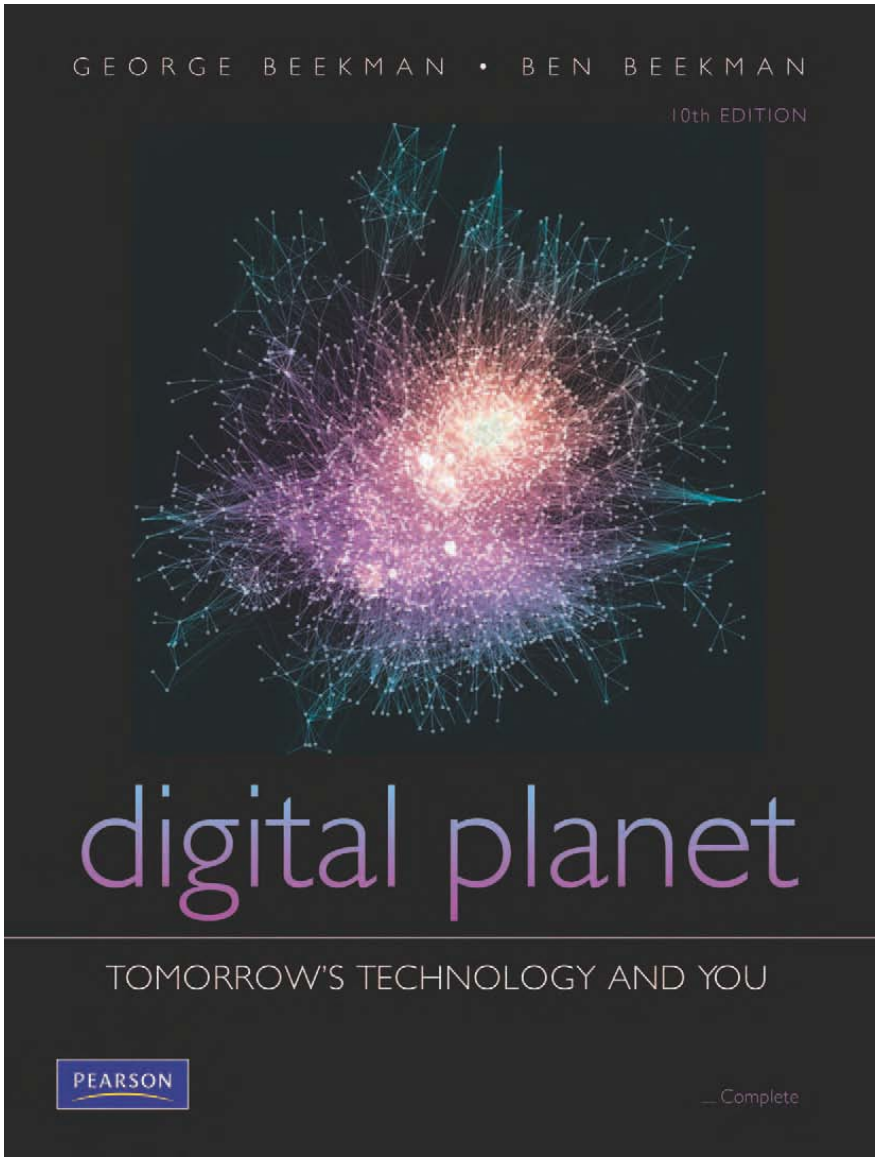


Digital Planet:

Tomorrow's Technology and You

George Beekman • Ben Beekman

Tenth Edition

Digital Planet: Tomorrow's Technology and You

Chapter 1

Exploring Our Digital Planet

Chapter 1 Objectives

- ✓ Describe digital technology's critical role in our lives
- ✓ Discuss several key trends in the evolution of computers and digital technology
- ✓ Describe the major types of computers and their principal uses
- ✓ Explain how the growth and evolution of the Internet is changing our lives

Objectives (cont.)

- ✓ Explain how our information age differs from any time that came before
- ✓ Discuss the social and ethical impact of information technology on our society

Living in a Nondigital World

- Computers are everywhere.
- Our lives are directly affected when they do not operate.
- Computers have infiltrated our lives so we do not know how to function without them.

