Chapter 9
The Computer Industry: History, Careers, and Ethics
Computer Concepts 2014

9 Chapter Contents

- ➢ Section A: Computer History
- ➢ Section B: The Computer and IT Industries
- ➢ Section C: Careers for Computer Professionals
- ➢ Section D: Professional Ethics
- ➢ Section E: Work Area Safety and Ergonomics

9

Section A: Computer History

- Manual Calculators
- Mechanical Calculators
- Computer Prototypes
- Generations of Computers
- Personal Computers

9 **Manual Calculators**

➢ Devices that assist in the process of numeric calculations, but require the human operator to keep track of the algorithm

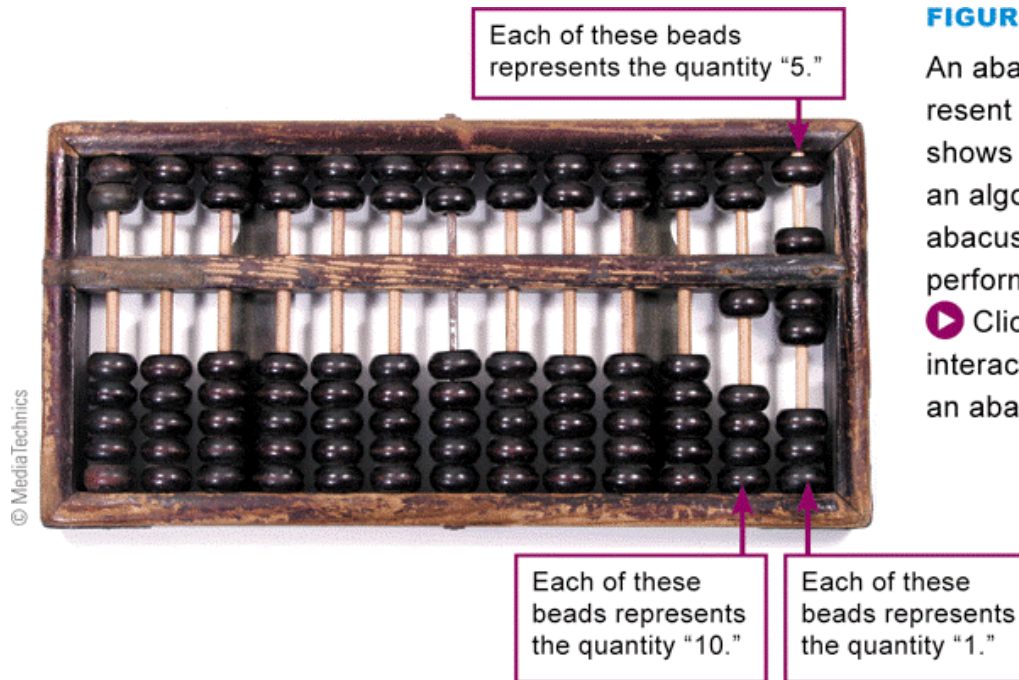Each of these beads represents the quantity "5."

FIGURE 9-1

An abacus uses beads to represent numbers. This abacus shows the number 17. Using an algorithm, the beads on an abacus can be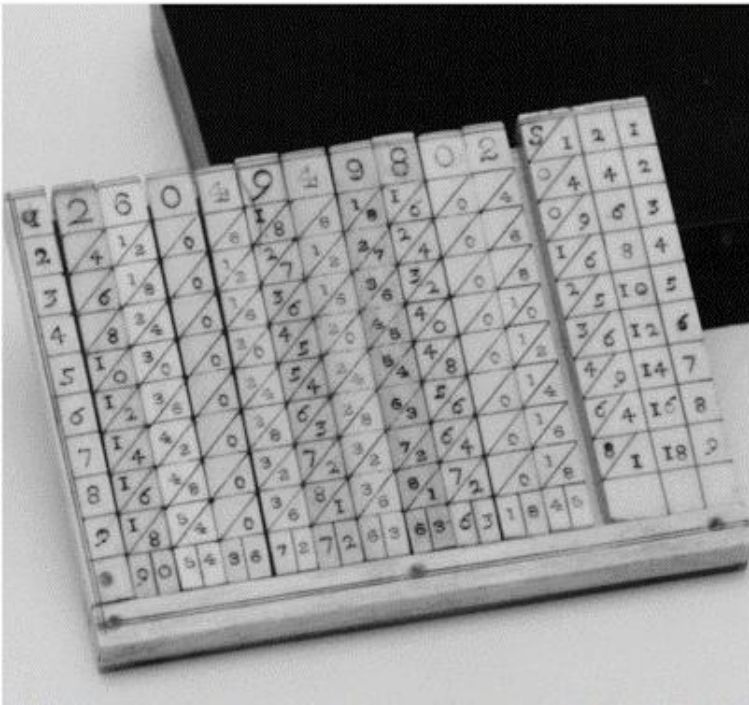 manipulated to perform arithmetic operations. ▶ Click this figure in your interactive eBook to learn how an abacus works.

© MediaTechnics

Each of these beads represents the quantity "10."

Each of these beads represents the quantity "1."
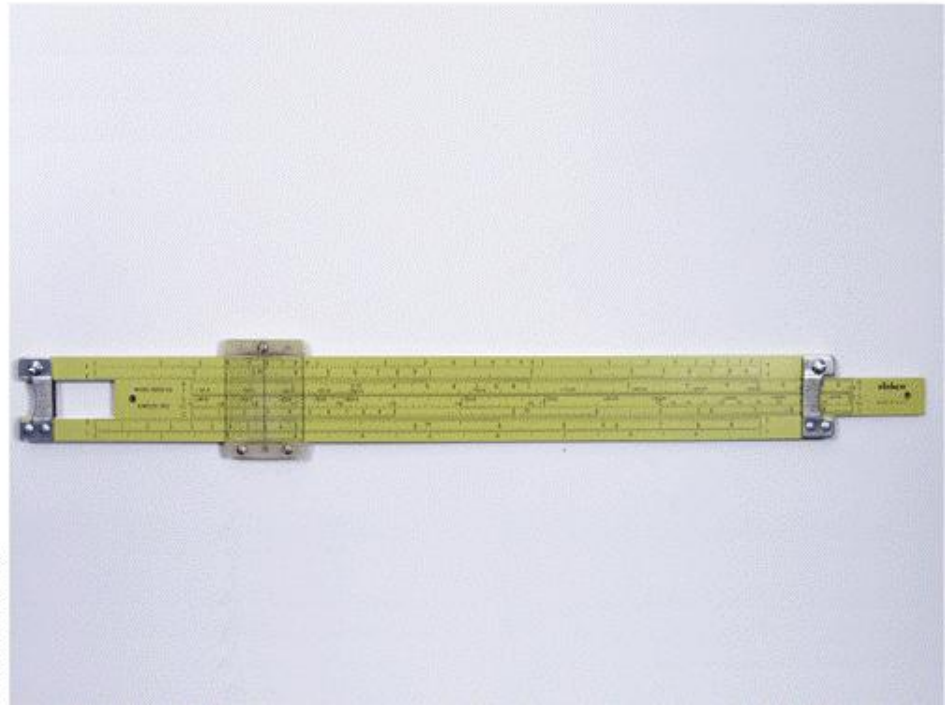
9 Manual Calculators

