Chapter One

Computers in Context

After reading this chapter, you should be able to:

- Characterize what a computer is and what it does
- Describe several ways computers play a critical role in modern life
- Discuss the circumstances and ideas that led to the development of the modern computer

After reading this chapter, you should be able to:

- Describe several trends in the evolution of modern computers
- Comment on the fundamental difference between computers and other machines
- Explain the relationship between hardware and software

After reading this chapter, you should be able to:

- Outline four major types of computers in use today and describe their principal uses
- Describe how the explosive growth of the Internet is changing the way people use computers and information technology

Chapter Outline

- Living without Computers
- Computers in Perspective: An Evolving Idea
- Computers Today: A Brief Taxonomy
- Computer Connections: The Network Revolution
- Living with Computers

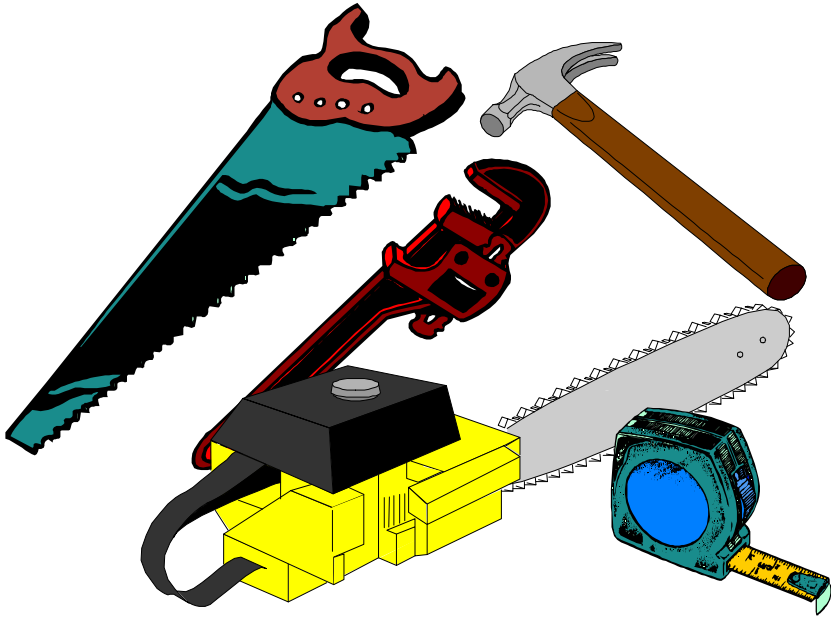
Living Without Computers

Which of these conveniences relies on a computer?

