing concerns with no people or with poorly skilled employees.

The key support activities in the value chain are:

Corporate infrastructure. This activity is the backbone of the business unit. It includes general management, accounting, finance, planning, and legal services. It is most often pictured in an organization chart showing the relationship among the different positions, the communication network, and the authority structure. Obviously, each position holder must add value to those above as well as below.

Human resources. This is the unique activity of matching the right people to the job. It involves recruitment, retention, career path development, compensation, training and development, and benefits administration. The output of this activity affects virtually every other activity in the company.

Technology development. This activity adds value in the way it improves the product and the business processes in the primary activities. The output of this activity contributes to the product quality, integrity, and reliability, which make life easier for the sales force and for customer relations.

Procurement. This activity focuses on the purchasing function and how well it ensures the availability of quality raw material for production.

Where does e-commerce fit in? The value chain is a useful way of looking at a corporation's activities and how the various activities add value to other activities and to the company in general.

[3]E-commerce can play a key role in reducing costs, improving product quality and integrity, promoting a loyal customer base, and creating a quick and efficient way of selling products and services. By examining the elements of the value chain, corporate executives can look at ways of incorporating information technology and telecommunications to improve the overall productivity of the firm. Companies that do their homework early and well ensure themselves a competitive advantage in the marketplace.

Words

| | | |
|----------------|-----------|----------|
| administration | <i>n.</i> | 管理; 管理部门 |
| analyze | <i>v.</i> | 分析 |
| assembly | <i>n.</i> | 装配 |

| | | |
|----------------|--------------|-------------|
| bake | <i>v.</i> | 烘, 烤 |
| backbone | <i>n.</i> | 脊椎, 中枢 |
| chain | <i>n./v.</i> | 链, 表链 |
| compensation | <i>n.</i> | 补偿, 赔偿, 赔偿费 |
| ensure | <i>v.</i> | 确保 |
| fabrication | <i>n.</i> | 制作, 构成 |
| focus | <i>n.</i> | 焦点 |
| handling | <i>n.</i> | 利用, 管理, 处理 |
| inbound | <i>adj.</i> | 回程的 |
| incorporate | <i>v.</i> | 结合, 合并, 收编 |
| infrastructure | <i>n.</i> | 基础设施 |
| integration | <i>n.</i> | 整体 |
| logistic | <i>n.</i> | 物流 |
| loyal | <i>adj.</i> | 忠诚的, 忠心的 |
| manufacture | <i>v.</i> | 制造 |
| overall | <i>adj.</i> | 全面的 |
| pizza | <i>n.</i> | 比萨饼 |
| procurement | <i>n.</i> | 采购 |
| raw | <i>adj.</i> | 原始的 |
| recruitment | <i>n.</i> | 招募 |
| retention | <i>n.</i> | 保留, 保持力 |
| trigger | <i>v.</i> | 触发, 促使, 引起 |
| vendor | <i>n.</i> | 卖主, 小贩 |
| warehousing | <i>n.</i> | 储仓, 仓库 |
| warranty | <i>n.</i> | 担保, 保证 |

Phrases

| | |
|----------------------|----------------------|
| be taken for granted | 认为某事理所当然 |
| bring in | 引进, 带来 |
| contribute to | 有助于; 促进 |
| deal with | 处理 |
| deliver to | 传送给…… |
| play a key role | 扮演一个重要的角色; 起了一个重要的作用 |
| value chains | 价值链 |

Notes

[1] 例句: Competitive advantage is achieved when an organization links the activities in its value chain more cheaply and more effectively than its competitors.

分析: 本句是条件状语从句其中 competitive advantage 是主语, when an organization ...

its competitors 是一个条件状语从句, more...than 是比较级结构。

译文: 当一个组织能比其他竞争者更有效更便宜的与其价值链的活动相联系时, 竞争优势就实现了。

- [2] 例句: There is no time sequence or special sequence of activities before a business is considered successful or effective.

分析: 本句是条件状语从句, is considered 是被动语态。

译文: 一个交易在它被认定是成功或有效之前, 其行为没有时间上或其他方面的特别顺序。

- [3] 例句: E-commerce can play a key role in reducing costs, improving product quality and integrity, promoting a loyal customer base, and creating a quick and efficient way of selling products and services.

分析: 本句是复杂句其中 play a key role in 必需+Ving, a key role 做的是宾语, 而 reducing, improving, promoting, and creating 是并列成分, 作宾语补足语。

译文: 电子商务能在降低成本、提高产品质量、促成忠诚客户基础和创建快捷高效的产品与服务销售方面起到关键作用。

Exercises

I. Write true or false for the following statements according to the passage.

1. () With an online merchant's business, value-added activities work together to make the business-to-consumer interface operational.
2. () The concept of the value chain is that the businesses receive finished product as input, add value to them through various processes.
3. () The purchasing function has the responsibility to produce quality products that the sales staff can depend on.
4. () In e-commerce the business must be capable of exchanging data with suppliers quickly, regardless of the electronic format.
5. () Operational activities are the point in the value chain where the value is added.
6. () Outbound logistics represents the just-in-time arrival of goods.
7. () The output of outbound logistics ties in directly with marketing and sales.
8. () Marketing and sales focus on after-sale service to the customer.
9. () The key support activities in the value chains are corporate infrastructure, human resources, technology development and procurement.
10. () Technology development focuses on the purchasing function.

II. Fill in the blanks according to the passage.

1. In e-commerce, a number of business process and activities go unnoticed by the consumer and are often _____.
2. Businesses receive _____ as input, add value to them through various processes, and sell the _____ as output to customers.

3. The human resource function must hire, retain, and develop the right personnel to ensure _____.
4. Bringing in qualified people contributes to _____, _____, _____ of operations throughout the firm.
5. In e-commerce, the business must be capable of _____ with suppliers quickly, regardless of the _____.
6. Outbound logistics represents the actual _____, _____ and _____ of the final product.
7. Corporate infrastructure is the _____ of the business unit.
8. Technology development adds value in the way it improves the _____ and _____ processes in the primary activities.
9. Procurement focuses on the _____ function and how well it ensures the availability of quality raw material for production.
10. E-commerce can play a key role in _____, _____ and _____, promoting a loyal customer base, and creating a quick and efficient way of selling products and services.

III. Translate the following words and expressions into Chinese.

- | | |
|-----------------------|------------------------|
| 1. Value Chains | 6. after-sale service |
| 2. fine-tuned | 7. backbone |
| 3. just-in time | 8. human resources |
| 4. inbound logistics | 9. purchasing function |
| 5. outbound logistics | 10. product quality |

3.4.1 Reading Material 1

Electronic Learning

Never in the history of the world has the rate at which new information is created increased so rapidly. According to a study done at the University of California-Berkeley, "the amount of new information stored on paper, film, magnetic and optical media has roughly doubled in the last three year." The study estimates that about, "Five exabytes of new information—roughly five billion gigabytes—was created in 2002 alone." How can one keep up with the rapid increase in information?

One of the many uses of the computer is for e-learning. Derek Shockley defines e-learning as, "The delivery of a learning, training or education program by electronic means." Therefore e-learning can involve a computer, cell phone, television and DVD play, etc. The new way of learning goes beyond the classroom and textbooks to make use of the latest technology to teach people in a variety of settings with a variety of methods.

E-learning can be divided into 3 main categories: computer based teaching (CBT), distance learners and their tutors, and finally classroom instruction online. The first category is a method

where the learner learns at his or her own pace. The material has all been prepared ahead of time and is available on a CD-ROM or via the Internet through a browser. Some examples of this type of learning include: children's educational software, on-line tutorials, searchable reference material, etc.

The second method, distance learning, allows the student to communicate with a real person. This person is usually knowledgeable in the area of study and can be contacted through an Internet chat session, e-mail, telephone, etc. This method usually includes some kind of self-study component, but the learner is periodically in contact with someone else who assesses their progress, answers questions the learner has and may provide extra motivation for learning. Some examples of this type of e-learning include: an e-mail based study program where one lesson must be completed before receiving the next one, a home schooling program where a teacher receive completed lessons by e-mail for evaluation, and so on.

The third method can be described as a virtual classroom. The students that make up the class are physically separate, but are again connected through some electronic medium like a satellite link, the Internet, etc. Some examples include: video conferencing, a satellite broadcasted training program, etc. Within each category, one can find many different environments to provide this learning opportunity. As technology advances, more e-learning possibilities will become available.

What advantages does e-learning have over more traditional forms of education? Since e-learning is usually electronic, it's much easier to update and distribute than a textbook for example. Also, one presenter is able to "teach" many students in different locations and at different times in some cases. Although the initial development costs for a good course can be costly, the maintenance and distribution costs are not as expensive. The transportation costs, and course fees for a traditional several-day course are often much more expensive.

The concept of e-learning, however, is still relatively new. A poorly designed course will course will not keep a person's attention for very long. It's been reported that between 20%~50% of distance learners don't finish the courses they have started. A pre-prepared course cannot adjust to the level and interests of the students as easily as a good teach can. Although, a well designed course can tailor the material to the level and interest of each student to a certain degree. The biggest obstacle to e-learning, however, is the mindset of the individual as well as high level management. People are still willing to pay 2,000 USD for a 3-day course with a live instructor than to pay a fraction of the cost to cover the same material through e-learning on the Internet.

What will e-learning look like in another 5, 10 or even 15 years? As technology develops and the tools to develop quality e-learning courses evolve, one can expect to see an even greater emphasis on e-learning in the future. Some of the technologies currently being perfected include things like teleconferencing with a holographic display (3D realistic image using light) of the student and instructor together. In the future learners will put on special LCD goggles and use haptic (touch) technologies to give the feeling of actually being in a real situation to learn a particular skill. Faster Internet speeds and more powerful computers will provide more realistic multimedia applications to stimulate learners. More experience with e-learning courses will also

provide higher quality courses in the future.

Learning cannot be limited to the first 20 years of one's life. With the constantly changing environment we live in, learning is something that needs to happen regularly for our entire lifetime. Whether you need to learn a new programming language or want to know how to grow roses, the relatively new world of e-learning will provide you with many opportunities to expand your knowledge. Go ahead and learn something new today!

Words

| | | |
|--------------|-------------|------------------------|
| fraction | <i>n.</i> | 小部分, 片段, 分数 |
| goggle | <i>n.</i> | 护目镜, 潜水镜 |
| haptic | <i>adj.</i> | 触觉的 |
| holographic | <i>adj.</i> | 亲笔书写的 |
| mindset | <i>n.</i> | 思想倾向, 想法 |
| motivation | <i>n.</i> | 动机的形成; 动机因素; 动力 |
| obstacle | <i>n.</i> | 障碍(物), 妨害, 阻碍, 干扰 |
| periodically | <i>adv.</i> | 周期地; 定期, 按时 |
| regularly | <i>adv.</i> | 有规则地, 定期地, 经常地, 完全, 非常 |
| roughly | <i>adv.</i> | 粗糙地; 粗暴地; 粗俗地; 粗略地 |

Phrases

| | |
|----------|------|
| go ahead | 继续下去 |
|----------|------|

Abbreviations

| | |
|--|---------|
| CBT (Computer Based Teaching) | 计算机教学 |
| CD-ROM (Compact Disc Read Only Memory) | 只读光盘 |
| DVD (Digital Video Disc) | 数字化视频光盘 |

3.4.2 Reading Material 2

Steganography and Honeytokens

Steganography is a method of embedding electronic messages into a media file (for example, an image or audio file) by altering nonessential lines of code; the changes are imperceptible. The message remains undetected until unencrypted.

Honeytokens is any kind of tantalizing false data, including phony patient records at a hospital, lists of invalid social security numbers, or even simply a word processing file named "HR-salaries," that's stored in a restricted part of the network. If anyone tries to access the files, the security team is alerted to the trespassing before the intruder can do any real damage.

Words

| | | |
|---------------|------|-----------|
| embed | v. | 嵌入, 埋入 |
| imperceptible | adj. | 感觉不到的 |
| intruder | n. | 侵入者 |
| invalid | adj. | 无效的, 无价值的 |
| nonessential | adj. | 无关紧要的 |
| phony | adj. | 伪造的, 假的 |
| tantalize | v. | 嘲弄, 戏弄 |
| trespass | n. | 侵入, 侵害行为 |
| unencrypt | v. | 解密 |

Abbreviations

| | |
|----------------------|----------|
| HR (Human Resources) | 人事, 人力资源 |
|----------------------|----------|

3.4.3 正文参考译文

电子商务中的价值链

在电子商务中, 许多交易的进程和活动不被消费者关注, 并且经常认为那是理所当然的。在线交易中, 价值增值活动一起发生作用使得 B2C (企业对消费者) 模式的交易得以实施。

1985 年迈克尔·波特写了一本书名为《竞争优势》, 在书中他介绍了价值链的概念。企业接受原材料为“输入”, 经过各种不同的流程为其增加价值, 然后将最终的产品作为“输出”销售给消费者。

当一个组织能比其他竞争者更有效更便宜的与其价值链的活动相联系时, 竞争优势就实现了。举例来说, 购买力促进了生产活动, 确保原材料和其他供给即时到位并满足产品生产的需求。相应地, 厂家有责任生产出销售团队可依赖的高质量的产品。人力资源也相当重要, 要雇佣、保留和发展适当的人才才能保证在公司的制造、销售和其他的环节上有相当强的连续性。吸引高素质的人才才能保证整个公司的稳定持续发展。

一个交易在它被认定是成功或有效之前, 其行为没有时间上或其他方面的特别顺序。这个理念是以下面的方式贯穿在不同的商务活动中的: 一个环节 (部门, 流程等) 的增加价值 (输出) 直接作用于另一个环节的输入。这些环节的整合为组织带来收益和增长。

据波特介绍, 商务活动主要是 (价值链的构成要素):

内运物流。包含一些采购活动包括供应商选择、比较购买、合同谈判和货物的即时抵达。他们代表着商务的供应方。在电子商务中, 企业必须有能力 and 供应商快速地交换信息, 不必考虑采用何种电子形式。

营运。这是原材料转变成制成品的环节。它包括制造、装配、测试和包装产品。这是为市场活动增加价值的环节。营运环节是价值链中增加价值的最重要的环节。例如在后台的比萨饼的烘烤、计算机的装配和股票交易。数据在公司内部和合伙人之间通过网络资源共享来积极参与整个流程来实现产品的最大价值。

配送物流。这个环节是最终产品的存储、分配和运输。包括储仓、材料处理、运输和及时发送到零售商或消费者。这个环节的“输出”直接和市场销售相联系。

营销和销售。这个环节针对最终的消费者。它包括广告、促销、销售管理、了解客户需求和销售渠道。这个活动的“输出”可以提高销售产量，获得更大的广告效益。

服务。这个环节是对客户售后的服务。它包括测试、维护、修理、质量保证和退换产品。这个环节意在使客户满意，以提高产品和企业的形象，从而潜在地提高产销量。

有基本的商务价值活动并不够，一个企业需要支援价值链来确保商务活动的实施。设想一下，制造业没有人力资源或者说没有熟练员工能行吗？

在价值链中的主要支持活动是：

公司内部管理系统。这个活动是公司的核心。它包括一般的管理、会计、财政、计划和法制服务。通常在组织结构图中展示各个部分的位置关系，连接网络和组织机构。很明显，每个位置的环节都会给其前后的环节增加价值。

人力资源。这是调配最优的人们到适合工作岗位的独特环节。它包括招募、保持、补偿、训练体系。这个环节直接影响到公司其他所有环节。

技术研发。这个环节是主要的环节，是改良产品和厂家流程的方式中增加价值的环节。这个环节的工作对产品质量、增值和可信度有益，这样可以增强购买力，增进与顾客的关系。

采购。这个环节的主要功能是购买，确保得到高质量的原材料。

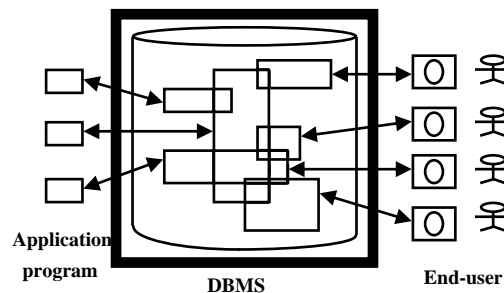
电子商务适合在什么环节呢？价值链是看一个公司运作情况的有效方式，而且从总体上考虑各种不同的商务活动环节是如何把价值加入其他的商务活动环节上的。

电子商务能在降低成本、提高产品质量、促成忠诚客户基础和创建快捷高效的产品与服务销售方面起到关键作用。通过对价值链中的要素进行分析和协调，结合信息技术和通信技术可以提高整个公司的销售能力。公司尽早做好内部管理可以确保在整个市场中具备竞争优势。

Chapter 4 Database Fundamentals

4.1 Introduction to DBMS

A database management system (DBMS) is an important type of programming system, used today on the biggest and the smallest computers.^[1] As for other major forms of system software, such as compilers and operating systems, a well-understood set of principles for database management systems has developed over the years, and these concepts are useful both for understanding how to use these systems effectively and for designing and implementing DBMS's. DBMS is a collection of programs that enables you to store, modify, and extract information from a database. There are many different types of DBMS's, ranging from small systems that run on personal computers to huge systems that run on mainframes. The following are the location of database between application programs and end-users.



The Capabilities of DBMS

There are two qualities that distinguish database management systems from other sorts of programming systems.

- 1) The ability to manage persistent data, and
- 2) The ability to access large amounts of data efficiently.

Point 1) merely states that there is a database which exists permanently; the contents of this database is the data that a DBMS accesses and manages. Point 2) distinguishes a DBMS from a file system, which also manages persistent data. A DBMS's capabilities are needed most when the amount of data is very large, because for small amounts of data, simple access techniques, such as linear scans of the data, are usually adequate.

^[2]While we regard the above two properties of a DBMS as fundamental, there are a number of other capabilities that are almost universally found in commercial DBMS's. These are:

- Support for at least one data model, or mathematical abstraction through which the user can view the data.

- Support for certain high-level languages that allow the user to define the structure of data, access data, and manipulate data.
- Transaction management, the capability to provide correct, concurrent access to the database by many users at once.
- Access control, the ability to limit access to data by unauthorized users, and the ability to check the validity of data.
- Resiliency, the ability to recover from system failures without losing data.

Data Models Each DBMS provides at least one abstract model of data that allows the user to see information not as raw bits, but in more understandable terms. In fact, it is usually possible to see data at several levels of abstraction. At a relatively low level, a DBMS commonly allows us to visualize data as composed of files.

Efficient File Access The ability to store a file is not remarkable: the file system associated with any operating system does that. The capability of a DBMS is seen when we access the data of a file. For example, suppose we wish to find the manager of employee "Clark Kent". If the company has thousands of employees, it is very expensive to search the entire file to find the one with NAME="Clark Kent". A DBMS helps us to set up "index files," or "indices," that allow us to access the record for "Clark Kent" in essentially one stroke no matter how large the file is. Likewise, insertion of new records or deletion of old ones can be accomplished in time that is small and essentially constant, independent of the file's length. Another thing a DBMS helps us do is navigate among files, that is, to combine values in two or more files to obtain the information we want.

Query Languages To make access to files easier, a DBMS provides a query language, or data manipulation language, to express operations on files. Query languages differ in the level of detail they require of the user, with systems based on the relational data model generally requiring less detail than languages based on other models.

Transaction Management Another important capability of a DBMS is the ability to manage simultaneously large numbers of transactions, which are procedures operating on the database. Some databases are so large that they can only be useful if they are operated upon simultaneously by many computers: often these computers are dispersed around the country or the world. The database systems used by banks, accessed almost instantaneously by hundreds or thousands of automated teller machines (ATM), as well as by an equal or greater number of employees in the bank branches, is typical of this sort of database. An airline reservation system is another good example.

Sometimes, two accesses do not interfere with each other. For example, any number of transactions can be reading your bank balance at the same time, without any inconsistency.^[3] But if you are in the bank depositing your salary check at the exact instant your spouse is extracting money from an automatic teller, the result of the two transactions occurring simultaneously and without coordination is unpredictable. Thus, transactions that modify a data item must "lock out" other transactions trying to read or write that item at the same time. A DBMS must therefore provide some form of concurrency control to prevent uncoordinated access to the same data item

by more than one transaction.

Even more complex problems occur when the database is distributed over many different computer systems, perhaps with duplication of data to allow both faster local access and to protect against the destruction of data if one computer crashes.

Security of Data A DBMS must not only protect against loss of data when crashes occur, as we just mentioned, but it must prevent unauthorized access. For example, only users with a certain clearance should have access to the salary field of an employee file, and the DBMS must be able associate with the various users their privileges to see files, fields within files, or other subsets of the data in the database. Thus a DBMS must maintain a table telling for each user known to it, what access privileges the user has for each object. For example, one user may be allowed to read a file, but not to insert or delete data; another may not be allowed to see the file at all, while a third may be allowed to read or modify the file at will.

DBMS Types

Designers developed three different types of database structures: hierarchical, network, and relational. Hierarchical and network were first developed but relational has become dominant. While the relational design is dominant, the older databases have not been dropped. Companies that installed a hierarchical system such as IMS in the 1970s will be using and maintaining these databases for years to come even though new development is being done on relational systems. These older systems are often referred to as legacy systems.

Words

| | | |
|-----------------|-------------|------------------------------|
| application | <i>n.</i> | 请求, 申请(表), 应用, 应用程序, 应用软件 |
| compiler | <i>n.</i> | 编译器 |
| coordination | <i>n.</i> | 同等, 调和 |
| concurrency | <i>n.</i> | 同时(或同地)发生, 同时存在, 合作 |
| clearance | <i>n.</i> | 清除 |
| distinguish | <i>v.</i> | 区别, 辨别 |
| duplication | <i>n.</i> | 副本, 复制 |
| destruction | <i>n.</i> | 破坏, 毁灭 |
| fundamental | <i>adj.</i> | 基础的, 基本的 |
| hierarchical | <i>adj.</i> | 分等级的, 分层的 |
| indices | <i>n.</i> | (index 的复数) 索引, 指针 |
| instantaneously | <i>adv.</i> | 瞬间地, 即刻地, 即时地 |
| legacy | <i>n.</i> | 遗赠(物), 遗产 |
| manipulate | <i>v.</i> | (熟练的)操作, 使用(机器等), 操纵(人, 市场等) |
| mainframe | <i>n.</i> | 主机, 大型机 |
| navigate | <i>v.</i> | 导航, 航行, 航海, 航空, 驾驶, 操纵 |

| | | |
|----------------|-------------|------------------------------|
| permanently | <i>adv.</i> | 永存地, 不变地 |
| privilege | <i>n.</i> | 权力, 特权 |
| resiliency | <i>n.</i> | 跳回, 弹性 |
| reservation | <i>n.</i> | 保留, (旅馆房间等) 预定, 预约 |
| simultaneously | <i>adv.</i> | 同时地 |
| transaction | <i>n.</i> | 办理, 处理, 会报, 学报, 交易, 事务, 处理事务 |
| unauthorized | <i>adj.</i> | 未被授权的, 未经认可的 |

Phrases

| | |
|----------------------|----------------|
| at the exact instant | 此时, 与此同时, 正当此时 |
| associate with | 联合, 结合 |
| at will | 随意, 任意 |
| high-level languages | 高级语言 |
| operating system | 操作系统 |
| take into account | 重视, 考虑 |

Abbreviations

| | |
|-----------------------------------|-------------|
| ATM (Automatic Teller Machine) | 自动取款 (出纳) 机 |
| DBMS (Database Management System) | 数据库管理系统 |

Notes

- [1] 例句: As for other major forms of system software, such as compilers and operating systems, a well-understood set of principles for database management systems has developed over the years, and these concepts are useful both for understanding how to use these systems effectively and for designing and implementing DBMS's.

分析: 本句是一个复杂句。其中, such as……systems 之间的部分是插入语, 翻译时可以把两个逗号作为括号翻译出来。

译文: 其他主要形式的系统软件, 比如说汇编以及操作系统, 近些年来开发出一系列容易理解的数据库管理系统原则, 并且这些概念既有助于理解如何有效利用系统, 又可以帮助设计和执行 DBMS 系统。

- [2] 例句: While we regard the above two properties of a DBMS as fundamental, there are a number of other capabilities that are almost universally found in commercial DBMS's.

分析: 本句是一个复合句, while 放于句首引导让步状语从句, 翻译为“虽然”, 后半句转折, 英文中不用“but”, 但在翻译时需要翻译出“虽然……, 但是……”。

译文: 虽然我们将以上两点作为 DBMS 的基本特性, 但是其他一些功能也是在商

业 DBMS 系统中常见的。

- [3] 例句: But if you are in the bank depositing your salary check at the exact instant your spouse is extracting money from an automatic teller, the result of the two transactions occurring simultaneously and without coordination is unpredictable.

分析: 本句是一个复合句, 主句为 “the result of……unpredictable”, 前面部分为 if 所引导的表假设的从句。

译文: 但是如果你正在银行里查询工资, 与此同时, 你的爱人在一台自动取款机上取款, 两个事务同时发生且没有彼此协调, 那你的查询结果就很难说了。

Exercises

I . Write true or false for the following statements according to the passage.

1. () A database management system is an important type of programming system.
2. () There are only one type of DBMS.
3. () DBMS has the ability to access large amounts of data efficiently.
4. () At a relatively low level, a DBMS commonly hasn't the ability to allows us to visualize data as composed of files.
5. () A DBMS provides a query language to make access to files.
6. () All types of DBMS hasn't the ability to manage simultaneously large numbers of transactions.
7. () DBMS can't prevent unauthorized access.
8. () With different access privileges, in a DBMS, one user may be allowed to read a file, but not to insert or delete data; another may not be allowed to see the file at all, while a third may be allowed to read or modify the file at will.
9. () While the relational design is dominant, the older databases have been dropped.
10. () Designers developed four different types of database structures.

II . Fill in the blanks according to the passage.

1. DBMS is a collection of programs that enables you to _____, _____, and information from a database.
2. There are many different types of DBMSs, ranging from small systems that run on____ to huge systems that run on.
3. DBMS support for at least one data model, or through which the user can view the data.
4. DBMS support for certain that allow the user to define the structure of data, access data, and manipulate data.
5. the capability of DBMS to provide correct, concurrent access to the database by many users at once.
6. the ability of DBMS to limit access to data by unauthorized users, and the ability to check the validity of data.

7. To make access to files easier, a DBMS provides a, or data manipulation language, to express operations on files.

8. A DBMS must maintain a table telling for each user known to it, what _____ the user has for each object.

9. Designers developed three different types of database structures: _____, _____, and _____.

10. Older hierarchical systems are often referred to as _____.

III. Translate the following words and expressions into Chinese.

- | | |
|-------------------------------|-----------------------------|
| 1. database management system | 6. query language |
| 2. application program | 7. transaction management |
| 3. end-user | 8. relational data model |
| 4. file system | 9. automatic teller machine |
| 5. high-level language | 10. hierarchical database |

4.1.1 Reading Material

PostgreSQL

PostgreSQL is an object-relational database management system (ORDBMS) based on POSTGRES, Version 4.2, developed at the University of California at Berkeley Computer Science Department. POSTGRES pioneered many concepts that only became available in some commercial database systems much later.

Features PostgreSQL is an open-source descendant of this original Berkeley code. It supports SQL92 and SQL99 and offers many modern features:

- complex queries
- foreign keys
- triggers
- views
- transactional integrity
- multiversion concurrency control

Additionally, PostgreSQL can be extended by the user in many ways, for example, by adding new:

- data types
- functions
- operators
- aggregate functions
- index methods
- procedural languages

And because of the liberal license, PostgreSQL can be used, modified, and distributed by everyone free of charge for any purpose, be it private, commercial, or academic.

Advantages PostgreSQL offers many advantages for your company or business over other database systems.

1) Immunity to over-deployment

Over-deployment is what some proprietary database vendors regard as their #1 licence compliance problem. With PostgreSQL, no-one can sue you for breaking licensing agreements, as there is no associated licensing cost for the software.

This has several additional advantages:

- More profitable business models with wide-scale deployment.
- No possibility of being audited for license compliance at any stage.
- Flexibility to do concept research and trial deployments without needing to include additional licensing costs.

2) Better support than the proprietary vendors

In addition to our strong support offerings, we have a vibrant community of PostgreSQL professionals and enthusiasts that your staff can draw upon and contribute to.

3) Significant saving on staffing costs

Our software has been designed and created to have much lower maintenance and tuning requirements than the leading proprietary databases, yet still retain all of the features, stability, and performance.

In addition to this our training programs are generally regarded as being far more cost effective, manageable, and practical in the real world than that of the leading proprietary database vendors.

4) Legendary reliability and stability

Unlike many proprietary databases, it is extremely common for companies to report that PostgreSQL has never, ever crashed for them in several years of high activity operation. Not even once. It just works.

5) Extensible

The source code is available to all at no charge. If your staff have a need to customise or extend PostgreSQL in any way then they are able to do so with a minimum of effort, and with no attached costs. This is complemented by the community of PostgreSQL professionals and enthusiasts around the globe that also actively extend PostgreSQL on a daily basis.

6) Cross platform

PostgreSQL is available for almost every brand of Unix (34 platforms with the latest stable release), and Windows compatibility is available via the Cygwin framework. Native Windows compatibility is also available with version 8.0 and above.

7) Designed for high volume environments

We use a multiple row data storage strategy called MVCC to make PostgreSQL extremely responsive in high volume environments. The leading proprietary database vendor uses this technology as well, for the same reasons.

8) GUI database design and administration tools

Several high quality GUI tools exist to both administer the database (pgAdmin, pgAccess) and do database design (Tora, Data Architect).

Words

| | |
|-------------|--------------------|
| aggregate | 集合, 聚集 |
| audit | 审计, 稽核 |
| Berkeley | 伯克利 (美国加利福尼亚州西部城市) |
| descendant | 子孙, 后裔, 后代 |
| enthusiast | 热心家, 狂热者 |
| extensible | 可扩张的, 可扩展的 |
| framework | 构架, 框架, 结构 |
| integrity | 完整性 |
| immunity | 免疫性 |
| legendary | 传奇中的 |
| pioneer | 先驱, 倡导者, 先遣兵, 先锋 |
| triggers | 触发, 扳机 |
| transaction | 事务 |

Abbreviations

| | |
|---|---------------|
| GUI (Graphical User Interface) | 图形用户界面 |
| SQL (Structured Query Language) | 结构化查询语言 |
| ORDBMS (Object-Relational Database Management System) | 对象-关系型数据库管理系统 |

4.1.2 正文参考译文

DBMS 简介

数据库管理系统是编程系统中的重要的一种, 现今可以用在最大的以及最小的电脑上。其他主要形式的系统软件, 比如说汇编以及操作系统, 近些年来开发出一系列容易理解的数据库管理系统原则, 并且这些概念既有助于理解如何有效利用系统, 又可以帮助设计和执行 DBMS 系统。DBMS 是一个程序的集合, 它使你能够存储、修改以及从数据库中提取信息。有很多种不同类型的 DBMS 系统, 从运行在个人电脑上的小型系统到运行在大型主机上的巨型系统。下图是数据库在应用程序和终端用户之间的位置。

DBMS 的功能

有两种功能使数据库管理系统区别于其他设计系统:

- 1) 管理固有数据的能力, 以及
- 2) 高效访问大量数据的能力。

第一点只是表明现有一个固定存在的数据库; 而这个数据库的内容也就是 DBMS 所要访问和管理的那些数据。第二点将 DBMS 和同样能管理固有数据的文件系统区分开来。通

常在数据量非常大的时候才需要用到 DBMS 系统的功能，因为对于小量数据而言，简单的访问技术（如对数据的线性扫描）就足够了。

虽然我们将以上两点作为 DBMS 的基本特性，但是其他一些功能也是在商业 DBMS 系统中常见的，它们是：

- 支持至少一种用户可以据之浏览数据的数据模式或数学提取方式。
- 支持某种允许用户用来定义数据的结构、访问和操纵数据的高级语言。
- 事务管理，即对多个用户提供正确、同时访问数据库的能力。
- 访问控制，即限制未被授权用户对数据的访问能力，以及检测数据有效性的能力。
- 恢复功能，即能够从系统错误中恢复过来而不丢失数据的能力。

数据模型 每个 DBMS 提供了至少一种允许用户不是以原始比特位的方式，而是以更容易理解的术语来观看信息的抽象数据模型。实际上，通常要观察以几个不同级别提取出来的数据是可能的。在相关的低级别中，DBMS 一般允许我们将数据形象化为文件的组成部分。

高效数据访问 存储一个文件的能力并不特别：操作系统中结合的文件系统都能够如此。DBMS 的能力在我们访问文件的数据时才能显露出来。比如，假设我们希望找到员工经理“克拉克·肯特”。如果这个公司有上万员工，则要通过 NAME = “克拉克·肯特”搜索整个文件来找到这个人是非常费时的。而 DBMS 帮助我们建立“索引文件”或“索引”，不管文件有多大，它都使我们能够一举访问到“克拉克·肯特”的记录。同样的，新记录的插入或者原有记录的删除都可以在较短并且本质上恒定的时间内完成，而不依赖于文件的长度。DBMS 还可以帮助我们进行文件间的导航，即，通过结合两个或更多文件的值来获得我们所需的信息。

查询语言 为了使访问文件更容易，DBMS 提供了查询语言（或者说数据控制语言）来表达对文件的操作。查询语言对用户所提供的细节的详细程度要求有所不同，基于关系数据模型的系统通常比基于其他模型的系统所需的细节要少。

事务管理 DBMS 的另外一项重要功能就是同时管理大量事务的能力。事务即是数据库中运行的进程。某些数据库是如此之大，它们只有在被多台计算机同时操作时才有用武之地：通常这些计算机分散在全国甚至世界各地。银行中使用的数据库系统就是这类数据库的一个典型，它们几乎同时被成千上万的自动取款机所访问，也同时被同样多甚至更多的支行员工所访问。机票预定系统是另一个好例子。

两个访问不会互相打扰。举个例子说，任意多的事务可以同时读取你银行的结余而不引起任何冲突。但是如果你正在银行里查询工资，与此同时，你的爱人在一台自动取款机上取款，两个事务同时发生且没有彼此协调，那你的查询结果就很难说了。因此，会引起数据项改变的事务必须“上锁”，将其他在同一时刻试图读写该项数据的事务关在外面。因此，DBMS 必须提供某种并发控制状态以阻止多个事务对于同一数据项的非协调访问。

更复杂的问题发生在数据库分布在许多不同计算机系统上的时候，它们多半使用数据副本来允许高速的本地访问以及避免由于某台计算机崩溃而破坏数据。

数据安全 DBMS 不只可以在计算机崩溃时保护数据不被丢失，正如上文提到的那样，而且它还能够阻止非法访问。比如，只有拥有特定权限的用户可以访问职工文件的工资区域，DBMS 还能结合不同用户的权利来判定他们有权看到哪些文件，文件的哪些区域或者

数据库中数据的哪些子集。因此 DBMS 必须拥有一个表，表中给出每个用户对于每个对象的访问权限。比如，某个用户可能被允许读取文件，但不能够插入或删除数据；另一个用户可能根本都不被允许看文件，而第三个用户可能被允许读取或随意修改文件。

DBMS 类型

设计人员开发了三种不同类型的数据库结构：层次数据库，网状数据库以及关系数据库。层次数据库和网状数据库是首先被开发出来的，但关系数据库已经成为了主导数据模型。尽管关系数据库的设计已经成为主导，但旧的数据库也仍然没有被抛弃。尽管关系数据库不断得到发展，但在 20 世纪 70 年代安装了层次数据库的一些公司，如 IMS，在未来仍然将维持使用这些数据库。这些旧的数据库系统通常被称作遗留系统。

4.2 Structure of the Relational Database

The relational model is the basis for any relational database management system (RDBMS).

^[1]A relational model has three core components: a collection of objects or relations, operators that act on the objects or relations, and data integrity methods. In other words, it has a place to store the data, a way to create and retrieve the data, and a way to make sure that the data is logically consistent.

A relational database uses relations, or two-dimensional tables, to store the information needed to support a business. Let's go over the basic components of a traditional relational database system and look at how a relational database is designed. Once you have a solid understanding of what rows, columns, tables, and relationships are, you'll be well on your way to leveraging the power of a relational database.

Tables, Rows, and Columns

A table in a relational database, alternatively known as a relation, is a two-dimensional structure used to hold related information. A database consists of one or more related tables.

Note: Don't confuse a relation with relationships. A relation is essentially a table, and a relationship is a way to correlate, join, or associate two tables.

A row in a table is a collection or instance of one thing, such as one employee or one line item on an invoice. ^[2]A column contains all the information of a single type, and the piece of data at the intersection of a row and a column, a field, is the smallest piece of information that can be retrieved with the database's query language. For example, a table with information about employees might have a column called LAST_NAME that contains all of the employees' last names. Data is retrieved from a table by filtering on both the row and the column.