FIGURE 9-2

Napier's Bones (left) evolved into the slide rule (right).
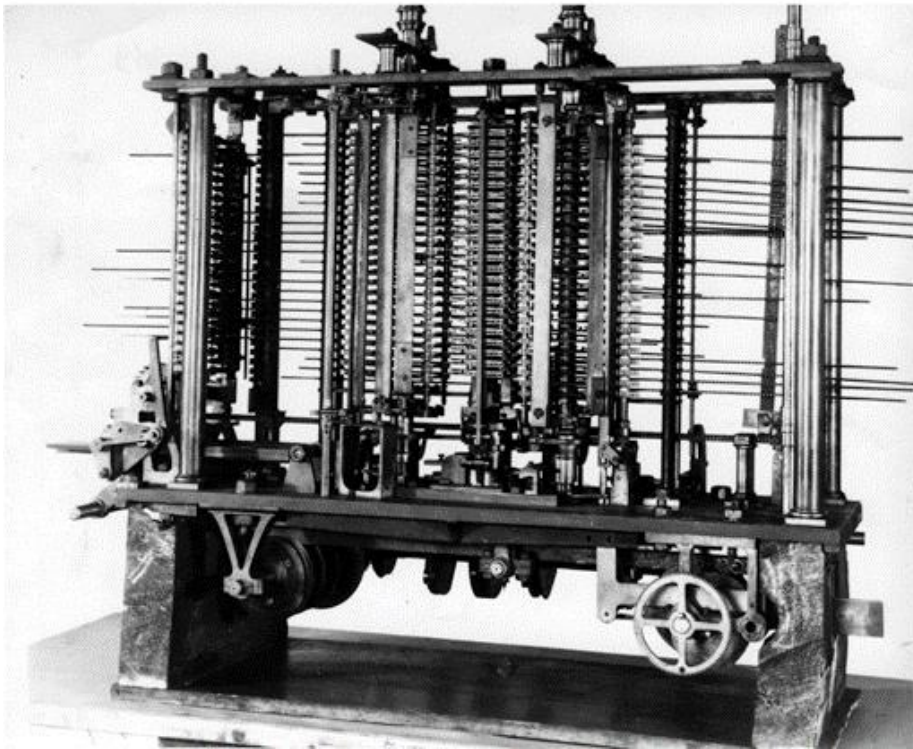▶ Watch a video showing how a slide rule works.

Courtesy IBM Corporation

© MediaTechnics

9 Mechanical Calculators

➢ Implement algorithms autonomously
  - ➢ Schickard's Calculator
  - ➢ Pascaline
  - ➢ Leibniz Calculator
  - ➢ de Colmar's Arithmometer
  - ➢ Difference Engine
  - ➢ Analytical Engine
  - ➢ Hollerith Tabulating Machine

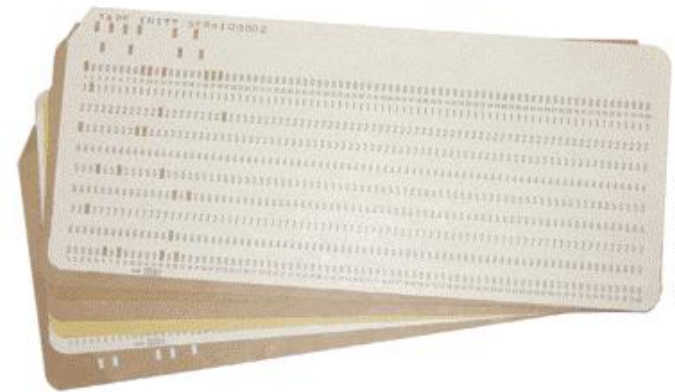# 9 Mechanical Calculators

FIGURE 9-3

Babbage's Analytical Engine was designed to process programs and data stored on punched cards, much like those used in 1970s mainframe computers. The use of punched cards was probably borrowed from the cards used to control Jacquard looms.

9 Leap to Computers

1890 US Census Bureau held a competition to find a way to tabulate 1890 census data.

➢ Hollerith Tabulating Machine won

➢ Punch card tabulating device

  ➢ Punch appropriate location for nationality, etc

➢ Only took 6 months to tabulate the cards

➢ (then 2 years to complete the statistical calculations

➢ In 1896, Hollerith formed The Tabulating Machine Company

➢ Later renamed, in 1924, to International Business Machines

9 Computer Prototypes

Atanasoff-Berry Computer (ABC) (1937-1942)

➤ First to use vacuum tubes

FIGURE 9-4

The Atanasoff-Berry Computer (ABC) gained national attention when it was pulled from obscurity in a 1972 patent dispute. The Sperry Rand company claimed to have a patent on digital computer architecture, but the court declared the patent claim invalid because it was based on the work of Atanasoff and Berry.
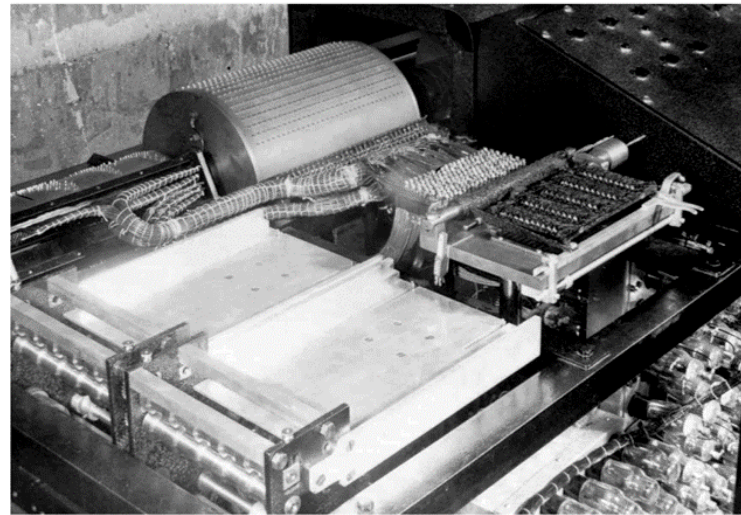
AP Photo/Frederick News-Post

