21世纪高等学校计算机教育实用规划教材

计算机基础与实践(英文版)

Computer Concepts and Practice

张桃红 姚琳 杨炳儒 编著

清华大学出版社

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内 容 简 介

本书是创新方法工作专项项目“科学思维、科学方法在高等学校教学创新中的应用与实践——KM 教学法的研究与实践”的主要研究成果之一。

全书共分两篇：第一篇为理论篇，包括 Computer Basics and Digitization, Computer Hardware, Computer Software, Operating System, Networks, and Computer Careers and Ethics; 第二篇为实践篇，包括 Microsoft Word 2010,Microsoft Excel 2010,and Microsoft PowerPoint 2010。

本书开篇给出理论知识的逻辑结构图，每章均有本章的知识逻辑结构图，相关知识点附有 KM 图，在教学上实现“薄—厚—薄”的教学回路，力图在内容、阐述等方面形成新的模式。

本书适合高等院校作为“大学计算机基础”课程的双语教材，也适合作为学习计算机及英语的入门参考书籍。

图书在版编目（CIP）数据

计算机基础与实践：英文/张桃红，姚琳，杨炳儒编著. --北京：清华大学出版社，2014
21 世纪高等学校计算机教育实用规划教材
ISBN 978-7-302-38252-2

Ⅰ. ①计… Ⅱ. ①张… ②姚… ③杨… Ⅲ. ①电子计算机－高等学校－教材－英文 Ⅳ. ①TP3

中国版本图书馆 CIP 数据核字（2014）第 230344 号

责任编辑：梁　颖
封面设计：常雪影
责任校对：时翠兰
责任印制：沈　露

出版发行：清华大学出版社
网　　址：http://www.tup.com.cn，http://www.wqbook.com
地　　址：北京清华大学学研大厦 A 座　　邮　　编：100084
社 总 机：010-62770175　　邮　　购：010-62786544
投稿与读者服务：010-62776969，c-service@tup.tsinghua.edu.cn
质 量 反 馈：010-62772015，zhiliang@tup.tsinghua.edu.cn
印 装 者：北京鑫海金澳胶印有限公司
经　　销：全国新华书店
开　　本：185mm×260mm　　**印　　张**：15.25　　**字　　数**：370 千字
版　　次：2014 年 11 月第 1 版　　**印　　次**：2014 年 11 月第1 次印刷
印　　数：1～1500
定　　价：35.00 元

产品编号：061560-01

出版说明

随着我国高等教育规模的扩大以及产业结构调整的进一步完善，社会对高层次应用型人才的需求将更加迫切。各地高校紧密结合地方经济建设发展需要，科学运用市场调节机制，合理调整和配置教育资源，在改革和改造传统学科专业的基础上，加强工程型和应用型学科专业建设，积极设置主要面向地方支柱产业、高新技术产业、服务业的工程型和应用型学科专业，积极为地方经济建设输送各类应用型人才。各高校加大了使用信息科学等现代科学技术提升、改造传统学科专业的力度，从而实现传统学科专业向工程型和应用型学科专业的发展与转变。在发挥传统学科专业师资力量强、办学经验丰富、教学资源充裕等优势的同时，不断更新教学内容、改革课程体系，使工程型和应用型学科专业教育与经济建设相适应。计算机课程教学在从传统学科向工程型和应用型学科转变中起着至关重要的作用，工程型和应用型学科专业中的计算机课程设置、内容体系和教学手段及方法等也具有不同于传统学科的鲜明特点。

为了配合高校工程型和应用型学科专业的建设和发展，急需出版一批内容新、体系新、方法新、手段新的高水平计算机课程教材。目前，工程型和应用型学科专业计算机课程教材的建设工作仍滞后于教学改革的实践，如现有的计算机教材中有不少内容陈旧（依然用传统专业计算机教材代替工程型和应用型学科专业教材），重理论、轻实践，不能满足新的教学计划、课程设置的需要；一些课程的教材可供选择的品种太少；一些基础课的教材虽然品种较多，但低水平重复严重；有些教材内容庞杂，书越编越厚；专业课教材、教学辅助教材及教学参考书短缺，等等，都不利于学生能力的提高和素质的培养。为此，在教育部相关教学指导委员会专家的指导和建议下，清华大学出版社组织出版本系列教材，以满足工程型和应用型学科专业计算机课程教学的需要。本系列教材在规划过程中体现了如下一些基本原则和特点。