Computers in Perspective

- ✓ Computers have been with us for a short time but are built on centuries of insight and effort.
- ✓ Early humans counted with fingers or rocks.
- ✓ The abacus was used by Babylonians and Chinese for thousands of years.
- ✓ By early 19th century, the need for more accurate calculating tools became evident.
- ✓ Charles Babbage and Ada Lovelace imagined the construction of the Analytical Engine.

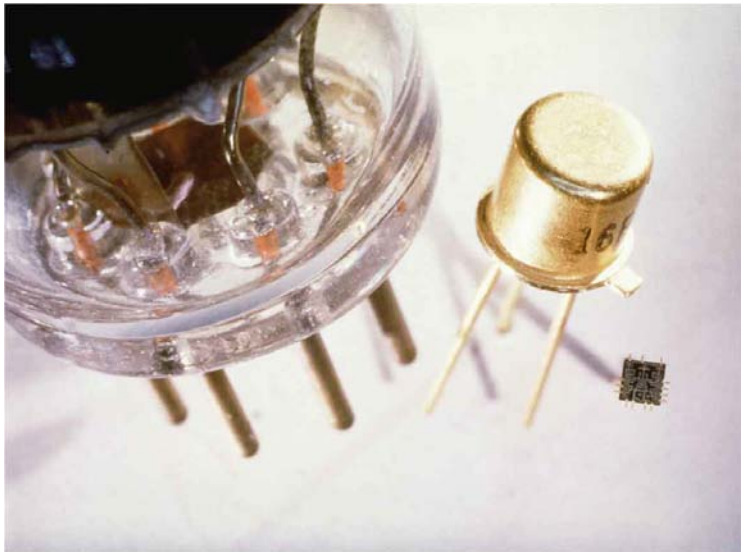
Computers in Perspective (cont.)

- ✓ Brief history of computers
  - 1939—Atanasoff-Berry Computer created
  - 1943—Alan Turing developed Colossus
  - 1944—Mark I completed to compute ballistics tables
  - 1945—ENIAC completed
  - 1951—UNIVAC I (the first general-purpose commercial computer) was delivered to the U.S. Census Bureau

Computers in Perspective (cont.)

✓Computer hardware

- Early computers used ***vacuum tubes*.**
- Tubes were replaced by ***transistors*.**
- By mid-1960s, more powerful machines were based on integrated circuits—small ***silicon chips*** containing hundreds of transistors.