Computer Prototypes

➢Harvard Mark I (IBM Automatic Sequence Controlled Calculator)

FIGURE 9-5

Constructed of relay switches, rotating shafts, and clutches, the Harvard Mark I sounded like a "roomful of ladies knitting." The device was 51 feet long and 8 feet tall and weighed about 5 tons.
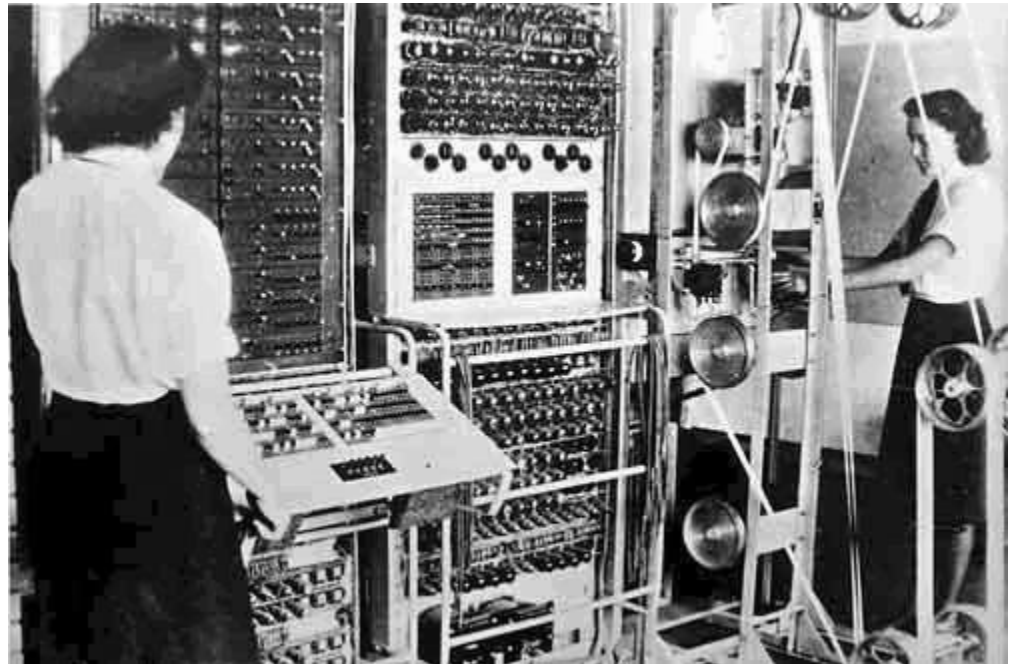
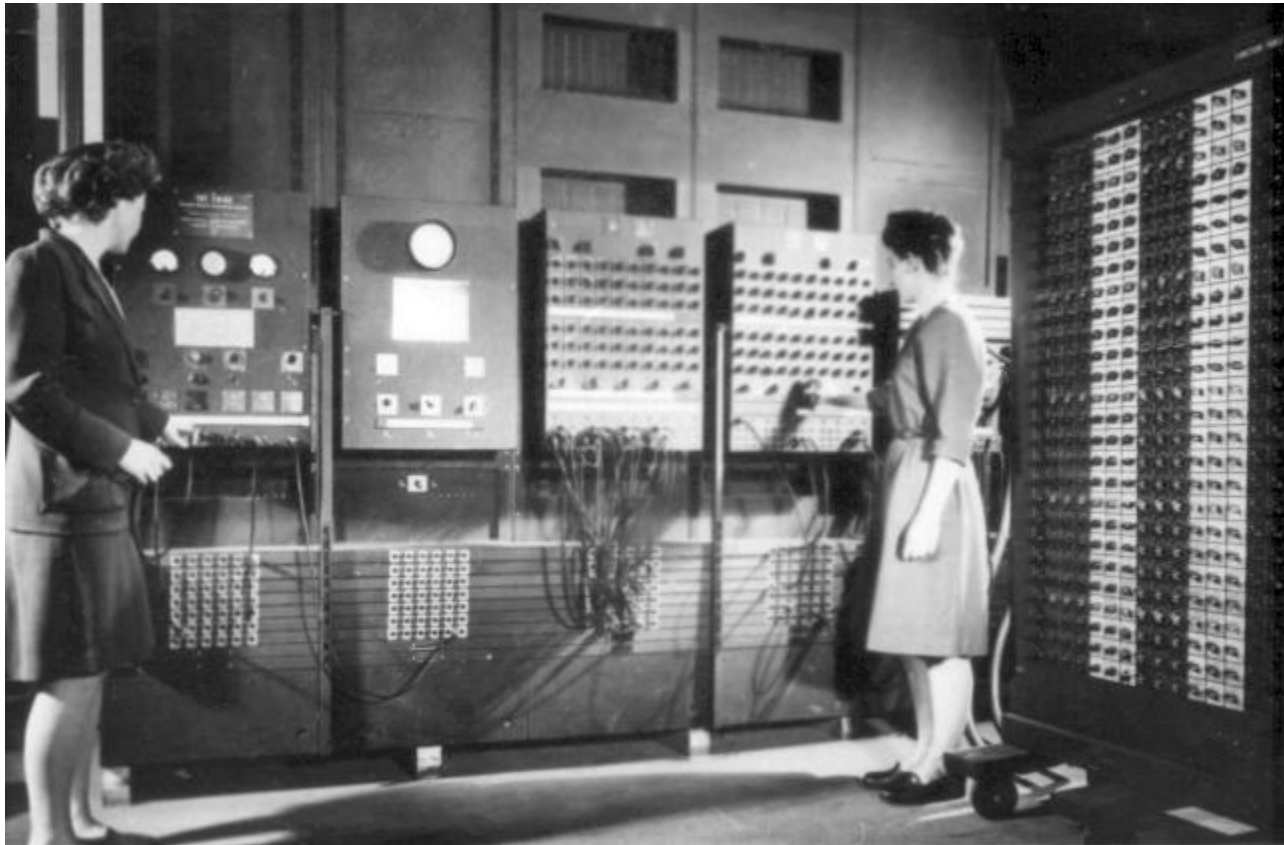**9** **Computer Prototypes**