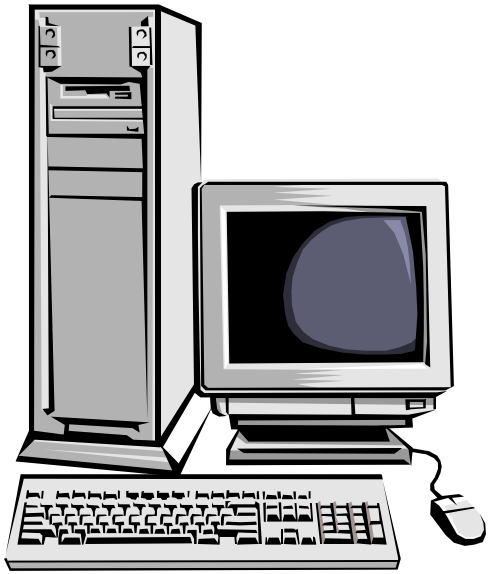
Computers in Perspective

Purposes of Tools

Single-purpose

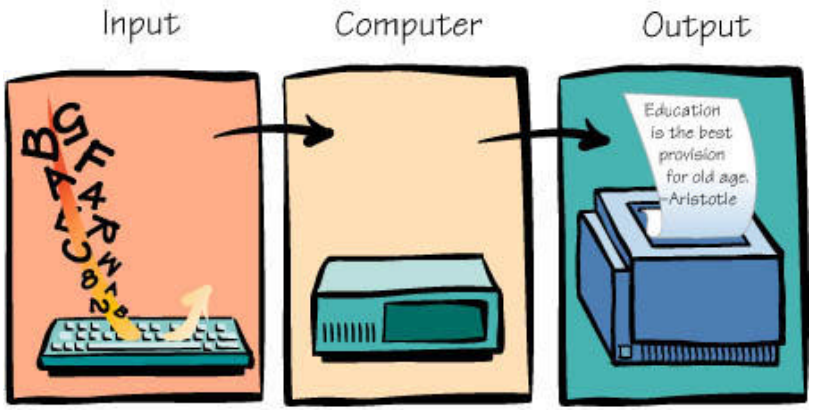


General-purpose



Information-Processing Machine

- Input
  - input documents
- Computer
  - processing elements
- Output
  - print materials



The First Real Computers

Inventors of the first real computers include:

- Konrad Zuse
- John Atanasoff
- Howard Aiken
- John Mauchly and J. Presper Eckert

Konrad Zuse

Germany, 1939

"I was too lazy to calculate and so I invented the computer."

Zuse's computer was built with electric relays and eventually vacuum tubes.

John Atanasoff

USA, 1939

Atanasoff-Berry Computer (ABC)

This computer was built with vacuum tubes and based on binary arithmetic.

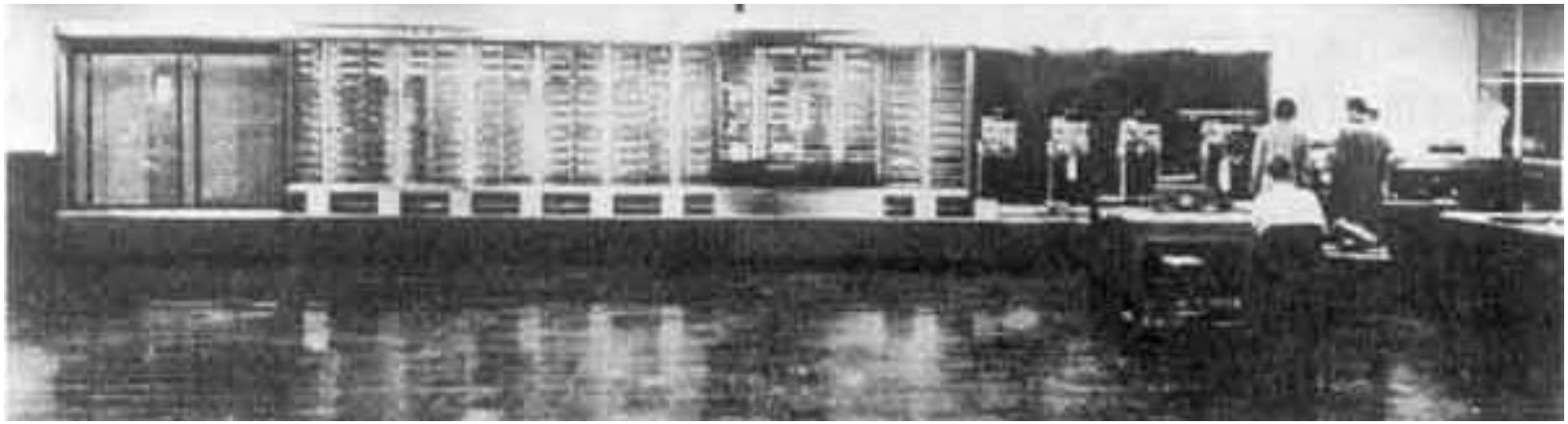
It was never completed.

Howard Aiken

USA, 1944

The Mark I was the largest electromechanical calculator ever built.

It was built with electromechanical relays and followed instructions punched in paper tape.