Primary Keys, Datatypes, and Foreign Keys

The examples throughout this article will focus on the hypothetical work of Scott Smith, database developer and entrepreneur. He just started a new widget company and wants to implement a few of the basic business functions using the relational database to manage his

Human Resources (HR) department.

Relation: A two-dimensional structure used to hold related information, also known as a table.

Note: Most of Scott's employees were hired away from one of his previous employers, some of whom have over 20 years of experience in the field. As a hiring incentive, Scott has agreed to keep the new employees' original hire date in the new database.

Row: A group of one or more data elements in a database table that describes a person, place, or thing.

Column: The component of a database table that contains all of the data of the same name and type across all rows.

You'll learn about database design in the following sections, but let's assume for the moment that the majority of the database design is completed and some tables need to be implemented. Scott creates the EMP table to hold the basic employee information, and it looks something like this:

| EMPNO | ENAME | JOB | MGR | HIREDATE | SAL | COMM | DEPTNO |
|-------|-------|-----------|------|-----------|------|------|--------|
| 7369 | SMITH | CLERK | 7902 | 17-DEC-80 | 800 | | 20 |
| 7499 | ALLEN | SALESMAN | 7698 | 20-FEB-81 | 1600 | 300 | 30 |
| 7521 | WARD | SALESMAN | 7698 | 22-FEB-81 | 1250 | 500 | 30 |
| 7566 | JONES | MANAGER | 7839 | 02-APR-81 | 2975 | | 20 |
| 7839 | KING | PRESIDENT | | 17-NOV-81 | 5000 | | 10 |
| 7902 | FORD | ANALYST | 7566 | 03-DEC-81 | 3000 | | 20 |

Notice that some fields in the Commission (COMM) and Manager (MGR) columns do not contain a value; they are blank. A relational database can enforce the rule that fields in a column may or may not be empty. ^[3]In this case, it makes sense for an employee who is not in the Sales department to have a blank Commission field. It also makes sense for the president of the company to have a blank Manager field, since that employee doesn't report to anyone.

Field: The smallest piece of information that can be retrieved by the database query language. A field is found at the intersection of a row and a column in a database table.

On the other hand, none of the fields in the Employee Number (EMPNO) column are blank. The company always wants to assign an employee number to an employee, and that number must be different for each employee. One of the features of a relational database is that it can ensure that a value is entered into this column and that it is unique. The EMPNO column, in this case, is the primary key of the table.

Primary Key: A column (or columns) in a table that makes the row in the table distinguishable from every other row in the same table.

Notice the different datatypes that are stored in the EMP table: numeric values, character or

alphabetic values, and date values.

As you might suspect, the DEPTNO column contains the department number for the employee. But how do you know what department name is associated with what number? Scott created the DEPT table to hold the descriptions for the department codes in the EMP table.

| DEPTNO | DNAME | LOC |
|--------|------------|----------|
| 10 | ACCOUNTING | NEW YORK |
| 20 | RESEARCH | DALLAS |
| 30 | SALES | CHICAGO |
| 40 | OPERATIONS | BOSTON |

The DEPTNO column in the EMP table contains the same values as the DEPTNO column in the DEPT table. In this case, the DEPTNO column in the EMP table is considered a foreign key to the same column in the DEPT table.

A foreign key enforces the concept of referential integrity in a relational database. ^[4]The concept of referential integrity not only prevents an invalid department number from being inserted into the EMP table, but it also prevents a row in the DEPT table from being deleted if there are employees still assigned to that department.

Foreign Key: A column (or columns) in a table that draws its values from a primary or unique key column in another table. A foreign key assists in ensuring the data integrity of a table.

Referential Integrity: A method employed by a relational database system that enforces one-to-many relationships between tables.

Data Modeling

Before Scott created the actual tables in the database, he went through a design process known as *data modeling*. In this process, the developer conceptualizes and documents all the tables for the database. One of the common methods for modeling a database is called ERA, which stands for entities, relationships, and attributes. The database designer uses an application that can maintain entities, their attributes, and their relationships. In general, an entity corresponds to a table in the database, and the attributes of the entity correspond to columns of the table.

Data Modeling: A process of defining the entities, attributes, and relationships between the entities in preparation for creating the physical database.

The data-modeling process involves defining the entities, defining the relationships between those entities, and then defining the attributes for each of the entities. Once a cycle is complete, it is repeated as many times as necessary to ensure that the designer is capturing what is important enough to go into the database. Let's take a closer look at each step in the data-modeling process.

Defining the Entities

First, the designer identifies all of the entities within the scope of the database application. The entities are the persons, places, or things that are important to the organization and need to be tracked in the database. Entities will most likely translate neatly to database tables. For example, for the first version of Scott's widget company database, he identifies four entities: employees, departments, salary grades, and bonuses. These will become the EMP, DEPT, SALGRADE, and BONUS tables.

Defining the Relationships Between Entities

Once the entities are defined, the designer can proceed with defining how each of the entities is related. Often, the designer will pair each entity with every other entity and ask, "Is there a relationship between these two entities?" Some relationships are obvious; some are not.

In the widget company database, there is most likely a relationship between EMP and DEPT, but depending on the business rules, it is unlikely that the DEPT and SALGRADE entities are related. If the business rules were to restrict certain salary grades to certain departments, there would most likely be a new entity that defines the relationship between salary grades and departments. This entity would be known as an associative or intersection table and would contain the valid combinations of salary grades and departments.

Associative Table: A database table that stores the valid combinations of rows from two other tables and usually enforces a business rule. An associative table resolves a many-to-many relationship.

In general, there are three types of relationships in a relational database:

- One-to-many The most common type of relationship is one-to-many. This means that for each occurrence in a given entity, the parent entity, there may be one or more occurrences in a second entity, the child entity, to which it is related. For example, in the widget company database, the DEPT entity is a parent entity, and for each department, there could be one or more employees associated with that department. The relationship between DEPT and EMP is one-to-many.
- One-to-one In a one-to-one relationship, a row in a table is related to only one or none of the rows in a second table. This relationship type is often used for subtyping. For example, an EMPLOYEE table may hold the information common to all employees, while the FULLTIME, PARTTIME, and CONTRACTOR tables hold information unique to full-time employees, part-time employees, and contractors, respectively. These entities would be considered subtypes of an EMPLOYEE and maintain a one-to-one relationship with the EMPLOYEE table. These relationships are not as common as one-to-many relationships, because if one entity has an occurrence for a corresponding row in another entity, in most cases, the attributes from both entities should be in a single entity.
- Many-to-many In a many-to-many relationship, one row of a table may be related to many rows of another table, and vice versa. Usually, when this relationship is

implemented in the database, a third entity is defined as an intersection table to contain the associations between the two entities in the relationship. For example, in a database used for school class enrollment, the STUDENT table has a many-to-many relationship with the CLASS table—one student may take one or more classes, and a given class may have one or more students. The intersection table STUDENT_CLASS would contain the combinations of STUDENT and CLASS to track which students are in which classes.

Assigning Attributes to Entities

Once the designer has defined the entity relationships, the next step is to assign the attributes to each entity. This is physically implemented using columns, as shown here for the SALGRADE table as derived from the salary grade entity.

Iterate the Process: Are We There Yet?

After the entities, relationships, and attributes have been defined, the designer may iterate the data modeling many more times. When reviewing relationships, new entities may be discovered. For example, when discussing the widget inventory table and its relationship to a customer order, the need for a shipping restrictions table may arise.

Once the design process is complete, the physical database tables may be created. ^[5]Logical database design sessions should not involve physical implementation issues, but once the design has gone through an iteration or two, it's the DBA's job to bring the designers "down to earth." As a result, the design may need to be revisited to balance the ideal database implementation versus the realities of budgets and schedules.

| GRADE | LOSAL | HISAL |
|-------|-------|-------|
| 1 | 700 | 1200 |
| 2 | 1201 | 1400 |
| 3 | 1401 | 2000 |
| 4 | 2001 | 3000 |
| 5 | 3001 | 9999 |
| 6 | 10000 | 12500 |

Words

| | | |
|---------------|-------------|-----------------------|
| alphabetic | <i>adj.</i> | 字母的 |
| associative | <i>adj.</i> | 联合的, 联想的, [数]结合的 |
| attribute | <i>n.</i> | 属性 |
| assign | <i>v.</i> | 分配, 指派 |
| bonus | <i>n.</i> | 奖金 |
| conceptualize | <i>v.</i> | 使有概念 |
| dimensional | <i>adj.</i> | ……维的, 空间的 |
| department | <i>n.</i> | 部, 局, 处, 科, 部门, 系, 学部 |
| derive | <i>v.</i> | 得自, 起源 |
| enrollment | <i>n.</i> | 登记, 注册, 入伍, 入会, 入学 |
| hypothetical | <i>adj.</i> | 假设的 |
| incentive | <i>n.</i> | 动机 |
| intersection | <i>n.</i> | [数]交集, 十字路口, 交叉点 |
| iterate | <i>v.</i> | 反复说, 重申, 重述 |
| query | <i>n.</i> | 查询 |

| | | |
|------------|-------------|----------|
| relational | <i>adj.</i> | 相关的 |
| restrict | <i>vt.</i> | 约束, 限制 |
| suspect | <i>v.</i> | 猜想, 怀疑 |
| widget | <i>n.</i> | 装饰品, 小器具 |

Phrases

| | |
|---------------|---------|
| correspond to | 相应, 符合 |
| line item | 排列项, 项目 |
| foreign key | 外码 |
| primary key | 主码, 主键 |

Abbreviations

| | |
|------------------------------|--------|
| DBA (Database Administrator) | 数据库管理员 |
|------------------------------|--------|

Notes

- [1] 例句: A relational model has three core components: a collection of objects or relations, operators that act on the objects or relations, and data integrity methods.
 分析: 本句是简单句。其中冒号后面部分为 three components 的展开, collection 数学中意为“集合”。
 译文: 一个关系模型有三个核心组件: 对象或关系的集合, 作用于对象或关系上的操作, 以及数据完整性规则。
- [2] 例句: A column contains all the information of a single type, and the piece of data at the intersection of a row and a column, a field, is the smallest piece of information that can be retrieved with the database's query language.
 分析: 这是一个复合句。其中主语是“a field”, 后面“is the smallest……information”是谓语及宾语。前面是修饰 a field 的定语从句。其中 information 后面的 that 从句是定语从句, 修饰 information。“field”在数据库中指的是“字段”, 而“database's query language”指的是数据库查询语言。
 译文: 表中的一列包含了一类信息; 而且行列交叉点上的数据, 字段, 即是能够用数据库查询语言检索到的最小片信息。
- [3] 例句: In this case, it makes sense for an employee who is not in the Sales department to have a blank Commission field.
 分析: 本句是一个简单句。其中, “make sense for” = “make sense of” 指的是“把……搞清楚”。
 译文: 如此, 可以明确那些非销售部的员工佣金单元为空。
- [4] 例句: The concept of referential integrity not only prevents an invalid department number from being inserted into the EMP table, but it also prevents a row in the

DEPT table from being deleted if there are employees still assigned to that department.

分析：这是一个复合句。由 not only……but also 引导的部分，翻译为“不但……而且”。

译文：参考完整性的概念不只可以阻止无效的部门编号被插入 EMP 表中，而且在某部门仍有员工的情况下，可以防止 DEPT 表中该部门的信息被删除。

[5] 例句：Logical database design sessions should not involve physical implementation issues, but once the design has gone through an iteration or two, it's the DBA's job to bring the designers "down to earth."

分析：本句是一个复合句。其中，“DBA”指的是“database administrator”即数据库管理员，“down to earth”直译为“落到地球上，脚踏实地”，在这里译为“实际，真实”。

译文：逻辑数据库的建立过程不会陷于实际执行中的问题，但是一旦设计进行了一两次反复，将设计变成“实际”就是数据库管理员的任务了。

Exercises

I. Write true or false for the following statements according to the passage.

1. () A relational database uses two-dimensional tables to store the information needed to support a business.
2. () A relation is the same as a relationship.
3. () Primary key is a column (or columns) in a table that makes the row in this table distinguishable from every other row in every other table in the same database.
4. () A relation is essentially a database, and a relationship is a table in the database.
5. () Field is the smallest piece of information that can be retrieved by the database query language.
6. () Foreign key is a column (or columns) in a table that draws its values from a primary or unique key column in another table.
7. () The data-modeling process involves defining the entities, defining the relationships between those entities, and then defining the attributes for each of the entities.
8. () In general, there are two types of relationships in a relational database.
9. () Once the designer has defined the entity relationships, the next step is to assign the name to each entity.
10. () Once the design process is complete, the logical database tables may be created.

II. Fill in the blanks according to the passage.

1. A relational model has three core components: _____, _____ and _____.
2. A relational database uses relations, or _____, to store the information needed to support a business.

3. A _____ in a table is a collection or instance of one thing, such as one employee or one line item on an invoice.

4. _____ is a method employed by a relational database system that enforces one-to-many relationships between tables.

5. Notice the different datatypes that are stored in the EMP table: _____, _____, and _____.

6. _____ is a database table that stores the valid combinations of rows from two other tables and usually enforces a business rule. An associative table resolves a many-to-many relationship.

7. In general, there are three types of relationships in a relational database: _____, _____, and _____.

8. After the _____, _____ and _____ have been defined, the designer may iterate the data modeling many more times.

9. _____ is a process of defining the entities, attributes, and relationships between the entities in preparation for creating the physical database.

10. Logical database design sessions should not involve _____, but once the design has gone through an iteration or two, it's the DBA's job to bring the designers "down to earth."

III. Translate the following words and expressions into Chinese.

- | | |
|--------------------------|---------------------------|
| 1. core components | 6. numeric value |
| 2. two-dimensional table | 7. Referential Integrity |
| 3. related table | 8. Associative Table |
| 4. Foreign Key | 9. Attributes to Entities |
| 5. Primary Key | 10. entity relationship |

4.2.1 Reading Material

National Geochemical Database

The broad objective of this project is to maintain and enhance the National Geochemical Database (NGDB). The NGDB consists of 1) the original RASS and PLUTO data from the USGS labs, which are now stored in a common format under the ORACLE relational database management system; 2) the NURE data, which have been reformatted and reside currently on the following web site: <http://pubs.usgs.gov/of/1997/ofr-97-0492/> where downloads may be made on the basis of 1:250,000-scale quadrangles; and 3) the newly generated data (approximately 1996-present) which reside on the Laboratory Information Management System. The enhancements to the NGDB will enable both USGS scientists and external customers to more easily extract immediately useable data on a national, regional, and local scale to help establish a baseline for the abundance and spatial distribution of chemical elements in the Earth's surficial materials. Specific short-term objective include:

Linking the newly developed ORACLE-based database to the Laboratory Information

Management System (LIMS) to provide for the smooth transfer of newly generated data from the LIMS to the NGDB.

Implement the new Sample Submittal Information procedure on a nationwide basis throughout the USGS. This procedure has only been implemented at this time (June 2002) in the Central Region. Without this new system in place, it is possible that more errors and omissions regarding the nature and location of samples may be generated.

Complete the re-formatting of the NURE HSSR database based on 1:250,000-scale quadrangles, compile the quadrangle-based data into one large data set, and provide these data to the public via a web site and CD/DVD.

Complete the upgrading of archival USGS geochemical data for Alaska and release these to the public via a web site and CD/DVD.

Initiate the upgrading of the remainder (non-Alaska) portion of the USGS-generated data. Generate subsets of the master databases containing data in a format more useful to geochemists so they do not have to wade through the process of extracting the data they need from the entire database.

Communicate and coordinate the work within this Project with other data delivery efforts within the Bureau such as NatWeb, GEODE, and Spatial Data Delivery.

Produce map representations of the database showing the spatial variation of chemical species throughout the nation and within sub-regions that are of priority to the USGS.

Relevance and Impact

An accurate, easily accessible geochemical database containing multi-element information on the surficial materials of the nation is vital if the USGS is to respond quickly to earth science issues raised by Congress and land management and environmental protection agencies. A nationally consistent geochemical database provides baseline information on the natural abundance and spatial variation of chemical elements to which changes caused by agricultural and irrigation practices, waste disposal, urbanization, industrial pollution, mineral exploration and mining activities, environmental remediation and restoration activities, and other land-use practices can be compared. Human-induced chemical changes to the environment are superimposed on a variable natural geochemical background where trace-element abundances can range over several orders of magnitude within short distances. These variations are inadequately documented and their existence is often overlooked in the setting of public policy. Important aspects of change cannot be measured, or their consequences anticipated, unless the present composition of the earth's surface materials is known. In her 2000 Presidential address to the Geological Society of America, Mary Lou Zoback identified six "grand challenges in earth and environmental science". The first of these was "recognizing the signal within the natural variability". Zoback stated that "documenting and understanding natural variability is a vexing topic in almost every environmental problem. How do we recognize and understand changes in natural systems if we don't understand the range of baseline values?" Preserving and enhancing the vast amount of geochemical data within MRP's databases will provide a powerful tool for addressing this "grand challenge". The ultimate goal of producing and electronically

disseminating the vast amount of geochemical data within MRP's databases directly supports many of the goals and objectives as stated in the Science Strategy of the Geologic Division (Bohlen and others, 1999). These databases are essential for understanding the relationship between geologic processes and human health, ecosystem structure and function, and the distribution of energy and mineral resources. This project also serves as the focal point of requests for geochemical data from outside customers. From June 2001 through May 2002, the predecessor project (National Geochemical Database Project) received over 100 requests for data from Federal, state, and local government clients; private sector clients; and internal USGS clients. At a conservatively estimated cost of \$300 per sample for collection, preparation, and chemical analysis, the geochemical databases under MRP management represent an expenditure of over \$500 million of taxpayer money. To realize the fullest possible return for this investment, these data must be archived in perpetuity in an easily accessible and user-friendly format for full utilization by the wide array of customers that need geochemical data to accomplish their work.

Words

| | | |
|---------------|-------------|------------------|
| Approximately | <i>adv.</i> | 近似地, 大约 |
| baseline | <i>n.</i> | 基线 |
| disseminating | <i>v.</i> | 散布 |
| ecosystem | <i>n.</i> | 生态系统 |
| focal | <i>adj.</i> | 焦点的, 有焦点的, 在焦点上的 |
| geochemist | <i>n.</i> | 地质化学家 |
| omissions | <i>n.</i> | 冗长 |
| perpetuity | <i>n.</i> | 永恒 |
| quadrangle | <i>n.</i> | 四角形, 四边形, 方院 |
| urbanization | <i>n.</i> | 都市化, 文雅化 |
| utilization | <i>n.</i> | 利用 |

Abbreviation

| | |
|---|--------------------|
| LIMS (Laboratory Information Management System) | 实验室信息管理系统 |
| MRP (Material Requiring Plan) | [计] 物资需求计划, 材料需求计划 |
| NGDB (National Geochemical Database) | 国家地质化学数据库 |
| USGS (United States Geological Survey) | 美国地质勘探局 |

4.2.2 正文参考译文

关系数据库的结构

关系模型是任何关系数据库管理系统 (RDBMS) 的基础。一个关系模型有三个核心组件: 对象或关系的集合, 作用于对象或关系上的操作, 以及数据完整性规则。换句话说,

关系数据库有一个存储数据的地方，一种创建和检索数据的方法，以及一种确认数据的逻辑一致性的方法。

一个关系数据库使用关系或二维表来存储支持某个事物所需的信息。让我们了解一下一个传统的关系数据库系统的基本组件并且学习如何设计一个关系数据库。一旦你对于行、列、表和关联是什么有了深刻理解，你就能够充分发挥关系数据库的强大功能。

表，行和列

在关系数据库中，一个表（或者说一个关系）是一个用于保存相关信息的二维结构。一个数据库由一个或者多个相关联的表组成。

注意：不要混淆了关系和关联。一个关系实际上是一个表，而一个关联指的是一种连接、结合或联合两个表的方式。

表中的一行是一种事物的集合或实例，比如一个员工或发票上的一项。表中的一列包含了一类信息；而且行列交叉点上的数据，字段，即是能够用数据库查询语言检索到的最小片信息。举个例子来说，一个员工信息表可能有一个“名字”列，列中就包含所有员工的名字。数据是通过对行、列进行过滤而从表中检索出来的。

主码、数据类型和外码

本篇文章均以假设的斯科特·史密斯的工厂为例，他是数据库的建立者和企业的主办人。他刚开办了一个饰品公司并且想要使用关系数据库的几项基本功能来管理人力资源部门。

关系：用来保存相关信息的一个二维结构（也就是表）。

注意：大多数斯科特的雇员都是雇自过去的从业者，他们中有些人在这个领域已经有20年的经验了。出于雇用的目的，斯科特同意在新数据库中维持新进员工最初的雇佣日期。

行：在一个数据库表中的一组单数据或多数据元素，用于描述一个人、地方或事物。

列：列是数据库表的组件，它包含所有行中同名和同类型的所有数据。

你会在下面章节学到如何设计数据库，现在让我们假设数据库大部分已经设计完成并且有一些表需要被执行。斯科特创建了 **EMP** 表来保存基本的员工信息，就像这样：

| 员工编号 | 名字 | 工种 | 管理人 | 工作日期 | 工资 | 佣金 | 部门成员 |
|------|-----|------|------|----------|------|-----|------|
| 7369 | 史密斯 | 会计 | 7902 | 17-12-80 | 800 | | 20 |
| 7499 | 艾伦 | 推销员 | 7566 | 20-2-81 | 1600 | 300 | 30 |
| 7521 | 沃德 | 推销员 | 7566 | 22-2-81 | 1250 | 500 | 30 |
| 7566 | 琼斯 | 管理人员 | 7839 | 02-4-81 | 2975 | | 20 |
| 7839 | 金 | 厂长 | | 17-11-81 | 5000 | | 10 |
| 7902 | 福特 | 分析师 | 7566 | 03-12-81 | 3000 | | 20 |

你可能注意到佣金列和管理人列中有一些单元格中没有值；它们是空值。一个关系数据库能够规定列中的一个单元格是否为空。如此，可以明确那些非销售部的员工佣金单元为空。同样也明确了公司董事长的管理人单元为空，因为这个员工不需要向任何人汇报工作。

单元格：是数据库查询语言所能够检索到的最小片信息。一个单元格就是一个数据库表的行和列交叉形成的。

另一方面，没有哪个员工的员工编号单元为空。公司总是希望为每个员工分配一个员工号，并且这个号码必须是每个员工都不同的。关系数据库的一个特性能够确定某列的键入值必须为单值。如此，员工编号列便是这个表的主码。

主码：主码即是表中的一列（或多列），使每一行能够区别于同表中的其他行。

留意一下 EMP 表中存储的不同数据类型：数值型，字符型或字母型，以及日期型。

如你所想，部门成员列保存的是员工所在部门的编号。但是你知道哪个部门名称对应哪个部门编号呢？斯科特建立了 DEPT 表来具体描述 EMP 表中提到的部门编号的情况。

EMP 表中的部门编号列同 DEPT 表中的部门编号列有着相同的值。既然如此，EMP 表中的部门编号列便被看作是与 DEPT 表中相同列对应的外码。

| 部门编号 | 部门名称 | 位置 |
|------|------|-----|
| 10 | 会计部 | 纽约 |
| 20 | 调查部 | 达拉斯 |
| 30 | 销售部 | 芝加哥 |
| 40 | 业务部 | 波士顿 |

外码加强了关系数据库中参考完整性的概念。参考完整性的概念不只可以阻止无效的部门编号被插入 EMP 表中，而且在某部门仍有员工的情况下，可以防止 DEPT 表中该部门的信息被删除。

外码：表中的一列（或多列），它的值来自于其他表的主码列或单值列。一个外码有助于确定表中数据的完整性。

参考完整性：是关系数据库用来加强表间一对多关联的一种方式。

数据建模

在斯科特于数据库中创建真实表之前，他要经过一个称作数据建模的过程。在这个过程中，数据库创建者定义和填写数据库中所有表。有一种为数据库建模的方式叫作 ERA，它可以表示出实体、实体间的关联和实体的属性。数据库设计者使用一个能够支持实体、实体属性和实体间关联的应用程序。通常，一个实体对应数据库中的一个表，而实体的属性对应于表中的列。

数据建模：一个定义实体、实体属性和实体间关联的过程，从而为建立物理数据库做准备。

数据建模过程包括定义实体、定义实体间关联以及定义每个实体的属性的过程。一旦一个周期完成，就需要不断重复直到设计者抓住了重点，足以开始建立数据库。让我们进一步了解为数据库建模过程的步骤。

定义实体

首先，设计者确定数据库应用程序范围内的所有实体。实体是人、地方或事物，它们对于整个团体是重要的且需要被记录在数据库中。实体将被巧妙的转化为数据表。比如，在第一版斯科特饰品公司数据库中，他定义了四个实体：员工、部门、工资水平和奖金。它们将称为 EMP（员工）表，DEPT（部门）表，SALGRADE（工资水平）表和 BONUS（奖金）表。

定义实体间的关联

一旦定义了实体，设计者就能够继续定义每个实体间是如何关联的。通常，设计者通常将每个实体同其他实体配对，并且考虑：“两者之间是否存在关联呢？”实体间的某些关联是明显的，某些不是。

在饰品公司数据库中，员工实体和部门实体间极可能存在关联，而依据事物间的关系原则，部门实体跟工资水平实体间似乎就没有关联了。如果事物间的关系原则是用来约束某个部门的工资水平的，就可能需要一个新的实体来说明工资水平和部门之间的关联。这个实体被称作关系表或交表，其中包含工资水平和部门之间的有效联合。

关系表：是一个数据库表，其中保存着另外两个表的行（记录）间的有效结合，并且通常强调了事物间的关系原则。关联表处理的是一个多对多关联。

通常，关系数据库间有三种关联方式：

- **一对多关联：**最常见的关联是一对多关联。意思是对于每个给出的现有实体（即父实体）都有一个或多个现有的另一个实体（即子实体）与之相关联。举个例子来说，在饰品公司数据库中，部门实体是一个父实体，而每个部门中，都有一个或多个员工属于该部门。这样，部门实体和员工实体间的关联就是一对多关联。
- **一对一关联：**在一个一对一关联中，表中的一行只关联另一个表中的一行甚至 0 行。这种关联类型通常用于子类型数据中。例如，一个员工表可能保存了所有员工的信息，而全职表、兼职表和承包人表则分别保存全职员工、兼职员工和承包人的信息。这些实体被认为是员工表的子表，并且同员工表维持一对一关联。这种关系不像一对多关联那么常见，因为如果一个实体与另一个实体总有对应行，在大多数情况下，两个实体中的属性只在一个实体内出现就可以了。
- **多对多关联：**在多对多关联中，表的一行可能对应另一个表的许多行，反之亦然。通常，当这些关联在数据库中被执行时，往往再定义第三个实体用来保存前两个实体间的所有关联。例如，在一个学籍注册数据库中，学生表与班级表之间有一个多对多关联——一个学生可能听一门或多门课程，并且一个班级也可能有一个或多个学生。而学生_班级关系表中就包含了学生和班级之间的关系，以表明哪个学生在哪个班。

指定实体属性

一旦设计者定义了实体间关联，下一步就是去指定每个实体的属性。这是实现列的使用，如右图所示由工资水平实体所建立的工资水平表。

重复步骤：我们仍然在原地

在定义了实体、关联以及属性之后，设计者往往要多重复几次数据建模过程。当我们在回顾关联时，就会发现需要建立新的实体。比如，当讨论饰品库存表和与它相关的客户订单时，就会发现需要制定一个送货约束表。

一旦设计过程完成，下面将要建立实际的数据库表。逻辑数据库的设计过程不会牵涉实际执行中的问题。然而，一旦设计进入到实际的运作，数据库存管理员就会很快让设计

| 等级 | 最低标准 | 最高标准 |
|----|-------|-------|
| 1 | 700 | 1200 |
| 2 | 1201 | 1400 |
| 3 | 1401 | 2000 |
| 4 | 2001 | 3000 |
| 5 | 3001 | 9999 |
| 6 | 10000 | 12500 |

者从理想回到现实中来。结果，设计就可能需要再次构想以求得理想的数据库存运行与预算和进度之间的平衡。

4.3 Brief Introduction of SQL

SQL (pronounced "ess-que-el") stands for Structured Query Language. SQL is used to communicate with a database. According to ANSI, it is the standard language for relational database management systems. SQL statements are used to perform tasks such as update data on a database, or retrieve data from a database. Some common relational database management systems that use SQL are: Oracle, Sybase, Microsoft SQL Server, Access, Ingres, etc. ^[1] Although most database systems use SQL, most of them also have their own additional proprietary extensions that are usually only used on their system. However, the standard SQL commands such as "Select", "Insert", "Update", "Delete", "Create", and "Drop" can be used to accomplish almost everything that one needs to do with a database.

A relational database system contains one or more objects called tables. The data or information for the database are stored in these tables. Tables are uniquely identified by their names and are comprised of columns and rows. Columns contain the column name, data type, and any other attributes for the column. Rows contain the records or data for the columns. Here is a sample table called "weather".

City, state, high, and low are the columns. The rows contain the data for this table:

| Weather | | | |
|-------------|------------|------|-----|
| city | state | high | low |
| Phoenix | Arizona | 105 | 90 |
| Tucson | Arizona | 101 | 92 |
| Flagstaff | Arizona | 88 | 69 |
| San Diego | California | 77 | 60 |
| Albuquerque | NewMexico | 80 | 72 |

The select statement is used to query the database and retrieve selected data that match the criteria that you specify. Here is the format of a simple select statement:

```
select "column1"  
    [, "column2", etc]  
from "tablename"  
[where "condition"];  
[] = optional
```


The column names that follow the select keyword determine which columns will be returned in the results. You can select as many column names that you'd like, or you can use a "*" to select all columns.

The table name that follows the keyword from specifies the table that will be queried to retrieve the desired results.

The where clause (optional) specifies which data values or rows will be returned or displayed, based on the criteria described after the keyword where.

The create table statement is used to create a new table. Here is the format of a simple create table statement:

```
create table "tablename"
("column1" "data type",
 "column2" "data type",
 "column3" "data type");
```

Format of create table if you were to use optional constraints:

```
create table "tablename"
("column1" "data type"
      [constraint],
 "column2" "data type"
      [constraint],
 "column3" "data type"
      [constraint]);
[ ] = optional
```

Note: You may have as many columns as you'd like, and the constraints are optional.

Example:

```
create table employee
(first varchar(15),
 last varchar(20),
 age number(3),
 address varchar(30),
 city varchar(20),
 state varchar(20));
```

^[2]To create a new table, enter the keywords create table followed by the table name, followed by an open parenthesis, followed by the first column name, followed by the data type for that column, followed by any optional constraints, and followed by a closing parenthesis. It is important to make sure you use an open parenthesis before the beginning table, and a closing parenthesis after the end of the last column definition. Make sure you separate each column definition with a comma. All SQL statements should end with a ";".

The table and column names must start with a letter and can be followed by letters, numbers,

or underscores — not to exceed a total of 30 characters in length. Do not use any SQL reserved keywords as names for tables or column names (such as "select", "create", "insert", etc).

Data types specify what the type of data can be for that particular column. If a column called "Last_Name", is to be used to hold names, then that particular column should have a "varchar" (variable-length character) data type.

Note: Here are the most common data types:

| | |
|----------------|--|
| char(size) | Fixed-length character string. Size is specified in parenthesis. Max 255 bytes. |
| varchar(size) | Variable-length character string. Max size is specified in parenthesis. |
| number(size) | Number value with a max number of column digits specified in parenthesis. |
| Date | Date value |
| number(size,d) | Number value with a maximum number of digits of "size" total, with a maximum number of "d" digits to the right of the decimal. |

What are constraints? When tables are created, it is common for one or more columns to have constraints associated with them. A constraint is basically a rule associated with a column that the data entered into that column must follow. For example, a "unique" constraint specifies that no two records can have the same value in a particular column. They must all be unique. The other two most popular constraints are "not null" which specifies that a column can't be left blank, and "primary key". A "primary key" constraint defines a unique identification of each record (or row) in a table.

The **insert** statement is used to insert or add a row of data into the table.

To insert records into a table, enter the key words **insert into** followed by the table name, followed by an open parenthesis, followed by a list of column names separated by commas, followed by a closing parenthesis, followed by the keyword **values**, followed by the list of values enclosed in parenthesis. The values that you enter will be held in the rows and they will match up with the column names that you specify. Strings should be enclosed in single quotes, and numbers should not.

```
insert into "tablename"
(first_column,...last_column)
values (first_value,...last_value);
```

In the example below, the column name first will match up with the value 'Luke', and the column name state will match up with the value 'Georgia'.

Example:

```
insert into employee
(first, last, age, address, city, state)
values ('Luke', 'Duke', 45, '2130 Boars Nest',
'Hazard Co', 'Georgia');
```

Note: All strings should be enclosed between **single** quotes: 'string'

Updating Records

The **update** statement is used to update or change records that match a specified criteria. This is accomplished by carefully constructing a where clause.

```
update "tablename"
set "columnname" =
    "newvalue"
[, "nextcolumn" =
    "newvalue2"...]
where "columnname"
    OPERATOR "value"
[and|or "column"
    OPERATOR "value"];
[ ] = optional
```

Examples:

```
update phone_book
    set area_code = 623
    where prefix = 979;
update phone_book
    set last_name = 'Smith', prefix=555, suffix=9292
    where last_name = 'Jones';
update employee
    set age = age+1
    where first_name='Mary' and last_name='Williams';
```

Deleting Records

The delete statement is used to delete records or rows from the table.

```
delete from "tablename"
where "columnname"
    OPERATOR "value"
[and|or "column"
    OPERATOR "value"];
[ ] = optional
```

Examples:

```
delete from employee;
```

Note: if you leave off the where clause, all records will be deleted!

```
delete from employee
    where lastname = 'May';
delete from employee
    where firstname = 'Mike' or firstname = 'Eric';
```

To delete an entire record/row from a table, enter "delete from" followed by the table name, followed by the where clause which contains the conditions to delete. If you leave off the where clause, all records will be deleted.

The drop table command is used to delete a table and all rows in the table.

To delete an entire table including all of its rows, issue the drop table command followed by the table name. Drop table is different from deleting all of the records in the table. Deleting all of the records in the table leaves the table including column and constraint information. Dropping the table removes the table definition as well as all of its rows.

```
drop table "tablename"
```

Example:

```
drop table myemployees_ts0211;
```

Words

| | | |
|-------------|-------------|------------|
| constraint | <i>v.</i> | 约束 |
| criteria | <i>v.</i> | 标准 |
| determine | <i>v.</i> | 确定, 求出, 计算 |
| parenthesis | <i>n.</i> | 括弧 |
| perform | <i>v.</i> | 执行, 完成任务 |
| proprietary | <i>adj.</i> | 专卖的, 专有的 |
| retrieve | <i>v.</i> | 查找, 找回 |
| underscore | <i>n.</i> | 下划线 “_” |
| uniquely | <i>adv.</i> | 惟一地 |

Phrases

| | |
|---------------------|------------|
| relational database | 关系数据库 |
| stands for | 代表, 代替, 象征 |
| such as | 例如 |

Abbreviations

| | |
|--|----------|
| ANSI (American National Standards Institute) | 美国国家标准学会 |
| SQL (Structured Query Language) | 结构化查询语言 |

Notes

[1] 例句: Although most database systems use SQL, most of them also have their own additional proprietary extensions that are usually only used on their system.

分析: 这并不是一个定语从句, most of them 指的是 database systems。 “that are usually only used on their system” 是一个定语从句, 修饰 extensions。

译文：虽然多数数据库系统使用 SQL，但是大多数的数据库在使用 SQL 语言时都有他们系统独有通常只被使用在他们的系统上的私有引伸。

- [2] 例句：To create a new table, enter the keywords create table followed by the table name, followed by an open parenthesis, followed by the first column name, followed by the data type for that column, followed by any optional constraints, and followed by a closing parenthesis.

分析：这是一个 to do 状语前置的句。连续几个 followed by...作为定语从句修饰 create table。

译文：创建一个新表，输入关键字 create table，后面输入表名，接着是左括弧，第一列的列名、数据类型、其他可选的约束条件，右括弧。

Exercises

I . Write true or false for the following statements according to the passage.

1. () Oracle only use the standard SQL commands.
2. () SQL is used to access with a database.
3. () Some common net database management systems use SQL.
4. () Tables are uniquely identified by their names and are comprised of columns and rows.
5. () A relational database system contains only one object called tables.
6. () The insert statement is used to update or change records that match a specified criteria.
7. () All SQL statements should end with a ".".
8. () The delete statement is used to delete the table.
9. () A constraint is basically a rule associated with a column that the data entered into that column must follow.
10. () Dropping the table removes the table definition as well as all of its rows.

II . Fill in the blanks according to the passage.

1. When tables are created, it is common for one or more columns to have _____ associated with them.
2. _____ specify what the type of data can be for that particular column.
3. A _____ constraint defines a unique identification of each record (or row) in a table.
4. SQL is used to communicate with a _____.
5. According to ANSI, SQL is the standard language for _____ database management systems.
6. Standard SQL commands such as "Select", "Insert", "____", "____", "Create", and "____" can be used to accomplish almost everything that one needs to do with a database.
7. Tables are uniquely identified by their names and are comprised of _____ and _____.
8. Make sure you separate each column definition with a _____. All SQL statements should end with a ";".