COLOSSUS (1943)

- used to decode German transmissions encrypted by the Engima machine

Computer Prototypes

ENIAC (1943-46) – compute US artillery trajectory tables

9 Generations of Computers

➢ UNIVAC is considered the first commercially successful digital computer

➢ First-generation computers

  ➢ Vacuum tubes

➢ Second-generation computers

  ➢ Transistors

FIGURE 9-8

Transistors first sparked a revolution in the entertainment industry by providing a small, power-efficient technology for portable radios. Later, transistors were incorporated in computers to replace large, hot, power-hungry vacuum tubes.

FIGURE 9-6

UNIVAC had RAM capacity of 12,000 characters (12 KB), and used magnetic tape for data storage and retrieval. The cost of a UNIVAC was about US$930,000—more than $7 million in today's currency. ▶ View original footage from Remington Rand Corporation showing how UNIVAC worked.

Keystone-France/Gamma-Keystone via Getty Images

© MediaTechnics

Transistors

9

Generations of Computers

- ➢ Third-generation computers
  - ➢ Integrated circuits
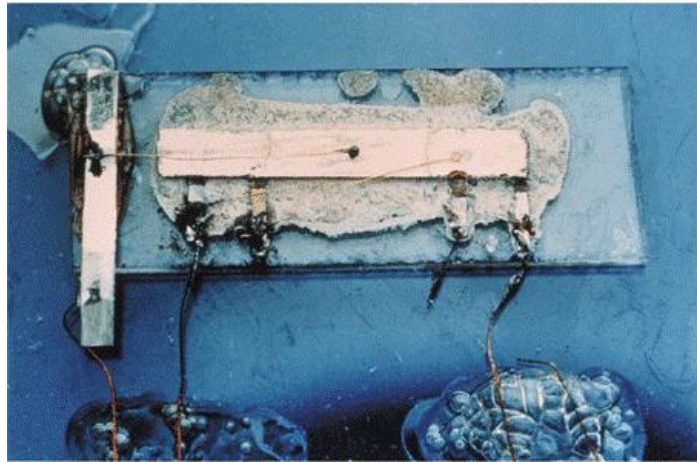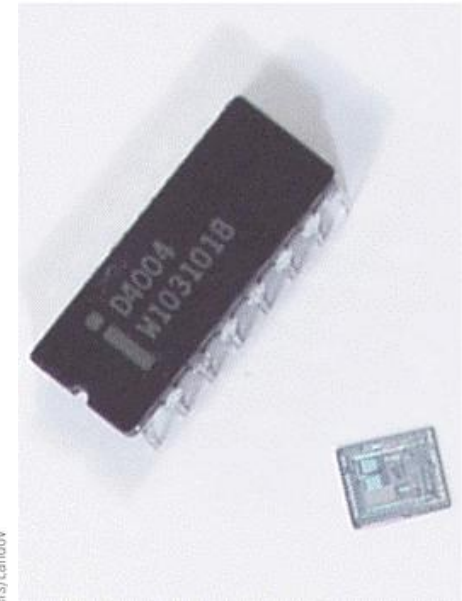- ➢ Fourth-generation computers
  - ➢ Microprocessor

FIGURE 9-11

The Intel 4004 microprocessor was small. Its chip (lower right) was only 1/8" by 1/16". Even in the chip carrier (top left), the microprocessor was less than 1" in length.

FIGURE 9-10

Jack Kilby's original integrated circuit was a key development for creating today's small, fast, and efficient computers.

9 **Personal Computers**

- ➢ Mark-8
- ➢ MITS Altair
- ➢ Apple I / Apple II
- ➢ VisiCalc

FIGURE 9-12

Although it was sold as a kit, required assembly, and was too limited to perform significant computational tasks, the Altair was snapped up by hobbyists interested in learning how computers worked.

HOW TO "READ" FM TUNER SPECIFICATIONS

Popular Electronics

WORLD'S LARGEST-SELLING ELECTRONICS MAGAZINE   JANUARY 1975/75¢

PROJECT BREAKTHROUGH!

World's First Minicomputer Kit to Rival Commercial Models...
"ALTAIR 8800"   SAVE OVER $1000

ALTAIR 8800

ALSO IN THIS ISSUE:
- An Under-$90 Scientific Calculator Project
- CCD's—TV Camera Tube Successor?
- Thyristor-Controlled Photoflashers

TEST REPORTS:
Technics 200 Speaker System
Pioneer RT-1011 Open-Reel Recorder
Tram Diamond-
Edmund Scienti
Hewlett-Packar

9 Personal Computers

- Mark-8
- MITS Altair-1st commercial microcomputer
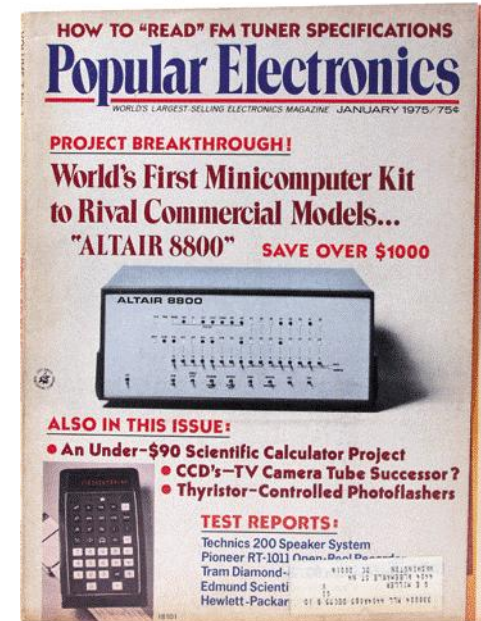- Apple I / Apple II
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TEST REPORTS:
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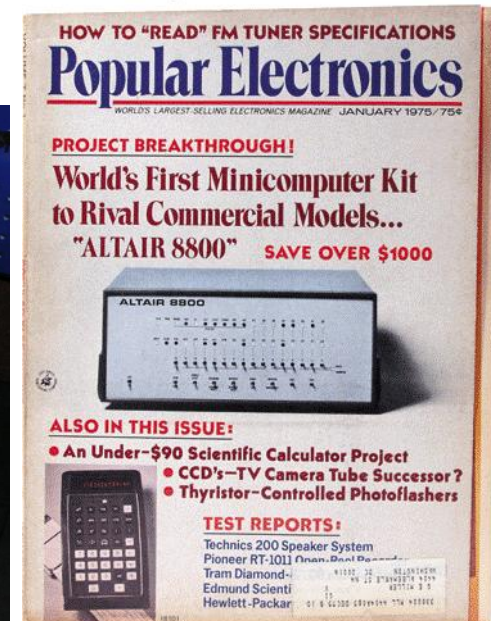Edmund Scientific
Hewlett-Packard