（1）面向工程型与应用型学科专业，强调计算机在各专业中的应用。教材内容坚持基本理论适度，反映基本理论和原理的综合应用，强调实践和应用环节。

（2）反映教学需要，促进教学发展。教材规划以新的工程型和应用型专业目录为依据。教材要适应多样化的教学需要，正确把握教学内容和课程体系的改革方向，在选择教材内容和编写体系时注意体现素质教育、创新能力与实践能力的培养，为学生知识、能力、素质协调发展创造条件。

（3）实施精品战略，突出重点，保证质量。规划教材建设仍然把重点放在公共基础课和专业基础课的教材建设上；特别注意选择并安排一部分原来基础比较好的优秀教材或讲义修订再版，逐步形成精品教材；提倡并鼓励编写体现工程型和应用型专业教学内容和课程体系改革成果的教材。

（4）主张一纲多本，合理配套。基础课和专业基础课教材要配套，同一门课程可以有多本具有不同内容特点的教材。处理好教材统一性与多样化，基本教材与辅助教材、教学参考书，文字教材与软件教材的关系，实现教材系列资源配套。

（5）依靠专家，择优选用。在制订教材规划时要依靠各课程专家在调查研究本课程教材建设现状的基础上提出规划选题。在落实主编人选时，要引入竞争机制，通过申报、评审确定主编。书稿完成后要认真实行审稿程序，确保出书质量。

繁荣教材出版事业，提高教材质量的关键是教师。建立一支高水平的以老带新的教材编写队伍才能保证教材的编写质量和建设力度，希望有志于教材建设的教师能够加入到我们的编写队伍中来。

21 世纪高等学校计算机教育实用规划教材编委会
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Preface

"Computer Basics" is a computer-based course which is taught in universities for the freshmen. The purpose is to introduce computers' basic knowledge, operating methods and applications in various fields. This enables students to acquire basic knowledge and skills of computer applications as well as to assist their own specialized courses with the help of the computer knowledge they learned.

This course contains a wide range of knowledge and the relative applications of computers that students should master. The updating of teaching contents shows hysteresis with the rapid replacement and evolution of computers. How to teach and be learned efficiently within the limited course hours is a big challenge for university teachers and students.

This textbook is the result of challenging, discovering teaching innovation. The renovated teaching theory, teaching methods, and teaching organizing with cognizing modules are applied in this textbook.

1. This textbook is compiled according to the renovation teaching theory of knowledge logic structure and mind form note (KM theory) based on cognition.
2. The contents of this textbook are seperated into two parts: theory part and application part. The theory part is lectured in class with basic computers theory knowledge. And the practice is operated in computer rooms with application of theory knowledge.
3. This textbook is lectured with new teaching modules. It is spread from part KM chart, chapter KM chart to knowledge nodes KM chart. The teaching module may be conducted as "thin - thick - thin" to realize the spiral cognition.

This textbook is one of the research achievements of Innovation Method Project "Application and Practice of Scientific Thinking, Scientific Method in Universities Teaching Renovation — Research and Practice of KM Teaching Method" (Project No. 2009IM010400-2-01). And this textbook is funded by University of Science and Technology Beijing. Thanks for the work of graduated students. And thanks for all the technical reviewers and press project coordinators.

