Leaning Objectives
1. Understand product segments
2. Understand computer system components
3. Understand the history

Product Segments

- **Supercomputer**
  - Hardware, Software and Services

- **Mainframe Computers or Servers**

- **Midrange Computers**

- **Processors**

- **Peripheral Devices**

- **Workstations**

- **Microcomputers**

**Product Segment** (continued)

- **Microcomputer Systems (PC’s)**
  - Dell, HP-Compaq, IBM, eMachine, Clones, Apple
  - Handheld, notebook, laptop, desktop
  - Home, personal, or business use

- **Workstations**
  - Sun, HP-Compaq (Digital), IBM, SGI
  - Segment created by Sun
  - Focused on high performance applications. e.g. engineering, software development, financial services.

**Product Segment** (continued)

- **Midrange Computers**
  - IBM, HP-Compaq (Digital)
  - Created initially by Digital as minicomputers and IBM as midrange general purpose computers.
  - Small companies and remote units of major corporations.
  - Network servers Workstations

- **Mainframe Computers**
  - IBM, Hitachi, Amdahl
  - Can process hundreds of millions of instructions per second.
  - Needed with large international banks and airlines in order to process millions of sales transactions.

**Product Segment** (continued)

- **Supercomputers** (Cray)
  - Focuses on massive computational applications like weather forecasting, DNA analysis, very complex mathematical models.
Worldwide Computer Hardware Sales

Product Segments (continued)

2001 PC Sales

Worldwide sales declined 4.6 or 5.1%.
US sales declined 11.1 or 12.1%.
Only the second time that the PC market has shrunk.
Worldwide units – 128 million
US units – 44 million

Computer Components

The Central Processing Unit (CPU) is the main processor that performs functions such as the arithmetic and logic functions, which are used in processing data.

Same basic architecture for everything from microprocessors to mainframes.

Computer Components (continued)

Internal Coding Systems

ASCII (American Standard Code for Information Interchange)

EBCDIC (Extended Binary Coded Decimal Interchange Code)

Computer Components (continued)

IT Terms

Amounts of data: kilobyte, megabyte, gigabyte and terrabyte.

Time: (processing or access) millisecond, microsecond, nanosecond and picosecond.

Rate of data transfer/transmission: bits per second (bps), kilobits per second (kbps), megabits per second (mbps), gigabits per second (gbps). Note: bits not bytes.

Internal clock speed and transmission frequency: Hertz, kilohertz, migahertz, gigahertz.

Instruction Execution Speed: MIPS, megaflops, gigaflops.
Efficient Networking Model

- Client/server computing is a model for computer networking. (an architecture that defines how future systems will be designed and built)
- The distinction of this model is that it defines (separates) what happens at the client (user device) and what happens at the server (PC up to mainframe).
- This offers an efficient, cost-effective way to provide information and services to many users.

Client-Server Overview

- Networking model
- Efficient and cost-effective (maybe!)
- Requests and responses
- Client programs (expensive!)
- Server programs
- Internet transactions

Network Computers and Terminals

- Network Computer (Thin Client) Benefits
  - Lower purchase cost
  - Easier maintenance
  - Easier software distribution and licensing
- Network Terminal
- Network Computer (Thick Client)
  - Computer platform standardization
  - Reduced end user support requirements
  - Improved manageability

Computer Peripherals

Computer peripherals is a generic name given to all input, output, and storage devices, which are an integral and important part of a computer system.

Input Devices

Input devices convert data into electronic machine-readable data. The most common examples are:

- Optical Scanners, e.g., retail product bar code scanners
- Magnetic Stripe Readers, e.g., credit and ATM cards
- Pointing Devices, e.g., electronic mouse or touch pads
- Touch Screens, e.g., kiosk information systems
- Pen-based computing, e.g., PDAs
- Voice Recognition, e.g., security system entry
- Smart Cards, e.g., stored value cards
- Digital Camera, e.g., multimedia presentations
Trend: Towards Direct Input Devices that Are More Natural and Easy to Use

Computer Components (continued)

