

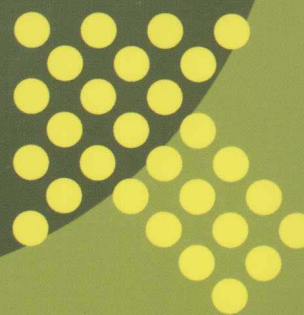
21世纪高等学校规划教材



JISUANJI YINGYU

# 计算机英语

陈 巍 王 静 主 编  
王善华 副主编



中国电力出版社

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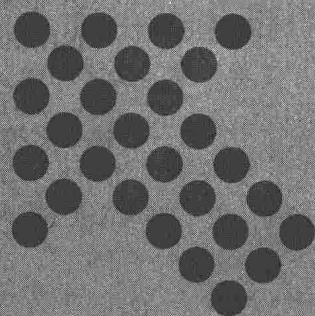
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# 计算机英语

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## 内 容 提 要

本书介绍了与计算机技术相关的各个领域,可以帮助提高学生的计算机专业知识及专业英语阅读能力。全书共9章,每章由若干小节组成,每节包含课文、单词及短语、练习,专业性较强的词汇作为脚注放在课文每页的下方,每章后均附有补充阅读材料。书中的课文和阅读材料均选自英美原文,并附有参考译文。需要说明的是,本书的译文不是唯一的,仅作为参考。

本书融知识性、趣味性及实用性为一体,结合计算机技术特点和学生英语水平程度,做到内容难度适中、新颖全面、专业实用、可选性强,所附译文能有效地辅助学生学习。

本书适用于计算机及相关专业本科院校的学生,可作为计算机专业英语教材或辅助阅读教材,也可供计算机爱好者和英语爱好者使用。

## 图书在版编目(CIP)数据

计算机英语 / 陈巍, 王静主编. —北京: 中国电力出版社, 2009.12

21 世纪高等学校规划教材

ISBN 978-7-5083-9958-4

I. ①计… II. ①陈… ②王… III. ①电子计算机—英语—高等学校—教材 IV. ①TP3

中国版本图书馆 CIP 数据核字 (2009) 第 237534 号

中国电力出版社出版、发行

(北京三里河路6号 100044 <http://jc.cepp.com.cn>)

北京市同江印刷厂印刷

各地新华书店经售

\*

2009 年 12 月第一版 2009 年 12 月北京第一次印刷

787 毫米×1092 毫米 16 开本 10.25 印张 240 千字

定价 17.00 元

## 敬告读者

本书封面贴有防伪标签,加热后中心图案消失

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5.4	Microsoft Excel 2007	57
5.5	Electronic Commerce	59
<b>Chapter Six</b>	<b>Multimedia</b>	<b>62</b>
6.1	What is Multimedia?	62
6.2	Uses for Multimedia	64
6.3	Digital Video	67
<b>Chapter Seven</b>	<b>The Fundamentals of Computer Software</b>	<b>71</b>
7.1	Data Structure	71
7.2	Operating Systems	72
7.3	Windows XP Overview	74
7.4	User Interface	76
7.5	Windows Vista	78
<b>Chapter Eight</b>	<b>Computer Networking</b>	<b>82</b>
8.1	Views of Networks	82
8.2	Data Communications	84
8.3	Architecture of Computer Networks	85
8.4	Local Area Network	87
8.5	Internet	89
8.6	The World Wide Web	91
<b>Chapter Nine</b>	<b>Computer Virus</b>	<b>95</b>
9.1	Virus Introduction	95
9.2	History	96
9.3	Virus Behavior	99
9.4	Number of Viruses	101
9.5	How Serious are Viruses?	102

## 第 2 部分 参 考 译 文

<b>第 1 章</b>	<b>计算机概述</b>	<b>109</b>
1.1	个人计算机	109
1.2	计算机历史	110
1.3	存储程序架构	110
1.4	程序	111
1.5	编程举例	112
<b>第 2 章</b>	<b>计算机是如何工作的</b>	<b>113</b>
2.1	控制单元	113
2.2	算术和逻辑	113
2.3	存储器	114