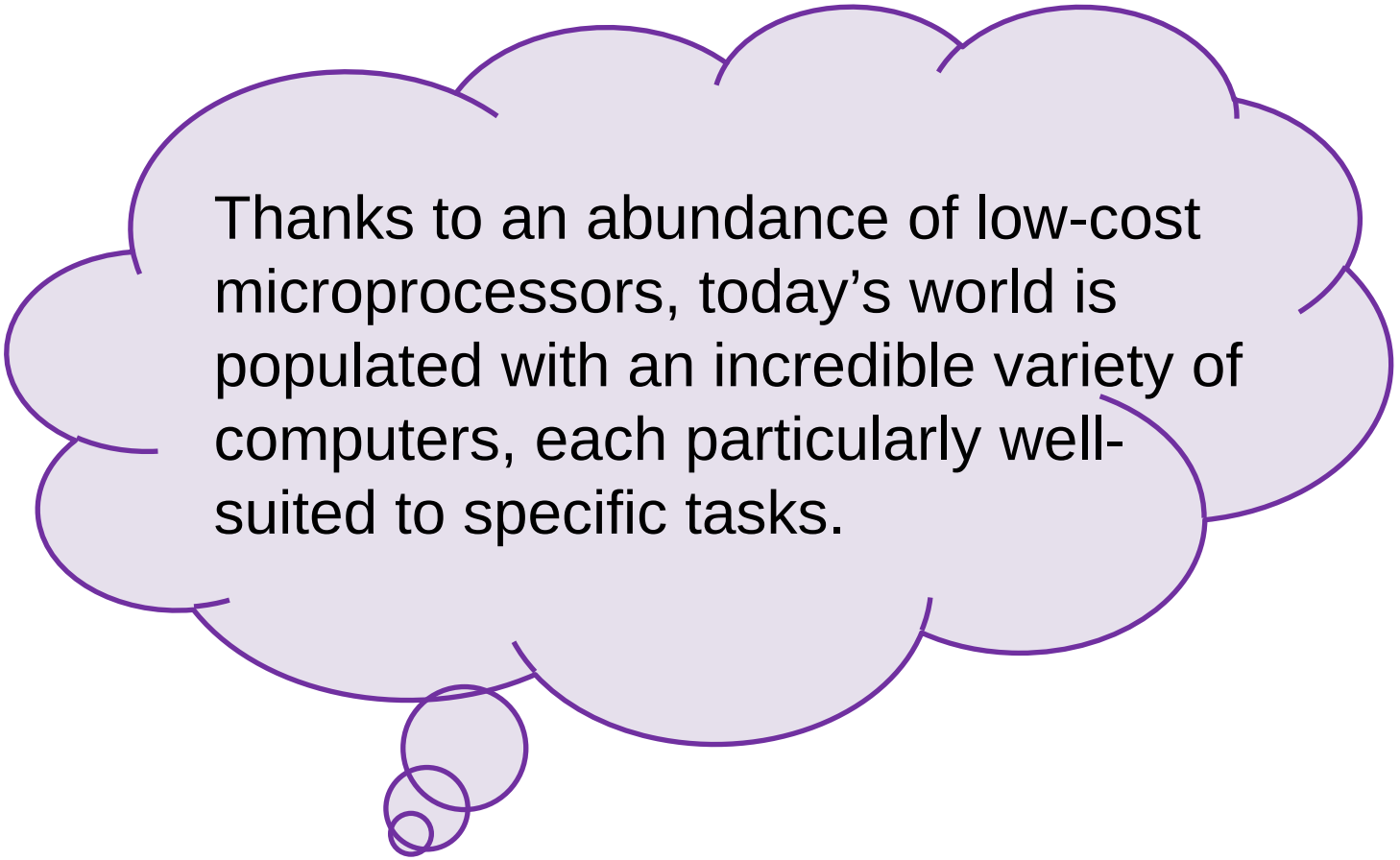


A vacuum tube, a transistor, and an integrated circuit.

Computers in Perspective (cont.)

- ✓ Benefits of integrated circuits
  - ***Reliability:*** Less prone to failure
  - ***Size:*** Single chips could replace entire boards
  - ***Speed:*** Electricity had shorter distances to travel
  - ***Efficiency:*** Small chips used less electrical power and created less heat
  - ***Cost:*** Mass production techniques made it easy to manufacture inexpensive chips

Computers Today: A Brief Taxonomy



Embedded Systems

- ***Embedded system:*** A microprocessor used as a component of a larger system
- More than 90% of microprocessors are hidden inside common household and electronic devices:
  - Thermostats, traffic lights, cars
  - Wristwatches, toys, game machines
  - TVs, camcorders, ovens
- Anything powered by electricity—battery or house current—is candidate for microprocessor implant

Personal Computers

- ✓ ***Personal computer:*** Designed to be used by one person at a time
  - Tool for enhancing productivity, creativity, communication
- ✓ ***Desktop computer*** has several components:
  - Tower (containing microprocessor and other components)
  - Monitor, keyboard, mouse, speakers
- ✓ Some house all components in monitor casing

Workstations

- ✓ ***Workstation:*** A high-end desktop computer with massive computing power.
  - Used for computationally intensive interactive applications
  - Large-scale scientific data analysis
- ✓ Line separating workstations and desktop computers becoming less distinct.

Portable Computers

- ***Laptop computers***—sometimes called ***notebook computers***—designed for portability
- ***Netbooks*** are extra-small, extra-light, no-frills computers

Handheld Devices

- ***Personal digital assistants (PDAs)***
- ***Smart phones*** combine the functions of a phone, camera, PDA, game machine, and music/video player.
- ***Tablet computers*** bridge the gap between smart phone and notebook/netbook PC.