9. The table and column names must start with a _____ and can be followed by _____, _____, or underscores - not to exceed a total of _____ characters in length.

10. If a column called "Last_Name", is to be used to hold names, then that particular column should have a "_____ " data type.

III. Translate the following words and expressions into Chinese

- | | |
|------------------------|----------------------|
| 1. relational database | 6. SQL statements |
| 2. contains | 7. keyword |
| 3. determine | 8. open parenthesis |
| 4. data types | 9. followed by |
| 5. entire table | 10. table definition |

4.3.1 Reading Material

What's .NET?

.NET is both a business strategy from Microsoft and its collection of programming support for what are known as Web services, the ability to use the Web rather than your own computer for various services. Microsoft's goal is to provide individual and business users with a seamlessly interoperable and Web-enabled interface for applications and computing devices and to make computing activities increasingly Web browser-oriented. The .NET platform includes servers; building-block services, such as Web-based data storage; and device software. It also includes Passport, Microsoft's fill-in-the-form-only-once identity verification service.

The .NET platform is expected to provide:

- The ability to make the entire range of computing devices work together and to have user information automatically updated and synchronized on all of them.
- Increased interactive capability for Web sites, enabled by greater use of XML (Extensible Markup Language) rather than HTML.
- A premium online subscription service, that will feature customized access and delivery of products and services to the user from a central starting point for the management of various applications, such as e-mail, for example, or software, such as Office .NET.
- Centralized data storage, which will increase efficiency and ease of access to information, as well as synchronization of information among users and devices.
- The ability to integrate various communications media, such as e-mail, faxes, and telephones.
- For developers, the ability to create reusable modules, which should increase productivity and reduce the number of programming errors.

According to Bill Gates, Microsoft expects that .NET will have as significant an effect on the computing world as the introduction of Windows. One concern being voiced is that although .NET's services will be accessible through any browser, they are likely to function more fully on products designed to work with .NET code.

The full release of .NET is expected to take several years to complete, with intermittent releases of products such as a personal security service and new versions of Windows and Office that implement the .NET strategy coming on the market separately. Visual Studio .NET is a development environment that is now available. Windows XP supports certain .NET capabilities.

Words

| | | |
|------------|-------------|-----------------|
| business | <i>n.</i> | 商业 |
| collection | <i>n.</i> | 收集, 采集 |
| individual | <i>adj.</i> | 特殊的, 特有的, 独特的 |
| interface | <i>n.</i> | 分界面, 两个独立体系的相交处 |

Phrases

| | |
|-------------|--------|
| rather than | 宁愿, 宁肯 |
|-------------|--------|

Abbreviations

| | |
|----------------------------------|---------|
| XML (Extensible Markup Language) | 扩展标记语言 |
| HTML(HyperText Markup Language) | 超文本标记语言 |

4.3.2 正文参考译文

什么是 SQL?

SQL 代表结构化查询语言。SQL 用于数据库会话。按照 ANSI 的标准, 它是关系数据库管理系统的标准语言。SQL 语句用于更新或者检索数据库中的数据, 使用 SQL 的常见的关系数据库管理系统有: Oracle、Sybase、Microsoft SQL Server、Access、Ingres 等等。尽管大多数的数据库系统都使用 SQL, 但是他们大多都有针对自己系统的额外扩展。然而, 标准的 SQL 命令, 例如 "Select"、"Insert"、"Update"、"Delete"、"Create" 和 "Drop", 可以用来完成数据库中所需的任何任务。

一个关系数据库系统包含一个或者多个被称为“表”的对象。数据库中的数据或信息存储在这些表中。表由表名称来惟一标记, 由列和行组成。列包含列名、数据类型和其他的全部列的属性。行包含列的数据或记录。下面是一个“天气”表的例子。

| 天气 | | | |
|--------|-------|-----|----|
| 城市 | 州 | 高 | 低 |
| 菲尼克斯 | 亚里桑那 | 105 | 90 |
| 图森 | 亚里桑那 | 101 | 92 |
| 福莱格斯塔伏 | 亚里桑那 | 88 | 69 |
| 圣地亚哥 | 加利福尼亚 | 77 | 60 |
| 阿尔博克季 | 新墨西哥 | 80 | 72 |

选择语句用来查询数据，检索根据你设定的条件所检索到的数据。下面是一个选择语句的格式：

```
select "column1"  
    [, "column2", etc]  
from "tablename"  
    [where "condition"];  
    [] = optional
```

select 关键字后面的列名决定了哪些列将在结果中出现。你可以根据需要选择任意的列名，或者使用 **"*"** 来选择全部列。

关键字 **from** 后面的表名确定了为得到结果所要检索的表。

关键字 **where** 后面的从句基于标准的描述，**where** 从句 (可选项) 限定了哪些数据或者行将会被查到或者显示。

生成表的语句用来生成一个新表，这是一个简单的生成表语句的格式：

```
create table "tablename"  
    ("column1" "data type",  
    "column2" "data type",  
    "column3" "data type");
```

Format of create table if you were to use optional constraints:

```
create table "tablename"  
    ("column1" "data type"  
        [constraint],  
    "column2" "data type"  
        [constraint],  
    "column3" "data type"  
        [constraint]);  
    [ ] = optional
```

注意：可以生成任意多的列，约束条件是可选项。

例如：

```
create table employee  
    (first varchar(15),  
    last varchar(20),  
    age number(3),  
    address varchar(30),  
    city varchar(20),  
    state varchar(20));
```

生成一个新表时，输入关键字 **create table**，后面输入表名，接着是左括弧、第一列的列名、数据类型、其他可选的约束条件、右括弧。在表开始的地方使用左括弧，最后一列定义结束的地方使用右括弧很重要。必须用逗号隔开每一个列的定义。所有 **SQL** 语句结束

时都有个分号。

表名、列名的第一个字符必须用字母，后面可以用字母、数字或者下划线——长度不要超过 30 个字符。不要用 SQL 的保留字（例如 `select`、`create`、`insert` 等等）作表名和列名。

数据类型定义了指定列的数据的类型。如果一个列名为“姓”，用来存储名字，那这个列的数据类型为 `varchar`（可变长度的字符）。

注意：下面是最常用的数据类型：

| | |
|-----------------------------|---|
| <code>char(size)</code> | 定长字符串，括号里面设定长度，最长 255 字节 |
| <code>varchar(size)</code> | 不定长字符串，括弧里面限定了最大的长度 |
| <code>number(size)</code> | 数值（括弧里面限定最大位数） |
| <code>date</code> | 日期值 |
| <code>number(size,d)</code> | 数值（括弧里的 <code>size</code> 限定最大总位数， <code>d</code> 限定小数点以后的位数） |

什么是约束条件？表建立以后，不同的列通常有相关的约束条件。列的相关约束条件是一个规则，所有输入本列的数据必须遵守这一规则。例如，`unique` 约束条件限定了这一列中不能有两个相同列值的记录。它们必须是惟一的。另外两个常见的约束条件是 `not null` 和 `primary key`，`not null` 限制了列不能有空数据，`primary key` 约束为每一条记录(或者行)定义了一个惟一的标志。

插入语句用来在表中插入或增加一行数据。

向表中插入数据时，关键字 `insert into` 后面依次是表名、左括弧、用逗号分开的不同列名、右括弧、关键字 `values`、括弧里面的数值列表。输入的数值将按照指定的列名存储到一行中。字符串要用单引号，数字不用。

```
insert into "tablename"
(first_column,...last_column)
values (first_value,...last_value);
```

在下面的例子中，列名为 `first` 的将被输入数值 `luke`，列 `state` 将被输入 `Georgia`。

例子：

```
insert into employee
(first, last, age, address, city, state)
values ('Luke', 'Duke', 45, '2130 Boars Nest',
'Hazard Co', 'Georgia');
```

注意：所有的字符串都要放在单引号之间：'string'。

更新记录：

更新语句用来按照某一标准更新或修改记录。这需要通过仔细构造一个 `where` 从句来实现。

```
update "tablename"
set "columnname" =
"newvalue"
[, "nextcolumn" =
"newvalue2"...]
where "columnname"
```

```

    OPERATOR "value"
[and|or "column"
    OPERATOR "value"];
[] = optional

```

例如:

```

update phone_book
    set area_code = 623
    where prefix = 979;
update phone_book
    set last_name = 'Smith', prefix=555, suffix=9292
    where last_name = 'Jones';
update employee
    set age = age+1
    where first_name='Mary' and last_name='Williams';

```

删除语句:

删除语句用来从表中删除记录或者行。

```

delete from "tablename"
where "columnname"
    OPERATOR "value"
[and|or "column"
    OPERATOR "value"];
[ ] = optional

```

例如:

```
delete from employee;
```

Note: if you leave off the where clause, all records will be deleted!

```

delete from employee
    where lastname = 'May';
delete from employee
    where firstname = 'Mike' or firstname = 'Eric';

```

要从表中删除一条完整的记录或行, 输入 “delete from”, 后面接着是表名, 包含删除条件的 where 从句。如果没有 where 从句, 表中所有记录都将被删掉。

删除表的命令用来删除表和表中的全部记录。

要删除一个完整的表和里面所有的记录, 输入 drop table 命令, 后面接着是表名。删除表与删除所有记录并不相同, 删掉所有记录以后还剩下包含列和约束条件的表。删除表则将记录和表的定义一起删掉了。

```
drop table "tablename"
```

例如:

```
drop table myemployees_ts0211;
```

4.4 Applications of Database

Database systems are designed to manage large bodies of information. ^[1]Management of data involves both defining structures for storage of information and providing mechanisms for the manipulation of information. In addition, the database system must ensure the safety of the information stored, despite system crashes or attempts at unauthorized access. If data are to be shared among several users, the system must avoid possible anomalous results.

Because information is so important in most organizations, computer scientists have developed a large body of concepts and techniques for managing data.

Databases are widely used. Here are some representative applications:

Banking: For customer information, accounts, and loans, and banking transactions.

Airlines: For reservations and schedule information. Airlines were among the first to use databases in a geographically distributed manner—terminals situated around the world accessed the central database system through phone lines and other data networks.

Universities: For student information, course registrations, and grades.

Credit card transactions: For purchases on credit cards and generation of monthly statements.

Telecommunication: For keeping records of calls made, generating monthly bills, maintaining balances on prepaid calling cards, and storing information about the communication networks.

Finance: For storing information about holdings, sales, and purchases of financial instruments such as stocks and bonds.

Sales: For customer, product, and purchase information.

Manufacturing: For management of supply chain and for tracking production of items in factories, inventories of items in warehouses/stores, and orders for items.

Human Resources: For information about employees, salaries, payroll taxes and benefits, and for generation of paychecks.

Databases form an essential part of almost all enterprises today.

Over the course of the last four decades of the twentieth century, use of databases grew in all enterprises. In the early days, very few people interacted directly with database systems, although without realizing it they interacted with databases indirectly—through printed reports such as credit card statements, or through agents such as bank tellers and airline reservation agents. Then automated teller machines came along and let users interact directly with databases. Phone interfaces to computers (interactive voice response systems) also allowed users to deal directly with databases—a caller could dial a number, and press phone keys to enter information or to select alternative options, to find flight arrival/departure times, for example, or to register for courses in a university.

The Internet revolution of the late 1990s sharply increased direct user access to databases. Organizations converted many of their phone interfaces to databases into Web interfaces, and

made a variety of services and information available online. For instance, when you access an online bookstore and browse a book or music collection, you are accessing data stored in a database. When you enter an order online, your order is stored in a database. When you access a bank Web site and retrieve your bank balance and transaction information, the information is retrieved from the bank's database system. When you access a Web site, information about you may be retrieved from a database, to select which advertisements should be shown to you. Furthermore, data about your Web accesses may be stored in a database.

Thus, although user interfaces hide details of access to a database, and most people are not even aware they are dealing with a database, accessing databases forms an essential part of almost everyone's life today.

The importance of database systems can be judged in another way—today, database system vendors like Oracle are among the largest software companies in the world, and database systems form an important part of the product line of more diversified companies like Microsoft and IBM.

Words

| | | |
|-------------------|-------|-----------------------|
| access | v. | 存取, 读取, 访问 |
| despite | prep. | 不管, 不论 |
| diversified | adj. | 多边化的, 多元化的 |
| interface | n. | 交互界面, 接口 |
| manipulation | n. | 操作 |
| manufacturing | n. | 制造业 |
| mechanism | n. | 机制 |
| reservation | n. | 保留, 预定 |
| telecommunication | n. | 电讯, 电信学 |
| transaction | n. | 处理, 交易 |
| Oracle | n. | 甲骨文公司(全球最大的数据库产品公司之一) |

Phrases

| | |
|--------------|----|
| access to | 接通 |
| for instance | 例如 |

Abbreviations

| | |
|---------------------------------------|---------------|
| IBM (International Business Machines) | (美国) 国际商业机器公司 |
|---------------------------------------|---------------|

Notes

- [1] 例句: Management of data involves both defining structures for storage of information and providing mechanisms for the manipulation of information.

分析: 这是一个 both...and...语句, 从句只修饰 providing mechanisms, 而不修

饰 and 前面的部分。

译文：数据管理既包括定义信息的存储结构，也包括提供信息的处理机制。

Exercises

I . Write true or false for the following statements according to the passage.

1. () Data couldn't be shared among several users in database system.
2. () Databases form an essential part of almost all enterprises today.
3. () Databases are widely used.
4. () Over the course of the last four centuries, use of databases grew in all enterprises.
5. () When you access an online bookstore and browse a book, you are accessing a database.
6. () In the early days, many people interacted directly with database systems.
7. () Oracle is the largest database system vendor in the world.
8. () The internet revolution sharply increased direct user access to databases.
9. () Computer scientists have developed a large body of concepts and techniques for managing

data.

10. () Most people are aware they are dealing with a database.

II . Fill in the blanks according to the passage.

1. The _____ of the late 1990s sharply increased direct user access to databases.
2. When you enter an order online, your _____ is stored in a database.
3. The database system must ensure the _____ of the information stored.
4. If data are to be shared among _____ the system must avoid possible anomalous results.
5. Databases are widely used in _____, _____, _____, _____, _____, _____, _____, _____, _____.
6. Teller machines let users interact _____ with databases.
7. Management of data involves both _____ for storage of information and _____ for the manipulation of information.
8. _____ to computers (interactive voice response systems) also allowed users to deal directly with databases.
9. User interfaces hide _____ of access to a database.
10. Database systems form an important part of the _____ of more diversified companies like Microsoft and IBM.

III. Translate the following words and expressions into Chinese.

- | | |
|------------------------------|---------------------------|
| 1. phone lines | 6. data networks |
| 2. monthly bills | 7. communication networks |
| 3. Human Resources | 8. credit card statements |
| 4. airline reservation agent | 9. internet revolution |
| 5. phone interface | 10. a variety of services |

4.4.1 Reading Material

Database New Horizon

The modern database era began in 1970, when E.F. Codd published his paper "A Relational Model of Data for Large Shared Data Banks." His ideas enabled the logical manipulation of data to be independent of its physical location, greatly simplifying the work of application developers.

Now we are poised for another leap forward. Databases will scale to gargantuan proportions, span multiple locations and maintain information in heterogeneous formats. And they will be autonomous and self-tuning. The major database vendors are pursuing these goals in different ways.

Thirty years ago, IBM researcher Selinger invented "cost-based" query optimization, by which searches against relational databases such as IBM's DB2 minimized computer resources by finding the most efficient access methods and paths. Now Selinger is leading an effort at IBM called Leo—for Learning Optimizer—that she says will push DB2 optimization into a new realm.

Rather than optimizing a query once, when it's compiled, Leo will watch production queries as they run and fine-tune them as it learns about data relationships and user needs. For example, Leo would come to realize that a ZIP code can be associated with only one state, or that a Camry is made only by Toyota, even if those rules aren't specified in advance.

Selinger says Leo will be most helpful in large and complex databases, and in databases where interdata relationships exist but aren't explicitly declared by database designers. Leo is likely to be included in commercial releases of DB2 in about three years, she says.

Whether the future of databases is the traditional, relational and SQL model with XML technologies incorporated into it or a new XML-based model is a matter of debate. XML will become the dominant format for data interchange with its flexibility and ability to provide self-description, according to Don Chamberlin, a database technology researcher at IBM.

Relational databases, he said, will be fitted with front ends to support XML and process queries based on the XQuery standard. XML will become the "lingua franca" for exchange of data. "We'll also see some large relational systems adapt to XML as a native format," Chamberlin said. Technologists are in the early stages of development of XML technologies. SQL will not go away, but there are new data formats for which it just was not designed, he said.

Sun's Rick Cattell, a distinguished engineer at the company, had a less dominant outlook for XML, saying very few people are going to store XQuery data in an XML format. "I think the momentum behind relational databases is insurmountable," Cattell said, adding that he was drawing on his experience with object-oriented databases, which were unable to unseat relational databases in enterprise IT shops. Developers, Cattell said, will need tools to convert relational data to XML and vice versa.

Currently, performance on the Web is hindered because of translations between Java and XML data formats. Eventually, an extension of XQuery will replace both Java and SQL,

according to some experts.

The next step in the evolution of databases is to provide a more powerful way to query them than what is being done on search sites such as Google today.

Experts are expecting tuple space technology, which is intended to make it easier to store and fetch data by recognizing patterns. And in-memory databases technology is a "no-brainer," but there is not enough memory available yet to accommodate it.

Microsoft Corp. says users will never be persuaded to dump everything—e-mail, documents, audio/video, pictures, spreadsheets and so on—into one gigantic database. Therefore, the software vendor is developing technology that will allow a user to seamlessly reach across multiple, heterogeneous data stores with a single query.

Microsoft's Unified Data project involves three steps. First, the company will devise "schema" based on XML that define data types. Then it will develop methods for relating different data types to each other and finally develop a common query mechanism for distributed databases. For example, I want to search for a document that references Microsoft, and the document "tells" the query that there's also a media file in another place that references Microsoft.

The technology will appear in 18 months in SQL Server. It will be added to other Microsoft products in ensuing years.

Oracle Corp. says its customers are moving toward data stores of huge size and complexity, spread over multiple locations. The company says its products will not only evolve to handle those kinds of jobs, but will also do them extraordinarily well. "Over the next couple of releases, we'll see essentially fully autonomous databases," says Robert Shimp, vice president of database marketing.

Oracle also wants to facilitate collaboration for people in different companies with widely varying information types. "What doesn't exist today is the underlying infrastructure, or plumbing, that's capable of managing all these diverse types of data," Shimp says. "What you need is the ability to link all these clustered databases around the globe into a single, unified view for the individual user."

Elsewhere, researchers are finding that the best design for some database applications isn't a traditional database at all, but rather data streams. Researchers at Stanford University are working on ways that continuous flows of information—such as Web site hits, stock trades or telecommunications traffic—can be passed through queries and then archived or discarded. A query might, for example, be written to look continuously for suspicious patterns in network traffic and then spit out an alert.

The problem in handling some kinds of problems with a traditional database management system is one of timeliness, says Jennifer Widom, a computer science professor at Stanford. "If you want to put a stream of data into a DBMS, you have to at some point stop, create a load file, load the data and then query it," she says. "Data stream queries are continuous; they just sit there and give you new answers automatically."

Widom and her colleagues are developing algorithms for stream queries, and she says her group will develop a comprehensive data stream management system. A prototype of such a system will take a number of years to develop, and the underlying technology will then be either licensed or offered as freeware, she says.

Words

| | | |
|--------------|-------------|------------------|
| gargantuan | <i>adj.</i> | 庞大的 |
| horizon | <i>n.</i> | 眼界, 视界; 范围, 见识 |
| logical | <i>adj.</i> | 逻辑的, 逻辑上的; 逻辑学上的 |
| manipulation | <i>n.</i> | 操纵, 处理 |
| simplify | <i>n.</i> | 使简单, 简化 |
| ZIP | <i>n.</i> | (文件等的) 压缩 |

Abbreviations

| | |
|-----------------------------------|---------|
| DB (Data Base) | 数据库 |
| DBMS (DataBase Management System) | 数据库管理系统 |

4.4.2 正文参考译文

数据库应用

数据库系统被设计用来处理海量数据。数据管理既包括定义信息的存储结构, 也包括提供信息的处理机制。此外, 即使发生系统瘫痪或有非法访问, 数据库系统也必须保证所存储数据的安全。如果多用户共享数据库, 系统必须避免可能的不正确结果。

因为数据在大部分组织中都很重要, 计算机科学家已经为管理数据开发了大规模的理论和技术体系。

数据库被广泛地应用, 以下是一些代表性的应用:

银行业务: 用于客户数据、帐户和贷款以及银行交易。

航空公司: 通过分布于全球各地的终端来预定机票和查询时间表是航空公司对于数据库的首要应用, 终端机利用电话线和其他的数据网络访问中央数据库系统。

大学: 用于学生数据、课程注册和分级。

信用卡交易: 用于刷卡购物和产生月结账单。

电讯: 用于保存通话记录, 产生每月的账单, 保存预付费电话卡上的结余, 而且存储有关网络的资讯。

财务: 用于存储各种信息, 例如财物、销售、股票和债券之类的金融交易。

销售业: 用于客户、产品和进货数据。

制造业: 用于供应链的管理和跟踪工厂的项目生产、库存清单、订单。

人力资源: 用于有关信息, 如职位、薪水、薪资税和福利, 以及工资支票。

数据库现在几乎是所有企业一个必要的部分。

20 世纪最后 40 年的进程中, 数据库的使用在所有的企业中不断扩大。在早期, 很少

有人直接的受数据库系统影响，虽然不很清楚细节，他们还是间接的利用数据库——经过印刷的报告，例如信用卡使用情况，或经过代理人，像是银行工作人员和航空公司代理人。然后自动取款机出现，让用户直接使用数据库。用于计算机的电话交互（交互式声音回应系统）也能让用户直接与数据库打交道——举例来说，一位来电者可以拨一个数字，按电话机的键输入信息或选择其他可能的选项，以获悉班机抵达或起飞的时间，或注册一所大学的课程。

20 世纪 90 年代后期的 Internet 革命顺理成章地增加了直接访问数据库的用户。他们访问数据库的电话接口多数转换为互联网接口，而且各种服务信息都可以通过在线完成。举例来说，当你访问一家在线书店，浏览一本书或音乐专辑的时候，你就是在存储在一个数据库中的数据。当你进入一个在线购物时，你的订单被存储在一个数据库中。当你访问一个银行网站，并且获取你的银行余额和交易数据的时候，数据从银行的数据库系统被取出。当你访问一个网站的时候，你的信息可能从一个数据库取出，用于选择该给你看哪一些广告。此外，你访问网络的信息也可能被存储在某个数据库中。

因此，虽然用户界面隐藏了存取数据库的细节，而且绝大多数的人甚至不知道他们正在利用数据库处理事务，但存取数据库构成几乎每个人今天生活的一个必要的部分。

现在数据库系统的重要性可以用另一种方式判断出——数据库系统厂商，例如甲骨文是世界上最大软件公司之一，并且在微软和 IBM 这样多元化的公司中，数据库系统是产品线的一个重要组成部分。

Chapter 5 Programming Language

5.1 Algorithms and Flowcharts

The computer scientist Niklaus Wirth stated that:

$$\text{Programs} = \text{Algorithms} + \text{Data}$$

The algorithm is part of the blueprint or plan for the computer program; an algorithm is: "An effective procedure for solving a problem in a finite number of steps."

It is effective, which means that an answer is found and it finishes, that is it has a finite number of steps. A well-designed algorithm will always provide an answer, and it may not be the answer you want but there will be an answer. It may be that the answer is that there is no answer. A well-designed algorithm is also guaranteed to terminate.

The key features of an algorithm are:

Sequence (also known as Process),

Decision (also known as Selection)

Repetition (also known as Iteration or Looping)

In 1964 the mathematicians Corrado Bohm and Guiseppe Jacopini demonstrated that any algorithm can be stated using sequence, decision and repetition. The work of Bohm and Jacopini was of great importance since it eventually led to the disciplines of structured program design that are much used today.

Sequence means that each step or process in the algorithm is executed in the specified order. In an algorithm each process must be in the correct place, otherwise the algorithm will most probably fail.

The Decision constructs—If ... then, If ... then ... else ...

In algorithms the outcome of a decision is either true or false, and there is no in between. The outcome of the decision is based on some condition that can only result in a true or false value^[1].

The decision takes the form: if proposition then process

A proposition in this sense is a statement, which can only be true or false. It is either true that today is Wednesday or false that today is Wednesday. It can't be both true and false. If the proposition is true then the process, which follows the then, is executed.

The decision can also be stated as:

if proposition

then process1

else process2

This is the if ... then ... else ... form of the decision. This means that if the proposition is true

then execute process1 else or otherwise execute process2.

The first form of the decision if proposition then process has a null else, that is, there is no else.

The Repetition constructs—Repeat and While

Repetition takes two forms, the Repeat loop and the While loop.

The repeat loop is used to iterate or repeat a process or sequence of processes until some condition becomes true. It has the general form:

```
Repeat
Process1
Process2
ProcessN
Until proposition
```

The repeat loop does some processing before testing the state of the proposition.

The while loop is used to iterate or repeat a process or sequence of processes while some condition becomes true. It has the general form:

```
While proposition
Process1
Process2
ProcessN
```

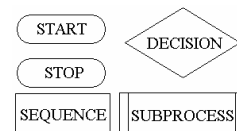
The while loop tests the state of the proposition first.

There are four different ways of stating algorithms: Step-Form, Pseudocode, Flowchart, and Nassi-Schneiderman.

The first two are written forms. The written form is just normal language.^[2] A problem with human language is that it can seem to be imprecise. In terms of meaning, what I write may not be the same as what you read.^[3] Pseudocode is also human language but tends toward more precision by using a limited vocabulary.

The last two are graphically-oriented, that is they use symbols and language to represent sequence, decision and repetition.

Flow charts are a graphical method of designing programs and once the rules are learned they are very easy to draw. A well-drawn flow chart is also very easy to read.



The major symbols are the DECISION (also known as selection) and the SEQUENCE (or process) symbols. The START and STOP symbols are called the terminals. The SUBPROCESS symbol is a variation on the sequence symbol.

Words

| | | |
|-----------|-----------|--------|
| algorithm | <i>n.</i> | [数]算法 |
| decision | <i>n.</i> | 决定, 判断 |
| design | <i>n.</i> | 设计 |

| | | |
|------------|----|--------|
| | v. | 设计 |
| discipline | n. | 纪律, 学科 |
| | v. | 训练 |
| iteration | n. | 反复 |
| procedure | n. | 程序 |
| pseudocode | n. | 伪代码 |
| repetition | n. | 重复, 循环 |
| sequence | n. | 顺序, 序列 |
| structure | n. | 结构 |
| | v. | 构成, 组织 |
| terminate | v. | 停止, 结束 |

Notes

- [1] 例句: The outcome of the decision is based on some condition that can only result in a true or false value.

分析: 本句为复合句, condition 前是主句, condition 后是 that 引导的定语从句, 修饰 condition. 句中 result in... 意为“产生某种作用或结果”。例如: Our effort resulted in success. 我们的努力终于成功了。

译文: 判定的结果基于某些条件, 条件的结果可能是真值或假值。

- [2] 例句: A problem with human language is that it can seem to be imprecise.

分析: 本句是复合句。句中 that it can seem to be imprecise 为表语从句, 做 is 的表语, 其中 it 指代“人类语言”。

译文: 人类语言的问题是它可能看起来不精确。

- [3] 例句: Pseudocode is also human language but tends toward more precision by using a limited vocabulary.

分析: 本句是并列句, 连词 but 连接表转折意义的两个分句。句中 tends towards..., 意为“倾向……”, “趋于……”; by using a limited vocabulary 是介词短语做状语, 修饰 tends。

译文: 伪代码也是人类语言, 但通过使用少量的词汇而倾向于更精确。

Exercises

I. Write true or false for the following statements according to the passage.

- () Any algorithm can be stated using sequence, decision and repetition.
- () Sequence means that each step or process in the algorithm is executed in the specified order.
- () In algorithms the outcome of a decision is Neither true Nor false.
- () If the proposition is false then the process, which follows the then, is executed.
- () The repeat loop does some processing after testing the state of the proposition.

6. () The while loop does some processing after testing the state of the proposition or does not do anything.
7. () Decision is also known as Iteration.
8. () Repetition is also known as Selection or Looping.
9. () The outcome of the decision is based on some condition that can only result in a true or false value.
10. () An algorithm may be written down as a flowchart.

II. Fill in the blanks according to the passage.

1. _____ is: An effective procedure for solving a problem in a finite number of steps.
2. An algorithm may be written down as _____ for a computer, or as a _____.
3. A well-designed algorithm is guaranteed to _____.
4. Sequence is the key feature of an _____.
5. Decision boxes are _____ shaped.
6. Flowchart is _____-oriented.
7. Human language can seem to be _____.
8. Pseudocode is also human language but tends toward more _____ by using a limited vocabulary.
9. A _____ flow chart is very easy to read.
10. In algorithms the outcome of a _____ is either true or false

III. Translate the following words and expressions into Chinese.

- | | |
|---------------|-------------------|
| 1. scientist | 6. execute |
| 2. program | 7. order |
| 3. finite | 8. correct |
| 4. condition | 9. construct |
| 5. importance | 10. well-designed |

5.1.1 Reading Material 1

Some Rules for Well-drawn Flow Charts

Well-drawn flow charts are easy to read. Here are a few rules for well-drawn flow charts:

Every flowchart has a START symbol and a STOP symbol.

The flow of sequence is generally from the top of the page to the bottom of the page. This can vary with loops which need to flow back to an entry point.

Use arrow-heads on connectors where flow direction may not be obvious.

There is only one flow chart per page.

A page should have a page number and a title.

A flow chart on one page should not break and jump to another page.

A flow chart should have no more than around 15 symbols (not including START and STOP).

Words

| | | |
|------------|-------------|------|
| arrow-head | <i>n.</i> | 箭头 |
| connector | <i>n.</i> | 连线 |
| well-drawn | <i>adj.</i> | 画得好的 |

5.1.2 Reading Material 2

Algorithm Design and Implementation

This course introduces a set of fundamental design principles and problem-solving techniques for the construction and implementation of computer algorithms. Problem solutions are developed in a design language such as Pseudocode and then coded in a high-level structured programming language. (Consult the Computer Science Department for the language currently in use.) Topics such as problem specification, top-down design with stepwise refinement, standard data types, control structures, subprograms, modular design, and parameter passing are presented through a study of specific example algorithms. Style, documentation, solution robustness, and conformance with specifications are emphasized throughout.

Prerequisites: High school algebra I & II.

Goals:

The purpose of this course is to present a coherent set of tools and techniques for the development of computer solutions to simple problems in data manipulation and report generation. Upon completion of the course, a student should be able to: analyze a problem statement for completeness and clarity; use the method of top-down, modular, structured design to develop a hierarchy chart (structure chart) and a set of Pseudocode modules for a problem solution; convert this solution into source code in the designated high-level language in accordance with a well-defined set of style rules; debug and test the program; and provide clear documentation for the result.

Topics:

the "problem-solving universe"

- operational definition of computer (specifically, electronic digital stored-program computer)
- components of a typical computer
- fundamental computer capabilities (read, write, store, compute, compare)

formulating precise specifications for a problem and its solution

- preconditions and post conditions

- specification of user requirements in measurable terms

tools for algorithm development

- algorithm design languages (Pseudocode, flowcharts)
- top-down design and stepwise refinement (including contrast with bottom-up design)
- structure charts (hierarchy charts)
- subprograms (procedures, functions) and the modular design of algorithms
- standard control structures:
 - sequence, decision, loop (pre-test, post-test, count- controlled), module
- nested control structures
- decision tables, decision trees
- identifiers, variables, constants, expressions

typing and structuring of data

- standard data types:
 - numeric (integer vs. real)
 - character, character string
 - boolean
 - file type (for sequential text files)
 - record types
 - array types
- primitive data structures:
 - simple variables
 - record variables
 - arrays
 - character strings

some common algorithmic techniques

- the Initialize/Process/Terminate (IPT) paradigm
- file operations (create, open, close, read, write)
- sequential processing of data records
- end-of-file testing
- report generation (headers, footers, page breaks, simple control breaks)

- use of counters and accumulators
- numeric computations (evaluating formulas, generating sequences, printing tables)
- exchanging (swapping) data values
- complex decisions and branching
- testing and validating data
- use of 'flag' variables
- finding maximum and minimum values
- array manipulations (filling, summing, searching, printing)
- uses of record variables

communication between modules:

- formal parameters, arguments, parameter passing, inheritance

coding algorithms in a high-level language

- overall structure of a program (including stylistic layout)
- internal and external documentation
- nesting of procedures and functions
- declarations, formal parameter lists
- file variables and file operations
- input/output (keyboard and file)
- translation of standard control structures
- arithmetic expressions
- assignment statements, type compatibility
- boolean expressions

implementing an algorithm on the computer

- transcribing a pseudocode algorithm into a programming language
- log-in procedures, customizing the account
- creating a source file
- compiling the program; compilation errors
- generation of test data
- executing the program; run-time (execution) errors

Words

accordance *n.* 一致, 和谐

| | | |
|---------------|-------------|------------------|
| boolean | <i>adj.</i> | 布尔数学体系的 |
| clarity | <i>n.</i> | 清楚, 透明 |
| coherent | <i>adj.</i> | 粘在一起的, 一致的, 连贯的 |
| conformance | <i>n.</i> | 顺应, 一致 |
| consult | <i>v.</i> | 参考 |
| designated | <i>adj.</i> | 指定的, 派定的 |
| documentation | <i>n.</i> | 文件 |
| emphasize | <i>v.</i> | 强调, 着重 |
| formulate | <i>v.</i> | 明确地叙述 |
| identifier | <i>n.</i> | 标识符 |
| module | <i>n.</i> | 模数, 模块, 登月舱, 指令舱 |
| paradigm | <i>n.</i> | 范例 |
| parameter | <i>n.</i> | 参数 |
| primitive | <i>adj.</i> | 原始的, 简单的 |
| refinement | <i>n.</i> | 精致, 细化 |
| robustness | <i>adj.</i> | 耐用性 |
| solution | <i>n.</i> | 解答, 解决方案 |
| specification | <i>n.</i> | 详述, 规格, 说明书, 规范 |
| stepwise | <i>adj.</i> | 逐步的 |
| style | <i>n.</i> | 风格 |
| validate | <i>v.</i> | 确认 |

5.1.3 正文参考译文

算法和流程图

计算机科学家 Niklaus Wirth 提出这样的公式: 程序=算法+数据。

算法是计算机程序的蓝图或计划的一部分, 一个算法就是: “用有限的步骤解决问题的有效的过程。”

所谓有效, 就是说找到了答案并且停止了, 也就是说有有限的步骤。一个设计良好的算法总是能得到答案, 也许不是希望的答案但是会有答案。也可能答案本身就是没有答案。一个设计良好的算法应该保证能够终止。

算法的主要特征如下:

顺序 (或者处理)、判断 (或者选择)、循环 (或者重复)。

数学家 Bohm 和 Jacopini 于 1964 年证明: 任何一个程序均可用 “顺序”、“判断” 和 “循环” 来陈述。Bohm 和 Jacopini 的工作非常有意义, 因为它最终发展成为当前应用广泛的结构化定理。

顺序算法就是处理过程的每一步以特定的顺序执行, 在这种算法中的每一个过程要处在正确的位置, 否则算法可能会失败。

判断结构——If...then, If...then...else...

判断算法的结果或者是真或者是假, 不可能有中间值。判断的结果基于某些条件, 条

件的结果只可能是真值或假值。

判断语句的形式为：if（条件）then（过程）

此形式中的条件是一个状态，只能是真或假，譬如：今天是星期三这个说法或者是真或者是假，不可能又是真又是假。如果条件是真，then 后的过程被执行。

判断语句还可以写成如下形式：

if（条件）

then 过程 1

else 过程 2

这是 if ... then ... else ...形式的判断语句，表示如果条件的结果为真，则执行过程 1，否则执行过程 2。

第一种形式的判断语句的 else 为空，也就是说没有 else。

循环结构——直到型循环和当型循环

循环有两种形式，直到型循环和当型循环。

直到型循环用来重复一些过程直到条件为真，一般形式如下：

(略)

这种循环在测试条件状态之前先执行过程。

当型循环当条件为真时重复一些过程，一般形式如下：

(略)

当型循环先测试条件的状态。

有四种表示算法的方法：Step-Form、伪代码、流程图和 N-S 流程图

前两种方法是书写形式的，是普通语言。人类语言的问题是它可能看起来不精确，也就是说作者所写的和读者读到的可能不一致。伪代码也是人类语言，但通过使用少量的词汇而倾向于更精确。

后面的两种是面向图形的，也就是说它们使用符号和语言来表示顺序、判断和循环。

流程图是程序设计的图形表示法，只要掌握了规则，就很容易画流程图，画得好的流程图也很容易读。

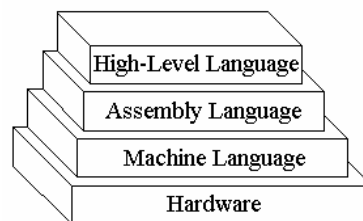
主要的符号是判断（或者选择）和顺序（处理），开始和结束的符号称为端点符号，子过程的符号是顺序符号的变形。

5.2 Introduction of Programming Languages

A programming language is a defined set of instructions that are used to make a computer perform a specific task. Written using a defined vocabulary the programming language is either compiled or interpreted by the computer into the machine language that is understood by the processor.