2.4	输入/输出设备和多任务处理 .....	115
2.5	多重处理技术 .....	116
2.6	网络和互联网 .....	116
<b>第 3 章</b>	<b>操作系统 .....</b>	<b>117</b>
3.1	“操作”概述 .....	117
3.2	中断 .....	118
3.3	保护模式和管理模式 .....	118
3.4	内存管理 .....	119
3.5	多任务处理 .....	120
<b>第 4 章</b>	<b>计算机的硬件功能 .....</b>	<b>121</b>
4.1	计算机系统的组织结构 .....	121
4.2	中央处理器 .....	121
4.3	主板 .....	122
4.4	存储器 .....	123
4.5	键盘 .....	124
<b>第 5 章</b>	<b>办公自动化 .....</b>	<b>126</b>
5.1	办公自动化基础 .....	126
5.2	微软办公处理软件 Office 2007 .....	127
5.3	微软文字处理软件 Word 2007 .....	127
5.4	微软表格处理软件 Excel 2007 .....	128
5.5	电子商务 .....	129
<b>第 6 章</b>	<b>多媒体 .....</b>	<b>131</b>
6.1	什么是多媒体 .....	131
6.2	多媒体的用途 .....	131
6.3	数字视频 .....	132
<b>第 7 章</b>	<b>计算机软件技术基础 .....</b>	<b>134</b>
7.1	数据结构 .....	134
7.2	操作系统 .....	134
7.3	Windows XP 概述 .....	135
7.4	用户界面 .....	136
7.5	Windows Vista .....	136
<b>第 8 章</b>	<b>计算机网络 .....</b>	<b>138</b>
8.1	网络简介 .....	138
8.2	数据通信 .....	138
8.3	计算机网络结构 .....	139
8.4	局域网 .....	140
8.5	互联网 .....	140

8.6 万维网.....	141
<b>第9章 计算机病毒</b> .....	<b>143</b>
9.1 计算机病毒简介.....	143
9.2 历史.....	143
9.3 病毒的行为.....	144
9.4 病毒的数量.....	145
9.5 病毒真的很可怕吗? .....	146

### **第3部分 练习题答案**

<b>Chapter One~Chapter Five</b> .....	<b>151</b>
<b>Chapter Six~Chapter Nine</b> .....	<b>152</b>
<b>参考文献</b> .....	<b>153</b>



21 世纪高等学校规划教材

第 1 部分

# 课 文



# Chapter One

## Computer Science: An Overview

### 1.1 Personal Computer

A computer is a machine that is based on the principle of electronics and manipulates data according to a set of instructions. Although mechanical examples of computers have existed through much of recorded human history, the first electronic computers were developed in the mid-20th century (1940-1945). These were the size of a large room, consuming as much power as several hundred modern personal computers (PCs). Modern computers based on integrated circuits<sup>①</sup> are millions to billions of times more capable than the early machines, and occupy a fraction of the space. Simple computers are small enough to fit into a wristwatch, and can be powered by a watch battery. Personal computers in their various forms are icons of the Information Age<sup>②</sup> and are what most people think of as “computers”. The embedded computers<sup>③</sup> found in many devices from MP3 players to fighter aircraft and from toys to industrial robots are however the most numerous. The ability to store and execute lists of instructions called programs makes computers extremely versatile, distinguishing them from calculators. The Church-Turing thesis<sup>④</sup> is a mathematical statement of this versatility: any computer with a certain minimum capability is, in principle, capable of performing the same tasks that any other computer can perform. Therefore computers ranging from a mobile phone<sup>⑤</sup> to a supercomputer are all able to perform the same computational tasks, given enough time and storage capacity.

At present, there are four types of computers: microcomputers, minicomputers, mainframe computers, and supercomputers.

In general, there are seven factors determining a computer's type:

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

(2) 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

① integrated circuit 集成电路。

② Information Age 信息化时代。

③ embedded computer 嵌入式计算机。

④ Church-Turing thesis 邱奇-图灵论，是计算机科学中以数学家阿隆佐·邱奇（Alonzo Church）和阿兰·图灵命名的论题。该论题最基本的观点表明，所有计算或算法都可以由一台图灵机来执行。

⑤ mobile phone 移动电话。

several different programs in memory at the same time.

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

(4) The speed of the output devices. 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.

(5) 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.

(6) 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.

(7) 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.

### 【 Vocabularies 】

principle ['prinsəpl] *n.* 原则, 原理

electronics [ilek'trɒniks] *n.* 电子学

manipulate [mə'nɪpjuleɪt] *vt.* 熟练操作

mechanical [mi'kænikəl] *adj.* 机械的

wristwatch ['ristwɒtʃ] *n.* 手表

icon ['aɪkɒn] *n.* 符号, 图像

execute ['eksɪkju:t] *vt.* 执行, 实现

versatile ['və:sə taɪl] *adj.* 多功能的

distinguish [dis'tɪŋɡwɪʃ] *vt. & vi.* 辨别, 区别

capability [keɪpə'bɪləti] *n.* 性能, 容量, 功率

computational [kəm'pjʊ(:)'teɪf(ə)n(ə)l] *adj.* 计算的

sophisticated [sə'fɪstɪkeɪtɪd] *n.* 精密的, 尖端的

instruction [ɪn'strʌkʃən] *n.* 命令, 指示

identify [aɪ'dentɪfaɪ] *vt.* 认出, 识别

simultaneously [sɪməl'teɪniəsli] *adv.* 同时地

## 【 Exercises 】

Fill in the blank with appropriate words or phrases found behind this exercise.