Photo Courtesy of MediaTechnics, Popular Electronics Magazine © Gernsback Publications Inc., 1975

9 **Personal Computers**

- ➢ IBM PC
  - ➢ IBM PC XT
- ➢ Apple Lisa
- ➢ Xerox Alto
- ➢ Apple Macintosh

FIGURE 9-14

The IBM PC, which was launched in 1981, evolved into today's popular Windows-based PCs.

© iStockphoto.com/Maxiphoto

FIGURE 9-15

The Apple Macintosh computer popularized graphical user interfaces.

Courtesy of oldcomputers.net

9 **Section B: The Computer and IT Industries**

➢ Industry Overview

➢ Economic Factors

➢ Product Life Cycles

➢ Market Share

➢ Marketing Channels

➢ Industry Regulation

9 **Industry Overview**

➢ The computer industry encompasses companies that manufacture computers and computer components

➢ The information technology industry refers to companies that develop, produce, sell, or support computers, software, and computer-related products

  ➢ Equipment manufacturers, chipmakers, software publishers, IT service companies, and computer retailers
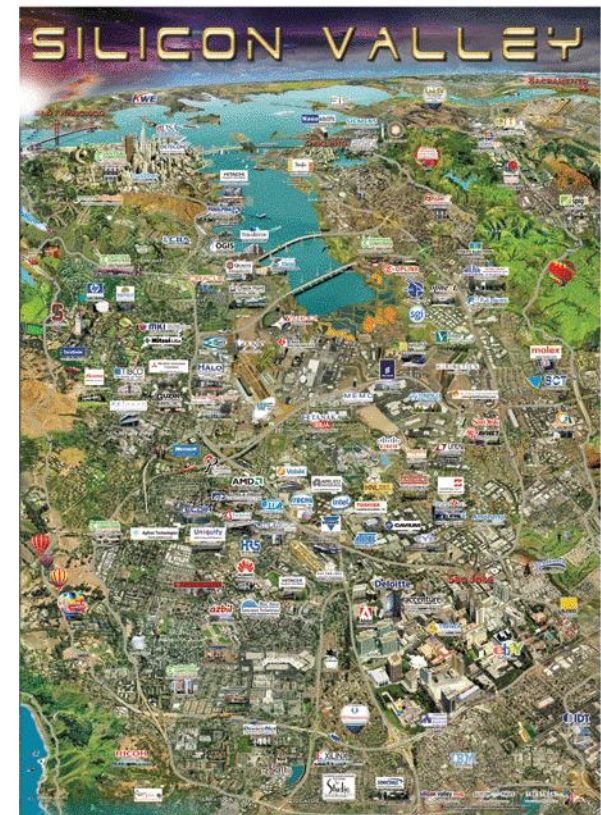
9 Industry Overview

➤ Silicon Valley was the birthplace of integrated circuits, microprocessors, and personal computers

➤ Outsourcing vs. offshoring

© Silicon Maps, Inc.

9 Economic Factors

➢ The IT industry is dynamic, prosperous, and economically beneficial

➢ The dot com business failures in 2001 and 2002

➢ Population growth and business globalization contributed to the success of the IT industry

9

Product Life Cycles

FIGURE 9-22

Hardware Product Life Cycle

Product Development

Product development often takes place under wraps. Developers use fanciful code names, such as Sawtooth and Portola, to refer to their products. Inevitably, news of these products leaks out and causes much speculation among industry analysts.

Product Announcement

Products are often announced at trade shows and press conferences. As a consumer, you should be wary of making purchase or investment decisions based on product announcements. A product announcement can precede the actual launch by months or even years. Some products, referred to as vaporware, are announced but never produced.

Introduction

When a new product becomes available, it is usually added to the vendor's product line and featured prominently in advertisements. Initial supplies of the product generally remain low while manufacturing capacity increases to meet demand.
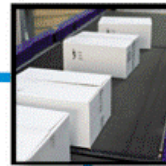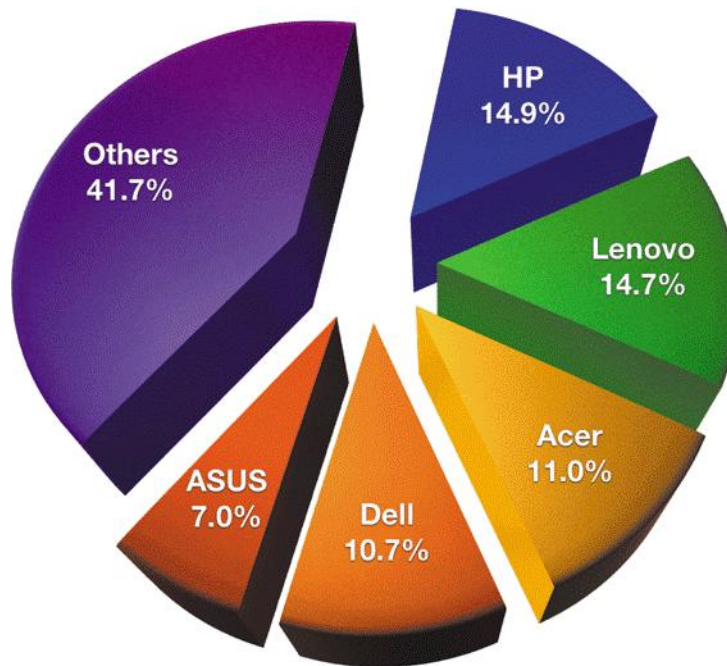
Maintenance

As supply and demand for a product reach an equilibrium, the manufacturer might reduce the price to keep the product attractive to buyers.