There are several types of programming languages, the most common are:

High-level Languages—these are written using terms and vocabulary that can be understood and written in a



similar manner to human language.^[1] They are called high-level languages because they remove many of the complexities involved in the raw machine language that computers understand. The main advantage of high-level languages over low-level languages is that they are easier to read, write, and maintain. All high-level languages must be compiled at some stage into machine language. The first high-level programming languages were designed in the 1950s. Now there are dozens of different languages, including BASIC, COBOL, C, C++, FORTRAN and Pascal.

Scripting Languages—like high-level languages, scripting languages are written in manner similar to human language. Generally, scripting languages are easier to write than high-level languages and are interpreted rather than compiled into machine language. Scripting languages, which can be embedded within HTML, commonly are used to add functionality to a Web page, such as different menu styles or graphic displays, or to serve dynamic advertisements. These types of languages are client-side scripting languages, affecting the data that the end user sees in a browser window. Other scripting languages are server-side scripting languages that manipulate the data, usually in a database, on the server. Scripting languages came about largely because of the development of the Internet as a communications tool. Some examples of scripting languages include VBScript, JavaScript, ASP and Perl.

Assembly Language—assembly language is as close as possible to writing directly in machine language. Due to the low level nature of assembly language, it is tied directly to the type of processor and a program written for one type of CPU generally will not run on another.

Machine language—The lowest-level programming language. Machine languages are the only languages understood by computers. While easily understood by computers, machine languages are almost impossible for humans to use because they consist entirely of numbers. Programmers, therefore, use either a high-level programming language or an assembly language. An assembly language contains the same instructions as a machine language, but the instructions and variables have names instead of being just numbers.

Programs written in high-level languages are translated into assembly language or machine language by a compiler. Assembly language programs are translated into machine language by a program called an assembler.

Every CPU has its own unique machine language. Programs must be rewritten or recompiled, therefore, to run on different types of computers.

For now, let's talk about some high level languages very briefly, which are used by professional programmers in the current mainstream software industry.

- C

This is probably the most widely-used, and definitely the oldest, of the three languages I mentioned. It's been in use since the 70s, and is a very compact (i.e. not much "vocabulary" to learn), powerful and well-understood language.

- C++

This language is a superset of C (that just means that it's C with more stuff added; it's more than C, and includes pretty much all of C). Its main benefit over C is that it's object oriented.^[2]

The key point is that object oriented languages are more modern, and using object oriented languages is the way things are done now in the programming world. So C++ is most definitely the second-most used language after C, and may soon become the most used language.

· Java

Java has a benefit which other programming languages lack: it's cross-platform. It means that it runs on more than one platform without needing to be recompiled. A platform is just a particular type of computer system, like Windows or Mac OS or Linux. Normally, if you wanted to use the same program on a different platform from the one it was written on, you'd have to recompile it—you'd have to compile a different version for each different platform. Sometimes, you'd also need to change some of your code to suit the new platform. This probably isn't surprising, since the different platforms work differently, and look different.

Java has another advantage that it runs inside web browsers, letting programmers create little applications which can run on web sites. However, Java also has a disadvantage, which is almost as serious: it's slow. Java achieves its cross-platform trick by putting what is essentially a big program on your computer which pretends to be a little computer all of its own. The Java runs inside this "virtual machine", which runs on whatever platform you're using (like Windows or Mac OS). Because of this extra layer between the program and the computer's processor chip, Java is slower than a program written and compiled natively for the same platform. Anyway, as the Internet develops, Java will be used more widely.

Words

| | | |
|----------------|-------------|------------------------|
| assembler | <i>n.</i> | 汇编程序 |
| compact | <i>adj.</i> | 紧凑的, 简洁的 |
| compile | <i>v.</i> | 编译 |
| compiler | <i>n.</i> | 编译器 |
| complexity | <i>n.</i> | 复杂性 |
| dozen | <i>n.</i> | 一打, 十二个 |
| cross-platform | | 跨平台 |
| instruction | <i>n.</i> | 指示, 指令 |
| interpret | <i>v.</i> | 解释, 口译, 认为是……的意思 |
| involve | <i>v.</i> | 包括 |
| involved | <i>adj.</i> | 棘手的, 有关的 |
| JavaScript | <i>n.</i> | Java 描述语言 |
| maintain | <i>v.</i> | 维护 |
| manipulate | <i>v.</i> | (熟练地) 操作, 使用 (机器等), 操纵 |
| Perl | <i>n.</i> | 一种通用编程语言, 可用于网络环境 |
| pretend | <i>v.</i> | 假装 |
| specific | <i>n.</i> | 细节 |
| | <i>adj.</i> | 特殊的, 特效的 |

| | | |
|-------|-----------|---------------------|
| stage | <i>n.</i> | 舞台, 活动场所, 发展的进程, 阶段 |
| stuff | <i>n.</i> | 原料, 素材资料 |
| | <i>v.</i> | 填充 |
| trick | <i>n.</i> | 诡计, 骗局, 诀窍 |
| | <i>v.</i> | 欺骗, 哄骗 |

Phrases

| | |
|------------------------|----------|
| due to | 由于, 应归于 |
| dynamic advertisements | 动态的广告 |
| Mac OS | Mac 操作系统 |
| scripting languages | 脚本语言 |
| super set | 超集, 父集 |
| virtual machine | 虚拟计算机 |

Abbreviations

| | |
|----------------------------------|-----------|
| ASP (Active Server Page) | 动态服务器主页 |
| HTML (Hypertext Markup Language) | 超文本链接标示语言 |
| OS (Operating System) | 操作系统 |
| VBScript (Visual Basic Script) | 描述语言 |

Notes

- [1] 例句: They are called high-level languages because they remove many of the complexities involved in the raw machine language that computers understand.

分析: 本句是复合句。句中 because 前是主句, because 后是原因状语从句。从句中 involved in the raw machine languages that computers understand 为过去分词短语, 做 complexities 的后置定语。

译文: 它们之所以被称为高级语言是因为它们去除了计算机所能理解的原始机器语言所包括的复杂性。

- [2] 例句: The key point is that object oriented languages are more modern, and using object oriented languages is the way things are done now in the programming world.

分析: 本句是 and 连接的并列句。在后一个分句中, using object oriented languages 是动名词短语做主语, 位于后面的动词用单数 is; things are done now in the programming world 为定语从句, 修饰 the way。修饰 way, distance, direction 等名词的定语从句, 通常可不用起连接作用的词, 有时也可用 that 但这时 that 在定语从句中做状语。

译文: 关键的一点是面向对象的语言更现代化, 使用该语言是当今程序世界处理事务的方式。

Exercises

I. Write true or false for the following statements according to the passage.

1. () Assemble languages are the only languages understood by computers.
2. () Low-level languages are easy to read, write, and maintain.
3. () Every CPU has its own unique machine language.
4. () Java achieves its cross-platform trick by putting what is essentially a big program on your computer which pretends to be a little computer all of its own. The Java runs inside a big program, which runs on whatever platform you're using.
5. () The Java runs inside a little computer of its own, which runs on whatever platform you're using.
6. () When we write a program in a high-level language, we have to compile a different version for each different platform.
7. () Java has a benefit which other programming languages lack: it's cross-platform.
8. () C++ program can run on more than one platform without needing to be recompiled.
9. () A platform is just a particular type of computer system, like Windows or Mac OS.
10. () Assembly language consist entirely of numbers.

II. Fill in the blanks according to the passage.

1. A programming language is a defined set of _____ that are used to make a computer perform a specific task.
2. High-level Languages are written using terms and vocabulary that can be understood and written in a manner _____ to human language.
3. An example of high level language is _____.
4. _____ can be embedded within HTML.
5. _____ is the lowest-level programming language.
6. C++ is _____.
7. _____ language is machine-oriented.
8. Java is _____ means that it runs on more than one platform without needing to be recompiled.
9. Java has an advantage that it runs inside _____.
10. Java has a disadvantage, which is almost as serious: _____.

III. Translate the following words and expressions into Chinese.

- | | |
|--------------|------------------|
| 1. program | 6. generally |
| 2. specific | 7. menu |
| 3. processor | 8. development |
| 4. manner | 9. communication |
| 5. advantage | 10. consist |

5.2.1 Reading Material 1

A Brief Word About Scripting

You've perhaps heard about something called scripting, or maybe you've heard of languages like JavaScript, VBScript, Tcl and others (those languages are called scripting languages). You may thus be wondering if scripting is the same as programming, and/or what the differences are, and so on. People get quite passionate about this question, so I'm just going to cover it briefly and technically. Here are some facts:

- Scripting is essentially a type of programming.
- Scripting languages have a few minor technical differences which aren't important to discuss at this point.
- Scripting languages tend to be interpreted rather than compiled, which means that you don't need to compile them—they're compiled "on the fly" (i.e. when necessary, right before they're run). This can make it faster to program in them (since you always have the source code, and don't need to take the deliberate extra step of compiling).
- The fact that scripting languages are interpreted generally makes them slower than programming languages for intensive operations (like complex calculations).
- Scripting languages are often easier to learn than programming languages, but usually aren't as powerful or flexible.
- For programming things like applications for personal computers, you'll need to use a programming language rather than a scripting language.

Scripting languages can be excellent for beginners: they tend to be easier to learn, and they insulate you from some of the technical aspects of programming (compiling, for one). However, if you're serious about programming, you won't be able to stay with a scripting language forever—you will move on to a programming language at some point. I'd say that it's good to know a scripting language or two, and even to start with a scripting language rather than a programming language. However, there's a point of view which says that, by protecting and "hand-holding" too much, scripting languages don't properly prepare you for "serious" programming, and set you up for a bit of a learning curve when you move on to a programming language.

Words

| | | |
|-------------|-------------|---------------------|
| deliberate | <i>adj.</i> | 故意的, 预有准备的 |
| essentially | <i>adv.</i> | 本质上, 本来 |
| insulate | <i>v.</i> | 使绝缘, 隔离 |
| intensive | <i>adj.</i> | 强烈的, 透彻的, [语法]加强语气的 |
| interpret | <i>v.</i> | 解释 |
| Tcl | <i>n.</i> | 一种早期的脚本语言 |

5.2.2 Reading Material 2

How to Learn a New Language

How do you learn a new language? The fastest way is when you are forced to do so. But if you're lucky enough to be learning by choice, you are probably doing it in your spare time and you won't do that unless you are enjoying yourself—so choose an interesting project.

Choosing what you are going to write in your new language is more important than choosing the language. Choose the language to suit the project or, better, choose both together. For example, if you want to write something that will look good then don't choose a language with no support for graphics.

Learn a little about the language before you start and try and find a solution that will play to the language's new features. If you are using OOP for the first time, for example, try and think how your project can be split into objects. If you are looking at functional programming, maybe a numerical project would be a good start (I chose cryptography) (this suggestion does not imply that functional languages are only useful for numerical code, just that most textbooks seem to feature numerical examples—in my limited experience—making it easier to start in that direction).

At the same time, be honest with yourself. Don't be too ambitious—don't pick too difficult a project and (maybe) don't pick too exotic a language. The second point is debatable. With any language you will learn something new: it doesn't have to be a huge intellectual leap into the unknown. You are going to be more productive in a language that has some familiar ideas, and you can lean on that part of the language to get going. On the other hand, if you enjoy new ideas, maybe you will be happier with something completely different.

Support is also important. If you intend to post questions to Usenet, is there an appropriate newsgroup? Personally, I like books—the best impetus for me is finding a good book on computing that uses a particular language in the examples.

A note about asking for information on newsgroups: people seem to vary widely in how precisely they talk about languages. At one end of the spectrum there are people who tend to rely on a "subconscious" (or at least "sub-language") intuition and happily misuse terminology to "get the idea across". At the other end are people who are very precise. Both, no doubt, will give conflicting advice on how to learn and, sometimes, apparently conflicting answers to questions. You have to learn to recognise different styles and read them in the context of the poster.

Finally, don't be afraid to change direction. I've stuck with a few languages much more than with others. Sometimes I have given up in frustration. But even when you only play around a little, you learn something—my argument is not that you must stay with a language a long time to learn anything, but that the learning continues. Stay for a while and you'll learn something. Stay longer and you'll learn more—there's no magic moment when you know everything (which is what makes programming such a rewarding profession).

Words

| | | |
|--------------|------|----------------|
| ambitious | adj. | 野心勃勃的 |
| conflicting | adj. | 相冲突的, 不一致的 |
| cryptography | n. | 密码使用法, 密码术 |
| debatable | adj. | 可争议的 |
| exotic | adj. | 外来的, 奇异的 |
| frustration | n. | 挫折, 受挫 |
| impetus | n. | 推动力, 促进 |
| intellectual | adj. | 智力的 |
| | n. | 知识分子 |
| intuition | n. | 直觉, 直觉的知识 |
| leap | v. | 跳, |
| | n. | 跳跃, 飞跃 |
| misuse | v. | 误用 |
| | n. | 误用 |
| productive | adj. | 生产性的, 生产的, 多产的 |
| spectrum | n. | 光, 光谱, 频谱 |
| split | v. | (使) 裂开, 分裂, 分离 |
| subconscious | adj. | 下意识的 |
| terminology | n. | 术语学 |

Phrase

| | |
|-----------------|--------|
| phrases rely on | 依赖, 依靠 |
| stick with | 坚持做某事 |

5. 2. 3 正文参考译文

程序设计语言介绍

程序设计语言是用来使得计算机完成特定任务的一系列指令。使用专用词汇的程序设计语言, 被计算机编译或解释成处理器可以识别的机器语言。

常用的程序设计语言类型如下:

高级语言——使用接近人类语言的短语、词汇和书写方式。之所以被称为高级语言, 是因为它们去除了计算机所能理解的原始机器语言所包括的复杂性。高级语言相对于低级语言的主要优点是它们易于读写和维护。所有高级语言都要在某种程度上翻译成机器语言。最早的高级语言大约出现于 20 世纪 50 年代。现在有很多种高级语言, 包括 BASIC、COBOL、C、C++、FORTRAN 和 Pascal 等。

脚本语言——类似于高级语言, 脚本语言用与人类语言相似的方式书写。一般来说, 用脚本语言比用高级语言更容易编程, 并且脚本语言采用解释方式而不是编译方式转换成

机器语言。脚本语言可以被嵌入 **HTML**，经常被用来在网页中添加功能，例如不同的菜单风格或图形显示或动态广告。这种类型的语言是客户端脚本语言，影响终端用户在浏览器窗口看到的数据。另一种是服务器端的脚本语言，操作服务器端数据库中的数据。脚本语言产生的很大原因是通信工具 **Internet** 的发展。脚本语言的例子包括 **VBScript**、**JavaScript**、**ASP** 和 **Perl**。

汇编语言——汇编语言尽可能的接近机器语言。由于汇编语言的低级特性，它和处理器的类型密切相关，在一种 **CPU** 类型上编写的程序一般不能在另一种类型上运行。

机器语言——最低级的编程语言。机器语言是惟一能直接被计算机识别的语言。易于被计算机理解的同时，机器语言几乎不能被人类使用，因为它们完全由数字组成。所以程序员使用高级语言或汇编语言。汇编语言的指令与机器语言对应，但是汇编语言中的指令或变量用名字表示而不是数字表示。

用高级语言编写的程序要通过编译器翻译成汇编语言或机器语言。汇编语言的程序通过汇编程序翻译成机器语言。

每种 **CPU** 有自己专用的机器语言。当用于不同类型的计算机时，程序需要重写或重新编译。

下面简要介绍几种主流软件工业中专业程序员采用的高级语言：

- **C**

这可能是提到的三种语言中应用最广最久的一种语言。从 20 世纪 70 年代开始应用，是一种紧凑（即不需要学习太多词汇）、功能强并且易于理解的语言。

- **C++**

这种语言是 **C** 的超集（也就是说，是 **C** 的扩充，比 **C** 增加了很多，包括 **C** 的全部）。**C++** 相对于 **C** 的主要优点是面向对象。关键的一点是面向对象的语言更现代化，使用该语言是当今程序世界处理事务的方式所以 **C++** 无疑是应用广泛度仅次于 **C** 的语言，并且很快会成为应用最为广泛的语言。

- **Java**

Java 有一个别的语言所没有的优点：它是跨平台的。也就是说，它不需要重新编译就可以运行于多个平台。一个平台就是一种计算机系统的类型，比如 **Windows**、**Mac OS** 或 **Linux**。一般来说，如果你在一个平台上编写了程序，想到另一个平台上去运行，需要重新编译——你需要为不同的平台编译不同的版本。有时候，你还需要更改代码以适应新的平台。这也许不奇怪，因为不同的平台工作不同，并且外观也不同。

Java 还有一个优点，就是可以运行于 **Web** 浏览器，使程序员创建能够运行在 **Web** 站点的小的应用程序。但是，**Java** 也有缺点，并且很严重，就是它速度慢。**Java** 得到跨平台性是通过在计算机上放置一个本质上的大程序，这使得它好像有自己的计算机。**Java** 运行于这个虚拟机中，而虚拟机运行于任何一种平台（像 **Windows** 或 **Mac OS**）上。因为在程序和计算机之间又附加了这么一层，**Java** 的运行比在该平台上编写并编译的程序慢。无论如何，随着 **Internet** 的发展，**Java** 会得到更多的应用。

5.3 Object-Oriented Programming

Object-oriented programming (OOP) refers to a special type of programming that combines data structures with functions to create re-usable objects.

Otherwise, the term object-oriented is generally used to describe a system that deals primarily with different types of objects, and where you can take the actions depends on what type of object you are manipulating. For example, an object-oriented draw program might enable you to draw many types of objects, such as circles, rectangles, triangles, etc. Applying the same action to each of these objects, however, would produce different results. If the action is Make 3D, for instance, the result would be a sphere, box, and pyramid, respectively.

Many languages support object oriented programming. In OOP data and functions are grouped together in objects (encapsulation). An object is a particular instance of a class.^[1] Each object can contain different data, but all objects belonging to a class have the same functions (called methods). So you could have a program with many e-mail objects, containing different messages, but they would all have the same functionality, fixed by the email class. Objects often restrict access to the data (data hiding).

Classes are a lot like types—the exact relationship between types and classes can be complicated and varies from language to language.

Via inheritance, hierarchies of objects can share and modify particular functions. You may have code in one class that describes the features all e-mails have (a sender and a date, for example) and then, in a sub-class for email containing pictures, add functions that display images.^[2] Often in the program you will refer to an e-mail object as if it was the parent (super-class) because it will not matter whether the e-mail contains a picture, or sound, or just text. This code will not need to be altered when you add another sub-class of e-mail objects, containing (say) electronic cash.

Sometimes you may want an action on a super-class to produce a result that depends on what sub-class it "really is". For example, you may want to display a list of email objects and want each sub-class (text, image, etc) to display in a different colour. In many languages it is possible for the super-class to have functions that sub-classes change to suit their own purposes (polymorphism, implemented by the compiler using a technique called dynamic binding). So each email sub-class may supply an alternative to the default, printing function, with its own colour.

In many OO languages it is possible to find out what class an object is (run time type information) and even what functions are connected with it (introspection / reflection). Others, like C++ have little run time information available (at least in the standard language—individual libraries of objects can support RTTI with their own conventions).

^[3]There are at least three approaches to OO languages: Methods in Classes, Multi-Methods Separate from Classes, Prototypes.

Methods in Classes

Many languages follow Smalltalk in associating functions (methods) with classes. The methods form part of a class definition and the language implementation will have (this is a low-level detail hidden from the programmer) a vtable for each class which links methods to their implementations. This indirection is necessary to allow polymorphism, but introduces a performance penalty. In some languages (C++, at least), only some methods, marked as virtual by the programmer, are treated in this way.

Multi-Methods Separate from Classes

Some languages (e.g. common Lisp / CLOS) allow functions to specialise on the class of any variable that they are passed (multi-methods). Functions cannot be associated with one class because different versions of the function may exist for many different combinations of classes.

Prototypes

Other OO languages do away with classes completely (e.g. Self). Prototype-based languages create new objects using an existing object as an example (prototype). Apart from solving some problems with dynamic object creation, this approach also encourages delegation (function calls are passed to other objects) rather than inheritance.

Words

| | | |
|----------------|--------------|------------|
| complicate | <i>v.</i> | (使) 变复杂 |
| delegation | <i>n.</i> | 代表团, 授权 |
| encapsulation | <i>n.</i> | 包装, 封装 |
| implementation | <i>n.</i> | 执行 |
| individual | <i>n.</i> | 个体 |
| | <i>adj.</i> | 个别的, 单独的 |
| inheritance | <i>n.</i> | 遗传, 遗产, 继承 |
| introspection | <i>n.</i> | 内省, 反省 |
| penalty | <i>n.</i> | 处罚 |
| polymorphism | <i>n.</i> | 多形性, 多态现象 |
| prototype | <i>n.</i> | 原型 |
| via | <i>prep.</i> | 通过, 经由 |

Phrases

| | |
|--------------|----|
| do away with | 废除 |
|--------------|----|

Abbreviations

| | |
|----------------------------------|---------------|
| CLOS (Common LISP Object System) | 公共 LISP 对象系统. |
|----------------------------------|---------------|

| | |
|-----------------------------------|-----------|
| OOP (Object-oriented Programming) | 面向对象的程序设计 |
| RTTI (Run Time Type Information) | 运行时类型信息 |

Notes

- [1] 例句: Each object can contain different data, but all objects belonging to a class have the same functions (called methods).
 分析: 本句是并列句, but 连接表转折意义的两个分句。后一个分句中, belonging to a class 为现在分词短语作 objects 的后置定语。
 译文: 每一个对象可以包含不同的数据, 但属于同一类的所有对象有着同样的功能(被称为方法)。
- [2] 例句: Often in the program you will refer to an email object as if it was the parent (super-class) because it will not matter whether the email contains a picture, or sound, or just text.
 分析: 本句是复合句。句中 because 前是主句, because 后是原因状语从句。主句中的 as if it was the parent 为 as if 引导的虚拟语气的方式状语从句, 如果表示与目前事实不符, 谓语用一般过去式。在状语从句 because it will not matter whether the email contains a picture, sound or just text. 中, it 为形式主语, 而主语从句 whether the email contains a picture, sound or just text 为真正主语。
 译文: 在程序中人们经常查阅电子邮件对象, 把它看作基类; 因为该邮件是否包含一种图像, 语音或仅仅一种文本无关紧要。
- [3] 例句: There are at least three approaches to OO languages: Methods in Classes, Multi-Methods Separate from Classes, Prototypes.
 分析: 本句是简单句。句中 approach 为名词, 意为方法, 后常跟 to+名词意为“对待……”的方法。冒号后的 Methods in Classes; Multi-Methods Separate from Classes; Prototypes 为 approaches 的同位语。
 译文: 至少有三种处理 OO 语言的方法: 类的方法、多方法、原型。

Exercises

I. Write true or false for the following statements according to the passage.

- () OOP stands for Object-oriented programming.
- () An object is a particular instance of a class.
- () A class is a particular instance of an object.
- () Data hiding means that data and functions are grouped together in objects.
- () Object-oriented programming (OOP) refers to a special type of programming that combines data structures with functions to create re-usable objects.
- () Popular modern object oriented programming languages include Java and C++.
- () machine language is an object oriented programming language.

8. () Functions cannot be associated with one class.
9. () Prototype-based languages create new classes using an existing object as an example.
10. () Objects often restrict access to the data (data hiding).

II. Fill in the blanks according to the passage.

1. In OOP data and _____ are grouped together in objects.
2. An object is a particular instance of a _____.
3. Each object can contain different data, but all objects belonging to a _____ have the same functions.
4. It is possible for the super-class to have functions that sub-classes _____ to suit their own purposes.
5. _____ versions of the function may exist for many different combinations of classes.
6. Objects often restrict _____ to the data (data hiding).
7. Via inheritance, hierarchies of objects can _____ and modify particular functions.
8. OOP combines data structures with functions to create re-usable _____.
9. There are at least three approaches to OO languages: Methods in _____, Multi-Methods Separate from Classes, _____.
10. Some languages (e.g. common Lisp / CLOS) allow _____ to specialise on the class of any variable that they are _____ (multi-methods).

III. Translate the following words and expressions into Chinese.

- | | |
|--------------------|-----------------|
| 1. data structures | 6. relationship |
| 2. functions | 7. feature |
| 3. describe | 8. electronic |
| 4. message | 9. compiler |
| 5. exact | 10. convention |

5.3.1 Reading Material 1

Object Orientation

OO can model a complex reality in a very natural way.

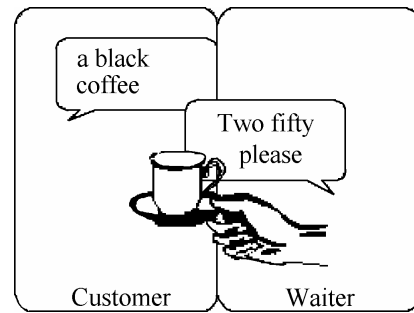
An example is "the cup of coffee". This shows interaction between customer, waiter and kitchen.

- Customer and kitchen don't know each other. The waiter is the intermediary. (Encapsulation).
- Waiter and kitchen act differently to the request "a black coffee" (Polymorphism)
- Both waiter and kitchen supply coffee (Inheritance).

The benefits of OO are higher for complex business processes. The more complex the better. Different responsibilities, lots of exceptions, and processes that "look alike". Those are the ideal ingredients for an OO approach.

Encapsulation means as much as shielding. Each OO object has a shield around it. Objects can't "see" each other. They can exchange things though, as if they are interconnected through a hatch.

Customer, waiter and kitchen are three shielded objects in the "cup of coffee" example. Customer and kitchen do not know each other. The waiter is the intermediary between those two. Objects can't see each other in an Object-oriented world. The 'hatch' enables them to communicate and exchange coffee and money.



Encapsulation keeps computer systems flexible. The business process can change easily. The customer does not care about the coffee brew process. Even the waiter does not care. This allows the kitchen to be reconstructed, is only the "hatch" remains the same. It is even possible to change the entire business process. Suppose the waiter will brew coffee himself. The customer won't notice any difference.

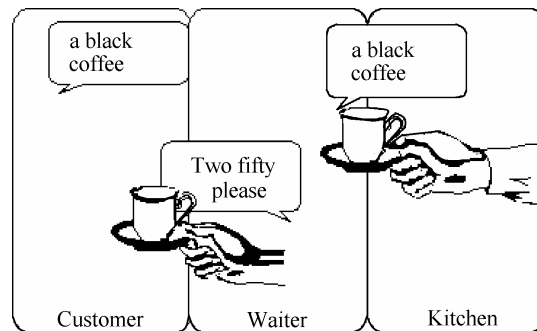
Encapsulation enables OO experts to build flexible systems. Systems that can extend as your business extends. Every module of the system can change independently, no impact to the other modules.

Objects can respond differently to the same message. Both waiter as kitchen respond to "a black coffee".

The actions are different though.

- The waiter passes the message to the kitchen, waits for response, delivers coffee and settles the account.
- The kitchen brews fresh coffee and passes it to the waiter.

The same message with different implementations, that is polymorphism.



Polymorphism makes Object-oriented systems extremely suitable for various exceptions and exceptions to exceptions.

Inheritance

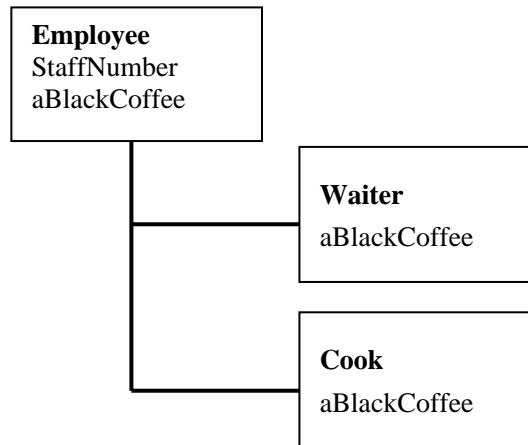
Similar, but just a little bit different. The world is full of exceptions and similarities. Object Orientation places everything perfectly in a class tree.

- Both waiter and cook are employees. So they both have an employee number. This generic employee number gets a generic place in Employee.
- Both return a cup of coffee to the question "A cup of coffee please". That similar behavior

also gets a generic place in Employee.

- There are some exceptions. Waiter and Cook have different methods to get a cup of coffee. Those specific methods get a specific place, reusing the more generic part in Employee.

No matter how complex your business situation is, Object Orientation can cope with it.



Words

| | | |
|----------------|-------------|-------------------|
| account | <i>n.</i> | 账目 |
| approach | <i>n.</i> | 接近, 逼近, 方法, 步骤 |
| | <i>v.</i> | 接近, 动手处理, 靠近 |
| brew | <i>v.</i> | 酿造(啤酒), 冲(茶或咖啡) |
| deliver | <i>v.</i> | 陈述, 发表(一篇演说等), 交付 |
| exception | <i>n.</i> | 除外, 例外 |
| generic | <i>adj.</i> | 类的, 一般的 |
| hatch | <i>n.</i> | 舱口, 窗口 |
| impact | <i>n.</i> | 影响 |
| | <i>v.</i> | 对……发生影响 |
| ingredient | <i>n.</i> | 成分, 因素 |
| interaction | <i>n.</i> | 交互作用, 交感 |
| interconnect | <i>v.</i> | 使互相连接 |
| intermediary | <i>n.</i> | 中间物 |
| | <i>adj.</i> | 中间的, 媒介的 |
| natural | <i>adj.</i> | 自然的, 自然界的, 关于自然界的 |
| reconstructed | <i>adj.</i> | 重建的, 改造的 |
| responsibility | <i>n.</i> | 责任, 职责 |
| settle | <i>v.</i> | 安排, 解决, 决定 |
| shield | <i>n.</i> | 防护物, 护罩 |
| | <i>v.</i> | (from) 保护, 防护 |

phrases

| | |
|-----------|-----------|
| cope with | 与……竞争, 应付 |
|-----------|-----------|

5.3.2 Reading Material 2

OOP Is Much Better in Theory Than in Practice

Like many ideas that sound good in theory but are clumsy in practice, object-oriented programming (OOP) offers benefits only in a specialized context—namely, group programming. And even in that circumstance the benefits are dubious, though the proponents of OOP would have you believe otherwise. Some shops claim OOP success, but many I've spoken with are still "working on it." Still trying to get OOP right after ten years? Something strange is going on here.

Certainly for the great majority of programmers—amateurs working alone to create programs such as a quick sales tax utility for a small business or a geography quiz for Junior—the machinery of OOP is almost always far more trouble than it's worth. OOP just introduces an unnecessary layer of complexity to procedure-oriented design. That's why very few programming books I've read use OOP techniques (classes, etc.) in their code examples. The examples are written as functions, not as methods within objects. Programming books are trying to teach programming—not the primarily clerical and taxonomic essence of OOP. Those few books that do superimpose the OOP mechanisms on their code are, not surprisingly, teaching about the mysteries of OOP itself.

Of course professional gang programming has specialized requirements. Chief among them is that the programmers don't step on each other's toes. For instance, a friend who programs for one of the world's largest software companies told me he knows precisely what he'll be working on in one year. Obviously, OOP makes sense in such a bureaucratic system because it needs to be intensely clerical. Helping to manage large-scale, complex-programming jobs like the one in which my friend is involved is the primary value of OOP. It's a clerical system with some built-in security features. In my view, confusing OOP with programming is a mistake.

Contradiction Leads to Confusion

Consider the profound contradiction between the OOP practices of encapsulation and inheritance. To keep your code bug-free, encapsulation hides procedures (and sometimes even data) from other programmers and doesn't allow them to edit it. Inheritance then asks these same programmers to inherit, modify, and reuse this code that they cannot see—they see what goes in and what comes out, but they must remain ignorant of what's going on inside. In effect, a programmer with no knowledge of the specific inner workings of your encapsulated class is asked to reuse it and modify its members. True, OOP includes features to help deal with this problem, but why does OOP generate problems it must then deal with later?

All this leads to the familiar granularity paradox in OOP: should you create only extremely small and simple classes for stability (some computer science professors say yes), or should you make them large and abstract for flexibility (other professors say yes). Which is it?

A frequent argument for OOP is it helps with code reusability, but one can reuse code without OOP—often by simply copying and pasting. There's no need to superimpose some elaborate structure of interacting, instantiated objects, with all the messaging and fragility that it

introduces into a program. Further, most programming is done by individuals. Hiding code from oneself just seems weird. Obviously, some kind of structure must be imposed on people programming together in groups, but is OOP—with all its baggage and inefficiency—the right solution?

Words

| | | |
|---------------|-------------|-----------------|
| amateur | <i>n.</i> | 业余爱好者 |
| argument | <i>n.</i> | 争论, 论据, 论点 |
| bureaucratic | <i>adj.</i> | 官僚政治的 |
| chief | <i>n.</i> | 首领, 主要部分 |
| | <i>adj.</i> | 主要的 |
| circumstance | <i>n.</i> | 环境, 详情 |
| clerical | <i>adj.</i> | 牧师的, 书记的 |
| | <i>n.</i> | 牧师 |
| clumsy | <i>adj.</i> | 笨拙的 |
| contradiction | <i>n.</i> | 反驳, 矛盾 |
| dubious | <i>adj.</i> | 可疑的, 不确定的 |
| elaborate | <i>adj.</i> | 精心制作的, 精细 |
| | <i>v.</i> | 详细描述 |
| fragility | <i>n.</i> | 脆弱, 虚弱 |
| granularity | <i>n.</i> | 间隔尺寸, 颗粒状 |
| instantiate | <i>v.</i> | 例示 |
| intensely | <i>adv.</i> | 激烈地, 热情地 |
| machinery | <i>n.</i> | [总称] 机器, 机械 |
| paradox | <i>n.</i> | 似非而是的论点, 自相矛盾的话 |
| profound | <i>adj.</i> | 深刻的, 意义深远的 |
| proponent | <i>n.</i> | 建议者, 支持者 |
| quiz | <i>n.</i> | 测验, 提问 |
| | <i>v.</i> | 进行测验 |
| stability | <i>n.</i> | 稳定性 |
| superimpose | <i>v.</i> | 添加, 双重 |
| taxonomic | <i>adj.</i> | 分类学的 |
| toe | <i>n.</i> | 脚趾 |
| utility | <i>n.</i> | 效用, 有用 |
| weird | <i>adj.</i> | 怪异的, 神秘的, 不可思议的 |

5.3.3 正文参考译文

面向对象程序设计

面向对象的程序设计涉及一种专用类型的程序设计，该技术将数据结构与函数相结合产生可重用的对象。

另一方面，术语“面向对象”通常用来描述一种系统，这种系统主要处理不同类型的对象，在这儿人们所采取的行为取决于他们正处理的对象的类型。例如，一种面向对象的绘图程序能使人们绘制多种类型的对象，如圆、长方形和三角形等。但是将同样的行为应用于不同的对象将产生不同的结果。例如，如果这一行为是制作三维，结果将分别形成球体、长方体和棱锥。

许多语言都支持面向对象的程序设计。在面向对象的程序设计中，数据和功能组合在一起归入对象内(封装)。一个对象是一个类的特例。每一个对象都可以包含不同的数据，但属于同一个类的所有对象具有相同的功能（称为方法）。于是，人们可以有一个带有许多电子邮件对象的程序，这些电子邮件对象包含有不同的信息，但具有电子邮件类固有的相同的功能。对象经常限制对数据的存储（数据隐藏）。

类很像类型——它们之间的关系会很复杂，而且随着语言的变化而变化。

通过继承，不同级别的对象可以共享和修改特殊的功能。可以在一个类中有代码描述所有邮件具有的特点（例如：发送者和日期），而在包含图片的子类中，增加显示图像的功能。在程序中人们经常查阅一个邮件对象，把它作为一个父类，因为该邮件是否包含图片、声音或仅仅一种文本无关紧要。当你添加另一个邮件对象的子类，譬如包含电子现金的时候不需要改变代码。

有时候人们可能希望在父类上的一个行为可以根据子类的“真实”内容产生结果。例如：你可能想显示邮件对象的列表并且希望每个子类（文本，图像等）显示出不同的颜色。很多语言都可能具有多态性，即父类具有的功能使子类变化以适应它们自己的目的(多态性，由编译器使用动态绑定技术来实现)。这样，每个邮件子类可以提供默认打印功能的选择，用自己的颜色显示。

在很多面向对象的语言中，可以找出一个对象属于哪个类（运行时信息），甚至相关的方法（自省）。其他的像 C++ 则没有可用的运行时信息（至少在标准语言，对象的个别的库以它们自己的约定支持运行时信息）。

至少有三种方法处理面向对象的语言：类的方法、与类分离的多方法和原型。

类的方法

Smalltalk 以及其后的许多语言都将方法与类关联。方法形成类定义的一部分，并且语言实现每个类有一个虚函数表将方法与执行联系起来。为了允许多态性，这种间接是必需的，但引起了性能下降。在某些语言中（至少 C++），只有程序员标记为虚拟的部分方法用这种方式来处理。

与类分离的多方法

某些语言（例如 Lisp/CLOS），允许函数专门研究不同变量的类以进行函数传递(多方

法), 多个函数不能和一个类相关联, 因为类的不同结合可能存在不同的函数版本。

原型

其他面向对象的语言完全取消了类(例如 **Self**)。基于原型的语言将已有的对象作为范例(原型)生成新的对象。除了解决一些动态对象产生的问题之外, 这种方法还鼓励授权(函数调用被传递到其他对象)而不是继承。

5.4 Program Debugging and Program Maintenance

If your program exits abnormally, then there is almost certainly a logical error (a bug) in your program. 99% of programming is finding and removing these bugs. Here are some tips to help you get started.