- (1) A computer manipulates data according to \_\_\_\_\_.
- (2) Modern computers based on \_\_\_\_\_ are millions to billions of times more capable than the early machines.
- (3) The \_\_\_\_\_ found in many devices are the most numerous.
- (4) The ability to store and execute lists of instructions called \_\_\_\_\_ makes computers extremely versatile.
- (5) Computers are all able to perform the same computational tasks, given \_\_\_\_\_.
- (6) There are four types of computers: \_\_\_\_\_.
- (7) The larger computers tend to use CPUs made up of \_\_\_\_\_.
  - a. integrated circuits
  - b. separate, high-speed, sophisticated components
  - c. embedded computers
  - d. microcomputers, minicomputers, mainframe computers, and supercomputers
  - e. enough time and storage capacity
  - f. programs
  - g. a set of instructions

## 1.2 History of Computing

The Jacquard loom<sup>①</sup> (see Fig.1-1) was one of the first programmable devices<sup>②</sup>. It was the fusion of automatic calculation with programmability that produced the first recognizable computers. In 1820, Charles Babbage was the first to conceptualize and design a fully programmable mechanical computer, his analytical engine<sup>③</sup>. Limited finances and Babbage's inability to resist tinkering with the design meant that the device was never completed. In the late 1880s Herman Hollerith invented the recording of data on a machine readable medium. Prior uses of machine readable media, above, had been for control, not data. After some initial trials with paper tape, he settled on punched cards<sup>④</sup>. To process these punched cards he invented the

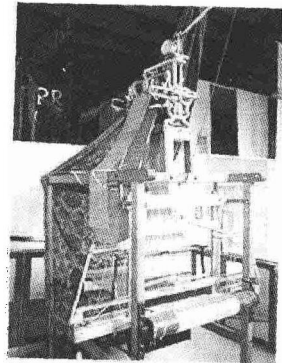


Fig.1-1 The Jacquard loom

① the Jacquard loom 提花织机。

② programmable device 可编程器件。

③ analytical engine 分析机 (早期的机械通用计算机)。

④ punched card 穿孔卡片。

tabulator, and the key punch machines. These three inventions were the foundation of the modern information processing industry. Large-scale automated data processing of punched cards was performed for the 1890 United States Census by Hollerith's company, which later became the core of IBM. By the end of the 19th century a number of technologies that would later prove useful in the realization of practical computers had begun to appear: the punched card, Boolean algebra, the vacuum tube<sup>①</sup> (thermionic valve) and the teleprinter. During the first half of the 20th century, many scientific computing needs were met by increasingly sophisticated analog computers<sup>②</sup>, which used a direct mechanical or electrical model of the problem as a basis for computation. However, these were not programmable and generally lacked the versatility and accuracy of modern digital computers.

Alan Turing is widely regarded to be the father of modern computer science. In 1936 Turing provided an influential formalization of the concept of the algorithm and computation with the Turing machine. Of his role in the modern computer, Time Magazine in naming Turing one of the 100 most influential people of the 20th century, states: "The fact remains that everyone who taps at a keyboard, opening a spreadsheet or a word-processing program, is working on an incarnation of a Turing machine."

George Stibitz is internationally recognized as a father of the modern digital computer. While working at Bell Labs in November 1937. Stibitz invented and built a relay-based calculator he dubbed the "Model K" (for "kitchen table", on which he had assembled it), which was the first to use binary circuits to perform an arithmetic operation. Later models added greater sophistication including complex arithmetic and programmability.

### 【 Vocabularies 】

finance [faɪ'næns] *n.* 金融

complete [kəm'pli:t] *vt.* 完成

initial [i'niʃəl] *adj.* 初步的

automate ['ɔ:tə, meɪt] *adj.* 自动化

automatic [ɔ:tə'mætɪk] *adj.* 自动的

calculation [kælkjə'leɪʃən] *n.* 计算

recognizable ['rekəgnaɪzəbl] *adj.* 识别

conceptualize [kən'septjuəlaɪz] *vt.* 概念化

analytical [ænə'lɪtɪkəl] *adj.* 分析

---

① vacuum tube 真空管。

② analog computer 模拟计算机。

inability [inə'biliti:] *n.* 无能, 无力

resist [ri'zist] *vt. & vi.* 抵制

settle on ['setld] 决定, 选定

foundation [faun'deifən] *n.* 基础

accuracy ['ækjurəsi, 'ækjərəsi] *n.* 精度

### 【 Exercises 】

Fill in the blank with appropriate words or phrases found behind this exercise.