Writer

2014/6/25

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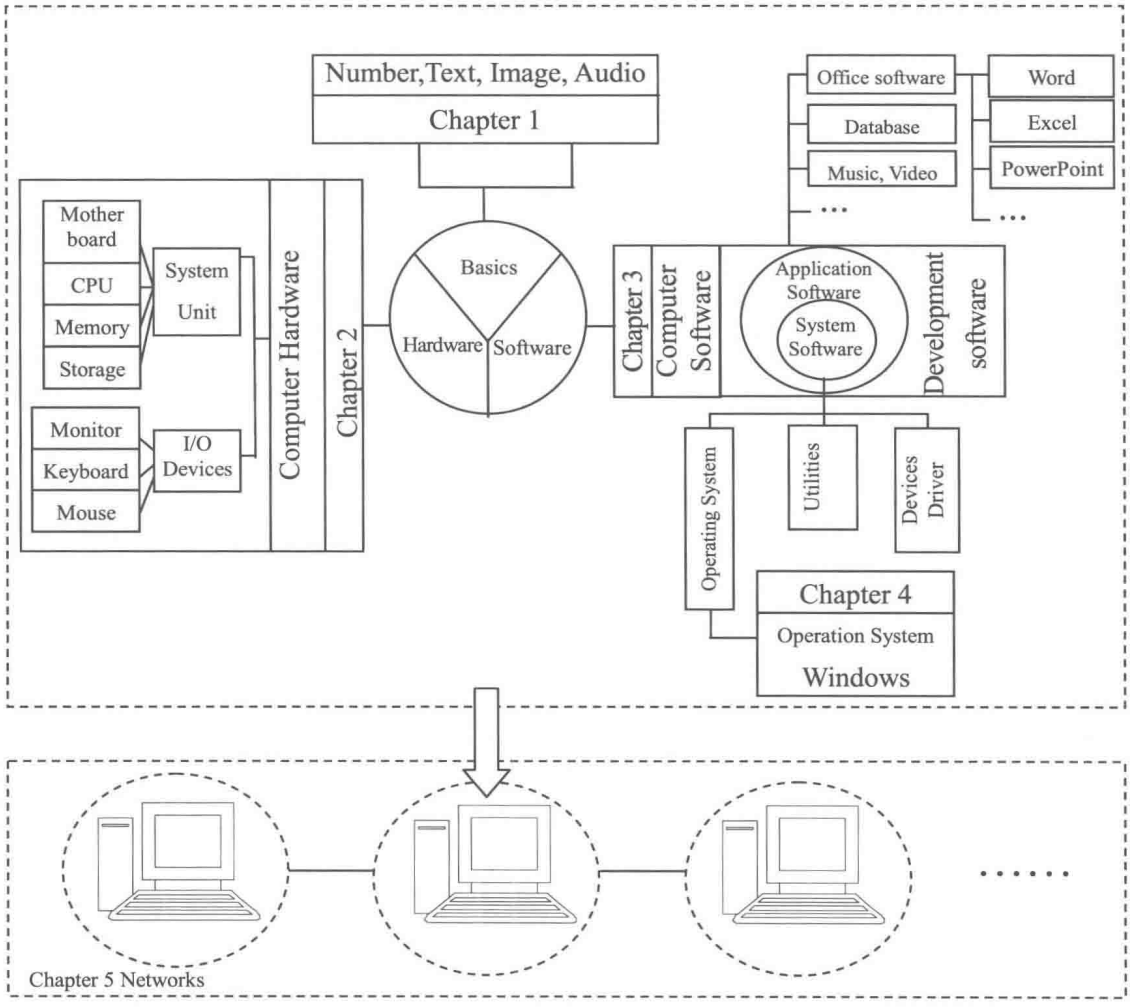
Part Ⅱ Practice Part

Part I Theory Part

The knowledge of Chapter 1 to Chapter 5 is configured in this chart according to the inner knowledge logic relation.



Chapter 1 Computer Basics and Digitization

The relationship of sections in this chapter is shown below (Figure 1-1).

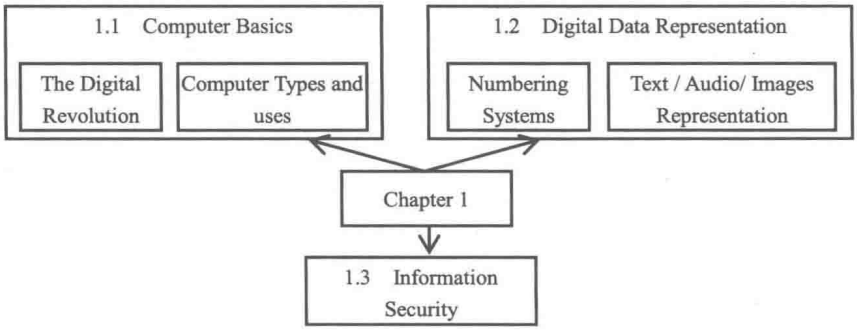


Figure 1-1 The relationship chart of Chapter One

1.1 Computer Basics

Computers have a significant impact (shown in Figure 1-2) on everyday life in nearly all areas. Computers are used in:

- Airline and Railway Reservations.
- Medical Diagnosis.
- Weather Forecasting.
- Payment of telephone and electricity bills.
- Banking.
- Space research.
- Online Education.
- Sending and receiving data throughout the world using internet.