Before going on, it is necessary to reiterate the standard OLC policy on program debugging: Do **NOT** ask OLC for help debugging a program.^[1] This stock answer is intended to give you some tips on how to get started in this area; however, in general, program debugging requires more time and effort than consultants are usually able to provide.

The first step is to find the exact line where the program exits. One way of doing this is with print statements scattered through your code. For example, you might do something like this in your source code:

```
myplot(int x, int y)
{ printf("Entering myplot()\n"); fflush(stdout);
  ---- lots of code here -----
  printf("Exiting myplot()\n"); fflush(stdout);
  return; }
```

The `fflush()` command in C ensures that the print statement is sent to your screen immediately, and you should use it if you're using `printf()` for debugging purposes.

^[2] Once you have narrowed down the line where your bug occurs, the next step is to find out the value of your variables at that time. You will probably find that one of your variables contains very strange values. This is the time to check that you have not done the following things:

- Assigned an integer value to a pointer variable; or
- Written to a subscript that is beyond the end of an array (remember that in C array subscripts go from 0 to N-1, not from 1 to N.)

Other mistakes also cause bugs. Make sure that your loops test correctly for their end conditions, for example.

Other kinds of bugs (programs not exiting, incorrect output) are debugged using similar methods. Again, find the line where the first error occurs, and then check the values of your variables. Once you fix a bug, recompile your program, run it again, and then debug it again as necessary.

Using `printf()` is a primitive method of debugging, but sometimes it's the only one that will work. If your program is too big for a debugger (such as `Saber` or `Ddbx`) or if you are working on a non-Athena platform, you may not have a debugger available. Usually, though, it is quicker and easier to use a debugger. Athena has several sophisticated debugging tools available. `Saber` is the tool of choice for C programmers. `Gdb` and `Dbx` may also come in handy, and both of these work with Fortran as well as with C. There are stock answers that introduce `Saber` and `Dbx`, and `Saber` even comes with a tutorial.

It is a fact of life in program design but there seems to be always one last bug or error to be corrected. We can broadly classify the errors as:

- Syntax errors—this class of error means that a mistake is made in the language used to state the algorithm.
- Logic errors—the algorithm is syntactically correct but doesn't do what is intended.
- Data range and data type errors—the algorithm is syntactically correct and logically correct but can be threatened by the wrong kind of data or by values which are out of range.

^[3] The syntax errors aren't a serious issue during the program design phase since in practice, after designing and testing the design, the program will be implemented in a computer program language and it is at this point that syntax errors become a problem. Even so syntax errors are a minor problem since the process of building the program will capture the errors. The program simply won't build until all the syntax errors are removed.

The logic errors are a much more serious problem since there is no way to eliminate these other than rigorously testing the program design.

The data errors are also serious errors and in some respects are harder to deal with than logic errors.

Once launched, the program needs to be maintained. Definition for program maintenance is that updating programs from time to time keeps abreast of changes in an organization's needs or its hardware and software. Based on the maintenance tasks needed to be performed, the program administrators should determine on-going financial and staffing needs and how they will be met. Program maintenance represents a major portion of the total expenditures on application programs.

Words

| | | |
|----------|--------------|--------------------|
| abnormal | <i>adj.</i> | 反常的, 变态的 |
| abreast | <i>adv.</i> | 并肩地, 并排地 |
| array | <i>n.</i> | 排列 |
| | <i>v.</i> | 部署, 排列 |
| assign | <i>v.</i> | 分配, 指派 |
| | <i>v.</i> | 赋值 |
| beyond | <i>prep.</i> | 在(到) ... 较远的一边, 超过 |
| | <i>adv.</i> | 在远处 |

| | | |
|--------------|-------------|---------------------------------|
| bug | <i>n.</i> | 程序缺陷, 电脑系统的问题臭虫, |
| capture | <i>n.</i> | 捕获 |
| | <i>v.</i> | 捕获 |
| consultant | <i>n.</i> | 顾问, 咨询者 |
| Dbx | <i>n.</i> | 一种调试运行源程序的工具 |
| debug | <i>v.</i> | <俗>除错, 改正有毛病部分 |
| | <i>n.</i> | 调试, 调试工具 |
| effort | <i>n.</i> | 努力, 成就 |
| eliminate | <i>v.</i> | 排除, 消除 |
| ensure | <i>v.</i> | 确保, 确保, 保证 |
| Gdb | | 一种项目调试器, 用来观察程序的执行过程 |
| handy | <i>adj.</i> | 手边的, 容易取得的 |
| implement | <i>n.</i> | 工具, 器具 |
| | <i>v.</i> | 贯彻, 实现 |
| issue | <i>n.</i> | 出版, 论点, 问题, |
| | <i>v.</i> | 使流出, 发行 (钞票等) |
| Saber | <i>n.</i> | 一种 C 调试程序用来找出程序中的错误, 有良好的在线帮助系统 |
| necessary | <i>n.</i> | 必需, 必需品 |
| | <i>adj.</i> | 必要的, 必然的 |
| pointer | <i>n.</i> | 指示器 |
| primitive | <i>adj.</i> | 原始的, 简单的 |
| rigorous | <i>adj.</i> | 严格的 |
| scatter | <i>v.</i> | 分散 |
| serious | <i>adj.</i> | 严肃的, 认真的, 严重的 |
| sophisticate | <i>n.</i> | 精于……之道的人 |
| | <i>v.</i> | 弄复杂; 诡辩 |
| stock | <i>n.</i> | 库存 |
| | <i>adj.</i> | 常备的, 存货的 |
| subscript | <i>adj.</i> | 写在下方的 |
| syntactical | <i>adj.</i> | [语]依照句法的 |
| threaten | <i>v.</i> | 恐吓, 威胁, 可能来临 |
| tip | <i>n.</i> | 提示 |

Abbreviations

OLC (The Online Learning Center) 在线学习中心

Notes

- [1] 例句: This stock answer is intended to give you some tips on how to get started in this area; however, in general, program debugging requires more time and effort than consultants are usually able to provide.
分析: 本句是并列句, however 连接表示转折意义的两个分句。后一个分句中 than consultants are usually able to provide 为 than 引导的比较状语从句。
译文: 这种预存的答案倾向于给出一些初步的指点。但总的来说, 程序调试需要的时间和努力比咨询者通常能提供的要多。
- [2] 例句: Once you have narrowed down the line where your bug occurs, the next step is to find out the value of your variables at that time.
分析: 本句是复合句。这里 “once” 引导的条件状语从句, 意为 “一旦……”。主句中不定式短语 to find out the value of your variables at that time 做 is 的表语。
译文: 一旦缩小了编程错误存在的范围, 下一步就是找出当时的变量值。
- [3] 例句: The syntax errors aren't a serious issue during the program design phase since in practice, after designing and testing the design, the program will be implemented in a computer program language and it is at this point that syntax errors become a problem.
分析: 本句是复合句。句中 since 前是主句, since 引导原因状语从句。原因状语从句中, it is at this point that syntax errors become a problem 为强调句。强调句句型结构为: It+be +被强调成分+that/who…。通过这种结构可以强调除谓语动词以外的大多数句子成分。
译文: 在程序设计阶段语法错误不是一个重要问题; 当设计完成并测试后, 程序将用某一种计算机语言实现程序, 这时语法错误才成为需要处理的问题。

Exercises

I . Write true or false for the following statements according to the passage.

1. () If a program exits abnormally, then there is almost certainly a logical error (a bug) in the program.
2. () The first step of debugging is to find the exact line where the program exits.
3. () One way of debugging a program is with print statements scattered through the code.
4. () Once you have narrowed down the line where your bug occurs, the next step is to find out the value of your variables at that time.
5. () In C array subscripts go from 1 to N.
6. () Using printf()s is a primitive method of debugging.
7. () We can broadly classify the errors as: Syntax errors, Logic errors, Data range and data type errors.
8. () Logic errors are a minor problem.

9. () Syntax errors means the algorithm is syntactically correct but doesn't do what is intended.

10. () Once launched, the program needs to be maintained.

II. Fill in the blanks according to the passage.

1. When you write a C program, you cannot assign _____ value to a pointer variable.

2. There seems to be always one last _____ or error to be corrected.

3. Syntax errors means that a mistake is made in the _____ used to state the algorithm.

4. Once launched, the program needs to be _____.

5. Program maintenance represents a _____ portion of the total expenditures on application programs.

6. The logic errors are a much more _____ problem.

7. Usually, it is quicker and easier to use a _____.

8. Using printf() is a _____ method of debugging, but sometimes it's the only one that will _____.

9. Program debugging is finding and removing _____ in a program.

10. Bugs are _____ in a program.

III. Translate the following words and expressions into Chinese.

1. necessary

6. exact

2. check

7. platform

3. choice

8. algorithm

4. tutorial

9. implement

5. broadly

10. expenditure

5.4.1 Reading Material

What's Actually Involved in Programming?

What's actually involved in programming—the actual process of writing programs? Here's a quick overview of the process:

- Write a program.
- Compile the program.
- Run the program.
- Debug the program.
- Repeat the whole process until the program is finished.

Let's discuss those steps one by one.

Write a Program

I have a small amount of bad news for you: you can't write programs in English. It would be

nice indeed to be able to type "count the number of words in a sentence" into your computer and have it actually understand, but that's not going to happen for a while (unless someone writes a program to make a computer do that, of course). Instead, you have to learn a programming language.

Much of a programming language is indeed in English. Programming languages commonly use words like "if", "repeat", "end" and such. Also, they use the familiar mathematical operators like "+" and "=". It's just a matter of learning the "grammar" of the language; how to say things properly.

So, we said "Write a program". This means: write the steps needed to perform the task, using the programming language you know. You'll do the typing in a programming environment (an application program which lets you write programs, which is an interesting thought in itself). A common programming environment is CodeWarrior, and another common one is InterDev, but you don't need to worry about those just yet. Some programming environments are free, and some you have to buy just like any other application program. Commercial (non-free) programming environments cost anything from \$50 to \$500+, and you'll almost always get a huge discount if you're a student or teacher of some kind.

Incidentally, the stuff you type to create a program is usually called source code, or just code. Programmers also sometimes call programming coding. We think it sounds slightly cooler.

Compile the program

In order to use a program, you usually have to compile it first. When you write a program (in a programming language, using a programming environment, as we mentioned a moment ago), it's not yet in a form that the computer can use. This isn't hard to understand, given that computers actually only understand lots of 1s and 0s in long streams. You can't very well write programs using only vast amounts of 1s and 0s, so you write it in a more easily-understood form (a programming language), then you convert it to a form that the computer can actually use. This conversion process is called compiling, or compilation. Not surprisingly, a program called a compiler does the compiling.

It's worth mentioning that if your program has problems which the compiler can't deal with, it won't be able to compile your program.

You'll be pleased to hear that your programming environment will include a suitable compiler (or maybe more than one compiler: each different programming language your programming environment allows you to use requires its own compiler). Compilers are just fancy programs, so they too are written by programmers. Programmers who write compilers are a bit like gods; they make it possible for everyone else to program.

Run the program

Now that you've compiled the program into a form that the computer can use, you want to see if it works: you want to make the computer perform the steps that you specified. This is called running the program, or sometimes executing it. Just the same as how a car isn't of much

use if you don't drive it, a program isn't of much use if you don't run it. Your programming environment will allow you to run your program too.

Debug the program

You've probably heard the term "debug" before (it's pronounced just as you might expect: "dee-bug"). It refers to fixing errors and problems with your program. As I'm sure you know, the term came about because the earliest computers were huge building-sized contraptions, and actual real-life insects sometimes flew into the machinery and caused havoc with the circuits and valves. Hence, those first computer engineers had to physically "debug" the computers—they had to scrape the toasted remains of various kinds of flying insects out of the inner workings of their machines. The term became used to describe any kind of problem-solving process in relation to computers, and we use it today to refer purely to fixing errors in our code.

You may also have heard the phrase "it's not a bug, it's a feature". Programmers sometimes say this when someone points out a problem with their programs; they're saying that it's not a bug, but rather a deliberate design choice (which is almost always a lie). This is rather like accidentally spilling coffee all over yourself whilst simultaneously falling down some stairs, then getting up and saying "I meant to do that".

Once again, your programming environment will help you to debug your programs (indeed, you'll often find the picture of an insect shown in your programming environment to indicate debugging). You usually debug your program by stepping through it. This means just what it sounds like: you go through your program one step at a time, watching how things are going and what's happening. Sooner or later (usually later), you'll see what's going wrong, and slap yourself upside the head at the ridiculously obvious error you've made.

Repeat the whole process until the program is finished

And then you repeat the whole process until you're happy with the program. This is trickier than it might sound, since programmers are never happy with their programs. You see, programmers are perfectionists—never satisfied until absolutely everything is complete and elegant and powerful and just gorgeous. Programmers will commonly release a new version of their program every day for a couple of weeks after the initial release.

As you can imagine, enjoying an intellectual challenge is an important trait to have when you're going back to correct and enhance your code many times over. You'll actually find that you can't wait to get back into your program and fix the bugs, make improvements, and refine the existing code.

And that's the basic process of programming. Note that most programming environments will make a lot of it much easier for you, by doing such things as:

- Warning you about common errors
- Taking you to the specific bit of code which is causing the compiler to puke
- Letting you quickly look up documentation on the programming language you're using
- Letting you just choose to run the program, and compiling it automatically first

- Colouring parts of your code to make it easier to read (for example, making numbers a different colour from other text)
- And many other things

So, don't worry too much about the specifics of compiling then running then debugging or whatever. The purpose of this section was mostly to make you aware of the cyclical nature of programming: you write code, test it, fix it, write more, test it, fix, and so on.

Words

| | | |
|----------------|--------------|--------------|
| commercial | <i>adj.</i> | 商业的, 贸易的 |
| contraption | <i>n.</i> | 装置 |
| conversion | <i>n.</i> | 变换, 转化 |
| cyclical | <i>adj.</i> | 周期的, 循环的 |
| deliberate | <i>adj.</i> | 故意的, 预有准备的 |
| | <i>v.</i> | 商讨 |
| enhance | <i>v.</i> | 提高, 增强 |
| gorgeous | <i>adj.</i> | 宜人的, 令人满意的 |
| havoc | <i>n.</i> | 大破坏, 浩劫 |
| | <i>v.</i> | 严重破坏 |
| incidentally | <i>adv.</i> | 附带地, 顺便提及 |
| involve | <i>v.</i> | 包括 |
| perfectionist | <i>n.</i> | 完美主义者 |
| puke | <i>n.</i> | 呕吐 |
| | <i>v.</i> | 呕吐 |
| ridiculously | <i>adv.</i> | 可笑地 |
| scrape | <i>n.</i> | 刮, 擦, 困境 |
| | <i>v.</i> | 刮, 擦伤, 挖成 |
| simultaneously | <i>adv.</i> | 同时地 |
| slap | <i>v.</i> | 拍, 拍击 |
| | <i>n.</i> | 拍 |
| stream | <i>n.</i> | 溪, 流, 一串 |
| toast | <i>v.</i> | 烤(面包等); 使暖和 |
| trait | <i>n.</i> | 显著的特点, 特性 |
| tricky | <i>adj.</i> | 不易处理的, 需要技巧的 |
| whilst | <i>conj.</i> | 时时, 同时 |

5.4.2 正文参考译文

程序调试与维护

如果你的程序非正常退出, 很有可能你的程序中有逻辑错误, 或称之 `bug`。99%的程

序工作是要找出并去除这些 bug。下面是对一些初学者的提示。

首先，有必要重复关于程序调试的标准 OLC 规则：不要请求 OLC 帮助调试程序。这一备用答案用来给出一些关于在这一领域怎样开始的提示。但总的来说，程序调试需要的时间和努力比咨询者通常所能提供的更多。

第一步是找出程序出错的精确的语句行。实现的方法是在程序代码中分散布置一些打印语句。例如，你可以在源程序中做如下工作：（略）

C 语言中的 `fflush()` 命令使得输出立即被送到显示器上，如果你的 `printf()` 是用于调试目的的就用到 `fflush()`。

当你找到了 bug 发生的行，下一步就是要找出当时的变量值。你可能会发现某个变量值很奇怪。这时候就要检查你有没有做下面的事情。

——给指针变量赋予一个整数值；或者

——数组的下标越界。（记住，C 数组的下标是从 0 到 N-1，不是从 1 到 N。）

别的错误也会引起 bug，例如要确认循环测试的边界条件使用正确。

其他类型的 bug（程序不终止，错误输出）用同样的方法进行调试。再一次找到第一个错误发生的行，检查变量值。当你处理了一个 bug 后，重新编译程序，再次运行。如果需要还要再调试。

使用 `printf()` 是调试程序最原始的方法，但有时却是惟一有效的方法。如果你的程序对一个调试器（如 *Saber* 或 *Dbx*）来说太大，或者你使用的是非 *Athena* 平台，你可能没有合适的调试器。通常，使用调试器会更快更容易。*Athena* 有几个好用的调试工具，*Saber* 是 C 程序员的工具选择，*Gdb* 和 *Dbx* 使用也很方便。并且适用于 *Fortran* 和 C。有许多介绍 *Saber* 和 *Dbx* 的现成答案，甚至还有 *Saber* 的辅导材料。

程序设计中有这样的情况，就是好像永远有一个 bug 或错误有待改正。错误的大体分类如下：

- 语法错误——这一类错误出现在表示算法的语言中。
- 逻辑错误——表示算法的语法是正确的，但得不到预期结果。
- 数据范围和数据类型错误——算法的语法和逻辑都正确，但是有错误数据类型或超出范围的数据值对程序造成威胁。

程序设计阶段，语法错误不是一个严重问题，当设计完成并测试后，要用某一种计算机语言实现程序，这时语法错误才成为需要处理的问题。但即使这样，语法错误也是小问题，因为在程序形成阶段会发现错误。只有语法错误清除后才形成程序。

逻辑错误是较为严重的问题，因为没有办法可消除逻辑错误，除非彻底测试程序设计。

数据错误也是严重错误，有时比逻辑错误更难处理。

当投入使用后，程序需要维护。程序维护的定义就是根据组织需要或硬件、软件改变的情况不断地更新程序。基于要实现的维护任务，程序管理员需要决定后续经济支持和人员需要及配备。程序维护是应用程序总体花费中的主要部分。

Chapter 6 Information Security

6.1 Concept of Information Security

The issue of information security and data privacy is assuming tremendous importance among global organizations, particularly in an environment marked by computer virus and terrorist attacks, hackings and destruction of vital data owing to natural disasters. ^[1] When it comes to information security, most companies fall somewhere between two extreme boundaries: complete access and complete security. A completely secure computer is one that is not connected to any network and physically unreachable by anyone. A computer like this is unusable and does not serve much of a practical purpose. On the other hand, a computer with complete access is very easy to use, requiring no passwords or authorization to provide any information. ^[2] Unfortunately, having a computer with complete access is also not practical because it would expose every bit of information publicly, from customer records to financial documents. Obviously, there is a middle ground—this is the art of information security.

The concept of information security is centered on the following components:

Integrity: gathering and maintaining accurate information and avoiding malicious modification

Availability: providing access to the information when and where desired

Confidentiality: avoiding disclosure to unauthorized or unwanted persons

For an information system to be secure, it must have a number of properties:

^[3] **service integrity.** This is a property of an information system whereby its availability, reliability, completeness and promptness are assured;

data integrity. This is a property whereby records are authentic, reliable, complete, unaltered and useable, and the processes that operate on them are reliable, compliant with regulatory requirements, comprehensive, systematic, and prevent unauthorized access, destruction, alteration or removal of records. These requirements apply to machine-readable databases, files and archives, and to manual records;

data secrecy . This is a property of an information system whereby information is available only to those people authorized to receive it. Many sources discuss secrecy as though it was only an issue during the transmission of data; but it is just as vital in the context of data storage and data use;

authentication. Authentication is a property of an information system whereby assertions are checked. Forms of assertion that are subjected to authentication include:

- "data authentication", whereby captured data's authenticity, accuracy, timeliness, completeness and other quality aspects are checked;
- "identity authentication", whereby an entity's claim as to its identity is checked.

This applies to all of the following:

- the identity of a person;
 - the identity of an organizational entity;
 - the identity of a software agent; and
 - the identity of a device.
- "attribute authentication", whereby an entity's claim to have a particular attribute is checked, typically by inspecting a "credential". Of especial relevance in advanced electronic communications is claim of being an authorized agent, i.e. an assertion by a person, a software agent or a device to represent an organization or a person.

Non-repudiation. This is a property of an information system whereby an entity is unable to convincingly deny an action it has taken.

There is a strong tendency in the information systems security literature to focus on the security of data communications. But security is important throughout the information life-cycle, i.e. during the collection, storage, processing, use and disclosure phases, as well as transmission. Each of the properties of a secure system identified above needs to be applied to all of the information life-cycle phases.

Words

| | | |
|-----------------|-------------|-----------------|
| authorization | <i>n.</i> | 授权, 认可 |
| availability | <i>n.</i> | 可用性, 有效性 |
| boundary | <i>n.</i> | 分界线 |
| component | <i>n.</i> | 成分 |
| | <i>adj.</i> | 组成的, 构成的 |
| confidentiality | <i>n.</i> | 机密性 |
| convincingly | <i>adv.</i> | 有说服力地 |
| credential | <i>n.</i> | 凭证 |
| entity | <i>n.</i> | 实体 |
| financial | <i>adj.</i> | 财政的, 金融的 |
| hacker | <i>n.</i> | 电脑黑客 |
| integrity | <i>n.</i> | 完整性 |
| organizational | <i>adj.</i> | 组织的 |
| owing | <i>adj.</i> | (~ to) 由于, 应归功于 |
| plug in | <i>v.</i> | 插上电源 |
| promptness | <i>n.</i> | 敏捷, 机敏 |
| relevance | <i>n.</i> | 中肯, 适当 |
| repudiation | <i>n.</i> | 批判 |
| secrecy | <i>n.</i> | 秘密, 保密 |
| terrorist | <i>n.</i> | 恐怖分子 |

| | | |
|-------------|-------------|------------------|
| unreachable | <i>adj.</i> | 不能达到的 |
| virus | <i>n.</i> | 病毒 |
| vital | <i>adj.</i> | 重大的, 至关重要的, 所必需的 |
| whereby | <i>adv.</i> | 由此, 赖以 |

Notes

- [1] 例句: When it comes to information security, most companies fall somewhere between two extreme boundaries: complete access and complete security.

分析: 本句是复合句。When it comes to information security 是时间状语从句。when it comes to sth/doing sth. 意为当涉及到(做)某事物的情况、事情和问题时。

译文: 涉及到信息安全, 很多公司会处于两种极端的边界: 完全访问和完全安全。

- [2] 例句: Unfortunately, having a computer with complete access is also not practical because it would expose every bit of information publicly, from customer records to financial documents.

分析: 本句是复合句, because 引导原因状语从句。句中 unfortunately 为评注性状语。评注性状语不是修饰谓语或谓语动词。而是对整个句子进行说明或解释, 表明说话人对话语的看法或态度, 通常位于句首并用逗号与句子隔开。

译文: 遗憾的是, 拥有完全访问的计算机也是不实际的。因为它会公开暴露每一点信息, 从客户记录到财政文件。

- [3] 例句: This is a property of an information system whereby its availability, reliability, completeness and promptness are assured.

分析: 本句是复合句。句中 whereby 前是主句。whereby 为关系副词, 引导定语从句, 相当于 by which, 意为靠那个, 凭那个, 借以。

译文: 服务完整性。这是信息系统的一个特性, 以保证信息系统具有有效性、可靠性、完整性和敏捷性。

Exercises

I. Write true or false for the following statements according to the passage.

- () Complete access and complete security are good for information security.
- () A completely secure computer is unusable and does not serve much of a practical purpose.
- () Having a computer with complete access is practical.
- () Integrity means gathering and maintaining accurate information and avoiding malicious modification.
- () Confidentiality means providing access to the information when and where desired.
- () Availability means avoiding disclosure to unauthorized or unwanted persons.
- () Data secrecy is a property of an information system whereby information is available only to those people authorized to receive it.

8. () Authentication is a property of an information system whereby assertions are checked.
9. () Security is important throughout the information life-cycle.
10. () During transmission, information security is not important.

II. Fill in the blanks according to the passage.

1. A completely _____ computer is one that is not connected to any network, not plugged in, and physically unreachable by anyone.
2. A computer with complete access is very _____ to use, requiring no _____ or authorization to provide any information.
3. The concept of information security is centered on the following components: _____, _____, and confidentiality.
4. Service integrity is a property of an information system whereby its _____, _____, completeness and promptness are assured.
5. Data secrecy is a property of an information system whereby information is available only to those people _____ to receive it.
6. Forms of assertion that are subjected to authentication include: data _____, identity authentication, and _____ authentication.
7. Non-repudiation is a property of an information system whereby an entity is unable to convincingly _____ an action it has taken.
8. There is a strong tendency in the information systems security literature to focus on the security of data communications.
9. Security is important throughout the _____.
10. There is a _____ between complete access and complete security.

III. Translate the following words and expressions into Chinese.

- | | |
|----------------|-------------------|
| 1. importance | 6. unusable |
| 2. environment | 7. maintain |
| 3. destruction | 8. process |
| 4. disaster | 9. database |
| 5. unreachable | 10. communication |

6.1.1 Reading Material 1

Information Security System

The information security system is an integral part of the national security system. The main functions of the information security system are:

- assessing the state of information security in the country, identifying and forecasting internal and external threats to information security, drafting an information security doctrine;
- developing a comprehensive system of legal, administrative, economic, technical and

other measures and methods aimed at ensuring information security;

- coordinating and monitoring the work of information security entities;
- protecting information security entities against incomplete, inaccurate and distorted information and against exposure to information damaging to their life and health;
- protecting protected information;
- counteracting technical intelligence services;
- developing and perfecting an information infrastructure, an information technology industry, systems, means and services;
- organizing scientific research, developing and implementation of scientific, scientific-technical programmes in the field of information security;
- licensing the activities of corporations and individual entrepreneurs in the field of information security;
- certifying information systems and means, assessing and rating the compliance of information facilities with information protection requirements;
- state inspection in the field of information security;
- creating conditions for preserving and developing intellectual potential in the information sphere;
- preventing, identifying and suppressing offences which are aimed at hurting the rights and freedoms of corporations and individuals in the information sphere, prosecuting and trying in court perpetrators of crimes in the information sphere;
- carrying out international cooperation in the sphere of information security.

Words

| | | |
|----------------|-------------|---------------|
| integral | <i>adj.</i> | 完整的, 构成整体所需要的 |
| | <i>n.</i> | 部分 |
| assess | <i>v.</i> | 估定, 评定 |
| identify | <i>v.</i> | 识别, 鉴别, 确定 |
| forecast | <i>v.</i> | 预测 |
| threat | <i>n.</i> | 恐吓, 威胁 |
| draft | <i>v.</i> | 起草 |
| doctrine | <i>n.</i> | 教条, 学说 |
| administrative | <i>adj.</i> | 管理的, 行政的 |
| coordinate | <i>n.</i> | 坐标 (用复数) |
| | <i>adj.</i> | 同等的, 并列的 |
| | <i>v.</i> | 调整 |
| counteract | <i>v.</i> | 抵消, 中和, 阻碍 |
| infrastructure | <i>n.</i> | 下部构造, 基础下部组织 |
| entrepreneur | <i>n.</i> | <法>企业家, 主办人 |
| certify | <i>v.</i> | 证明, 保证 |

| | | |
|-------------|-----------|----------------------|
| rating | <i>n.</i> | 等级, 级别, 额定 |
| compliance | <i>n.</i> | 依从, 顺从 |
| inspection | <i>n.</i> | 检查, 视察 |
| preserve | <i>v.</i> | 保存, 保留 |
| sphere | <i>n.</i> | 领域, 方面 |
| suppress | <i>v.</i> | 抑制, 查禁 |
| offence | <i>n.</i> | 犯罪, 冒犯, [军] 攻击 |
| prosecute | <i>v.</i> | 实行, 起诉, 告发, 起诉, 作检察官 |
| perpetrator | <i>n.</i> | 犯罪者, 作恶者 |

6.1.2 Reading Material 2

Data Security

The Development of Data Transmission

In the traditional, manual working environment, information (in the form of texts, numbers, etc.) and medium (such as paper) were closely intertwined. Long experiences in their usage and the application of anti-counterfeit technology have made traditional forms of information very difficult to alter. Similarly, it was also difficult to send bogus information by an impersonator. Even those who succeeded in doing so usually were discovered very easily. In today's world of information and technology, the Internet is rapidly changing many ways people do things. Similarly, it has also introduced many management problems. For man and information to interact, there is a need to establish a reliable information system working environment in which we grasp, distribute, store and manage information. Such an environment must be able to provide ample protection against tampering, stealing, delaying, transmission by fictitious parties, denial of having faxed a document, illegal intrusion and the like. Only so can we build a strong foundation for an information society.

Data Transmission

Security in the process of transmission, data resemble all the cash in a bank armored van. It can be lost or robbed anytime. With the purpose of maintaining data transmission security on the Internet, most people use encryption technology. Data to be transmitted is first encrypted as a way to prevent snooping or theft. The "Public-Key Cryptographic System" has the functions of a "digital signature" and requires no prior exchange of keys while offering the advantages of "secret communication." To make this system work smoothly, it is first necessary to agree and certify beforehand as to who or which institution holds a certain key. This goes to say that a certification management system must first be established to handle issuance or revocation of electronic certification. In addition to this system, all matters related to its usage and application services must form part of the basic operations framework of the whole system.

Pointers on Data Security

The first important thing in maintaining data security is the periodic making of back-ups. Personal computer users must periodically make back-ups of data using different back-up tools (such as diskettes, magnetic tape, removable hard drives, etc.) and store them in a safe location. If and when data from a personal computer is damaged and cannot be recovered, the back-up copies will serve their purpose. Thus, the first step in data security is to develop the habit of making periodic back-ups. It is the most effective way to assure data security under extreme circumstances. There are many factors that pose a threat to data security. They include viruses, deliberate acts of sabotage and theft. Users can guard against them using the following methods: Use a protection password for access to personal computers and the Internet. This prevents the unauthorized from stealing or damaging data inside personal computers. Handle files with encryption protection and decipher only when necessary. In this way, even if files are stolen, encryption would still be necessary to use the files. Files transmitted through the Internet must first be encrypted. The Internet is an open environment where anybody can intercept data during transmission. Encryption of such data is an effective way to prevent unwanted disclosure. Respect intellectual property rights by refraining from using software programs of dubious sources. This way, viral attack can be avoided or the use of Trojan Horse by the unscrupulous to steal data can be thwarted.

Passwords and names of users of databases and application programs must be kept confidential. Avoid using birth dates, telephone numbers and other readily accessible figures as passwords. They must be handled carefully and recorded in secret locations. Periodic changing of passwords is also recommended. Print-outs of application software programs no longer used must be shredded to prevent disclosure of data. Build up a no-diskette system environment to avoid computer virus contamination.

To guarantee data security, the Information Department must, in addition to setting up comprehensive regulations, ensure cooperation by users. Their usage of computer equipment according to regulated procedures contributes to the effective maintenance of data security.

It is necessary to build up a data security audit system that includes periodic and random spot checks and testing of information security and protection operations, as well as conduct tracking and improvement of deficiencies.

Words

| | | |
|-------------|-------------|------------|
| ample | <i>adj.</i> | 充足的, 丰富的 |
| armored | <i>adj.</i> | 披甲的, 装甲的 |
| audit | <i>n.</i> | 审计 |
| | <i>v.</i> | 稽核, 查账 |
| bogus | <i>adj.</i> | <美>假的, 伪造的 |
| counterfeit | <i>n.</i> | 贗品 |
| | <i>adj.</i> | 伪造的, 假冒的 |

| | | |
|---------------|-------------|--------------|
| | <i>v.</i> | 伪造, 假冒 |
| cryptographic | <i>adj.</i> | 关于暗号的, 用密码写的 |
| certify | <i>v.</i> | 证明, 保证 |
| circumstance | <i>n.</i> | 环境, 详情, 境况 |
| confidential | <i>adj.</i> | 秘密的, 机密的 |
| contamination | <i>n.</i> | 玷污, 污染物 |
| denial | <i>n.</i> | 否认, 拒绝 |
| decipher | <i>v.</i> | 译解(密码等), 解释 |
| | <i>n.</i> | 密电译文 |
| deficiency | <i>n.</i> | 缺乏, 不足 |
| dubious | <i>adj.</i> | 可疑的, 不确定的 |
| encryption | <i>n.</i> | 编密码 |
| fictitious | <i>adj.</i> | 假想的, 编造的 |
| intertwine | <i>v.</i> | (使)纠缠, (使)缠绕 |
| impersonator | <i>n.</i> | 模拟(名人等的)艺人 |
| intrusion | <i>n.</i> | 闯入, 侵扰 |
| institution | <i>n.</i> | 公共机构, 协会, 制度 |
| issuance | <i>n.</i> | <美>发行, 发布 |
| refrain | <i>v.</i> | 避免, 制止 |
| resemble | <i>v.</i> | 像, 类似 |
| revocation | <i>n.</i> | 撤回 |
| snoop | <i>v.</i> | 探听, 偷窃 |
| sabotage | <i>n.</i> | 破坏 |
| | <i>v.</i> | 对……采取破坏行动 |
| shred | <i>n.</i> | 碎片 |
| | <i>v.</i> | 撕碎, 切碎 |
| tamper | <i>v.</i> | 干预, 损害, 篡改 |
| thwart | <i>v.</i> | 反对, 阻碍 |
| unscrupulous | <i>adj.</i> | 无道德的 |
| van | <i>n.</i> | 有篷货车 |
| | <i>v.</i> | 用车搬运 |

phrases

Trojan Horse 〈希神〉特洛伊木马, 一种藏有恶意代码的程序

6.1.3 正文参考译文

信息安全的概念

信息安全和数据保密的问题在全球的组织中非常重要, 尤其在一个计算机病毒、恐怖

分子、黑客攻击以及自然灾害造成重要数据破坏的环境。涉及到信息安全，很多公司会处于两种极端的边界：完全访问和完全安全。一个完全安全的计算机是这样的，不连接任何网络，并且也不让任何人接触。像这样的计算机是不能用的并且也没有多少实际用途。另一方面，完全访问的计算机容易使用，提供任何信息不需要密码和权限。不幸的是，拥有完全访问的计算机也是不实际的，因为它会公开暴露每一点信息，从客户记录到财政文件。显然可以有一个中间区域——这就是信息安全的技术。

信息安全的概念集中于下面几部分：

完整性：收集和维护正确的信息并且避免恶意破坏。

可用性：在需要的时候提供对信息的访问。

机密性：避免向未授权或不必要的人泄漏信息。

安全的信息系统需要具有如下的特性：

服务完整性。这是信息系统的一个特性，以保证信息系统具有有效性、可靠性、完整性和敏捷性。

数据完整性。这是信息系统的一个特性，以保证纪录是可信的、可靠的、完全的、无改变的并且是可用的。对记录进行的操作是可靠的、适应调整要求的、全面的、系统的并且能阻止未授权者访问、破坏、改变或删除纪录。这些要求适用于机器可读的以及人工的数据库、文件和档案。

数据保密。这是信息系统的一个特性，使得信息只对有授权的人可用。很多资料把安全仅作为数据传输中的问题讨论，但是在数据存储和使用环境中安全问题同样重要。

鉴定。这是信息系统的一个特性，使行为可以被检查。可以鉴定的行为方式包括：

- 数据鉴定，得到的数据的真实性、精确性、时效性、完全性以及其它方面的性能可以被检查。
- 身份鉴定，对实体宣称的身份的鉴定。可应用于下面：人员身份、组织实体的身份、软件代理的身份和设备的身份。
- 属性鉴定，实体要求的以证书检查作为代表的特殊属性的鉴定。特别适用于先进的电子通信的是声明授权代理。也就是个人、软件代理商或设备代表某个组织或个人所做的声明。

不可否认性。这是信息系统的一个特性，使实体不能否认所执行过的行为。

在信息系统安全的文献中有一个很强的倾向就是关注数据通信中的安全。但是安全在整个信息处理周期中都是很重要的，也就是说，安全在信息的收集、存储、处理、使用和公布阶段，与传输阶段同样重要。上述安全系统的特性需要应用于信息处理周期的各阶段。

6.2 Computer Viruses

^[1] Just as human viruses invade a living cell and then turn it into a factory for manufacturing viruses, computer viruses are small program that replicate by attaching a copy of themselves to another program. Once attached to the host program, the virus then lock for other programs to "infect". In this way, the virus can spread quickly throughout a hard disk or an entire organization if

it infects a LAN (Local Area Network) or a multi-users system.