Retirement

As demand declines, a company's oldest products are discontinued. Eventually product support is discontinued as well.

© Masterfile (Royalty-Free Div.), © Monkey Business Images/Shutterstock, STAN CARROLL/The Commercial Appeal/Landov, © Jupiterimages/Comstock Images/Getty Images, © Baloncici/Shutterstock

9 Market Share

➢ Refers to a company's share, or total percentage, of the total market

FIGURE 9-24

Worldwide Market Share for Personal Computer Vendors in the Second Quarter of 2012 (Data includes desktop and portable computers, but not tablets such as the iPad.)

Data source: Gartner, Inc.

9

Marketing Channels

FIGURE 9-25

Computer hardware and software are sold through several marketing channels.

Distribution centers stock products from many different manufacturers and then sell the products to retailers.

Distribution centers

Manufacturers produce products and ship them to resellers, distribution centers, computer retailers, and mail-order suppliers.

Computer retailers stock products from several manufacturers and sell these products to customers.

Retail stores

Manufacturers

Customers

VARs

Some manufacturers ship products directly to customers.

Mail-order suppliers

Value-added resellers generally modify products or assemble them into complete hardware and software solutions targeted at specific businesses.

Mail-order suppliers specialize in taking phone orders and shipping products to customers using U.S. mail or courier services.

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9

Marketing Channels

9 Industry Regulation

➤ Some aspects regulated by government agencies
  - ➤ FCC
  - ➤ FTC
➤ Most IT industry leaders oppose further regulation

IT Industry Regulation

Internet activity is affected by policies of the U.S. Federal Communications Commission (FCC), which regulates interstate and international communications by television, wire, radio, satellite, and cable.

Courtesy of the Federal Communications Commission

UNITED STATES
FEDERAL TRADE COMMISSION BUILDING
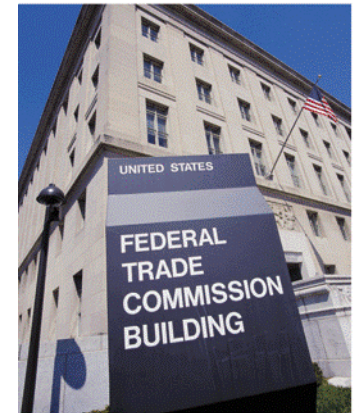
The U.S. Federal Trade Commission (FTC) and Department of Justice police the business practices of the IT industry, just as they police other industries.

© James Leynse/CORBIS

Section C: Careers for Computer Professionals

9

Lots of possible careers.

➤ Information Systems department
  - ➤ Chief Information Officer
  - ➤ Systems Analyst
  - ➤ Computer Programmer
  - ➤ Security Specialist
  - ➤ Database Administrator
  - ➤ Network Specialist/Administrator
  - ➤ Computer Operator
  - ➤ Technical Support Specialist
  - ➤ Web site designer

9 Careers

➢ Outside the IS department
- ➢ Technical Writer
- ➢ Computer Salesperson
- ➢ Quality Assurance Specialist
- ➢ Computer Engineer
- ➢ Manufacturing Technician

9 Education and Jobs

Certifications

➢ exam to test knowledge of a particular technology or subject

➢ Eg Microsoft Office Specialist (MOS) Expert/Master

University Degrees

➢ Computer Science, Computer Engineering, Software Engineering, etc

Contract workers

➢ hired as consultants and are not official employees

Telecommuting allows workers in many industries to work from home and makes financial sense

9 **Professional Networking Sites**

LinkedIn

➢ Complete your profile

➢ Request recommendations

➢ Add connections

➢ Join groups

Web portfolio - hypertext version of your resume, which might contain links to relevant Web sites

➢ Post on your personal Web site

9 **Section D: Professional Ethics**

➢ Ethics Basics

➢ IT Ethics

➢ Ethical Decision Making

➢ Whistleblowing

9 **Ethics Basics**

➢ Professional ethics refers to on-the-job choices and actions that reflect a person's values

➢ Laws try to promote ethical behavior

  ➢ Laws and ethics are not necessarily the same

➢ Ethical values apply to any career field

➢ Ethical decisions can vary from one field to another

9 **IT Ethics**

➢ Situations that require computer professionals to make ethical decisions often involve

  ➢ Software copyrights
  ➢ Privacy
  ➢ Conflict of interest
  ➢ Use of work computers
  ➢ Software quality
  ➢ Hacking
  ➢ Social responsibility

FIGURE 9-42

Copyrights can trigger ethical dilemmas.

Jiang Jin/SuperStock

9 IT Ethics

➢ Confidentiality is the obligation not to disclose willingly any information that should be kept private

 ➢ Applies to individuals and organizations

 ➢ Proprietary information

➢ It is never good practice to use facilities at work for personal activities

9 IT Ethics

➢ Computer professionals have to keep up with the latest threats from viruses and intrusion attempts

  ➢ Hacking

➢ Computer professionals should consider the repercussions of shortened software test cycles

➢ Software developers should consider whether they will be responsible for how their software is used

9 Ethical Decision Making

➤ Talk to people whose judgment you respect

➤ Consider what the most ethical person you know would decide to do

➤ Think about what you would do if your actions were made public

➤ Look at the problem from the opposite perspective

➤ Consult a code of professional ethics

9 **Ethical Decision Making**

➢ A code of ethics is a set of guidelines designed to help professionals make decisions

FIGURE 9-49

Many IT professional organizations offer codes of ethics.

"Ten Commandments" from the Computer Ethics Institute Professional Code

- Thou shalt not use a computer to harm other people.
- Thou shalt not interfere with other people's computer work.
- Thou shalt not snoop around in other people's files.
- Thou shalt not use a computer to steal.
- Thou shalt not use a computer to bear false witness.
- Thou shalt not use or copy software for which you have not paid.
- Thou shalt not use other people's computer resources without authorization.
- Thou shalt not appropriate other people's intellectual output.
- Thou shalt think about the social consequences of the program you write.
- Thou shalt use a computer in ways that show consideration and respect.