### Input Technology Trends

<table>
<thead>
<tr>
<th>First Generation</th>
<th>Second Generation</th>
<th>Third Generation</th>
<th>Fourth Generation</th>
<th>Fifth Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punched Card</td>
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<td>Key to Tape/Disk</td>
<td>Keyboard Data Entry</td>
<td>Voice Recognition</td>
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<tr>
<td>Paper Tape</td>
<td></td>
<td></td>
<td>Pointing Devices</td>
<td>Speech and Handwriting</td>
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<td>Optical Scanning</td>
<td>Recognition</td>
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Business Purpose & Value of Web-Enabled Voice Recognition

- Shoppers can find and purchase goods by using voice synthesis and recognition technologies.
- Cost of order processing has been dramatically reduced.
- Customers are placing larger orders.
- Outsourcing costs for the voice system are relatively low.
- Leveraged existing infrastructure to provide the data interface.

Challenges of Voice Systems:

- Must recognize human factors such as knowing when and how long to pause for responses, how to differentiate among ambiguous answers and how to design a script so that customers feel comfortable with the system.
- Not a good choice for companies where speech recognition is a key component of the business model.

### Output Devices

- Video Display Units (monitors)
- Printed Display Units (printers and plotters)
- Audio Response Units (speakers and telephone)
- Archival Devices (microfilm)

### Output Technology Trends

<table>
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<td>Printed Reports</td>
<td>Video Displays</td>
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<tr>
<td>Printed Reports</td>
<td>and Documents</td>
<td>and Documents</td>
<td>Audio Responses</td>
<td>Video Responses</td>
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<td>and Documents</td>
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<td>and Documents</td>
<td>Hyperlinked</td>
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<td>Multimedia Documents</td>
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</tbody>
</table>

Trend: Towards Output Methods that Communicate Naturally, Quickly, and Clearly
Primary & Secondary Storage Media

<table>
<thead>
<tr>
<th>Direct Access</th>
<th>Sequential Access</th>
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<tbody>
<tr>
<td>Semiconductor Memory</td>
<td>Magnetic Tape</td>
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<tr>
<td>Magnetic Disks</td>
<td>Optical Disks</td>
</tr>
<tr>
<td>Floppy Disk, RAID</td>
<td>CD-ROM, CD-R, CD-RW, DVD</td>
</tr>
</tbody>
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Access Speed Increases
Storage Capacity Decreases
Cost per Bit Increases

Trade-offs

Conclusions

Hardware is the engine of computer-based systems.
Selection of specific computer system components is a function of volumes, time windows and complexity.
It is also a result of a sound financial analysis of the cost/benefits of a proposed information system.

History

ENIAC
The world’s first computer!

History (continued)

ELECTRONIC NUMERICAL INTEGRATOR AND COMPUTER
- First large scale general purpose electronic computer.
- Paved the way for the modern electronic computing industry.
- Demonstrated that high speed digital computing was possible.

Atanasoff-Berry Computer
Built between 1937 and 1946.
On October 19, 1973 following a lengthy court trial the ENIAC patent of Mauchly and Eckert was ruled invalid and Atanasoff was named the inventor of the electronic digital computer.
*Atanasoff, Forgotten Father of the Computer* by Clark Mollenhoff.
Atanasoff was awarded a National Medal of Technology by President George Bush on Nov. 13, 1990.

History (continued)

Controversy
Mauchly & Eckert versus Atanasoff versus Von Newman
- Primary contributor to the invention and design of the ENIAC?
  - John Atanasoff’s contributions (Iowa State)
- Primary contributor to the standardized hardware architecture of the computer?
  - John Von Neumann’s stored program concept (Princeton University)
On Valentine’s Day, the 14th of February 1946, the ENIAC received widespread attention from the public. Thoughts of improvement had already befallen the scientists and researchers working with the ENIAC:

- Complicated process of programming and wiring
- Storing programs within some special mechanism

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**2002 is the Fifty-Sixth Anniversary!**

In just 56 years, R&D combined with giant leaps in technology, have brought us from vacuum tubes to microprocessors, and from computing instruments the size of an entire classroom to handheld computers that can link us to information across the globe.