John Mauchly and Presper Eckert

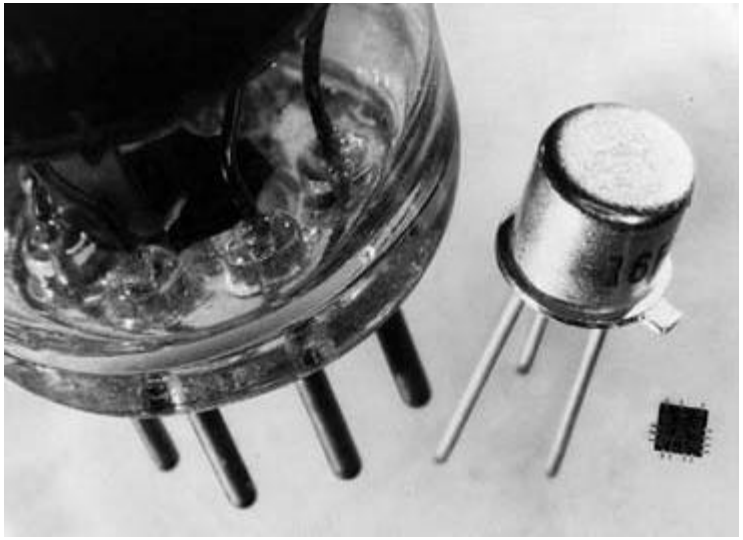
USA, 1945

Mauchly and Eckert built the ENIAC (Electronic Numerical Integrator and Computer).

The ENIAC was built with vacuum tubes and programmed with plug wires and switches.

Evolution and Acceleration

- First Generation
  - Vacuum tubes
- Second Generation
  - Transistors
- Third Generation
  - Integrated circuit
- Fourth Generation
  - Microprocessor



First-Generation Computers

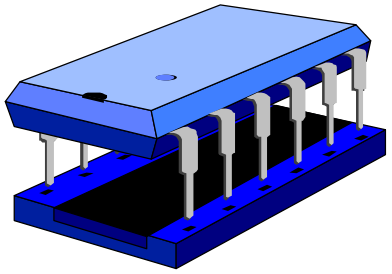
- 1930's – 1940's
- Vacuum tubes used as switches
- Large computers
- Extremely slow by today's standards
- Prone to frequent failure
- Includes the ABC, Mark I, ENIAC, UNIVAC, and others of similar design

Second-Generation Computers

- 1950's – mid-1960's
- Transistors used as switches
- Smaller than vacuum tube-built computers
- As much as a thousand times faster than first-generation computers
- More reliable and less expensive

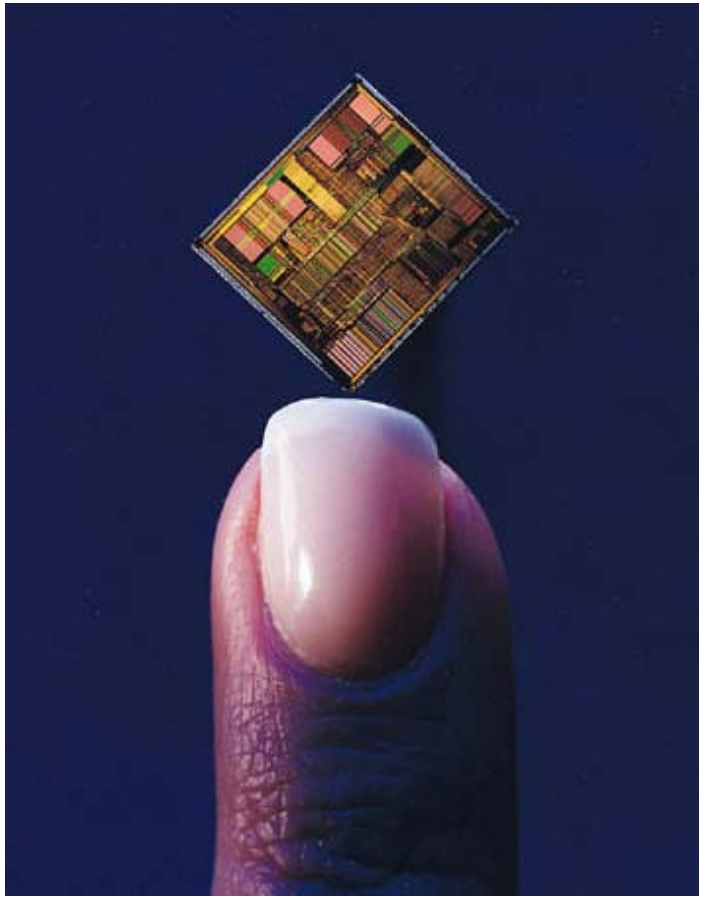
Third-Generation Computers

- Late 1960's
- Silicon "chips" used as switches
- Dramatic reduction in size and cost
- Significant increases in reliability, speed, and efficiency