Smart phone

Servers

- ***Server:*** A computer that provides other computers connected to a ***network*** with access to data, programs, and other resources
- Any desktop computer can be used as a server but some are specifically designed for this purpose.
- Servers have faster processors, more memory, or faster network connections.
- Often clustered together in groups to increase processing power

Mainframes

- ***Mainframes:*** Room-sized computers with price tags to match
- Before microcomputers, most information processing was done on mainframe computers.
- Today mainframe computers are used by large organizations, such as airlines and banks.
- Mainframe computers can communicate with several users simultaneously through timesharing.

Supercomputers

- Typical ***supercomputer*** is constructed out of thousands of microprocessors.
- Power users with special requirements need access to fastest, most powerful computers.

Computer Connections: The Internet Revolution

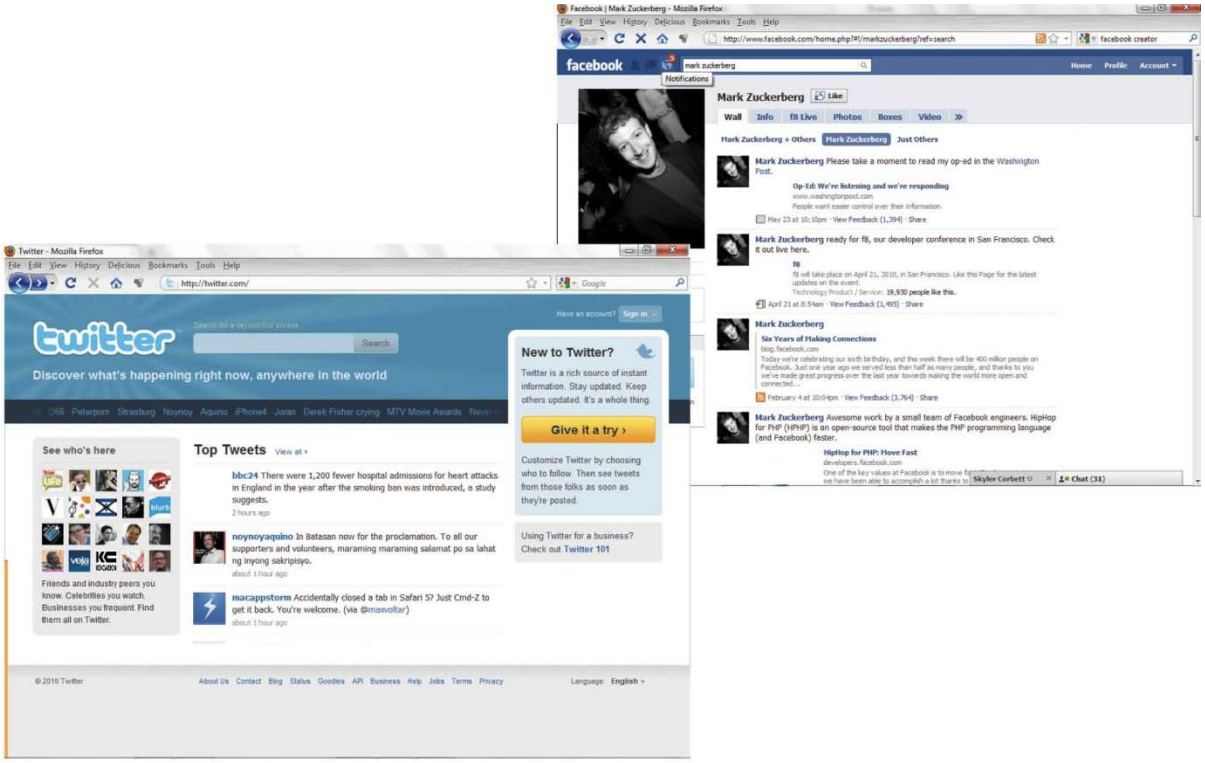
- ***Internet:*** Work began on experimental network in the in late 1960s as it evolved it became known as the Internet.
- In 1990s, software became more usable.
- The Internet was transformed from text-only to include pictures, animation, sounds, and video.
- The ***World Wide Web*** (WWW) became accessible to millions who connect through a Web ***browser***.