9 Ethical Decision Making

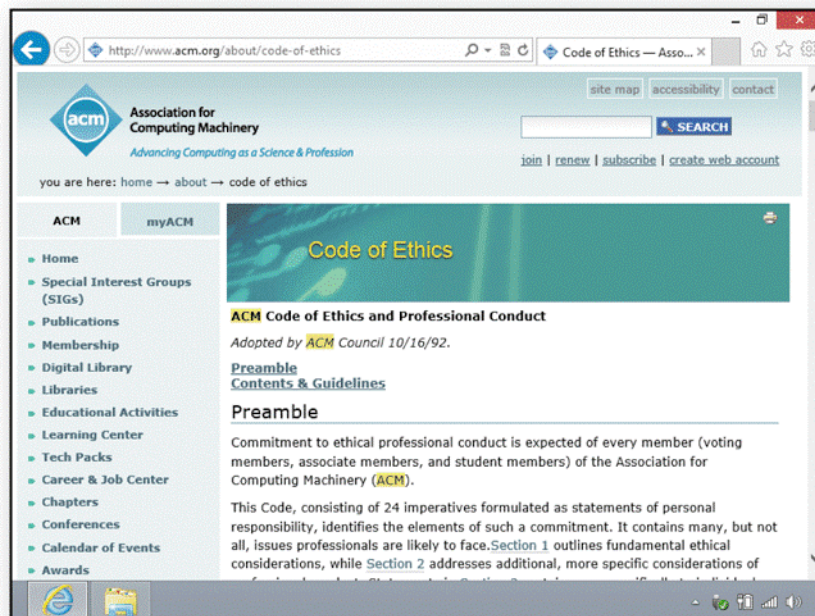➢ Codes of ethics are published online and are available to the public

FIGURE 9-50

The ACM posts a code of ethics at its Web site.

9 **Whistleblowing**

➢ Disclosure by an employee of confidential information which relates to some danger, fraud, or other illegal or unethical conduct

  ➢ Speaks out against on-the-job activities

➢ Whistleblowers are often fired or forced out of their jobs

9 **Whistleblowing**

➢ Before whistleblowing:

  ➢ Examine your motives

  ➢ Try the normal chain of command

  ➢ Collect evidence to back up your accusations

  ➢ Record events as they unfold

  ➢ Act ethically

  ➢ Be ready to accept repercussions

  ➢ Establish a support network

  ➢ Consult a lawyer
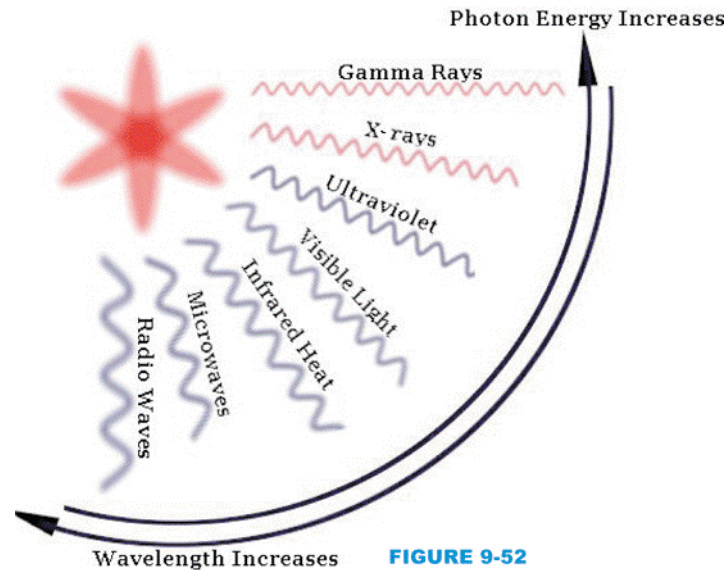
  ➢ Consider your strategy

9 **Section E: Work Area Safety and Ergonomics**

➢ Radiation Risks

➢ Repetitive Stress Injuries

➢ Eye Strain

➢ Back Pain

➢ Sedentary Lifestyle

Radiation Risks

➢ Every electronic device emits some type of radiation

Photon Energy Increases

Gamma Rays

X-rays

Ultraviolet

Visible Light

Infrared Heat

Microwaves

Radio Waves

Wavelength Increases

Courtesy of Body Composition Laboratory, Baylor College of Medicine

FIGURE 9-52

Some types of radiation, such as light, heat, microwaves, and radio waves, are generally considered safer than Gamma rays, X-rays, and ultraviolet light.
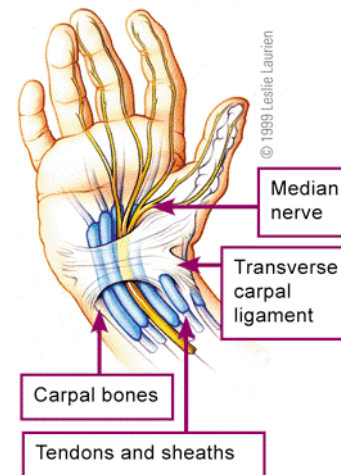
9 **Radiation Risks**

➢ CRTs and LCD screens emit radiation

  ➢ LCD screens emit low levels

➢ Cell phones emit RF energy

  ➢ The scientific community continues to study and debate the amount of RF radiation that should be considered safe for long-term use

  ➢ Use a hands-free headset to reduce exposure

9 **Repetitive Stress Injuries**

➤ A repetitive stress injury (RSI) is not a specific disease but a group of similar overuse disorders that affect the tendons, muscles, and nerves

 ➤ Carpal tunnel syndrome

FIGURE 9-54

Carpal tunnel syndrome is a condition affecting the nerve that runs to your thumb, index finger, and middle finger.
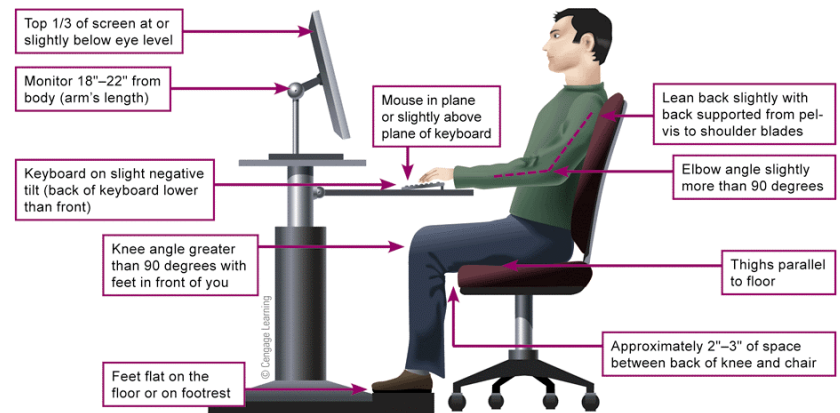
© 1999 Leslie Laurien

Median nerve

Transverse carpal ligament

Carpal bones

Tendons and sheaths

9 **Repetitive Stress Injuries**

➢ Ergonomics is the study of safe and efficient environments, particularly working environments

FIGURE 9-55

Set up and use your computer equipment according to ergonomic guidelines to avoid repetitive stress injuries.