Fourth-Generation Computers

- 1970’s to present
- All the computer switches of the previous generation were reduced to a single chip, the microprocessor



Fourth-Generation Computers

- Cost dropped so much that “hobbyists” could own them
- New industries filled the gap created by these fast, affordable computers

A Brief Taxonomy

- Mainframes
- Supercomputers
- Workstations
- Personal Computers
- Portable Computers
- Embedded Computer
- Special-Purpose Computers

Multi-User Computers

- Supercomputers
  - the most powerful computers made

Multi-User Computers

- Mainframes
  - timesharing allows several users access to the same computer
- Minicomputers
  - smaller and less expensive than mainframes

Single-User Computers

- Workstations
  - the power of a minicomputer but less expensive; not designed to serve multiple users

Single-User Computers

- Personal Computers (PC)
  - includes popular desktop computers dedicated to serving one user

Portable Computers

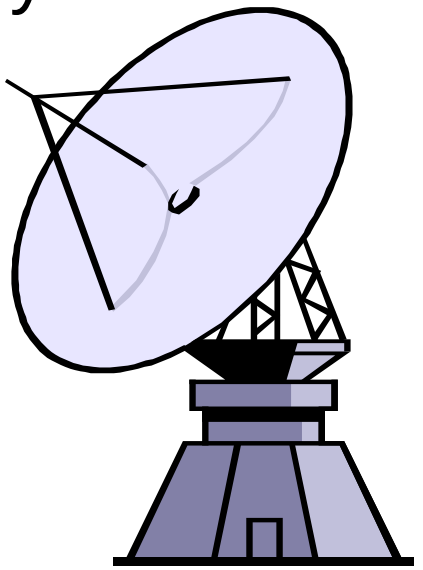
- Laptop
  - computers with flat screens, that are battery-operated, and lightweight
- Palmtop
  - computers that are pocket-sized; power is not lost over portability

Special-Purpose Computers

- Special-purpose
  - these computers are often attached to sensors to measure and/or control the physical environment
- Embedded
  - these computers are used to enhance consumer goods

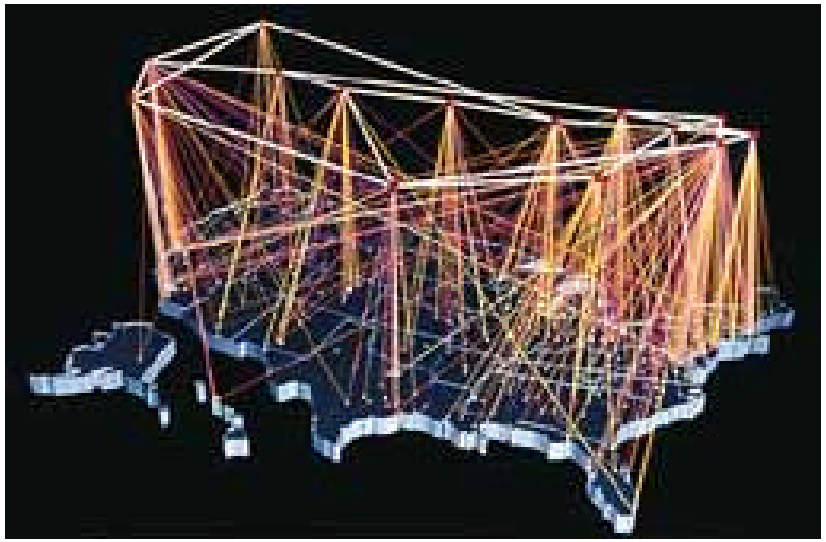
Computer Connections

- Local Area Networks (LAN)
  - designed to share resources and foster communication usually in the same building
- Wide Area Networks (WAN)
  - designed to share resources and foster communication around the globe