^[2] Skillfully written virus can infect and multiply for weeks or months without being detected. During that time, system backups duplicate the viruses, or copies of data or programs made and passed to other systems to infect. At some point—determined by how the virus was programmed—the virus attacks. The timing of the attack can be linked to a number of situations, including: a certain time or date; the presence of a particular user ID; the use or presence of a particular file; the security privilege level of the user; and the number of times of a file is used.

Likewise, the mode of attack varies, so-called "being" viruses might simply display a message, like the one that infected IBM's main computer system last Christmas with a season's greeting.

Malignant viruses, on the other hand, are designed to damage your system. One common attack is to wipe out data, to delete files, or to perform a format of disk.

There are four main types of viruses: shell, intrusive, operating system, and source code.

- Shell viruses wrap themselves around a host and do not modify the original program. Shell program are easy to write, which is why about half of all viruses are of this type. In addition, shell viruses are easy for programs like Data Physician to remove.
- Intrusive viruses invade an existing program and actually insert a portion of themselves into the host program. Intrusive viruses are hard to write and difficult to remove without damaging the host file.

Shell and intrusive viruses most commonly attack executable program file—those with .COM or .EXE extension—although data are also at some risk.

- Operating system viruses work by replacing parts of operating system with their own logic. ^[4]Very difficult to write, these viruses have the ability, once booted up, to take total control of your system. According to Digital Dispatch, known versions of operating system viruses have hidden large amounts of attack logic in falsely marked bad disk sectors. Others install RAM-resident programs or device drivers to perform infection or attack functions invisibly from memory.
- ^[5]Source code viruses are intrusive programs that are inserted into a source program such as those written in Pascal prior to the program being compiled. These are the least common viruses because they are not only hard to write, but also have a limited number of hosts compared to the other types.

New computer viruses are written all the time, and it's important to understand how your system can be exposed to them and what can do to protect your computer. Follow the suggestions listed below to substantially decrease the danger of infecting your computer system with a potentially dangerous computer virus.

- Be very cautious about inserting disks from unknown sources into your computer.
- Always scan the disk's files before operating any of them.
- Only download Internet files from reputable sites.

- Do not open e-mail attachments (especially executable files) from strangers.
- Purchase, install, and use an anti-virus software program. The program you choose must provide three functions:
 - Detection.
 - Prevention.
 - Removal.

As new viruses are created everyday, upgrade your anti-virus software regularly.

Words

| | | |
|---------------|-------------|----------------|
| attach | <i>v.</i> | 附加, 隶属 |
| anti-virus | <i>a.</i> | 防病毒的, 抗病毒的 |
| backup | <i>n.</i> | 后备, 备份 |
| cautious | <i>adj.</i> | 细心的, 谨慎的 |
| detect | <i>v.</i> | 发觉, 发现, 侦测 |
| duplicate | <i>adj.</i> | 复制的 |
| driver | <i>n.</i> | 驱动程序 |
| detection | <i>n.</i> | 发觉, 侦察 |
| infect | <i>v.</i> | 传染, 侵染, 感染 |
| invade | <i>v.</i> | 侵入, 侵犯 |
| intrusive | <i>adj.</i> | 侵入的, 闯入的 |
| ID | <i>n.</i> | 身份标识 |
| manufacture | <i>v.</i> | 加工, 制造 |
| mode | <i>n.</i> | 方式, 样式 |
| multiply | <i>v.</i> | 增加, 成倍的增加 |
| malignant | <i>adj.</i> | 恶意的, 有害的 |
| privilege | <i>n.</i> | 特权, 特许 |
| potentially | <i>adv.</i> | 潜在地 |
| purchase | <i>n.</i> | 购买, 购置 |
| prevention | <i>n.</i> | 预防, 防止 |
| replicate | <i>v.</i> | 复制, 重复 |
| reputable | <i>adj.</i> | 声誉好的, 可尊敬的 |
| resident | <i>adj.</i> | 常驻的, 居留的 |
| removal | <i>n.</i> | 移动, 除掉 |
| regularly | <i>adv.</i> | 有规律的, 有规则的 |
| situation | <i>n.</i> | 位置, 地位, 情况, 局面 |
| shell | <i>n.</i> | 外壳 |
| substantially | <i>adv.</i> | 潜在地 |
| virus | <i>n.</i> | 病毒, 计算机病毒 |

| | | |
|---------|--------------|--------------|
| | <i>n.</i> | 复制品 |
| upgrade | <i>n./v.</i> | 升级, 使升级 |
| wipe | <i>v.</i> | 擦去, 去除 |
| wrap | <i>v.</i> | 包, 裹, 隐藏, 伪装 |

Notes

- [1] 例句: Just as human viruses invade a living cell and then turn it into a factory for manufacturing viruses, computer viruses are small program that replicate by attaching a copy of themselves to another program.

分析: 本句是复合句, computer 到句末是主句, computer 前是比较状语从句, 由 just as 引导。在主句中又包含一个定语从句 that replicate...到句末, 修饰 programs。

译文: 正如人的病毒侵害活细胞, 然后将它变成制造病毒的工厂一样, 计算机病毒是一个小程序, 通过将该程序本身的拷贝附加到另一个程序上来进行复制。

- [2] 例句: Skillfully written virus can infect and multiply for weeks or months without being detected.

分析: 本句是简单句。skillful written 是过去分词短语, 修饰 viruses, 作定语。

译文: 巧妙编写的病毒会在数周或数月内进行传染并倍增, 而不会被人们发现。

- [3] 例句: The timing of the attack can be linked to a number of situations, including: a certain time or date; the presence of a particular user ID; the use or presence of a particular file; the security privilege level of the user; and the number of times of a file is used.

分析: 本句的基本框架是简单句。A file is used 是一个定语从句, 修饰 number of times。

译文: 攻击的时刻可能与许多情况有关, 其中包括: 某一特定时间或日期、特定用户身份的出现、特定文件的使用或出现、用户的安全优先级别以及某一文件被使用的次数。

- [4] 例句: Very difficult to write, these viruses have the ability, once booted up, to take total control of your system.

分析: 本句是复合句。主句是 these viruses have the ability to take...到句末, 从句是 once booted up, 因句子的需要主句被断开。

译文: 这种病毒很难编写, 而一旦被引导, 它就能够完全控制整个系统。

- [5] 例句: Source code viruses are intrusive programs that are inserted into a source program such as those written in Pascal prior to the program being compiled.

分析: 本句是复合句。That 之前是主句, 之后是定语从句, 修饰 programs。

译文: 源代码型病毒是一种侵入式程序, 在源程序被编译以前, 这种程序被插入到例如用 Pascal 编写的源程序之中。

Exercises

I . Write true or false for the following statements according to the passage.

1. () Computer viruses can replicate copies of themselves attaching to another program.
2. () There are four main types of viruses: shell, intrusive, operating system, and source code.
3. () Intrusive viruses wrap themselves around a host and do not modify the original program.
4. () In order to protect your computer you should only download Internet files from reputable sites.
5. () Be very cautious about inserting disks from unknown sources into your computer.
6. () We may download Internet files from any site in order to decrease the danger of infecting your computer system.
7. () Do not open e-mail attachments (especially executable files) from strangers.
8. () Intrusive viruses are hard to write and difficult to remove without damaging the host file.
9. () Operating system viruses work by replacing parts of operating system with their own logic.
10. () Source code viruses are intrusive programs that are inserted into a source program.

II . Fill in the blanks according to the passage.

1. Once attached to the host program, the virus then lock for other programs to "_____".
2. The timing of the attack can be linked to a number of situations, including: a certain time or date; the presence of a particular_____; the use or presence of a _____; the security privilege level of the user; and the number of times of a file is used.
3. There are four main types of viruses: _____, intrusive,_____, and source code.
4. As new viruses are created everyday, upgrade your _____regularly.
5. Computer viruses are small program that_____ by attaching a copy of themselves to another program.
6. Skillfully written virus can infect and multiply for weeks or months without _____.
7. One common attack is to _____ data, to delete files, or to perform a format of disk.
8. Intrusive viruses _____an existing program and actually insert a portion of themselves into the host program.
9. _____ viruses are intrusive programs that are inserted into a source program.
10. As new viruses are created everyday, _____ your anti-virus software regularly.

III. Translate words and expressions into Chinese.

1. computer virus

6. shell virus

- | | |
|-----------------------------|---------------------------------|
| 2. host program | 7. intrusive virus |
| 3. LAN | 8. operating system virus |
| 4. a particular user ID | 9. reputable site |
| 5. security privilege level | 10. anti-virus software program |

6.2.1 Reading Material 1

Backdoors

Backdoor programs are typically more dangerous than computer viruses, as they can be used by an intruder to take control of a PC and potentially gain access to an entire network.

Backdoor programs, also referred to as Trojan horses, are typically sent as attachments to e-mails with innocent-looking file names, tricking users into installing them. They often enable remote users to listen in on conversations using the host computer's microphone, or even see through its video camera if it has one. Back Orifice (BO) 2000 is a backdoor program designed for malicious use. Its main purpose is to maintain unauthorized control over another machine for reconfiguration and data collection. It takes the form of a client/server application that can remotely control a machine without the user's knowledge to gather information, perform system commands, reconfigure machines and redirect network traffic.

With BO an intruder has to know the user's IP address to connect, or could scan an entire network looking for the victim. Once connected, the intruder can send requests to the BO 2000 server program, which performs the actions the intruder specifies on the victim's computer, sending back the results.

BO is installed on the server machine simply through the execution of the server application. This executable file is originally named bo2k.exe, but it can be renamed. The configuration wizard will step through the various configuration settings, including the server file (the executable), the network protocol, port number, encryption, and password. Once this process is complete, running bo2kgui.exe executes the user interface for BO.

It is very difficult to detect BO, because it is so highly configurable. In addition, backdoor programs are multi-dimensional, so several detection methods are recommended to achieve maximum protection and awareness of the installation of BO 2000 on a machine or series of machines on a network.

We recommend coupling the use of an updated version of anti-virus software to detect which machines on the network have BO installed—and intrusion detection software to identify attacks over the network.

Users are urged to follow three important precautions:

Do not accept files from Internet chat systems.

If you are connected to the Internet, do not enable network sharing without proper security in place.

Do not open e-mail attachments: never run any executable files sent to you (.exe files or .zip files with a.exe in them). It is safer if these are run through a virus checker first, but they could be

new backdoor programs or viruses that a virus scanner will not detect. It is safe to open Word documents and Excel spreadsheets if the Microsoft Auto-Run feature is turned off. Allowing macros to run automatically can spread e-mail viruses such as Melissa. Many people send each other animations in e-mail: it is easy to put a backdoor program into one of these and users cannot tell when they infect their computers with Back Orifice 2000.

Words

| | | |
|--------------|-----------|------------|
| animation | <i>n.</i> | 动画（制作） |
| backdoor | <i>n.</i> | 后门 |
| encryption | <i>a.</i> | 秘密的, 不正当的 |
| | <i>n.</i> | 加密术 |
| unauthorized | <i>a.</i> | 越权的; 未经授权的 |

6.2.2 Reading Material 2

Content Filtering Sifts out Viruses

It might be a stretch to call the recent "Melissa" virus a positive event because it disrupted thousands of government and commercial computer systems. But it did put the focus on content filtering, a network security technology that observers say has been undervalued. In the long run, many believe this new focus will prove beneficial to users.

As a macro virus attached to an e-mailed Microsoft Corp. Word document, Melissa would not have been picked up by traditional security solutions such as firewalls or intrusion-detection systems, which are designed to detect items that break certain global access rules. The only way to detect a virus such as Melissa is to examine what is inside the e-mail, which can only be done through content filtering, supporters of the technology said.

Filtering products have been around for years, but manufacturers have been struggling to meet the needs of organizations that employ varying security policies among different users. Recently, however, vendors have released filtering products that can be tailored to the needs of user groups, and industry has begun working on standards that allow these products to work with firewalls.

Content filtering encompasses several areas of protection. As well as guarding against viruses, it includes:

E-mail filtering, which controls incoming e-mail that contains spam, file attachments that are too large or hoax e-mails. It also can be used internally to make sure confidential information is not accidentally or intentionally sent outside of the organization.

Uniform Resource Locator filtering, which blocks access to inappropriate sites not connected to a user's work needs.

Malicious-code protection, which prevents hostile code embedded in Java and ActiveX scripts in otherwise innocuous World Wide Web pages from reaching the user's browser and

being executed.

The most obvious benefit of filtering products is the ability to boost network security, but many organizations also use them for internal network control. For example, URL filters can be used to block access to certain sites and to maintain productivity. Message Inspector, an e-mail filter produced by Elron Software Inc. uses context-sensitive filtering to weed out offensive or sensitive communications in e-mail, newsgroups or FTP sites. Message Inspector is an example of the newer generation of filter products that examine messages for words and phrases used in conjunction with each other to narrow the range of filter targets. This strategy differs from the one employed by traditional products that block communications based on factors such as keywords—a process that can generate a lot of "false positive" alarms.

Melissa presented a clear idea of why people need a gateway-based virus-detection product, "Viruses need to be kept out of the enterprise altogether because you just can't update all virus-detection software on desktops in time to catch them."

The International Computer Security Association is working on what it calls the Common Content Inspection program to define a general application program interface (API) that would enable filter vendors to fit their products to a range of firewalls.

Abbreviations

| | |
|-------------------------------------|--------|
| FTP (File Transfer Protocol) | 文件传输协议 |
| API (Application Program Interface) | 应用程序接口 |

6.2.3 正文参考译文

计算机病毒

正如人的病毒侵害活细胞，然后将它变成制造病毒的工厂一样，计算机病毒是一个小程序，通过将该程序本身的拷贝附加到另一个程序上来进行复制。病毒一旦附加在主程序上，该病毒就会将另一些程序锁住令其“感染”。这样，如果病毒传染了局域网或多用户系统的话，那么该病毒就会迅速传播到整个硬盘或整个（计算机）的组成部分。

巧妙地编写的病毒会在数周或数月的时间内进行传染并倍增，而不会被人们发现。在这一段时间内，系统的备份对此病毒进行复制，或者数据或程序的拷贝被制造出来，并且被传递到其他系统进行传染。在某一点——这取决于该病毒的编程方式——病毒开始攻击了。攻击的时刻可能与许多情况有关，其中包括：某一特定时间或日期、特定用户身份的出现、特定文件的使用或出现、用户的安全优先级以及某一文件被使用的次数。

类似地，攻击模式是多变的。所谓“生物”病毒，可能只显示一条信息，这类似于去年圣诞节曾经传染了 IBM 主计算机的病毒，它显示的信息是季节的问候。

另一方面，致命的病毒是设计用来破坏你的系统的。一种常见的攻击是擦除数据、删除文件或对硬盘进行格式化。

共有四种主要类型的病毒：壳型、侵入型、操作系统型和源代码型。

- 壳型病毒：它将自己捆绑在主程序上，并不修改原始程序。壳型程序易于编写，这就

是为什么大约一半的病毒均属于这种类型。此外，对于像“数据医生”这样的程序来说，壳型病毒是易于清除的。

- 侵入型病毒：它侵害现有的程序，实际上，它把自己的一部分插入到主程序中。侵入型病毒难以编写，而且很难把它清除同时又不破坏主文件。

壳型和侵入型病毒通常攻击可执行文件——即带有.COM或.EXE扩展名的文件——虽然数据文件也有某种危险。

- 操作系统型病毒：它用自己的逻辑替换操作系统（OS）的某些部分。这种病毒很难编写，而一旦被引导，它就能够完全控制整个系统。有一种有名的操作系统病毒——“数字调度”，该病毒利用虚假地被标记为坏磁盘扇区的方式隐藏了大量的攻击逻辑。这一类型的其他病毒对 RAM 中的驻留程序或设备驱动程序进行安装，以便不被内存看见执行感染或攻击功能。
- 源代码型病毒：它是一种侵入式程序，在源程序被编译之前，这种程序被插入到例如用 Pascal 编写的源程序中。这些病毒不常见，这是因为这种程序不仅难以编写，而且与其他类型的病毒相比，其宿主的数量很有限。

新病毒时时刻刻都有人在编写，了解系统是如何暴露给病毒的以及为了保护计算机我们能够做些什么。按照下列建议，可以大大减少某种潜在的计算机病毒感染给计算机系统造成的危险。

- 当来源不明的磁盘插入计算机时，要非常小心。
- 在打开任何文件之前，总应当扫描一下磁盘文件。
- 应当仅从信誉好的网站下载文件。
- 不应打开来自陌生人的电子邮件的附件（特别是可执行的文件）
- 购买、安装及使用防病毒软件程序，所选择的这种程序必须提供三种功能：检测、预防、清除。

因为每天都有新病毒产生出来，所以要定期地升级防病毒软件。

6.3 Internet Security

In recent years, Internet changes our life a lot. We use e-mail and Internet phone to talk with our friends, we get up-to-date information through web and we do shopping in the cyber-market. Internet has many advantages over traditional communication channels, e.g. it's cost effective, it delivers information fast and it is not restricted by time and place. ^[1]The more people use Internet, the more concerns about Internet security.

In person-to-person community, security is based on physical cues. To name but a few, we use our signature to authenticate ourselves; we seal letters to prevent others inspection and modification; we receive receipt with the shop's chop to make sure we paid; we get information from a reliable source. But in the Internet society, no such physical cue is available. There are two areas that we concern about in Internet communication. The first one is secrecy—how do we ensure no one reads the data during its transmission? The second one is authentication—how do we be sure that the identity of someone claiming "who it is". Imagine one day you receive an

e-mail, which the e-mail sender is "Bill Gates". How do you confirm the e-mail is actually sent by Bill Gates?

Encryption is the way to solve the data security problem. In real life, if Tom wants to talk with Mary secretly, he can choose a room with nobody there and talk with Mary quietly, or he can talk with Mary using codes understandable by Tom and Mary only. We take the second approach—encryption—to transmit data through Internet. There are two kinds of encryption techniques—symmetric key encryption and asymmetric key encryption.

For symmetric key encryption, both parties should have a consensus about a secret encryption key. When A wants to send a message to B, A uses the secret key to encrypt the message. After receiving the encrypted message, B uses the same (or derived) secret key to decrypt the message. The advantage of using symmetric key encryption lies in its fast encryption and decryption processes (when compared with asymmetric key encryption at the same security level). The disadvantages are, first, the encryption key must be exchanged between two parties in a secure way before sending secret messages. Secondly, we must use different keys with different parties. For example, if A communicates with B, C, D and E, A should use 4 different keys. Otherwise, B will know what A and C as well as A and D has been talking about. The drawbacks of symmetric key encryption make it unsuitable to be used in the Internet, because it's difficult to find a secure way to exchange the encryption key.

For asymmetric key encryption, there is a pair of keys for each party: a public key and a private key. The public key is freely available to the public, but only the key owner gets hold of the private key. Messages encrypted by a public key can only be decrypted by its corresponding private key, and vice versa. When A sends message to B, A first gets B's public key to encrypt the message and sends it to A. After receiving the message, B uses his private key to decrypt the message. The advantage comes in the public key freely available to the public, hence free from any key exchange problem. The disadvantage is the slow encryption and decryption process.

^[2]Almost all encryption schemes used in the Internet uses asymmetric key encryption for exchanging the symmetric encryption key, and symmetric encryption for better performance. Asymmetric key cryptography seems to attain secrecy in data transmission, but the authentication problem still exists. Consider the following scenario: when A sends a message to B, A gets B's public key from the Internet—but how can A know the public key obtained actually belongs to B? Digital certificate emerges to solve this problem.

Digital certificate is an identity card counterpart in the computer society. When a person wants to get a digital certificate, he generates his own key pair, gives the public key as well as some proof of his identification to the Certificate Authority (CA). CA will check the person's identification to assure the identity of the applicant.^[3] If the applicant is really the one "who claims to be", CA will issue a digital certificate, with the applicant's name, e-mail address and the applicant's public key, which is also signed digitally with the CA's private key. When A wants to send B a message, instead of getting B's public key, A now has to get B's digital certificate. A first checks the certificate authority's signature with the CA's public key to make sure it's a trustworthy certificate. Then A obtain B's public key from the certificate, and uses it to encrypt

message and sends to B.

Authentication is an important part everyday life. The lack of strong authentication has inhibited the development of electronic commerce. It is still necessary for contracts, legal documents and official letters to be produced on paper. Strong authentication is then, a key requirement if the Internet is to be used for electronic commerce. Strong authentication is generally based on modern equivalents of the one time pad. For example tokens are used in place of one-time pads and are stored on smart cards or disks.

^[4] Many people pay great amounts of lip service to security, but do not want to be bothered with it when it gets in their way. It's important to build systems and networks in such a way that the user is not constantly reminded of the security system around him. Users who find security policies and systems too restrictive will find ways around them. Security is everybody's business, and only with everyone's cooperation, an intelligent policy, and consistent practices, will it be achievable.

Words

| | | |
|----------------|-----------|--------------------|
| authenticate | <i>v.</i> | 鉴别 |
| authentication | <i>n.</i> | 证明, 鉴定 |
| applicant | <i>n.</i> | 申请者, 请求者 |
| cyber-market | <i>n.</i> | 网上商店 |
| cryptography | <i>n.</i> | 密码系统, 密码术 |
| certificate | <i>n.</i> | 证书 |
| | <i>v.</i> | 发给证明书 |
| counterpart | <i>n.</i> | 副本, 配对物 |
| cooperation | <i>n.</i> | 合作, 协作 |
| decrypt | <i>v.</i> | 解密, 解释明白 |
| encryption | <i>n.</i> | 加密术, 密码术 |
| identification | <i>n.</i> | 辨认, 鉴定, 证明 |
| receipt | <i>n.</i> | 收据, 收条 |
| signature | <i>n.</i> | 签名 |
| scenario | <i>n.</i> | 情况说明, 游戏的关或是某一特定情节 |
| token | <i>n.</i> | 令牌 |
| trustworthy | <i>a.</i> | 可信赖的 |
| up-to-date | <i>a.</i> | 最近的, 当代的 |

phrases

| | |
|------------|------|
| public key | 公开密钥 |
|------------|------|

Abbreviations

CA (Certificate Authority) 证书授权机构

Notes

- [1] 例句: The more people use Internet, the more concerns about Internet security.
分析: 这是 the 形容词比较级+the +形容词比较级句型, 表示越……越……
译文: 使用 Internet 的人越多, 对 Internet 安全的关注就越多。
- [2] 例句: Almost all encryption schemes used in the Internet uses asymmetric key encryption for exchanging the symmetric encryption key, and symmetric encryption for better performance.
分析: asymmetric key encryption 是指“非对称密钥加密”, symmetric key encryption 是指“对称密钥加密”。
译文: 在 Internet 中几乎所有的加密方案都使用非对称密钥加密来替换对称密钥加密和对称加密, 以得到更好的加密控制。
- [3] 例句: If the applicant is really the one "who claims to be", CA will issue a digital certificate, with the applicant's name, E-mail address and the applicant's public key, which is also signed digitally with the CA's private key.
分析: CA 指“证书授权机构”, 是可信任的第三方, 它保证数字证书的有效性。CA 负责注册、颁发证书, 并在证书包含的信息变得无效后收回证书。
译文: 如果申请人确如自己所声称的, 证书授权机构将授予带有申请人姓名、电子邮件地址和申请人公钥的数字证书, 并且该数字证书由证书授权机构用其私有密钥进行数字签名。
- [4] 例句: Many people pay great amounts of lip service to security, but do not want to be bothered with it gets in their way.
分析: lip service 意思是“说得好听的话, 空口的应酬话”, when it gets in their way: 状语从句, 修饰 when 前面的 it, when 前面和后面的 it 均指网络安全问题。
译文: 许多人大肆空谈安全, 不过当安全问题走近他们时, 他们却不愿意为之打扰。

Exercises

I . Write true or false for the following statements according to the passage.

1. () In this article, "cybermarket" means a market that sells all kinds of goods.
2. () In Internet communication, we concern about secrecy and authentication.
3. () The two kinds of encryption techniques used in the Internet are symmetric key encryption and asymmetric key encryption.
4. () Checking the person's identification is one of the CA's tasks.
5. () Internet delivers information fast and it is not restricted by time and place.
6. () In person-to-person community, security is based on physical cues.

7. () Encryption is the only way to solve the data security problem.
8. () The advantage of using symmetric key encryption lies in its fast encryption and decryption processes.
9. () The private key is available to the public.
10. () The lack of strong authentication has inhibited the development of electronic commerce.

II. Fill in the blanks according to the passage.

1. _____ people use Internet, _____ concerns about Internet security.
2. Many people pay great amounts of _____ to security, but do not want to be bothered with it when it gets in their way.
3. When a person wants to get a digital certificate, he generates his own key pair, gives the _____ as well as some proof of his identification to the Certificate Authority.
4. There are two kinds of encryption techniques — _____key encryption and _____ key encryption.
5. Digital certificate is an identity card _____ in the computer society.
6. The lack of strong authentication has _____ the development of electronic commerce.
7. Strong _____ is then, a key requirement if the Internet is to be used for electronic commerce.
8. Users who find security policies and systems too_____ will find ways around them.
9. To name but a few, we use our _____ to authenticate ourselves.
10. For symmetric key encryption, both parties should have a _____ about a secret encryption key.

III. Translate words and expressions into Chinese.

- | | |
|------------------------------|------------------------------|
| 1. up-to-date | 6. identity card |
| 2. symmetric key encryption | 7. digital certificate |
| 3. asymmetric key encryption | 8. Certificate Authority |
| 4. vice versa | 9. a trustworthy certificate |
| 5. as well as | 10. one-time |

6.3.1 Reading Material 1

Network Security Report

Any one responsible for the security of a trusted network will be concerned when connecting it to a distrusted network. In the case of connections to the Internet this concern may be based largely on anecdotal evidence gleaned from widespread media coverage of security breaches. A closer inspection of the facts and statistics behind some of the media coverage will, however, only serve to deepen that concern. For example, the US National Computer Security Agency (NCSA) asserts that most attacks to computer systems go undetected and unreported, citing attacks made against 9,000 Department of Defence computers by the US Defence Information Systems Agency

(DISA). These attacks had an 88 percent success rate and went undetected by more than 95 percent of the target organizations. Only 5 percent of the 5 percent that detected an attack, a mere 22 sites, reacted to it.

It is noteworthy that these sites belong to the US Department of Defence (DoD) and were not commercial sites, which may give security less priority than the DoD.

NCSA also quote the FBI as reporting that in more than 80 percent of FBI investigated computer crimes, unauthorized access was gained through the Internet.

Putting a value on the damage done by such attacks is difficult but a 1995 survey conducted by Ernst & Young, a New York based accounting firm, reported that one third of businesses connected to the Internet reported up to 100 000 USD in financial loss over a two year period due to malicious acts by computer users outside the firm. A little more than two percent of connected companies reported losses of more than 1M USD.

There is amazement in the computer security industry at the level of ignorance to the problem. To understand the risks often involves a steep learning curve and they have few real parallels in everyday life, for example nobody worries that a burglar will be able to trick their front door into opening by posting cryptic messages through the letterbox. When there is a good "hacker" story to report the press goes into frenzy, but the general level of awareness is still surprisingly low. For example, the Sunday Times which prides itself on providing accurate coverage of IT issues published an article recently that claimed that most businesses worry too much about Internet security. The article goes on to explain that encryption is all that is needed to be completely secure. The article focuses purely on privacy of communication and completely misses the possibility of an attack originating from the Internet.

6.3.2 Reading Material 2

Internet Firewall Concept

A packet filter is often used to protect an organization's computers and networks from unwanted Internet traffic. The filter is placed in the router that connects the organization to the rest of the Internet.

A packet filter configured to protect an organization against traffic from the rest of the Internet is called an Internet firewall; the term is derived from the fireproof physical boundary placed between two structures to prevent fire from moving between them. Like a conventional firewall, an Internet firewall is designed to keep problems in the Internet from spreading to an organization's computers.

Firewalls are the most important security tool used to handle network connections between two organizations that do not trust each other. By placing a firewall on each external network connection, an organization can define a secure perimeter that prevents outsiders from interfering with the organization's computers. In particular, by limiting access to a small set of computers, a firewall can prevent outsiders from probing all computers in an organization or flooding the organization's network with unwanted traffic.

A firewall can lower the cost of providing security. Without a firewall to prevent access, outsiders can send packets to arbitrary computers in an organization. Consequently, to provide security, an organization must make all of its computer secure. With a firewall, however, a manager can restrict incoming packets to a small set of computers. In the extreme case, the set can contain a single computer. Although computers in the set must be secure, other computers in the organization do not need to be. Thus, an organization can save money because it is less expensive to install a firewall than to make all computer systems secure.

Words

| | | |
|----------|-----------|-----|
| firewall | <i>n.</i> | 防火墙 |
| router | <i>n.</i> | 路由器 |

6.3.3 正文参考译文

网络安全

近几年来, Internet 使人们的生活改变了许多。人们使用 e-mail, 通过 IP 电话和朋友交谈, 从网上获取最新信息, 在网络市场购物。与传统通信渠道相比, Internet 有许多优势: 花费实在, 信息传送速度快, 并且不受时间和地点的限制。使用 Internet 的人越多, 对 Internet 安全的关注就越多。

在个人面对个人的社会, 安全取决于物理的提示。简单说来, 人们用签名来表明自己的身份; 人们把信函密封起来, 防止他人窥视和更改; 人们接受商店里有公章的收条来证明已经付款; 人们从可靠的地方获取信息。不过对 Internet 安全而言, 就没有这样的物理提示。对 Internet 通信, 人们关心两个方面, 第一是保密——如何确信数据在传输过程中没有人阅读过? 第二是鉴定——如何确信某个人(或计算机)所声称的身份。设想有一天用户收到了一份 e-mail, 寄件人是“比尔·盖茨”, 用户如何确认这份 e-mail 真的是比尔·盖茨发送的?

解决数据安全问题的途径是加密。在现实生活中, 如果汤姆想和玛丽密谈, 他可以找一间没人的房子和玛丽平静地交谈, 或者他用只有他们两人明白的密码交谈。在互联网, 人们用第二种方法——加密——来传输数据。加密技术有两种——对称密钥加密和非对称密钥加密。

对称密钥加密来说, 当事人双方要有一致的密钥。当 A 给 B 要发送消息时, A 用密钥将消息加密。B 收到加密的消息后, 用相同的(或最初的)密钥将消息解密。用对称密钥加密的优点在于它的加密和解密速度快(与相同安全标准下的非对称密钥加密术相比)。它的缺点是: 第一, 在发送秘密消息之前, 当事双方必须安全地交换密钥; 第二, 对不同当事人, 人们必须使用不同的密钥。例如, 如果 A 和 B、C、D 及 E 通信, A 必须用四种不同的密钥。否则, B 将知道 A 和 C 以及 A 和 D 在谈论什么。要找到安全交换密钥的方式很困难, 所以, 对称密钥加密的缺点使它不适合用于 Internet。

对非对称密钥加密, 当事各方都有一对密钥: 公钥和私人密钥。公钥可自由使用, 但只有密钥持有者拥有私人密钥。用公钥加密的消息只能用相应的私人密钥解密, 反之亦然。

当 A 给 B 发送消息时, A 首先得到 B 的公钥将消息加密, 然后发送给 B。B 收到消息后, 用他的私人密钥将消息解密。这种加密术的优点是人们可以自由获得公钥, 因此从交换密钥问题中解脱出来。它的缺点是加密和解密速度慢。在因特网中几乎所有的加密方案都使用非对称密钥加密来替换对称密钥加密和对称加密, 以得到更好的加密控制。非对称密钥加密在数据传输上似乎是安全的, 但鉴定的问题依然存在。请考虑如下情节: 当 A 给 B 发送消息时, A 从互联网上得到 B 的公钥——A 怎样才能知道他获得的公钥确实属于 B? 这个问题由数字证书来解决。

数字证书相当于电脑世界的身份证。当一个人想获得数字证书时, 他生成自己的一对密钥, 把公钥和其他的鉴定证据送达证书授权机构, 证书授权机构将核实这个人的证明, 来确定申请人的身份。如果申请人确如自己所声称的, 证书授权机构将授予带有申请人姓名、电子邮件地址和申请人公钥的数字证书, 并且该数字证书由证书授权机构用其私有密钥做了数字签名。当 A 要给 B 发送消息时, A 必须得到 B 的数字证书, 而非 B 的公钥。A 首先核实带有证书授权机构公钥的签名, 以确定是否为可信赖的证书。然后, A 从证书上获得 B 的公钥, 并利用公钥将消息加密后送给 B。

认证是日常生活中的重要部分。缺少强有力的认证制约了电子商务的发展。写在纸上的合同、法律文件和官方信函仍是必要的。如果互联网用于电子商务, 强有力的认证是一个关键要求。强有力的认证通常是建立在现代版的一次性密码本技术上的。例如, 令牌用来代替昔日的一次性密码本, 而且储存在小巧的卡片或磁盘上。

许多人大肆空谈安全, 不过当安全问题走近他们时, 他们却不愿意为之打扰。建立一个用户无需时时想到他们周围的安全保障系统的系统和网络是重要的。安全是每个人的事情, 只有通过每个人的协作、采用明智的对策, 进行坚持不懈的实践网络安全才能实现

6.4 Secure Networks and Policies

What is a secure network? Can an Internet be made secure?^[1] Although the concept of a secure network is appealing to most users, networks cannot be classified simply as secure or not secure because the term is not absolute—each group defines the level of access that is permitted or denied. For example, some organizations store data that is valuable. Such organizations define a secure network to be a system prevents outsiders from accessing the organization's computers. Other organizations need to make information available to outsiders, but prohibit outsiders from changing the data. Such organizations may define a secure network as one that allows arbitrary access to data, but includes mechanisms that prevent unauthorized changes. Finally, many large organizations need a complex definition of security that allows access to selected data or services the organization chooses to make public, while preventing access or modification of sensitive data and services that are kept private.

Because no absolute definition of information secure exists, the first step an organization must take to achieve a secure system is to define the organization's security policy. The policy does not specify how to achieve protection. Instead, it states clearly and unambiguously the items that are to be protected.

Defining an information security policy is complex. The primary complexity arises because an information security policy cannot be separated from the security policy for computer systems attached to the network. In particular, defining a policy for data that traverses a network does not guarantee that data will be secure. Information security cannot prevent unauthorized users who have accounts on the computer from obtaining a copy of the data. The policy must hold for the data stored on disk, data communicated over a telephone line with a dialup modem, information printed on paper, data transported on portable media such as a floppy disk, and data communicated over a computer network.

Defining a security policy is also complicated because each organization must decide which aspects of protection are most important, and often must compromise between security and ease of use. For example, an organization can consider:

- Data Integrity;
- Data Availability;
- Data Confidentiality and Privacy.

Words

| | | |
|----------------|-------------|--------------|
| accountability | <i>n.</i> | 责任, 可计算性 |
| archive | <i>v.</i> | 存档 |
| | <i>n.</i> | 档案文件 |
| authorization | <i>n.</i> | 授权, 特许 |
| incur | <i>v.</i> | 招致 |
| liability | <i>n.</i> | 责任, 债务, 负债 |
| traverse | <i>n.</i> | 横贯, 横断 |
| | <i>v.</i> | 横过, 穿过, 经过 |
| unauthorized | <i>adj.</i> | 未被授权的, 未经认可的 |

Phrases

| | |
|----------------------|----------------------|
| appeal to | 呼吁, 要求, 诉诸, 上诉, 有吸引力 |
| arise from | 起于, 由……而引起, 由……而产生 |
| be separated from | 使分离, 使分开; 使分散; 把……分类 |
| data integrity | 数据完整性 |
| data availability | 数据有效性 |
| data confidentiality | 数据机密性 |
| focus on | 集中 |
| integrity mechanisms | 完整性机制 |
| prevent...from | 阻止, 防止 |
| prohibit...from | 禁止, 阻止 |

Notes

[1] 例句: Although the concept of a secure network is appealing to most users, networks cannot be classified simply as secure or not secure because the term is not absolute—each group defines the level of access that is permitted or denied.