▶ Position the keyboard so that it is just above your lap and your elbows are able to extend past the 90-degree angle when you type. If you use an external keyboard, choose a computer desk with a keyboard tray that you can adjust so it is 1"–2" above your thighs.

▶ Angle the keyboard so that your wrists are straight when typing.

▶ If you have a wrist-rest, use it only when you are not typing; resting your palm on a wrist-rest while typing usually creates an angle in your wrist that is not efficient.

▶ Use a keyboard that fits the size of your hands and fingers. When you rest your fingers on the home keys (asdf and jkl;), there should be 1/8"–1/4" of space between them so you are not trying to type with your fingers cramped together or overextending.

Top 1/3 of screen at or slightly below eye level

Monitor 18"–22" from body (arm's length)

Mouse in plane or slightly above plane of keyboard

Keyboard on slight negative tilt (back of keyboard lower than front)

Lean back slightly with back supported from pelvis to shoulder blades

Elbow angle slightly more than 90 degrees

Knee angle greater than 90 degrees with feet in front of you

Thighs parallel to floor

Approximately 2"–3" of space between back of knee and chair

Feet flat on the floor or on footrest

© Cengage Learning

▶ Make sure your mouse is positioned close by so that you don't have to reach for it.

▶ Keep the mouse at the same height as your keyboard to minimize arm movements.

▶ Use your mouse with a relaxed arm and wrist.

▶ When working at mouse-intensive activities, change mouse hands occasionally or change to an air mouse, trackball, or touchpad, which require a different set of muscles.

9 Eye Strain

➢ Studies have found links between computer use and eye problems

FIGURE 9-56

You can position your monitor by stretching out your arm parallel to the ground. Your fingertips should almost touch the center of the screen.

© Cengage Learning

9 **Eye Strain**

➢ Adjust screen resolution to a comfortable level
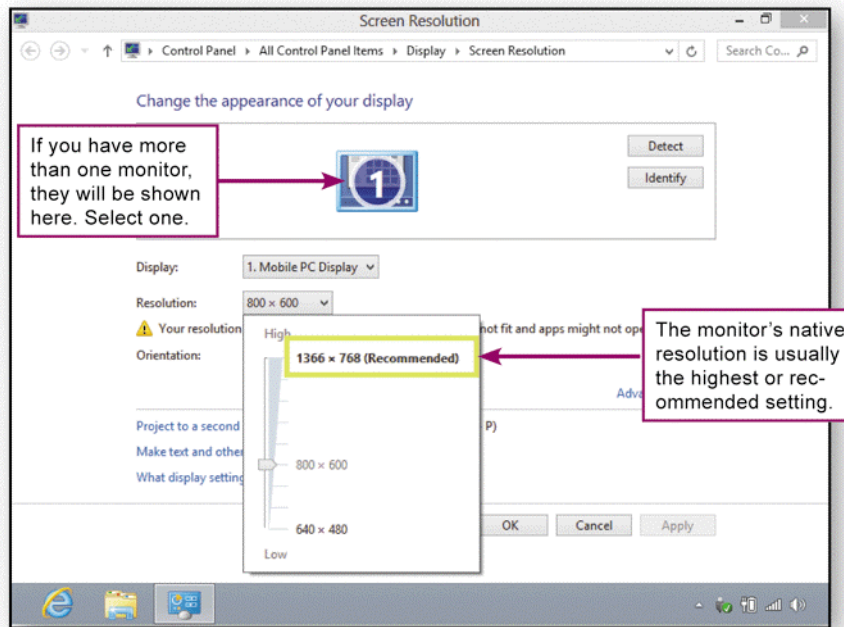   ➢ Native resolution

FIGURE 9-57

To find your screen's native resolution when using Windows, check the display settings. In general, the highest resolution available is your screen's native resolution.

9 **Back Pain**

➢ Back pain can be caused by many factors, including poor posture and careless lifting of heavy objects

➢ The key to comfort while working on a computer is keeping your shoulders relaxed so that tense muscles don't generate headaches and stiffness

FIGURE 9-59

Bad posture can lead to back pain.

© Cengage Learning

9 **Sedentary Lifestyle**

➢ People who live and work in digital cultures tend to spend many hours each day in sedentary pursuits, such as watching television and using computers

➢ Sitting still for long periods of time, especially in positions that limit blood circulation can be a health risk

➢ Your chair should not prevent good circulation to your legs

9 **Sedentary Lifestyle**

➢ Try to take breaks periodically

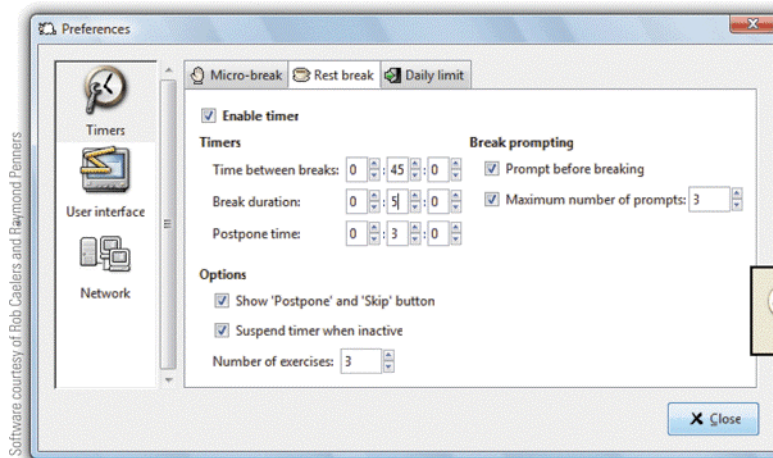➢ Break reminder software can help you remember when it is time to take a break from your work

FIGURE 9-60

Once you set your preferences, your break reminder software will display a pop-up window when it is time for you to take a break.

Chapter 9 Complete

Computer Concepts 2014