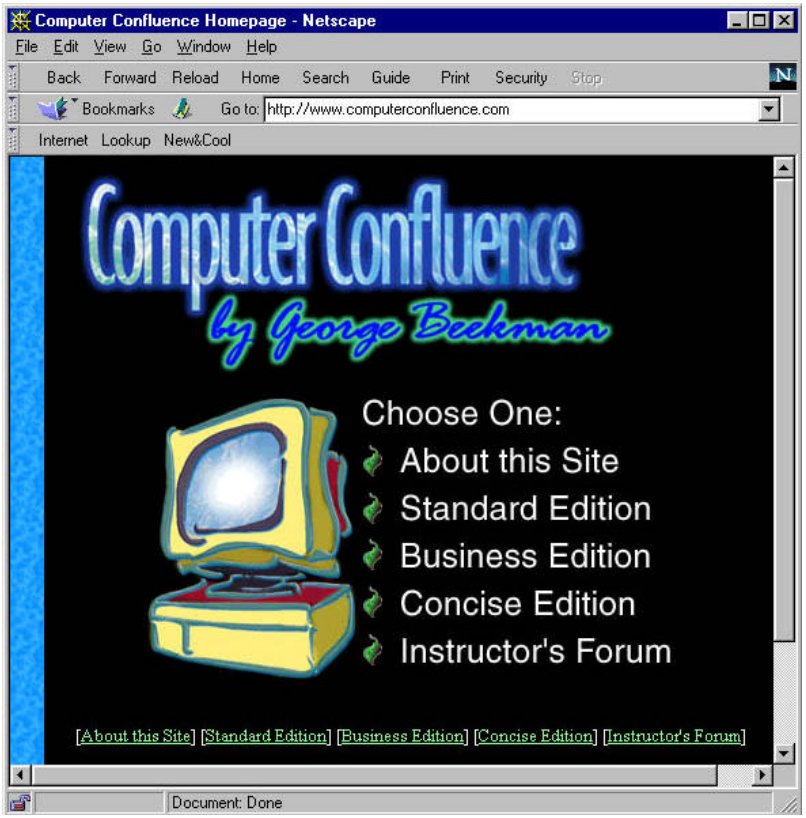


The Internet Explosion

- A network of networks
- Immense source of information
- Electronic mail
- Audio/Video links
- Multimedia simulations
- On-line transactions
- World Wide Web



World Wide Web



- Browsers
- Web site
  - www.computerconfluence.com

Living with Computers

What do you really need to know about computers?