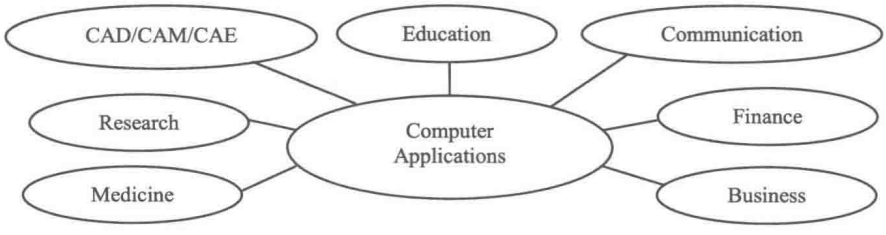


Figure 1-2 Usage of Computer

What is a computer? A computer is made by electronic devices and can manipulate information or data by executing the instructions in a program/software. It has the ability to **accept data, process data, store data and produce output.** You can use a computer to type documents, storage data, send E-mail, have a chat with friends and browse the Web. You can also use it to handle spreadsheets, accounting, database management, presentations, games, and more.

What is data? Data refers to a collection of numbers, characters, graphs, music, image, etc.. In a computer, all data can only be expressed by a serial of **1**s or **0**s which can be represented in people, events, things, and ideas. Data can be a name, a number, the colors in a photo, or the note in a musical composition.

What makes a computer powerful? It is **Speed, Reliability and Storage**. A computer can do billions of actions per second. Computers can provide reliable computation and failures are usually due to human error. A computer can keep huge amounts of data.

1.1.1 An Overview of the Computer Development

It is generally thought that there are four generations in the development of computers.

1. The First Generation-Vacuum Tubes (1946—1956).

1946 ENIAC (Electronic numerical integrator and calculator, shown in Figure 1-3):

- General-purpose electronic digital computer.
- Wartime needs.
- Programmed manually.

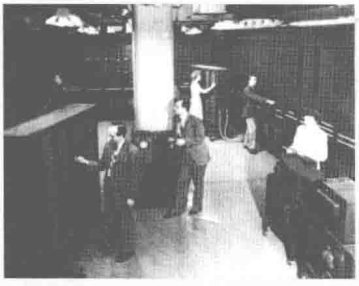


Figure 1-3 ENIAC

In February, the public got its first glimpse of the ENIAC, a machine built by John Mauchly and J. Presper Eckert that improved by 1,000 times on the speed of its contemporaries.

Start of : 1943.
Completed: 1946.
Programmed: Plug board and switches.
Speed: 5,000 operations per second.
Input/output: Cards, lights, switches, plugs.
Floor space: 1,000 square feet.
Project leaders: John Mauchly and J. Presper Eckert.

1952 EDVAC (Electronic discrete variable automatic computer), the Von Neumann Machine:

- Stored-program concept.
- Had general structure and function.

Figure 1-4 John von Neumann

John von Neumann (Figure 1-4) wrote "First Draft of a Report on the EDVAC" in which he outlined the architecture of a stored-program computer. Electronic storage of programming information and data eliminated the need for the more clumsy methods of programming, such as punched paper tape — a concept that has characterized mainstream computer development since 1945. Hungarian-born von Neumann demonstrated prodigious expertise in hydrodynamics, ballistics, meteorology, game theory, statistics, and the use of mechanical devices for computation. After the war, he concentrated on the development of Princeton's Institute for Advanced Studies computer and its copies around the world.

2. The Second Generation: Transistors（1957—1964）

1947 Bell Labs invented transistor.

The late 1950s NCR, RCA: Deliver the new technology.

IBM 7094:

- Size of memory grew from 2KB to 32KB.
- Memory cycle time (the time to access one word of memory)fell from 30μs to 1.4 μs.

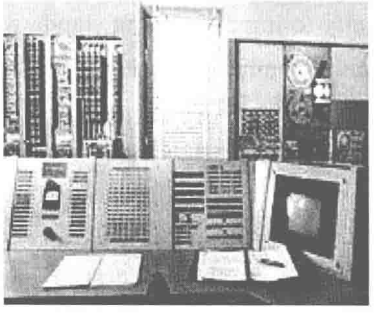


Figure 1-5 MIT TX-0

MIT researchers built the TX-0 (Figure 1-5), the first general-purpose, programmable computer built with transistors. For easy replacement, designers placed each transistor circuit inside a "bottle," similar to a vacuum tube. Constructed at MIT's Lincoln Laboratory, the TX-0 moved to the MIT Research Laboratory of Electronics, where it hosted some early imaginative tests of programming, including a Western movie shown on TV, 3-D tic-tac-toe, and a maze in which mouse found martinis and became increasingly inebriated.

3. The Third Generation: Integrated Circuits (1965—1971).

4. Later Generations (1972—).

Large-scale integration (LSI): >1000 components.

Very-large-scale integration (VLSI):>100,000 components.

Microprocessors: microcomputer (PC).

All of the components of a CPU on a single chip.