分析: 这是一个复合句。主句为 networks cannot be classified simply as secure or not secure, 从句为原因状语从句。

译文: 尽管网络安全的概念吸引着绝大多数使用者, 但我们不能把网络简单的称为安全的网络或不安全的网络, 因为安全这个术语不是绝对的——每个组织定义它的标准是不同的。

Exercises

I. Write true or false for the following statements according to the passage.

1. () Networks can be classified as secure or not secure.
2. () Security policy specifies how to achieve protection.
3. () Defining a policy for data that traverses a network does not guarantee that data will be secure.
4. () A security policy cannot be defined unless an organization understands the value of its information.
5. () Many large organizations need a complex definition of security that allows access to selected data or services the organization chooses to make public.
6. () Absolute definition of information secure exists.
7. () Information security must prevent unauthorized users who have accounts on the computer from obtaining a copy of the data.
8. () Each group defines the level of access that is permitted or denied.
9. () Other organizations need to make information available to outsiders, but prohibit outsiders from changing the data.
10. () Defining a security policy isn't complicated.

II. Fill in the blanks according to the passage.

1. _____ refers to protection from change: is the data that arrives at a receiver exactly the same as the data that was sent?
2. _____ refers to protection against disruption of service: does data remain accessible for legitimate uses?
3. _____ refer to protection against snooping or wiretapping: is data protected against unauthorized access?
4. _____ refers to how an audit trail is kept: which group is responsible for each item of data? How does the group keep records of access and change?
5. Networks cannot be _____ simply as secure or not secure because the term is not

absolute—each group defines the level of access that is permitted or denied.

6. The concept of a secure network is _____ to most users
7. Such organizations define a secure network to be a system prevents outsiders from _____ the organization's computers.
8. Many large organizations need a complex _____ of security.
9. The first step an organization must take to _____ a secure system is to define the organization's security policy.
10. Defining a policy for data that _____ a network does not guarantee that data will be secure.

III. Translate the following words into Chinese.

- | | |
|-------------------------|--------------------------|
| 1. appeal to | 6. prohibit...from |
| 2. data integrity | 7. be responsible for |
| 3. data availability | 8. be analogous to |
| 4. data confidentiality | 9. result from |
| 5. integrity mechanisms | 10. information security |

6.4.1 Reading Material 1

Computer Security

The techniques developed to protect single computers and network-linked computer systems from accidental or intentional harm are called computer security. Such harm includes destruction of computer hardware and software, physical loss of data, and the deliberate invasion of databases by unauthorized individuals.

Data may be protected by such basic methods as locking up terminals and replicating data in other storage facilities. Most sophisticated methods include limiting data access by requiring the user to have an encoded card or to supply an identification number or password. Such procedures can apply to the computer-data system as whole or may be pinpointed for particular information banks or programs. Data are frequently ranked in computer files according to degree of confidentiality.

Operating systems and programs may also incorporate built-in safeguards, and data may be encoded in various ways to prevent unauthorized persons from interpreting or even copying the material. The encoding system most widely user in the United States is the Data Encryption Standard (DES) designed by IBM and approved for use by the National Institute of that are then repeated several times. Very large-scale computer systems, for example, the U.S. military's Advanced Research Project Agency Network (ARPANET), may be broken up into smaller subsystems for security purposes, but smaller system in government and industry are more prone to system-wide invasions. At the level of personal computers, security possibilities are fairly minimal.

Most invasions of computer systems are for international or corporate spying or sabotage, but computer hackers may take the penetration of protected databanks as a challenge, often with

no object in mind other than accomplishing a technological feat. Of growing concern is the deliberate implantation in computer programs of worms or viruses that, if undetected, may progressively destroy databases and other software. Such infected programs have appeared in the electronic bulletin boards available to computer users. Other viruses have been incorporated into computer software sold commercially. No real protection is available against such bugs except the vigilance of manufacturer and user.

Phrases

| | |
|-------------------|-------|
| computer security | 计算机安全 |
| computer virus | 计算机病毒 |

Abbreviations

| | |
|--------------------------------|--------|
| DES (Data Encryption Standard) | 数据加密标准 |
|--------------------------------|--------|

6.4.2 Reading Material 2

Security Policy Design Issues

When designing a firewall system and its corresponding security policy, a number of questions should be answered. The first question involves the company's expected level of security. Is the company trying to restrict all access to services not deemed essential to the business? Or does the company wish to allow all or most types of transactions, thus asking the firewall system only to audit transactions and create an orderly request for transactions? Restricting all access to services not deemed essential requires a more elaborate firewall system and thus more work and expense. Allowing most types of transactions requires a simpler system that only performs queue management operations and creates an audit trail.

A second question stems from the first decision: How much money is the company willing to invest in a firewall system? Commercially-purchased firewall systems can be powerful, complex, and expensive. It is possible, however, to construct a home-grown firewall system that takes advantage of the capabilities of existing equipment, such as routers and network operating systems. As we saw earlier, it is possible to restrict access into a system based on time of day, day of week, and location. It is also possible to use existing software to create an audit trail of all incoming and outgoing transactions. Depending on the detail of auditing required, additional software can be purchased and installed that will work in concert with network operating system software to provide any desired level of audits.

Similarly, many routers can be programmed to restrict access to certain kinds of traffic. A router can be programmed to accept and reject requests with specific IP addresses or a range of IP addresses. Routers can also be programmed to deny access to certain port addresses at the TCP level.

A third question relates to the company's commitment to security. If the company is serious about restricting access to the corporate network through a link such as the Internet, will the

company be equally serious about supporting security on any and all other links into the corporate network environment? Dial-up modem access, wireless network access, and other telecommunication links should also be considered when making security decisions. Fax machines, both stand alone and computer based, as well as removable disk media are two more examples of how data may enter or leave a corporation. Any security policy must take these entrance and exit points, as well as the Internet, into consideration.

Having a well-designed security policy in place will make the jobs of network support staff clearer. The staff employees will know what the network users can and cannot access and where they can and cannot go. A well-designed security policy will make enforcement more straightforward, and it will allow the staff to react properly to specific security requests. The policy will also make clear the goals and duties of network employees in enforcing security with respect to requests from the outside. If there is a good security policy, the users themselves will have a better understanding of what they can and cannot do. This understanding will hopefully assist the network staff in conducting their jobs and will allow the company to maintain security in an increasingly insecure world.

Perhaps because companies have well-designed security policies in place, many people who use the Internet to purchase items online are growing comfortable with the fact that, if they transfer credit card information during a secure session, their data is safe from hackers and other eavesdroppers. This sense of security may change, however, because the Internet Engineering Task Force is considering whether to allow a backdoor entry into all Internet traffic. This backdoor entry would allow authorized persons to intercept any data traffic on the Internet. Since this proposal appears to be a violation of privacy, why would anyone want to create such a backdoor?

At the core of the argument is the fact that standard telephone systems currently allow agencies of the U.S. government to wiretap communications. This wiretap occurs at the telephone central office and is built into central office telephone switches.

The act that allows wiretapping (the Communications Assistance for Law Enforcement Act) has been in existence since 1994. Now that the Internet is beginning to carry voice traffic, should it also be possible for the U.S. government to wiretap voice transactions on the Internet? As one critic of the proposal states, if they can tap voice, then they can tap data. Furthermore, if the designers of the Internet create such a backdoor, it is also possible that this knowledge could fall into the wrong hands and be used for criminal intent.

This issue is further complicated by the fact that many businesses presently encrypt all data leaving the corporate network. Most encryption techniques used by businesses are so effective that virtually no one, including the government, can crack them. If the network does the encryption just before the data leaves corporate boundaries, then it would be the responsibility of the corporate network support personnel to provide the U.S. government, if asked, with unencrypted data. If, on the other hand, the encryption is applied at the user workstation before it is inserted onto the corporate network, who will supply the U.S. government with the

unencrypted data? Clearly, this issue will be hotly debated for some time to come.

Despite the fact that a company may have a well-designed security policy in place, external events are making this area more complex all the time.

Words

| | | |
|----------|-----------|--------|
| auditing | <i>n.</i> | 审查, 审计 |
| firewall | <i>h.</i> | 防火墙 |

6.4.3 正文参考译文

网络安全和政策

什么是安全网络? Internet 是安全的吗? 尽管安全网络的概念吸引着绝大多数使用者, 但是我们不能把网络简单的称为安全的网络或不安全的网络, 因为安全这个术语不是绝对的——每个组织定义它的标准是不同的。例如, 一些组织存储着有价值的数据。这样的组织把安全网络定义为系统能够防止外部对本组织计算机的非法侵入。其他一些组织需要向外部提供有效的信息, 但也要禁止外部对数据的更改。这样的组织可能把安全网络定义为能够任意访问数据, 但是要有能够防止非法更改数据的机制。最终, 许多大型组织需要一个对安全的复杂定义, 这种安全允许访问本组织对外公开的部分数据和服务, 同时又禁止对其处于保密状态的敏感数据和服务进行访问或修改。

因为信息安全没有绝对的定义存在, 那第一步就要求某组织必须开发出一个安全系统来定义组织的安全政策。政策不规定如何去实现保护, 而是要清楚明白地表明哪些项目需要得到保护。

定义信息安全政策是非常复杂。首要的复杂性在于信息安全政策与网络中的计算机系统的安全政策密不可分。尤其为横贯于网络中的数据定义安全政策时无法保证其数据的安全性。信息安全不能禁止在计算机上拥有账户的非法使用者获得拷贝的数据。所以安全政策必须针对存储在磁盘上的, 通过带拨号调制解调器的电话线进行沟通的数据, 书面形式打印出来的信息, 通过便携的媒介如软盘传送的数据以及通过计算机网络进行通讯的数据。

定义安全政策也是复杂的, 因为各自的组织必须裁决哪些方面的保护是最重要的, 而且常常要在安全和易于使用之间做出妥协。例如, 组织可以考虑以下几个方面:

- 数据完整性;
- 数据可用性;
- 数据机密性和保密。

Chapter 7 Image Processing

7.1 Concept of Graphics and Images

Image or Graphic? Technically, neither.^[1] If you really want to be strict, computer pictures are files, the same way WORD documents or solitaire games are files. They're all a bunch of ones and zeros all in a row. But we do have to communicate with one another so let's decide.

Image. We'll use "image". That seems to cover a wide enough topic range.

"Graphic" is more of an adjective, as in "graphic format." we denote images on the Internet by their graphic format. GIF is not the name of the image. GIF is the compression factors used to create the raster format set up by CompuServe.

So, they're all images unless you're talking about something specific.

The images produced in Drawing programs (CorelDraw, Illustrator, Freehand, Designer etc) are called vectorised graphics.^[2] That is, all of the objects shown on the computer monitor are representations of points and their relationship to each other on the work area, each of which is stored in the computer as simple values and mathematical equations depicting: the relationship between each point and the next point referenced to it, and the position (vector) of each point referenced to a starting corner of the work area.

Bitmap pictures are stored as a vertical and horizontal array of Pixels and stored information represents the colour of each of these pixels. The resolution of a bitmap picture describes how many of these pixels exist over a set distance, usually horizontally: ie pixels per inch or pixels per centimetre. An unaltered bitmap picture of 300 pixels / inch enlarged by 1000% will therefore still have the same number of pixels across the actual picture area but each represented pixel will cover a larger area.

^[3]At such an enlargement, the picture would be of little use for reproduction unless viewed from quite a long distance.

Bitmap or Photo-retouching programs are correctly called PAINTING PROGRAMS.

Vectorised drawings on the other hand can be enlarged as much as desired because, although the above mentioned points on a drawing would be further apart, the relationship of any described line between the points would always be the same. A single company logo file produced in a Drawing program could be used for a business card, any brochure or poster, or plotting out to a Screen Print stencil 3 metres (9 feet) wide, where as bitmap files would have to be created for every size used if practicable.

What is raster, vector, metafile, PDL, VRML, and so forth?

These terms are used to classify the type of data a graphics file contains.

Raster files (also called bitmapped files) contain graphics information described as pixels, such as photographic images. Vector files contain data described as mathematical equations and

are typically used to store line art and CAD information. Metafiles are formats that may contain either raster or vector graphics data. Page Description Languages (PDL) are used to describe the layout of a printed page of graphics and text.

Animation formats are usually collections of raster data that is displayed in a sequence. Multi-dimensional object formats store graphics data as a collection of objects (data and the code that manipulates it) that may be rendered (displayed) in a variety of perspectives. Virtual Reality Modeling Language (VRML) is a 3D, object-oriented language used for describing "virtual worlds" networked via the Internet and hyperlinked within the World Wide Web. Multimedia file formats are capable of storing any of the previously mentioned types of data, including sound and video information.

Words

| | | |
|----------------|-------------|------------------|
| brochure | <i>n.</i> | 小册子 |
| bunch | <i>n.</i> | 串, 束 |
| | <i>v.</i> | 捆成一束 |
| depict | <i>v.</i> | 描述, 描写 |
| enlarge | <i>v.</i> | 扩大, 放大 |
| metafile | <i>n.</i> | 元文件, 图元文件 |
| perspective | <i>n.</i> | 透视图, 远景, 观点, 观察 |
| pixel | <i>n.</i> | (显示器或电视机图像的) 像素 |
| poster | <i>n.</i> | 海报, 宣传画 |
| practicable | <i>adj.</i> | 能实行的, 可行的 |
| raster | <i>n.</i> | [物]光栅 |
| render | <i>v.</i> | 呈递, 归还, 着色; 给予补偿 |
| representation | <i>n.</i> | 表示法, 表现, 代表 |
| solitaire | <i>n.</i> | 单人纸牌游戏 |
| stencil | <i>n.</i> | 模版 |
| vector | <i>n.</i> | [数]向量, 矢量 |

Phrases

| | |
|--------------------|-----------------|
| compression factor | 压缩因子 |
| CompuServe | 美国最大的在线信息服务机构之一 |

Abbreviations

| | |
|--|----------|
| CAD (Computer Aided Design) | 计算机辅助设计 |
| PDL (Page Description Languages) | 页面描述语言 |
| VRML (Virtual Reality Modeling Language) | 虚拟现实建模语言 |

Notes

- [1] 例句: If you really want to be strict, computer pictures are files, the same way WORD documents or solitaire games are files.
分析: 本句是复合句, If you really want to be strict 是条件状语从句, computer 到句末是主句。主句中, the same way WORD documents or solitaire games are files 为方式状语从句, the same way 前省去了 in。
译文: 从严格意义上来说计算机图像是文件, 就象 Word 文档或纸牌游戏是文件一样。
- [2] 例句: That is, all of the objects shown on the computer monitor are representations of points and their relationship to each other on the work area, each of which is stored in the computer as simple values and mathematical equations depicting: the relationship between each point and the next point referenced to it, and the position (vector) of each point referenced to a starting corner of the work area.
分析: 本句是复合句。that is 意为: 即; 也就是说。all of the objects shown on the computer monitor are representations of points and their relationship to each other on the work area, 是主句。each of which is stored in the computer as simple values and mathematical equations... 为“名词+介词+which”开始的定语从句, 修饰 representations。
译文: 也就是说, 在计算机监视器显示的所有对象都是工作区域内的点和它们之间相互关系的表示, 每一点都作为简单值或数学公式存储在计算机里, 其中数学公式用来描述每个点和参照该点的下一个点之间的关系和参照工作区域开始角的每个点的位置(矢量)。
- [3] 例句: At such an enlargement, the picture would be of little use for reproduction unless viewed from quite a long distance.
分析: 本句是复合句。句中 unless viewed from quite a long distance 为 unless 引导的真实条件状语从句, unless 通常相当于 if not, unless 后省去了 it is。
译文: 在这样一个放大照片里, 图像无法用于再现除非从相当远的距离外观看。

Exercises

I. Write true or false for the following statements according to the passage.

1. () Computer pictures are files that are all a bunch of ones and zeros all in a row.
2. () GIF is the name of the image.
3. () Bitmap pictures are stored as a vertical and horizontal array of Pixels.
4. () The stored information represents the colour of each of the pixels.
5. () Vectorised drawings can be enlarged as much as desired.
6. () Bitmap pictures can not be enlarged as much as desired.
7. () Raster files contain graphics information described as pixels.

8. () Vector files contain data described as mathematical equations.
9. () Multimedia file formats are capable of storing sound and video information.
10. () Animation formats are usually collections of raster data that is displayed in a sequence.

II. Fill in the blanks according to the passage.

1. Computer pictures are _____, the same way WORD documents or solitaire games are _____.
2. The _____ of a bitmap picture describes how many of these pixels exist over a set distance, usually _____.
3. Raster, _____, metafile, PDL, and VRML are used to _____ the type of data a graphics file contains.
4. Raster files (also called bitmapped files) contain graphics information described as _____.
5. Photo-retouching programs are correctly called _____.
6. Vector files contain data described as _____ and are typically used to store line art and CAD _____.
7. _____ file formats are capable of storing sound and video information.
8. Page Description Languages (PDL) are used to describe the _____ of a printed page of graphics and _____.
9. Files are all a bunch of _____ and _____ all in a row.
10. GIF is the _____ factors used to create the raster format set up by _____.

III. Translate the following words and phrases into Chinese.

- | | |
|----------------|--------------------------|
| 1. row | 6. mathematical equation |
| 2. image | 7. monitor |
| 3. produce | 8. layout |
| 4. array | 9. format |
| 5. enlargement | 10. store |

7.1.1 Reading Material 1

Course Description

This course is an introduction to the basic concepts as well as applications of the rapidly emerging field of digital image processing. It familiarizes the audience with the understanding, design, and implementation of algorithms in the various subareas of digital image processing such as image enhancement, image deblurring, image understanding, image security, and image compression. Over 200 image examples complement the technical descriptions.

Benefits/Learning Objectives

This course will enable you to

- explain the fundamental concepts and terminologies employed in digital imaging such as sampling and aliasing, perceptual quantization; filtering, look-up tables, image histogram, etc;

- explain the various techniques used in image enhancement for contrast manipulation (e.g., histogram equalization), sharpening (e.g., unsharp masking) and noise removal (e.g., selective averaging, median filtering);
- briefly demonstrate the performance of image deblurring algorithms such as inverse filtering and Wiener filtering by using image examples;
- briefly demonstrate the concepts behind digital signatures for image authentication and invisible watermarking for image copyright protection;
- briefly describe the current research topics in image understanding and demonstrate related algorithm performances using image examples;
- explain the basic technologies that serve the existing JPEG and the emerging JPEG2000 standards.

Intended Audience

Scientists, engineers, and managers who need to understand and/or apply the fundamental concepts and techniques employed in digital image processing. Although no particular background is needed, some prior knowledge of linear system theory (e.g., Fourier transforms) would be helpful.

words

| | | |
|----------------|-------------|--------------------|
| aliasing | <i>n.</i> | [数]混淆现象 |
| audience | <i>n.</i> | 听众, 观众 |
| complement | <i>n.</i> | 补足物, [文法]补语, [数]余角 |
| | <i>v.</i> | 补助, 补足 |
| deblur | <i>v.</i> | 使变清晰 |
| demonstrate | <i>v.</i> | 示范, 证明 |
| description | <i>n.</i> | 描写, 记述, 形容, 种类, 描述 |
| emerge | <i>v.</i> | 显现, 形成, (事实)显现出来 |
| equalization | <i>n.</i> | 均等, 同等化 |
| familiarize | <i>v.</i> | 熟悉 |
| implementation | <i>n.</i> | 执行 |
| inverse | <i>adj.</i> | 倒转的, 反转的 |
| | <i>n.</i> | 反面 |
| | <i>v.</i> | 倒转 |
| perceptual | <i>adj.</i> | 知觉的 |
| prior | <i>adj.</i> | 优先的, 在前的 |
| | <i>n.</i> | 预先 |
| sampling | <i>v.</i> | 取样 取样 |
| sharpening | <i>v.</i> | 锐化 |
| signature | <i>n.</i> | 签名 |
| subarea | <i>n.</i> | 分区 |
| terminology | <i>n.</i> | 术语学 |

| | | |
|-----------|-----------|----|
| watermark | <i>n.</i> | 水印 |
|-----------|-----------|----|

phrases

| | |
|----------------------|--------|
| digital signature | 数字签名 |
| linear system theory | 线性系统理论 |
| wiener filtering | 维纳滤波 |

7.1.2 Reading Material 2

Convert a Graphics Format

Why change vectors to bitmaps?

Most of the clip art gallery is vector-based and will need to be converted into bitmap formats (GIF) prior to putting it on the Web.

Why change bitmaps to vectors?

You will need to change vectors to bitmaps to perform tasks from the Drawing toolbar on a bitmap picture (such as animate parts of a bitmap picture) you will need to convert it into a vector format. You can then e.g. ungroup it and apply animations to only parts of it.

Which graphic converter to use?

To change your graphics format, you need to use a graphics converter. A popular graphics editor you can use for this is Paint Shop Pro. Another graphics editor you can use is Adobe PhotoShop, which is said to be the best one for this kind of conversion.

How to use your graphic converter?

Open your file in the graphics editor chosen: Select File | Open.

Select File | Save As.

Rename your file and choose a new format. For a bitmap to vectors conversion select the WMF format. For the opposite conversion, select the GIF format if you have PowerPoint 97, otherwise select JPEG or TIFF.

Unfortunately, some of the quality may be lost in the switch. MS office also provides graphics converters.

Words

| | | |
|-----------|-----------|--------|
| converter | <i>n.</i> | 转换器 |
| gallery | <i>n.</i> | 图库 |
| switch | <i>n.</i> | 开关, 转换 |
| | <i>v.</i> | 转换, 转变 |
| ungroup | <i>n.</i> | 取消组 |

7.1.3 正文参考译文

graphic 和 image 的概念

是 graphic 还是 image 呢？从技术上说都不是。从严格意义上来说，计算机图像是文件，就像 Word 文档或纸牌游戏是文件一样。它们都是由很多 1 和 0 排成的数据。但是我们需要互相交流，所以要确定名称。

“image”。我们要使用“image”的概念。这一概念似乎覆盖了非常广泛的话题范围。（graphic 经常翻译成图形、绘图，image 翻译成图像、影像。编者注）

“graphic”更多的情况是作形容词用，例如“绘图的格式”。用绘图的格式来表示 Internet 中的图像。GIF 不是映像的名字，而是用来生成通过 CompuServe 建立的光栅格式的压缩因子。

所以除非被用来讨论专用的事物，它们都是图像。

绘图程序（CorelDraw、Illustrator、Freehand、Designer 等）生成的图像都被称为矢量化图形。也就是说，在计算机监视器显示的所有对象都是工作区域内的点和它们之间相互关系的表示，每一点都作为简单值或数学公式存储在计算机里，其中数学公式用来描述每个点和参照该点的下一个点之间的关系和参照工作区域开始角的每个点的位置（矢量）。

位图图像存储为垂直和水平排列的像素，存储的像素信息表示每个像素的颜色。位图图像的清晰度描述在一个特定距离（通常指水平距离）存在着多少像素：即像素数/英寸或像素数/厘米。一个未改变的 300 像素/英寸的位图图像放大 10 倍后在实际的图像范围内将会有相同的像素数目，但每一个表示出的像素将会覆盖更大的范围。

在这样一个放大的图片里，图像无法用于再现，除非从相当远的距离外观看。

位图或照片润色程序的正确叫法为画图程序。

另一方面，矢量化的图画可以按要求尽量放大。因为，尽管上面提到的图画上的点可以相隔得更远，但点之间任一描述线之间的关系是相同的。也就是说，画图程序产生的一个单独的公司标语文件可以用来作为名片、小册子或海报，或绘制到一个 3 米（9 英尺）宽的打印模板上，如果可行，需要为每个可用尺寸建立位图文件。

光栅、矢量、图元文件、PDL、VRML 等是什么呢？

这些术语用来划分一个图像文件含有数据的种类。

光栅文件也被称为位图文件，包含以像素描述的图像信息，例如摄影图像。矢量文件含有被描述为数学等式的数据，并通常用来存储矢量图或 CAD 信息。图元文件包含有光栅或矢量图数据。页面描述语言（PDL）被用来描述图形或文本打印页面的版面设置。

动画格式通常是以序列显示的光栅数据集。多维对象格式将图像数据作为在各种视角下表示（展示）的对象集（数据及操作数据的代码）存储起来。VRML（虚拟现实建模语言）是用来描述通过 Internet 联网或全球网链接的“虚拟世界”的三维面向对象的语言。多媒体文件格式可以存储前面提到的任一种数据，包括声音和视频信息。

7.2 Introduction to Digital Image Processing

An image is digitized to convert it to a form that can be stored in a computer's memory or on

some form of storage media such as a hard disk or CD-ROM. This digitization procedure can be done by a scanner, or by a video camera connected to a frame grabber board in a computer. Once an image has been digitized, it can be operated upon by various image processing operations.

Image processing operations can be roughly divided into three major categories, Image Compression, Image Enhancement and Restoration, and Measurement Extraction. Image compression is familiar to most people.^[1] It involves reducing the amount of memory needed to store a digital image.

Image defects which could be caused by the digitization process or by faults in the imaging set-up (for example, bad lighting) can be corrected using Image Enhancement techniques. Once the image is in good condition, the Measurement Extraction operations can be used to obtain useful information from the image.

Some examples of Image Enhancement and Measurement Extraction are given below. The examples shown all operate on 256 grey-scale images. This means that each pixel in the image is stored as a number between 0 to 255, where 0 represents a black pixel, 255 represents a white pixel and values in-between represent shades of grey. These operations can be extended to operate on colour images.

The examples below represent only a few of the many techniques available for operating on images. Details about the inner workings of the operations have not been given.

Image Enhancement and Restoration

The image at the left of Figure 1 has been corrupted by noise during the digitization process. The "clean" image at the right of Figure 1 was obtained by applying a median filter to the image.



Figure 1. Application of the median

An image with poor contrast, such as the one at the left of Figure 2, can be improved by adjusting the image histogram to produce the image shown at the right of Figure 2.



Figure 2. Adjusting the image histogram to improve image contrast

The image at the top left of Figure 3 has a corrugated effect due to a fault in the acquisition process. This can be removed by doing a 2-dimensional Fast-Fourier Transform on the image (top right of Figure 3), removing the bright spots (bottom left of Figure 3), and finally doing an inverse Fast Fourier Transform to return to the original image without the corrugated background

(bottom right of Figure 3).

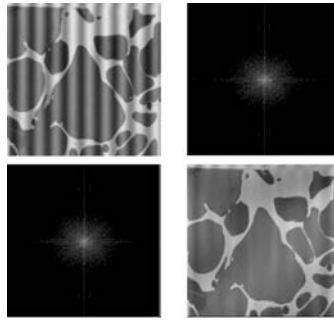


Figure 3. Application of the 2-dimensional Fast Fourier Transform

An image which has been captured in poor lighting conditions, and shows a continuous change in the background brightness across the image (top left of Figure 4) can be corrected using the following procedure. First remove the foreground objects by applying a 25 by 25 greyscale dilation operation (top right of Figure 4). Then subtract the original image from the background image (bottom left of Figure 4). Finally invert the colors and improve the contrast by adjusting the image histogram (bottom right of Figure 4).

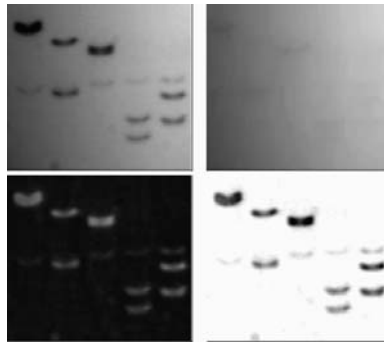


Figure 4. Correcting for a background gradient

Image Measurement Extraction

^[2]The example below demonstrates how one could go about extracting measurements from an image. The image at the top left of Figure 5 shows some objects. The aim is to extract information about the distribution of the sizes (visible areas) of the objects. The first step involves segmenting the image to separate the objects of interest from the background. This usually involves thresholding the image, which is done by setting the values of pixels above a certain threshold value to white, and all the others to black (top right of Figure 5). Because the objects touch, thresholding at a level which includes the full surface of all the objects does not show separate objects. This problem is solved by performing a watershed separation on the image (lower left of Figure 5). The image at the lower right of Figure 5 shows the result of performing a logical AND of the two images at the left of Figure 5. This shows the effect that the watershed separation has on touching objects in the original image. Finally, some measurements can be extracted from the image.

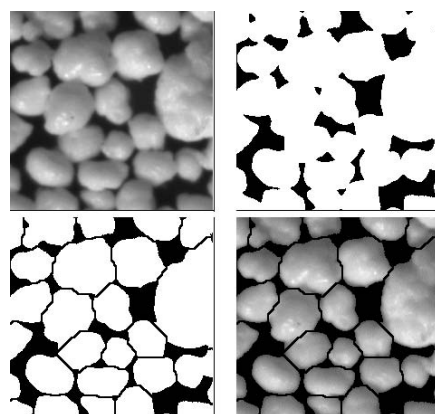


Figure 5. Thresholding an image and applying a Watershed Separation Filter

Words

| | | |
|---------------|-------------|-----------------|
| 2-dimensional | <i>adj.</i> | 二维的 |
| acquisition | <i>n.</i> | 获得, 获得物 |
| category | <i>n.</i> | 种类, [逻]范畴 |
| contrast | <i>v.</i> | 使与……对比, 和……形成对照 |
| | <i>n.</i> | 对比 |
| convert | <i>v.</i> | 使转变, 转换…… |
| corrugate | <i>v.</i> | 弄皱, (使)成波状 |
| corrupt | <i>adj.</i> | 被破坏的, |
| | <i>v.</i> | 使恶化, 堕落 |
| digitize | <i>v.</i> | 将资料数字化 |
| dilation | <i>n.</i> | 膨胀, 扩大 |
| enhancement | <i>n.</i> | 增进, 增加 |
| extraction | <i>n.</i> | 提取 |
| histogram | <i>n.</i> | 柱状图 |
| improved | <i>adj.</i> | 改良的 |
| invert | <i>adj.</i> | 转化的 |
| | <i>v.</i> | 使颠倒 |
| | <i>n.</i> | 颠倒的事物 |
| measurement | <i>n.</i> | 测量 |
| restoration | <i>n.</i> | 恢复, 修补 |
| roughly | <i>adv.</i> | 概略地, 粗糙地 |
| threshold | <i>n.</i> | 开始, 开端, 极限 |
| watershed | <i>n.</i> | 分水岭 |

Prases

| | |
|--------------------------------|----------------|
| Fast-Fourier Transform Fourier | 快速傅立叶变换 |
| frame grabber board | 帧中继访问设备(=FRAD) |
| inverse Fast Fourier Transform | 快速傅立叶反变换 |
| median filter | 中值滤波器 |

Notes

- [1] 例句: It involves reducing the amount of memory needed to store a digital image.
 分析: 本句是简单句。句中 reducing the amount of memory needed to store a digital image 是动名词短语作 involves 的宾语。involve 意为“包含、含有”，后接名词或动名词。例如，a task which involves much difficulty 有困难的任务。
 译文: 它包括减少存储数字图像所需的存储容量。
- [2] 例句: The example below demonstrates how one could go about extracting measurements from an image.
 分析: 本句是复合句。how one could go about extracting measurements from an image 为宾语从句，作 demonstrates 的宾语。句中 go about 意为从事、干，后跟名词或动名词，例如: Go about your business.忙你自己的事去吧。
 译文: 下面的例子示范了人们怎样从图像中提取尺寸。

Exercises

I . Write true or false for the following statements according to the passage.

1. () The digitization procedure can be done by a screen.
2. () Image compression involves extracting the amount of memory needed to store a digital image.
3. () Once the image is in good condition, the Measurement Extraction operations can be used to obtain useful information from the image.
4. () Each pixel in the image is stored as a number between 0 to 255, where 0 represents a black pixel, 255 represents a white pixel and values in-between represent shades of grey.
5. () The "clean" image at the right of Figure 1 was obtained by applying a median filter to the image.
6. () An image with poor contrast, such as the one at the left of Figure 2, can be improved by reducing the image histogram.
7. () Figure 3 shows an application of the 2-dimensional Fast Fourier Transform.
8. () The aim of Image Measurement Extraction is to extract information about the distribution of the sizes (visible areas) of the objects.
9. () Image defects could be caused by the digitization process or by faults in the imaging set-up (for example, bad lighting).

10. () Image defects can not be corrected using Image Enhancement techniques.

II. Fill in the blanks according to the passage.

1. An image is digitized to convert it to a form that can be stored in a computer's memory or on some form of _____ such as a hard disk or CD-ROM.

2. Once an image has been digitized, it can be operated upon by various _____ operations.

3. Image processing operations can be roughly divided into _____ major categories, _____, Image Enhancement and Restoration, and Measurement Extraction.

4. The digitization procedure can be done by a _____.

5. Image compression involves _____ the amount of memory needed to store a digital image.

6. Image defects can be _____ using Image Enhancement techniques.

7. Once the image is in good condition, the Measurement Extraction operations can be used to _____ useful information from the image.

8. An image with poor contrast can be improved by _____ the image histogram.

9. The "clean" image at the right of Figure 1 was obtained by applying a _____ to the image.

10. The image at the top left of Figure 3 has a corrugated effect. This can be removed by doing a _____ Fast-Fourier Transform on the image.

III. Translate the following words and phrases into Chinese.

1. storage

6. represent

2. media

7. corrupte

3. categorie

8. noise

4. digital image

9. background

5. pixel

10. continuous

7.2.1 Reading Material 1

Can Graphics Files Be Infected with a Virus?

For most types of graphics file formats currently available the answer is "no". A virus (or worm, Trojan horse, and so forth) is fundamentally a collection of code (that is, a program) that contains instructions which are executed by a CPU. Most graphics files, however, contain only static data and no executable code. The code that reads, writes, and displays graphics data is found in translation and display programs and not in the graphics files themselves. If reading or writing a graphics file caused a system malfunction is it most likely the fault of the program reading the file and not of the graphics file data itself.

With the introduction of multimedia we have seen new formats appear, and modifications to older formats made, that allow executable instructions to be stored within a file format. These instructions are used to direct multimedia applications to play sounds or music, prompt the user

for information, or display other graphics and video information. And such multimedia display programs may perform these functions by interfacing with their environment via an API, or by direct interaction with the operating system. One might also imagine a truly object-oriented graphics file as containing the code required to read, write, and display itself.

Once again, any catastrophes that result from using these multimedia application is most like the result of unfound bugs in the software and not some sinister instructions in the graphics file data. Such "logic bombs" are typically exorcised through the use of testing using a wide variety of different image files for test cases.

If you have a virus scanning program that indicates a specific graphics file is infected by virus, then it is very possible that the file coincidentally contains a byte pattern that the scanning programming recognizes as a key byte signature identifying a virus. Contact the author (or even read the documentation!) of the virus scanning program to discuss the probability of the mis-identification of a clean file as being infected by a virus. Save the graphics file, as the author will most likely wish to examine it as well.

If you suspect a graphics file to be at the heart of a virus problem you are experiencing, then also consider the possibility that the graphics file's transport mechanism (floppy disk, tape or shell archive file, compressed archive file, and so forth) might be the original source of the virus and not the graphics file itself.

Words

| | | |
|----------------|-------------|---------------------------|
| archive | <i>v.</i> | 存档 |
| | <i>n.</i> | 档案文件 |
| catastrophe | <i>n.</i> | 大灾难, 大祸 |
| coincidental | <i>adj.</i> | 巧合的 |
| exorcise | <i>v.</i> | 驱邪, 除怪 |
| fault | <i>n.</i> | 过错, 缺点, 故障, 毛病 |
| | <i>v.</i> | 挑剔, 弄错 |
| identification | <i>n.</i> | 辨认, 证明 |
| indicate | <i>v.</i> | 指出, 显示, 象征, 预示, 需要, 简要地说明 |
| infected | <i>adj.</i> | 被感染的 |
| interaction | <i>n.</i> | 交互作用, 交感 |
| interfacing | <i>n.</i> | 界面连接, 接口连接 |
| imagine | <i>v.</i> | 想像, 设想 |
| malfunction | <i>n.</i> | 故障 |
| modification | <i>n.</i> | 更改, 修改, 修正 |
| sinister | <i>adj.</i> | 险恶的 |

Abbreviations

API (Application Programming Interface) 应用编程接口

7.2.2 Reading Material 2

Can Graphics Files Be Encrypted?

Of course you can encrypt a graphics file. After all, most encryption algorithms don't care about the intellectual content of a file. All they chew on is a series of byte values. Therefore, most any encryption program that works on ordinary text files will work on graphics files as well.