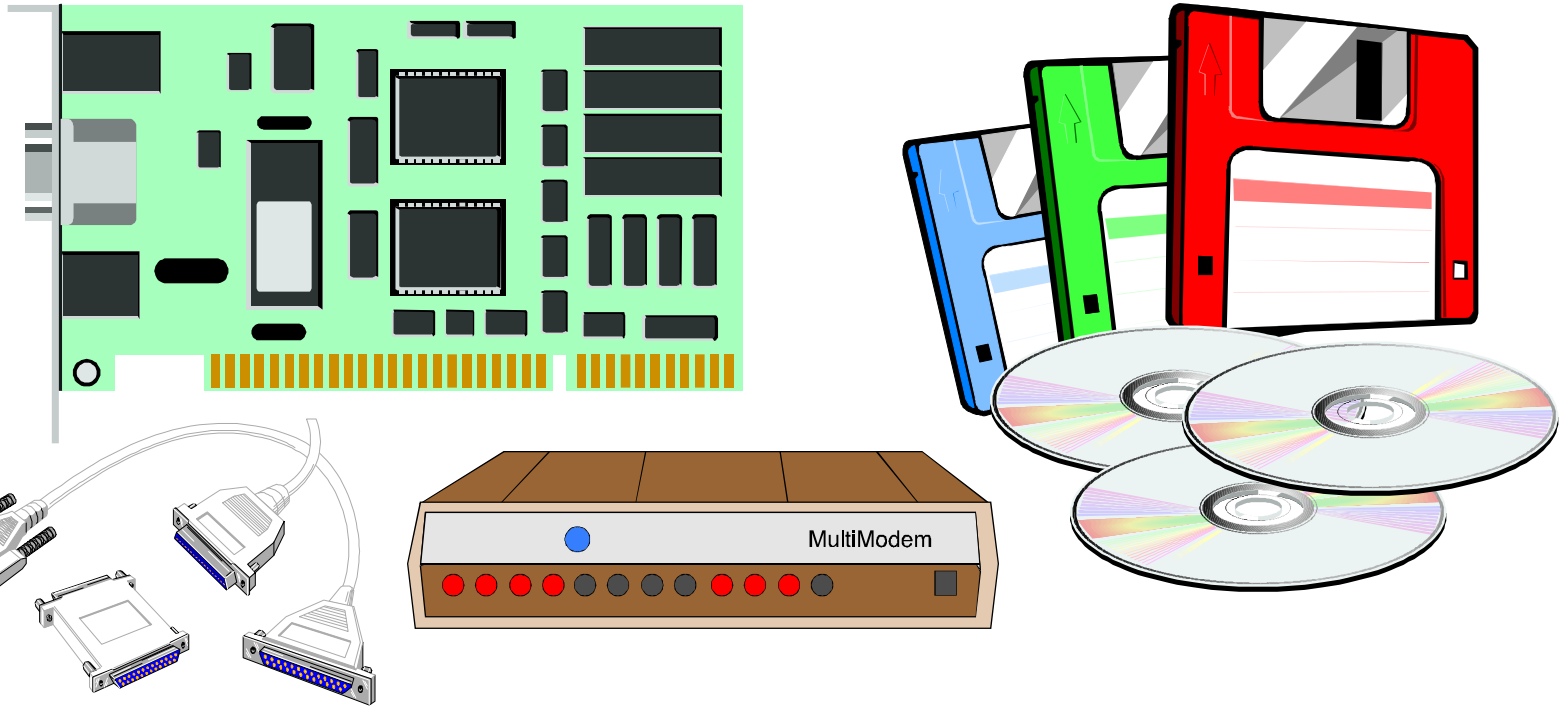
Explanations?

Applications?

Implications?

Explanations

Learn basic concepts of hardware and software.

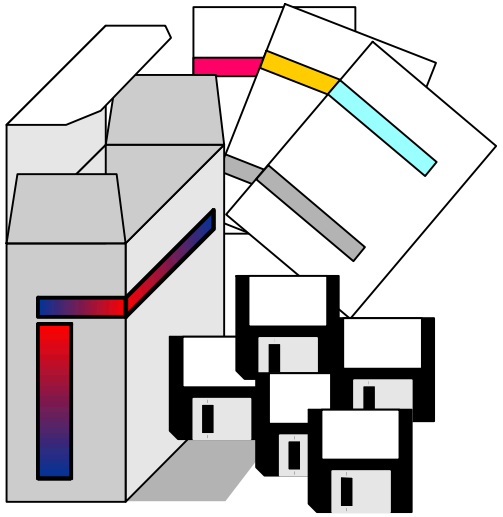


Applications

- Learn about the variety of software available:
  - Word processing and desktop publishing
  - Spreadsheets and databases
  - Computer graphics, multimedia and hypermedia

Applications

- Learn about the variety of software available:
  - Telecommunication and networking
  - Artificial intelligence
  - General problem-solving
  - Programming languages



Implications

- Learn about the impact of computers on your life:
  - Threat to personal privacy
  - Hazards of high-tech crime
  - Risks of computer failures

Implications

- Learn about the impact of computers on your life:
  - Threat of automation
  - Dehumanization of work
  - Abuse of information
  - Dangers of technology dependence