- (1) It was the fusion of \_\_\_\_\_ with programmability.
- (2) Charles Babbage was the first to design \_\_\_\_\_.
- (3) To process these punched cards he invented the \_\_\_\_\_.
- (4) \_\_\_\_\_ of punched cards became the core of IBM.
- (5) Many scientific computing needs were met by increasingly \_\_\_\_\_.
- (6) The fact remains that everyone is working on an incarnation of \_\_\_\_\_.
- (7) The “Model K” was the first to use \_\_\_\_\_ to perform an arithmetic operation.
  - a. key punch machines
  - b. sophisticated analog computers
  - c. automatic calculation
  - d. binary circuits
  - e. a Turing machine
  - f. a fully programmable mechanical compute
  - g. Large-scale automated data processing

## 1.3 Stored Program Architecture

The defining feature of modern computers which distinguishes them from all other machines is that they can be programmed. That is to say that a list of instructions (the program) can be given to the computer and it will store them and carry them out at some time in the future. In most cases, computer instructions are simple: add one number to another, move some data from one location to another, send a message to some external device, etc. These instructions are read from the computer's memory and are generally carried out (executed) in the order they were given. However, there are usually specialized instructions to tell the computer to jump ahead or backwards to some other place in the program and to carry on executing from there. These are called “jump” instructions. Furthermore, jump instructions may be made to happen conditionally so that different sequences of instructions may be used depending on the result of some previous calculation or some external event. Many computers directly support subroutines by

providing a type of jump that “remembers” the location it jumped from and another instruction to return to the instruction following that jump instruction. Program execution might be likened to reading a book. While a person will normally read each word and line in sequence, they may at times jump back to an earlier place in the text or skip sections that are not of interest. Similarly, a computer may sometimes go back and repeat the instructions in some section of the program over and over again until some internal condition is met. This is called the flow of control<sup>①</sup> within the program and it is what allows the computer to perform tasks repeatedly without human intervention.

Comparatively, a person using a pocket calculator<sup>②</sup> can perform a basic arithmetic operation such as adding two numbers with just a few button presses. But to add together all of the numbers from 1 to 1000 would take thousands of button presses and a lot of time—with a near certainty of making a mistake. On the other hand, a computer may be programmed to do this with just a few simple instructions.

For example:

mov #0,sum ; set sum to 0

mov #1,num ; set num to 1

loop: add num,sum ; add num to sum

add #1,num ; add 1 to num

cmp num,#1000 ; compare num to 1000

ble loop ; if num ≤ 1000, go back to 'loop' halt ; end of program. stop running

Once told to run this program, the computer will perform the repetitive addition task without further human intervention. It will almost never make a mistake and a modern PC can complete the task in about a millionth of a second.

However, computers cannot “think” for themselves in the sense that they only solve problems in exactly the way they are programmed to. An intelligent human faced with the above addition task might soon realize that instead of actually adding up all the numbers one can simply use the equation

$$1 + 2 + 3 + \cdots + n = \frac{n(n+1)}{2}$$

and arrive at the correct answer (500,500) with little work. In other words, a computer programmed to add up the numbers one by one as in the example above would do exactly that without regard to efficiency or alternative solutions.

### 【 Vocabularies 】

store [sto:] vt. & vi. 存储

① flow of control 控制流。

② pocket calculator 袖珍计算器。



location [ləu'keɪʃən] *n.* 位置  
 memory ['meməri] *n.* 内存  
 liken ['laɪkən] *vt.* 比喻  
 similarly ['similəli] *adv.* 同样  
 repeatedly [ri'pi:tɪdli] *adv.* 反复  
 external [eks'tə:nl] *adj.* 外部的  
 specialized ['speʃəlaɪzd] *adj.* 专门的  
 furthermore ['fə:ðə, mɔ:] *adv.* 此外  
 sequence ['si:kwəns] *n.* 序列  
 arithmetic [ə'riθmətik] *n.* 算术

### 【 Exercises 】

Fill in the blank with appropriate words or phrases found behind this exercise.

- (1) The defining \_\_\_\_\_ of modern computers is that they can be programmed.
- (2) The computer will store them and carry them out at some time \_\_\_\_\_.
- (3) These instructions are generally carried out \_\_\_\_\_ they were given.
- (4) Different \_\_\_\_\_ may be used depending on the result of some previous calculation or some external event.
- (5) They may at times jump back to an earlier place in the text or \_\_\_\_\_ that are not of interest.
- (6) A computer may sometimes repeat the \_\_\_\_\_.
- (7) To \_\_\_\_\_ all of the numbers from 1 to 1 000 would take a lot of time.
  - a. feature
  - b. add together
  - c. skip sections
  - d. in the future
  - e. in the order
  - f. instructions
  - g. sequences of instructions

## 1.4 Programs

In practical terms, a computer program may run from just a few instructions to many millions of instructions, as in a program for a word processor or a web browser. A typical modern computer can execute billions of instructions per second and rarely make a mistake over many years of operation. Large computer programs consisting of several million instructions may take teams of programmers' years to write, and due to the