It can be seen that the calculation tools developed from manually to machinery, automatically to now modern digital computers.

1.1.2 The Digital Revolution

The Digital Revolution is the change from analog, mechanical, and electronic technology to

digital technology which began anywhere from the late 1950s to the late 1970s with the adoption and proliferation of digital computers and digital record keeping that continues to the present day. The Digital Revolution marked the beginning of the Information Age.

Underlying the digital revolution was the development of the digital electronic computer, the personal computer, and particularly the microprocessor with its steadily increasing performance (as described by Moore's law), which enabled computer technology to be embedded into a huge range of objects from cameras to personal music players. Equally important was the development of transmission technologies including computer networking, the Internet and digital broadcasting. 3G phones, whose social penetration grew exponentially in the 2000s, also played a very large role in the digital revolution as they simultaneously provide ubiquitous entertainment, communications, and online connectivity.

The rapid growth of Information and Communication Technologies and innovation in digital systems represent a revolution that has fundamentally changed the way people think, behave, communicate, work and earn their livelihood. This so-called digital revolution has forged new ways to create knowledge, educate people and disseminate information. It has restructured the way the world conducts economic and business practices, runs governments and engages politically. It has provided for the speedy delivery of humanitarian aid and healthcare, and a new vision for environmental protection. It has even created new avenues for entertainment and leisure. As access to information and knowledge is a prerequisite to achieving the Millennium Development Goals—or MDGs—it has the capacity to improve living standards for millions of people around the world. Moreover, better communication between peoples helps resolve conflicts and attain world peace.

The Internet, especially the WWW in the 1990s, opened whole new avenues for communication and information sharing. The ability to easily and rapidly share information on a global scale brought with it a whole new level of freedom of speech. Individuals and organizations were suddenly given the ability to publish on any topic, to a global audience, at a negligible cost, particularly in comparison to any previous communication technology.

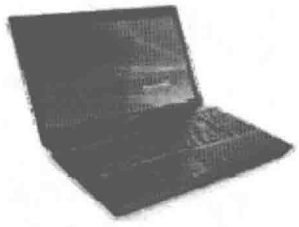
Large cooperative projects could be endeavored (e.g. Open-source software projects). Communities of like-minded individuals were formed (e.g. MySpace, Tribe.net). Small regional companies were suddenly given access to a larger marketplace.

The economic impact of the digital revolution has been large. Without the World Wide Web (WWW), for example, globalization and outsourcing would not be nearly as feasible as they are today. The digital revolution radically changed the way individuals and companies interact. Small regional companies were suddenly given access to much larger markets. Concepts such as On-demand services and manufacturing and rapidly dropping technology costs made possible innovations in all aspects of industry and everyday life.

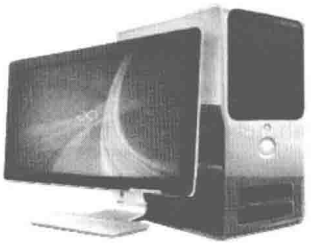
1.1.3 Computer Types and uses

Computers for personal use come in all kinds of shapes and sizes, from PC (personal computer)

to tiny smart phones (shown in Figure 1-6). More specialized models are announced each week - trip planners, expense account pads, language translators, health managers ... So the categories are blending together.



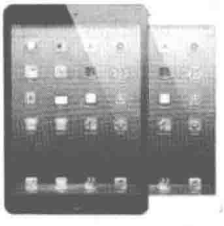
Laptop/Notebook
Full size keyboard



Desktop

Netbook
Compressed keyboard

Smart phone



Pad

Tablet PC

Figure 1-6 Computer types

Personal Computers

PC (personal Computer) is a general-purpose computer with a microprocessor (which will be talked in Chapter 2 Computer Hardware). Its size, capabilities and original sale price makes it useful for individuals. It is intended to be operated directly by an end-user.

A workstation is part of a computer network and generally would be expected to have more than a regular desktop PC of most everything, like memory, storage space, and speed. It's hard to tell the difference any more.

A laptop computer is intended to be portable, with a built-in screen. A netbook is even lighter, with a smaller screen, less storage, and is missing features like a built-in DVD drive. Companies are producing more varieties and styles of smaller computers daily to keep improving features and components, like battery life and screen quality.

With a Tablet PC you can write reports, watch movies, read ebooks, play games, or even do work. On many you can use an electronic stylus to write on the screen, just like with a pen and paper, only your words are digital. The Tablet PC saves your work just like you wrote it (as a picture), or even you can let the hand recognition software change your hand writing into regular text.