Computer Connections: The Internet Revolution (cont.)

- ✓ Growth of the Internet
  - Widespread ***email*** and Web use
  - Few million users in 1990s—about two billion users today
  - Internet's population reflects population at large
  - More than half are now female
  - Areas with no Internet access are harder to find

Computer Connections: The Internet Revolution (cont.)

- ✓ Web 2.0 sites are built around contributions from Web users
  - My Space
  - Facebook
  - Twitter
  - YouTube
  - Google Maps



Into the Information Age

- ✓ 10,000 years ago, people learned to domesticate animals and grow their own food.
- ✓ **Agricultural age:** Lasted until about 200 years ago
- ✓ **Industrial age:** Advances in machine technology ushered in this age
- ✓ **Information age:** A convergence of computer and network technology—where most people earn their living working with words, numbers, and ideas

Living with Digital Technology

- In 1943, Thomas Watson, Sr., declared that the world would not need more than five computers.
- Since then, computers have evolved from massive, expensive, unreliable calculators into (mostly) dependable, versatile machines.
- Who could have imagined netbooks, iPhones, PlayStations, Google, Facebook, YouTube, Twitter, eBay, robot moon rovers, or laserguided “smart bombs”?

Phases of the Information Age

1. Institutional computing phase, starting about 1950: large, expensive mainframes
2. Personal computing phase, starting about 1975: millions of PCs joined mainframes
3. Interpersonal computing phase, starting about 1995: networks connected the PCs and mainframes
4. Collaborative computing phase, starting about 2005: smart phones, tablets, and other digital devices join PCs on the Internet; migration to Internet "cloud"

Explanations: Clarifying Technology

- ✓ Computer hardware and software details change every few years.
- ✓ Internet is evolving even faster.
- ✓ Most of the underlying concepts remain constant.
- ✓ It is important to understand the basics to keep up with the changes.

Applications: Digital Technology in Action

- ✓ Everyone can benefit from knowing the following:
  - Network applications
  - Word processing and desktop publishing
  - Spreadsheets and databases
  - Graphics and image processing
  - Audio, video, and multimedia
  - Programming and customized problem solving
  - Artificial intelligence

Implications: Social and Ethical Issues

- ✓ Potential risks of digital technology:
  - Threat to personal privacy
  - Hazards of high-tech crime
  - Difficulty of defining and protecting intellectual property
  - Threat of automation and the dehumanization of work
  - Abuse of information for political and economic power
  - Dangers of dependence on complex technology
  - Emergence of biodigital technology

Computer Ethics

- ✓ Know the rules and the law.
- ✓ Don’t assume that it’s okay if it’s legal.
- ✓ Think scenarios.
- ✓ When in doubt, talk it out.
- ✓ Make yourself proud.
- ✓ Remember the golden rule.
- ✓ Take the long view.
- ✓ Do your part.

History of the Future

- ✓ Today's technology raises fascinating and difficult questions.
- ✓ We will need to deal with even more difficult questions as technology evolves.
- ✓ Exponential growth in computing power makes it likely that we will see technology that was once considered far-fetched in our everyday lives.

Chapter 1 Summary

- ✓ Mechanical computing devices date back hundreds of years.
- ✓ First real computers were developed during 1940s.
- ✓ Computers have evolved at an incredible pace, becoming consistently smaller, faster, more efficient, more reliable, and less expensive.
- ✓ Computers today come in all shapes and sizes with specific types suited for particular jobs.

Summary (cont.)

- ✓ Connecting to a network enhances the value and power of a computer.
- ✓ Computers share resources with other computers and facilitate electronic communication with other users.
- ✓ The Internet is a collection of networks connecting computers and other devices around the globe.
- ✓ Internet users have access to billions of pages on the World Wide Web.

Summary (cont.)

- ✓ Our civilization is in a transition from an industrial economy to an information economy.
- ✓ Emerging technologies, such as artificial intelligence, offer promise for future applications.
- ✓ At the same time, computers threaten our privacy, our security, and perhaps our way of life.
- ✓ Our future depends on computers and our ability to understand and use them in productive, positive ways.