Why would you want to encrypt a graphics file? Mostly to control who can view its contents. You can invent a proprietary file format and that might slow a file format hack down for, say, five or ten minutes. You could add a proprietary data compression scheme, possibly a twisted variation of an already public algorithm. But there are so many people out there with nothing better to do than hack at unknown data formats that your data would probably be exposed in little time. But suppose we top off all this effort by encrypting the graphics file itself as we would an ordinary text file. Would your data then be safe?

Realize that an encrypted graphics file still might not be very secure. For every data encryption algorithm there exists at least one method of getting around it, although it may take hundreds of computers and many years to fully employ and execute that method!

For example, one of the more popular methods used to encrypt data is the Vernam or XOR cipher. This cipher Exclusive ORs the plain-text data with a single, random, fixed-length key. The longer the key the harder it is to break the cipher. A totally random key the length of your data is impossible to break. Shorter and less-random keys are easier to break.

XOR is very simple and fast, which is a must for a graphics file translators/viewers that must decrypt a file on the fly. A problem, however, is that most graphics files contain fixed size headers which vary only slightly in content from file to file. If you knew the approximate contents of the header of an encrypted file you could XOR a "decrypted" header with the encrypted file and possibly produce the key used to encrypt the file. A short key might be very easily discovered in this way.

If you wish to use a public key/private key encryption method, then storing the public key in the file format header (usually as a 4-byte field) and only encrypting the image data would be the way to go. The SMPTE DPX file format supports such an encryption feature.

If you really need to make the contents of a graphics file secure, then I'd suggest not only using some form of data encryption, but also create an unconventional and proprietary file format and do not publish its format specification.

Words

chew

v.

咀嚼, 认真考虑

| | | |
|--------------|------|------------|
| exclusive | adj. | 独占的, 惟一的 |
| intellectual | adj. | 智力的 |
| | n. | 知识分子 |
| proprietary | adj. | 所有的, 私人拥有的 |
| | n. | 所有者, 所有权 |
| twist | v. | 拧, 使转动 |
| | v. | 扭曲, 缠绕 |

7.2.3 正文参考译文

数字图像处理介绍

一个图像可以经过数字化处理转换成可存储在计算机存储器或其他存储介质如硬盘或 CD-ROM 上的格式。这种数字化处理过程可以通过扫描仪或者通过连接到计算机主板上的视频摄像机来实现。当对图像数字化处理后, 就可以进行各种图像处理操作。

图像处理操作可以大概分成三大类: 图像压缩、图像增强和恢复、测量提取。图像压缩是大多数人都熟悉的。它包括减少存储数字图像所需的存储容量。

数字化处理过程中造成的图像缺陷, 或成像时的错误(如灯光不好)造成的图像缺陷, 可以利用图像增强技术进行修改。当图像处于好的状况时, 就可以利用测量提取操作, 从图像中得到有用信息。

下面给出了一些图像增强和测量提取的例子。这些例子都是对 256 级灰度图进行的操作。也就是说, 图像中的每个像素以 0~255 之间的数字存储, 0 表示黑色像素, 255 表示白色像素, 之间的数值表示渐变的灰色。这些操作也可以扩展到彩色图像。

下面的例子只是给出图像操作技术中的少数几种, 没有给出操作的内部工作细节。

图像增强和恢复

图 1 中左边的图在数字化处理过程中被噪声破坏。右边干净的图是通过应用中值滤波器得到的。

图 1 中值滤波器的应用 (图名)

图 2 左边的图像对比度差, 这样的图可以通过调节图像的直方图来得到右边所示的图像。

图 2 调节直方图改善图像的对比度 (图名)

图 3 左上角的图由于成像过程中的错误, 有波纹影响。这可以通过对图像做二维快速傅立叶变换来去除 (图 3 右上角), 去掉亮点 (图 3 左下角), 最后再通过快速傅立叶反变换得到无波纹的原图像 (图 3 右下角)。

图 3 二维快速傅立叶变换的应用 (图名)

一个在差的灯光条件下得到的图像, 背景亮度显示出连续的变化 (图 4 的左上角), 可以用下述方法修改。首先通过 25*25 的灰度放大操作去除前景对象 (图 4 右上角)。然后从背景图像中减去原图像 (图 4 左下角)。最后翻转颜色并且通过调节直方图改变对比度 (图 4 右下角)。

图 4 修正背景偏斜 (图名)

图像测量提取

下面的例子示范了人们怎样从图像中提取尺寸。图 5 左上角的图像显示出一些物体。目标是要提取物体尺寸（可视部分）分布的信息。第一步包括分割图像，将物体与背景分离。这通常包括为图像限定阈值，在特定阈值之上的像素的值作为白色，其他的作为黑色（图 5 的右上角）。因为物体互相接触，设置的阈值包括所有物体的表面，不能显示出分离的物体。这个问题通过对图像实行分水岭分离来实现（图 5 左下角）。图 5 右下角显示出对左边的两个图像进行逻辑与处理后的结果。这显示出了分水岭分离法对原图中相接触的物体进行分离产生的效果。最后可以从图像中得到测量值。

图 5 为图像设定阈值并应用分水岭分离法滤波器（图名）

7.3 Image Compression

Why is image compression so important? Image files, in an uncompressed form, are very large. And the Internet, especially for people using a 56k dialup modem, can be pretty slow.^[1] This combination could seriously limit one of the Web's most appreciated aspects—its ability to present images easily.

JPEG (Joint Photographic Experts Group) compression is currently the best way to compress PHOTOGRAPHIC IMAGES for the web. Other forms of image compression, including GIF and PNG, are best used for other purposes on the web.

GIF (Graphics Interchange Format) is best used for graphics that have a limited color pallet and large areas of flat tone, like cartoons or banners. Although it has several remarkable features, such as transparency and the ability to present animated images, it is not well suited for the presentation of continuous tone images, such as photographs, due to its limit of 256 colors.

PNG (Portable Network Graphics) is a relatively new format with a lot of potential but, until all browsers can see images compressed in PNG form, it is not a good idea to use it.

JPEG, or JPG, is an evolving format that is universal in its use as a means of compressing continuous tone photographs for speedy transmission over the Internet. Photographs compressed using the JPEG format look good because JPEG supports millions of colors, so you can see the gradation of tones.

A Bitmap is a simple series of pixels all stacked up. But the same image saved in GIF or JPEG format uses less bytes to make up the file. How? Compression.

"Compression" is a computer term that represents a variety of mathematical formats used to compress an image's byte size. Let's say you have an image where the upper right-hand corner has four pixels all the same color. Why not find a way to make those four pixels into one?^[2] That would cut down the number of bytes by three-fourths, at least in the one corner. That's a compression factor.

Bitmaps can be compressed to a point. The process is called "run-length encoding." Runs of pixels that are all the same color are all combined into one pixel.^[3] The longer the run of pixels,

the more compression. Bitmaps with little detail or color variance will really compress. Those with a great deal of detail don't offer much in the way of compression. Bitmaps that use the run-length encoding can carry either the common ".bmp" extension or ".rle". Another difference between the two files is that the common Bitmap can accept 16 million different colors per pixel. Saving the same image in run-length encoding knocks the bits-per-pixel down to 8. That locks the level of color in at no more than 256.

So, why not create a single pixel when all of the colors are close? You could even lower the number of colors available so that you would have a better chance of the pixels being close in color. Good idea. The people at CompuServe felt the same way.

GIF, which stands for "Graphic Interchange Format," was first standardized in 1987 by CompuServe, although the patent for the algorithm (mathematical formula) used to create GIF compression actually belongs to Unisys. The first format of GIF used on the Web was called GIF87a, representing its year and version. It saved images at 8 bits-per-pixel, capping the color level at 256. That 8-bit level allowed the image to work across multiple server styles, including CompuServe, TCP/IP.

CompuServe updated the GIF format in 1989 to include animation, transparency, and interlacing. They called the new format, you guessed it: GIF89a.

There's no discernable difference between a basic (known as non-interlaced) GIF in 87 and 89 formats.

Words

| | | |
|--------------|-------------|----------------------|
| banner | <i>n.</i> | 旗帜, 标语 |
| discernable | <i>adj.</i> | 可辨别的, 可认识的 |
| evolving | <i>adj.</i> | 进化的, 展开的 |
| feature | <i>n.</i> | 特色 |
| gradation | <i>n.</i> | 分等级, 层次 |
| means | <i>n.</i> | 手段, 方法 |
| pallet | <i>n.</i> | 盘 |
| remarkable | <i>adj.</i> | 显著的 |
| suit | <i>v.</i> | 合适 |
| stack | <i>n.</i> | 堆, 堆栈 |
| | <i>v.</i> | 堆叠 |
| tone | <i>n.</i> | 色调 |
| transparency | <i>n.</i> | 透明, 透明度, 幻灯片, 有图案的玻璃 |
| universal | <i>adj.</i> | 普遍的, 通用的 |
| variance | <i>n.</i> | 不一致, 变化 |

Phrases

| | |
|---------------------|--------|
| animated image | 动态图像 |
| run-length encoding | 游程长度编码 |

Abbreviations

| | |
|---|-------------|
| GIF (Graphics Interchange Format) | 可交换的图像文件格式 |
| JPEG (Joint Photographic Experts Group) | 联合图像专家组 |
| PNG (Portable Network Graphics) | 便携式网络图像 |
| TCP/IP (Transfer Control Protocol) | 传输控制协议/网际协议 |

Notes

- [1] 例句: This combination could seriously limit one of the Web's most appreciated aspects – its ability to present images easily.
 分析: 本句是简单句。句中 its ability to present images easily 为 one of the web's most appreciated aspects 的同位语。
 译文: 这一结合很大程度上限制了网络令人欣赏的一个方面——易于显示图像的能力。
- [2] 例句: That would cut down the number of bytes by three-fourths, at least in the one corner. 那样将会至少在一个区域将字节的数目减少 3/4。
 分析: 本句是简单句。句中 by 意为“到……程度”，例如: The carpet is too short by three feet. 地毯短了 3 英尺。
 译文: 那样将会至少在一个区域将字节的数目减少 3/4。
- [3] 例句: The longer the run of pixels, the more compression.
 分析: 本句是“the + 比较级, the + 比较级”引导的比较状语从句，意为“越……，越……”。比较状语从句常以省略形式出现。
 译文: 游程越长，压缩幅度越大。

Exercises

I. Write true or false for the following statements according to the passage.

- () Image compression is important because uncompressed image files that are very large could limit one of the Web's most appreciated aspects.
- () GIF (Graphics Interchange Format) is not used for graphics that have a limited color pallet and large areas of flat tone, like cartoons or banners.
- () Photographs compressed using the jpeg format look good because jpeg supports millions of colors.
- () A Bitmap is a simple series of pixels all stacked up.
- () GIF stands for "Graphic Internet Format".
- () GIF87a, representing its year and version. It saved images at 8 pits-per-pixel, capping

the color level at 256.

7. () JPEG, or JPG stands for (Joint Photographic Experts Group).
8. () "Compression" is a computer term that represents a variety of mathematical formats used to decompress an image's byte size.
9. () A Bitmap is a simple series of pixels all stacked up. But the same image saved in GIF or JPEG format uses more bytes to make up the file.
10. () The aim of Compression is reducing file's size.

II. Fill in the blanks according to the passage.

1. Image compression is_____.
2. Image files, in an _____ form, are very large.
3. JPEG compression is currently the best way to_____ PHOTOGRAPHIC IMAGES for the web.
4. GIF (Graphics Interchange Format) is best used for graphics that have a _____ color pallet and _____ areas of flat tone, like cartoons or banners.
5. GIF is not well suited for the _____ of continuous tone images, such as photographs, due to its limit of 256 colors.
6. PNG (Portable Network Graphics) is a relatively new format with a lot of _____.
7. JPEG supports millions of _____.
8. "Compression" is a computer term that represents a variety of mathematical formats used to _____ an image's byte _____.
9. GIF stands for _____.
10. There's no discernable _____ between a basic (known as non-interlaced) GIF in 87 and 89 formats.

III. Translate the following words and phrases into Chinese.

- | | |
|----------------|--------------------|
| 1. compression | 6. format |
| 2. uncompress | 7. byte |
| 3. combination | 8. mathematical |
| 4. seriously | 9. extension |
| 5. ability | 10. bits-per-pixel |

7.3.1 Reading Material

Why You Should Not Use JPEGs for Image Storage

If I were king, I'd banish JPEGs forever. JPEGs (pronounced "jay-pegs", and sometimes spelled "JPGs") are the images you see all over the Web. Pictures stored as JPEGs are highly compressed so they can be sent across the Internet faster. A picture that takes up 1 million bytes can be squeezed down to 1/10th of that size if you turn it into a JPEG.

That would seem like a good idea. But it's actually a good idea gone bad. JPEGs are like jigsaw puzzles that can never be put back together again right. Pieces will always be missing.

Every time you change a normal image into a JPEG, you lose part of the picture. You can never get it back.

Remember that. I'll repeat it in a slightly different way to help out: When you create or save a JPEG image, you lose part of the picture and you simply can't get it back, ever.

JPEGs are losers. They use what's called "lossy" compression. To squeeze an image's file size down to something really small, the JPEG process tosses out 80 or 90 percent of the information and fakes a lot of the rest. JPEGs take advantage of a trick of our eyesight. When we see part of a small, familiar object, we automatically fill in the rest of it. JPEG processing breaks an image up into a lot of small pieces and strips out a great deal of detail from each small piece.

A picture of your grandmother holding a shawl might show every detail ordinarily, but a JPEG version might not show the way her fingers wrap around the fabric. Instead, they might be depicted as areas of light and dark contrast that suggest an old woman's fingers. Your eyes and brain do the rest. They turn what is only a suggestion of fingers into what your brain thinks is the real thing.

This might be fine for some uses. But anyone who cares about digital photography should consider JPEG as an enemy, not a friend. I'll bet you don't want that picture of grandma turned into someone who looks sorta like grandma. You want the real thing.

JPEGs are one-way trips to the Badlands. Here's a familiar scenario. You have a normal, non-compressed image. It's a Windows bitmap, maybe. (They're BMP files.) You open this bitmap in your image-editing software and save it as a JPEG. The file is a lot smaller. You celebrate a little. What a trick you just pulled!

Later, you realize you need to tweak the picture a little. Maybe you need to crop it. Maybe you just want to make the colors more vivid.

So you open the JPEG in your image editor, make your changes and save the file as a JPEG again.

The image you cropped or tweaked can't be the same as the one you started with. It was already chopped up a lot by the JPEG processing, and when you saved it again it got chopped and diced some more.

The PNG image format is the best thing since the wheel. PNG (pronounced "Ping," not "Pea En Gee") means "Portable Network Graphics." When you save an image as a PNG, nothing gets sliced or diced. A PNG is almost surely going to be smaller than a standard uncompressed image, but it won't have any wounds. Cut it up all you want, slice it hither and yon. It will be all there, even though it's smaller.

This miracle is actually just a trick of counting. We all do the same thing that PNGs do. We learned this trick in grade school.

Here's how it works. Suppose you have a lot of sheep to count. You could count every single one of them. Boring, right? Or you could count them by twos. Or maybe, if your eye is quick, you could count them by threes.

Let's say you've done this—maybe you were trying the old technique of counting sheep to

get to sleep but it didn't work—and now it's time to come up with the real number. If you counted by twos, you just multiply your total by two. If you counted by threes, you multiply your number by three.

Cool, right? You're storing something like 31 in your brain, but you can quickly turn that into the real number—62 or 93.

It's all shorthand. It's a perfectly sane mathematical trick. PNG uses the same approach. It squeezes the data in an image file using tricks of math. Does the image have 61 pixels of nothing but azure blue in one area? PNG stores that information as an instruction to make an azure blue pixel 61 times. That takes up a lot less space than something like this: azure blue pixel, azure blue pixel, azure blue pixel, ... you get the point.

The best part of this trick is the way it can be totally reversed without losses. the sky looks exactly the way it was supposed to in the image with all those azure blue pixels. Storing information by listing it as "1 pixel times 61" is the same as storing 61 pixels. Except that it doesn't take up all that wasted space.

PNGs can't quite squeeze images as much as JPEGs can. There's no way to do it the lossless way and get the same reduction in file size. But PNGs can cut an image down to anywhere from one-half to one-third of its normal file size without any loss of data. Some images can be reduced even more.

I took a few hundred uncompressed digital images and changed them from BMP to PNG to find out how much space I could save. Most of them were 12 megabyte files stored as BMPs.

PNG squeezed these scans down to a little less than half their uncompressed size on average. Some scans, especially ones that did not have much detail, compressed a lot more. But since I started storing most of my digital images as PNGs, I've come to expect about a 50 percent to 60 percent savings in file space.

That might not seem like much compared to the way JPEG squeezes images, but it's a huge bonus when you realize that PNG is harmless. Images are not changed in any way.

Good image viewers and editors know how to deal with PNG. If you don't see PNG listed as an option in your image editor's "Save As" menu (under the "File" menu), you have old software and should get a newer version.

If you don't have an image viewer of any kind, buy ACDSee, available for both Windows PCs and Macintoshes.

Words

| | | |
|--------|-------------|------------|
| azure | <i>n.</i> | 天蓝色, 碧空 |
| | <i>adj.</i> | 蔚蓝的 |
| banish | <i>v.</i> | 流放, 驱逐, 消除 |
| bonus | <i>n.</i> | 奖金, 红利 |
| depict | <i>v.</i> | 描述, 描写 |
| dice | <i>v.</i> | 切成方块 |

| | | |
|---------------|--------------|----------------|
| fake | <i>n.</i> | 假货, 欺骗 |
| | <i>adj.</i> | 假的 |
| | <i>v.</i> | 伪造, 仿造, 伪装 |
| hither | <i>adv.</i> | 到这里 |
| loser | <i>n.</i> | 失主, 失败者 |
| lossless | <i>adj.</i> | 无损的 |
| lossy | <i>adj.</i> | [电]有损耗的 |
| multiply | <i>v.</i> | 乘, 增加 |
| pronounce | <i>v.</i> | 发音, 宣告, 断言 |
| reduction | <i>n.</i> | 缩影, 变形, 缩减量 |
| sane | <i>adj.</i> | 健全的 |
| scenario | <i>n.</i> | 游戏的关, 或是某一特定情节 |
| shawl | <i>n.</i> | 披肩, 围巾 |
| shorthand | <i>n.</i> | 速记 |
| slice | <i>n.</i> | 切片, 片段 |
| | <i>v.</i> | 切(片) |
| sorta | <i>adv.</i> | <美口>近似, 可以说是 |
| squeeze | <i>n.</i> | 压榨, 挤 |
| | <i>v.</i> | 压榨, 挤 |
| strip | <i>v.</i> | 剥, 剥去 |
| toss | <i>v.</i> | 投, 掷 |
| trick | <i>n.</i> | 诡计, 骗局, 诀窍 |
| | <i>v.</i> | 欺骗 |
| tweak | <i>v.</i> | 拧 |
| yon | <i>pron.</i> | 彼处之人或物 |
| | <i>adj.</i> | 彼处的, 那边的 |
| jigsaw puzzle | <i>n.</i> | 七巧板, 智力拼图玩具 |

7.3.2 正文参考译文

图像压缩

为什么图像压缩如此重要? 非压缩格式的图像文件非常大。而 **Internet**, 尤其对使用 56k 调制解调器拨号上网的用户来说, 是相当慢的。巨大的图像和慢速的上网结合很大程度上限制了网络最令人欣赏的方面, 即易于显示图像的能力。

JPEG (联合图像专家组) 压缩是当前 **Web** 压缩图像的最好方法, 其他图像压缩格式, 包括 **GIF** 和 **PNG**, 更多地用于 **Web** 的其他目的。

GIF (可交换的图像文件格式) 最适合于色彩较少并且有大面积的均匀色调的图像, 如卡通或旗帜。尽管它有几个明显的特点, 譬如透明以及显示动态图像的能力, 但是由于 256 色的限制, 它不适合于显示照片之类连续色调的图像,

PNG (便携式网络图像) 是一种相对较新的有很大潜力的格式, 但是, 在所有浏览器

可以浏览 PNG 格式的图像之前，使用该格式并不是个好主意。

JPEG 或 JPG 格式是一个发展中的通用格式，用于压缩连续色调图像以提高网络传输速度。采用 JPEG 格式压缩的照片看起来很好，因为 JPEG 支持数百万种色彩，所以你可以看到色调的分级。

位图文件是一系列的像素堆积起来的。但是同一幅图片用 GIF 或 JPEG 格式保存可以用较少的字节形成文件。怎样实现？就是用压缩的方法。

压缩是一个计算机术语，表示用于压缩图像字节数的数学格式。假设有一幅图像的右上角有四个同色的像素，为什么不找一个方法将四个像素放在一起？那样将会至少在该区域将字节的数目减少 3/4。这就是一个压缩因子。

位图可以压缩成一个点，这个过程叫做“游程长度编码”。连续同色的像素作为一个游程被结合成一个点。游程越长，压缩幅度越大。细节和色彩变化较少的位图会更好压缩。那些有很多细节的位图用这种方法没有太大的压缩空间。使用游程长度编码的位图文件扩展名可以为“.bmp”或“.rle”。这两种文件的区别是普通位图文件可以接收每像素 1,6000 万万种不同的颜色，采用游程长度编码保存同一个图像将每像素字节数减少到 8，这限制颜色分级不超过 256。

那么，当所有颜色相近的时候为什么不创建一个单一的像素呢？你甚至可以降低可用颜色的数量以使得像素有更好的机会得到相近的颜色。这是个好办法 CompuServe 公司的人也是这样想的。

GIF（即 Graphic Interchange Format，可交换的图像文件格式），1987 年由 CompuServe 公司给出标准，而用来产生 GIF 压缩的算法（数学公式）的专利属于 Unisys。用于 Web 的第一个 GIF 格式叫做 GIF87a，表示年份和版本。这种格式以每像素 8 个二进制位存储图像，颜色分级的上限为 256。这种 8 位分级允许图像工作于多种服务器风格，包括 CompuServe、TCP/IP。

1989 年，CompuServe 公司更新了 GIF 格式，使其可以包含动画、透明和交织。你可以猜测到：他们称其新格式为 GIF89a。

87 和 89 格式的基本（无交织的）GIF 无明显不同。

7.4 Application of Digital Image Processing

The field of digital image processing has experienced continuous and significant expansion in recent years. The usefulness of this technology is apparent in many different disciplines covering medicine through remote sensing. The advances and wide availability of image processing hardware has further enhanced the usefulness of image processing.

Remote sensing is the process of collecting data about objects or landscape features without coming into direct physical contact with them.

Digital Image Processing is not only a step in the remote sensing process, but is itself a process that consists of several steps. It is important to remember that the ultimate goal of this process is to extract information from an image that is not readily apparent or is not available in its original form. The steps taken in processing an image will vary from image to image for

multiple reasons, including the format and initial condition of the image, the information of interest (i.e., geologic formations vs. land cover), the composition of scene elements. There are three general steps in processing a digital image; preprocessing, display and enhancement, and information extraction.

Preprocessing—Before digital images can be analyzed, they usually require some degree of preprocessing. This may involve radiometric corrections, which attempt to remove the effects of sensor errors and/or environmental factors.^[1] A common method of determining what errors have been introduced into an image is by modeling the scene at the time of data acquisition using ancillary data collected.

Geometric corrections are also very common prior to any image analysis. If any types of area, direction or distance measurements are to be made using an image, it must be rectified if they are to be accurate.^[2] Geometric rectification is a process by which points in an image are registered to corresponding points on a map or another image that has already been rectified. The goal of geometric rectification is to put image elements in their proper planimetric (x and y) positions.

Information Enhancement—There are numerous procedures that can be performed to enhance an image. However, they can be classified into two major categories: point operations and local operations. Point operations change the value of each individual pixel independent of all other pixel, while local operations change the value of individual pixels in the context of the values of neighboring pixels. Common enhancements include image reduction, image magnification, transect extraction, contrast adjustments (linear and non-linear), band ratioing, spatial filtering, fourier transformations, principle components analysis, and texture transformations.

Information Extraction—Unlike analog image processing, digital image processing presently relies almost wholly on the primary elements of tone and color of image pixels.

There has been some success with expert systems and neural networks which attempt to enable the computer to mimic the ways in which humans interpret images. Expert systems accomplish this through the compilation of a large database of human knowledge gained from analog image interpretation which the computer draws upon in its interpretations.^[3] Neural networks attempt to "teach" the computer what decisions to make based upon a training data set. Once it has "learned" how to classify the training data successfully, it is used to interpret and classify new data sets.

Once the remotely sensed data has been processed, it must be placed into a format that can effectively transmit the information it was intended to. This can be done in a variety of ways including a printout of the enhanced image itself, and image map, a thematic map, a spatial database, summary statistics and/or graphs. Because there are a variety of ways in which the output can be displayed, a knowledge not only of remote sensing, but of such fields GIS, cartography, and spatial statistics are a necessity. With an understanding of these areas and how they interact one with another, it is possible to produce output that give the user the information

needed without confusion. However, without such knowledge it is more probable that output will be poor and difficult to use properly, thus wasting the time and effort expended in processing the remotely sensed data.

Words

| | | |
|----------------|-------------|-------------------------|
| ancillary | <i>adj.</i> | 补助的, 副的 |
| cartography | <i>n.</i> | 绘图法 |
| compilation | <i>n.</i> | 复杂 |
| confusion | <i>n.</i> | 混乱, 混淆 |
| context | <i>n.</i> | 上下文, 文章的前后关系 |
| discipline | <i>n.</i> | 学科 |
| extract | <i>n.</i> | 榨出物 |
| | <i>v.</i> | 析取 |
| features | <i>n.</i> | 容貌, 特征 |
| interpretation | <i>n.</i> | 解释, 通译 |
| landscape | <i>n.</i> | 地形 |
| magnification | <i>n.</i> | 扩大, 放大倍率 |
| mimic | <i>adj.</i> | 模仿的 |
| | <i>v.</i> | 摹拟 |
| necessity | <i>n.</i> | 必要性, 必需品 |
| neural | <i>adj.</i> | 神经系统的 |
| numerous | <i>adj.</i> | 众多的, 许多的, 无数的 |
| planimetric | <i>adj.</i> | 平面的, 地球表面经纬度的 |
| preprocess | <i>v.</i> | 预加工, 预处理 |
| processing | <i>n.</i> | 处理 |
| properly | <i>adv.</i> | 适当地, 完全地 |
| radiometric | <i>adj.</i> | 辐射测量的 |
| rectification | <i>n.</i> | 纠正, 整顿, 校正 |
| reduction | <i>n.</i> | 减少, 缩减量 |
| texture | <i>n.</i> | (织品的) 质地, (木材, 岩石等的) 纹理 |
| thematic | <i>adj.</i> | 主题的 |
| transect | <i>v.</i> | 横断 |
| | <i>n.</i> | 横断面 |

phrases

| | |
|-----------------|--------|
| expert systems | 专家系统 |
| neural networks | 神经网络 |
| remote sensing | 遥感, 遥测 |

geologic formations

地质层

land cover

土地覆盖

Abbreviations

GIS (Geographic Information System)

地理信息系统

Notes

- [1] 例句: A common method of determining what errors have been introduced into an image is by modeling the scene at the time of data acquisition using ancillary data collected.

分析: 整个句子是主从复合句。句中 determining what errors have been introduced into an image 为动名词短语作 of 的宾语, 其中 what errors have been introduced into an image 作 determining 的宾语。by modeling the scene at the time of data acquisition using ancillary data collected 是介词短语作表语, 其中 using ancillary data collected 是现在分词短语作方式状语。

译文: 决定什么错误已经传入图像的常用方法是通过利用收集到的辅助数据对获得数据时的景象进行建模。

- [2] 例句: Geometric rectification is a process by which points in an image are registered to corresponding points on a map or another image that has already been rectified.

分析: 本句是复合句。process 前是主语。句中 by which 引出的定语从句修饰 process。which 代表 process 在从句中作介词 by 的宾语。介词短语 by which 在句中作状语, 修饰谓语动词 be registered to。从句中介词 by 是根据句子的意思和词的搭配而用的。

译文: 几何校正是图像中的点与地图或另一个已校准的图像中相应的点配准的过程。

- [3] 例句: Neural networks attempt to 'teach' the computer what decisions to make based upon a training data set.

分析: 本句是简单句。句中 what decisions to make 为疑问词+不定式结构, 在句中作 teach 的直接宾语。这种结构也可称为特殊不定式, 在句中可作主语、表语、宾语等。如,

主语 How to operate a computer is known to the students.

表语 The important thing is where to get the necessary information.

宾语 Please tell me what to do next time.

译文: 神经网络试图教给计算机基于一组训练数据做出什么判决。

Exercises

I. Write true or false for the following statements according to the passage.

1. () The usefulness of digital image processing is apparent in medicine field.

2. () Remote sensing is an example of digital image processing.
3. () Remote sensing is the process of collecting data about objects or landscape features by coming into direct physical contact with them.
4. () Digital Image Processing is a process that consists of several steps.
5. () The steps taken in processing an image will not vary from image to image.
6. () There are three general steps in processing a digital image; preprocessing, display and enhancement, and information extraction.
7. () Geometric corrections are useless.
8. () Information Enhancement can be classified into two major categories: point operations and local operations.
9. () Once the remotely sensed data has been processed, it must be placed into a format that can effectively transmit the information it was intended to.
10. () Digital image processing technology can not be used in medicine.

II. Fill in the blanks according to the passage.

1. The advances and wide availability of image processing hardware has further enhanced the usefulness of _____.
2. Remote sensing is the process of _____ data about objects or landscape features without coming into direct physical contact with them.
3. The ultimate goal of image processing is to _____ information from an image that is not readily apparent or is not _____ in its original form.
4. There are three general steps in processing a digital image; _____, display and enhancement, and information extraction.
5. The goal of _____ rectification is to put image elements in their proper planimetric (x and y) positions.
6. Point operations change the value of each _____ pixel independent of all other pixels.
7. _____ change the value of individual pixels in the context of the values of neighboring pixels.
8. digital image processing presently relies almost wholly on the _____ elements of tone and color of image pixels.
9. There has been some success with _____ and neural networks which attempt to enable the computer to _____ the ways in which humans interpret images.
10. Neural networks attempt to "teach" the computer what _____ to make based upon a training data set.

III. Translate the following words and phrases into Chinese.

- | | |
|-----------------------------|------------------|
| 1. application | 6. extraction |
| 2. Digital Image Processing | 7. correction |
| 3. extract | 8. expert system |

4. multiple

5. enhancement

9. classify

10. interact

7.4.1 Reading Material 1

Introduction to the Image Compression Manager

The Image Compression Manager provides your application with an interface for compressing and decompressing images and sequences of images that is independent of devices and algorithms.

Uncompressed image data requires a large amount of storage space. Storing a single 640-by-480 pixel image in 32-bit color can require as much as 1.2 MB. Sequences of images, like those that might be contained in a QuickTime movie, demand substantially more storage than single images. This is true even for sequences that consist of fairly small images, because the movie consists of such a large number of those images. Consequently, minimizing the storage requirements for image data is an important consideration for any application that works with images or sequences of images.

The Image Compression Manager allows your application to

- use a common interface for all image-compression and image-decompression operations;
- take advantage of any compression software or hardware that may be present in a given Macintosh configuration;
- store compressed image data in pictures;
- temporarily compress sequences of images, further reducing the storage requirements of movies;
- display compressed PICT files without the need to modify your application;
- use an interface that is appropriate for your application—a high-level interface if you do not need to manipulate many compression parameters or a low-level interface that provides you greater control over the compression operation.

The Image Compression Manager compresses images by invoking image compressor components and decompresses images using image decompressor components. Compressor and decompressor components are code resources that present a standard interface to the Image Compression Manager and provide image-compression and image-decompression services, respectively. The Image Compression Manager receives application requests and coordinates the actions of the appropriate components. The components perform the actual compression and decompression. Compressor and decompressor components are standard components and are managed by the Component Manager. For detailed information about creating compressor and decompressor components, see *Inside Macintosh: QuickTime Components*.

Because the Image Compression Manager is independent of specific compression algorithms and drivers, it provides a number of advantages to developers of image-compression algorithms. Specifically, compressor and decompressor components can

- present a common application interface for software-based compressors and hardware-based compressors;

- provide several different compressors and compression options, allowing the Image Compression Manager or the application to choose the appropriate tool for a particular situation.

words

| | | |
|-----------------|--------------|-----------------|
| appropriate | <i>adj.</i> | 适当的 |
| coordinate | <i>n.</i> | 相配之物 |
| consequently | <i>adv.</i> | 从而, 因此 |
| decompression | <i>n.</i> | 解压 |
| decompressor | <i>n.</i> | 解压程序 |
| demand | <i>n.</i> | 要求, 需要 |
| | <i>v.</i> | 要求, 查询 |
| invoke | <i>v.</i> | 调用 |
| minimizing | <i>v.</i> | 极小化; 求最小参数值 |
| request | <i>v./ n</i> | 请求, 要求 |
| substantially | <i>adv.</i> | 充分地 |
| temporarily | <i>adv.</i> | 临时 |
| Macintosh (Mac) | <i>n.</i> | 苹果公司生产的一种型号的计算机 |

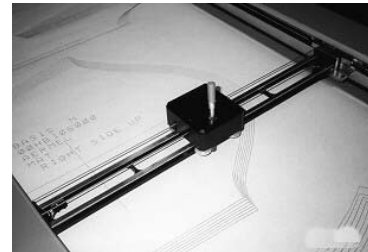
7.4.2 Reading Material 2

Graph Plotter

Graph plotters are used to produce high quality precision graphics usually on large sheets of paper.

They are slow, but can draw continuous curves often in a variety of colours. They are especially useful for architectural drawings, building plans and **CAD (Computer Aided Design)** applications, where precision drawing is required.

A mechanical arm holds a pen which can be moved across the page. The paper is sometimes laid on a flat bed (**flat bed plotter**) or on a rotating drum (**drum plotter**).



Words

| | | |
|---------------|-------------|------------|
| architectural | <i>adj.</i> | 建筑上的, 建筑学的 |
| arm | <i>n.</i> | 臂 |
| drum | <i>n.</i> | 鼓, 鼓形圆桶 |
| mechanical | <i>adj.</i> | 机械的 |
| rotate | <i>v.</i> | (使) 旋转 |
| rotate | <i>v.</i> | 旋转; 自转 |

phrases

graph plotters

绘图仪

7.4.3 正文参考译文

数字图像处理的应用

近年来, 数字图像处理领域不断扩大, 从医学领域到遥感技术, 数字图像处理技术在很多学科都得到了显著的应用。图像处理硬件的发展和广泛的适应性也进一步促进了图像处理的应用。

遥感技术是远距离地采集对象或地形特征的数据, 而不需要物质的直接接触。

数字图像处理不仅是遥感处理过程中的一个环节, 它本身也包括几个步骤。重要的是要记住这个过程的最終目的是从原始形式不明显或不可用的图像中提取信息。处理图像所采取的步骤根据不同的图像会有所不同。原因如下: 图像的格式和初始条件不同、对信息的兴趣不同(例如地质层对土地覆盖)以及环境成分不同。处理数字图像一般有三个步骤: 预处理、显示和增强、信息提取。

预处理——在分析数字图像之前, 经常需要对图像进行某种程度的预处理。包括辐射校正, 这种方法的目的是去除传感器错误和环境因素的影响。断定什么错误已经传入图像的常用方法, 是通过利用收集到的辅助数据对获得数据时的景象进行建模。

几何校正也是常用的优于其他图像分析的方法。如果需要利用图像测量区域、方向或距离, 需要对它们精确调整。几何校正是图像中的点与地图或另一个已校准的图像中相应的点配准的过程。几何校正的目的是将图像元素放在适当的平面位置。

信息增强——有几种方法可以增强图像。这些方法可以分成两大类: 点运算和局部运算。点运算独立地改变每一个像素的值, 而局部运算根据相邻像素的值改变每一个像素值。常用的增强方法包括图像缩小、图像放大、横断面提取、对比度调节(线形或非线形)、带比调节、空间滤波器、立里叶变换、主成分分析和纹理转换。

信息提取——与模拟图像处理不同, 当前的数字图像处理几乎仅依赖于像素的色调和颜色这些基本要素。

专家系统和神经网络试图让计算机模拟人类理解图像的方式, 已经获得了一些成功。专家系统通过编辑模拟图像解译得到的大型人类知识库, 由计算机利用图像解译实现模拟。神经网络试图“教”给计算机基于一组训练数据作出什么判决。当它成功地学会了怎样分类训练数据, 就被用来理解和分类新的数据组。

当遥感数据被处理后, 它需要设置成能有效传输信息的格式。这可以通过几种方法实现, 包括打印出增强图像本身、图像映射图、专题地图、空间数据库、摘要统计和图表。因为有多种方式可以显示输出, 不仅遥感知识, 地理信息系统的领域、绘图法和空间统计也是必需的。理解了这些领域和它们的交叉, 就可以清晰地输出用户需要的信息。无论如何, 如果没有这些知识, 输出会很差并且很难得到适当的应用, 这样就会浪费花费在遥感数据处理上的时间和努力。