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**IBM Corporation**

- Founded in 1890
- Herman Hollerith
- Punch Card Tabulating Machine

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**History (continued)**

**Thomas Watson Sr. Joined CTR in 1914**

- Hired from NCR to manage the diverse products offered.
- Focused on providing large-scale custom built tabulating solutions for businesses.

---

**History (continued)**

**Name Changed in 1924**

International Business Machines Corporation
History (continued)

Thomas Watson Jr.

- Led company’s transformation to an industrialized giant in the computer industry.
- $900 mil→$8 billion.

History (continued)

New Direction in Data Processing

1957 - IBM 305 RAMAC 1st disk storage system
1957 - FORTRAN
1970 - Relational Database
1981 – Personal Computer

History (continued)

The PC ERA - 1981

Outsourced for hardware and software:
- Intel for the microprocessor
- Microsoft for the operating system

History (continued)

Antitrust Suits

1932- Illegally forced customers to buy their punch cards
1952- Forced to sell versus lease tabulating machines
1970- 20 different suits from competitors
1982- Justice Department dropped suit after 13 years of litigation

History (continued)

1993-1996

A major refocusing and restructuring of a giant corporation following significant financial losses including $8 billion in 1993.

IBM proved that it is possible to turn a battleship.

History (continued)

1993

Louis V. Gerstner Jr.

First CEO from outside the company.
Shrank workforce. (1st layoff of employees)
Led transition from hardware focus to services.
**History (continued)**

**Present**

- Leader in Information Technology ($5.8 B in research, 2,756 new patents to be the leading US company for new patents for the 7th year in a roll).
- Impressive new balance in revenue: 42% from hardware, 37% from global services and 14% from software.

**History (continued)**

**2001 figures**

- Revenue $88.4 billion
- Net income $8 billion
- Number of employees 316,303
- Common stockholders 646,702

**History (continued)**

**IBM's Early Competitors**

The BUNCH!

- B = Burroughs
- U = Univac
- N = NCR
- C = Control Data
- H = Honeywell

**History (continued)**

**Sun Microsystems, Inc**

A leading provider of hardware, software and services for establishing enterprise wide intranets and expanding the power of the Internet.

While not the first company to market workstations, Sun is considered the company that established the workstation segment of the computer industry.

**History (continued)**

**Sun History**

- 1982: Sun Microsystems was incorporated
- 1987: Sun takes the lead in the workstation market and connects to the Internet
- 1988: Revenues reach $1 billion
- 1993: 1 million systems shipped in 10 years
- 1995: The Java technology revolution begins; Sun offers downloadable try-and-buy software on the Internet
- 1996: Sun licenses Java technologies to all major hardware and software companies
- 1997: Sun becomes the #1 supplier of UNIX multi-user disk subsystems
- 2000: $15.7 billion dollar global leader in network computing

**History (continued)**

**Co-founder and CEO**

Scott McNealy

“My goal is to kick butt and have fun”
Open Systems Crusader

“The lessons of the .com era are clear: Open beats proprietary; platform-independent beats platform-specific; choice beats single-vendor lock-in.”

Scott McNealy

Different lyrics but same music as Sun has always been an advocate of the merits of open systems (standards).

Open System Standards

- Cross platform compatibility: Sun’s software is built to run on all platforms.
- Based on a philosophy that all information should be accessible to everyone on the Internet.
- Sun stands behind a vision that all computers should talk to each other no matter who builds them.

Sun Software Products

- Solaris Operating Environment: acknowledged by the industry to be the premier reliable UNIX environment has a universal platform to meet the needs of .com businesses
- Java: first universal software platform. Designed from the ground up for the Internet and corporate intranets. Enables developers to write applications once to run on any computer.

Conclusions

- Sun’s goal is to put everything on the Internet and help companies .com their business with efficiency and productivity
- Sun’s vision is to network all computers and have information open to everyone.
- Its goal is to create innovative products that will help make network computing faster, more accessible, and more reliable.