Overview of the Revolution in Computers & Communications

- Analog vs. digital
- Technological convergence
- Major elements of a computer-and-communications system
- Information technology professional and end-user
- Data and information
- The five operations of a computer-and-communications system
- The difference between applications software and systems software
- The five major categories of computers
- Information Superhighway

Analog vs. digital

- Analog data: data in a continuous form
- Digital data: data in a discrete, discontinuous form

- Usually 0s & 1s

Fusion of computer & communication technology

Computer Technology

Communications Technology

Computer Technology

Communications Technology
The crank-driven difference engine, built by Charles Babbage in England in the 1820s.

ENIAC ("Electronic Numerical Integrator and Computer"), 1946.

- First working electronic digital computer
- Developed by Mauchly & Eckert in 1943 at the University of Pennsylvania.
- Used to solve ballistic problems.
- 1000x faster than Mark I
- Weighted 30 tons, 2 stories high, occuped a room thirty by fifty feet, used 200,000 Watts of power!
Replacing a bad tube meant checking among ENIAC’s 19,000 possibilities.

Two women wiring the right side of the ENIAC with a new program.

The Electronic Discreet Variable Computer (EDVAC)
- Developed by John von Neumann.
- Used 1/10th the equipment required by ENIAC.
- EDVAC used stored program in memory and used magnetic disks.

UNIVAC I, circa 1951, was the first computer to be mass produced for general use.

Punched card: most computers of the first and second generations relied heavily on punched-card input.
An operator at a keypunch machine.

IBM present and founder in the 1930s, Thomas J. Watson Sr., is shown here greeting some of his sales force. Watson pioneered the marketing of computer systems—selling business solutions rather than just electronic boxes.

One of the most important developments of the third generation computer: IBM System/360

Typical UNIVAC® 1108 Prices: 1968

The following are representative prices for UNIVAC 1108 computers as of 1968 (in 1968 dollars). These are "Basic" prices, quoted to customers who perform all their own maintenance and support. There are regular commercial prices; educational institutions typically received a 20% discount on purchase price.

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Purchase Price</th>
<th>Installation Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>3011-95</td>
<td>1108 CPU</td>
<td>$566,460</td>
<td>$2,200</td>
</tr>
<tr>
<td>7055-72</td>
<td>8 K word Core Memory</td>
<td>$823,500</td>
<td>$2,250</td>
</tr>
<tr>
<td>5050-04</td>
<td>FASTRAND™ Controller</td>
<td>$41,680</td>
<td>$600</td>
</tr>
<tr>
<td>6010-00</td>
<td>FH-432/FH-1782 Drum</td>
<td>$134,400</td>
<td>$1,080</td>
</tr>
<tr>
<td>4009-99</td>
<td>Console (TTY-35)</td>
<td>$29,365</td>
<td>$200</td>
</tr>
</tbody>
</table>

Notes

The depreciation of the U.S. dollar since 1968 makes a benchmark of the value of the dollar in those days useful. In 1968, a sporty domestic automobile, the Chevrolet Malibu Sport Coupe with a 307-cid V-8 engine cost US$2663, 696 times less than a megabyte of UNIVAC core memory.

Apple I, 1976
- Processor: MOS6502, 1MHz
- Memory: 8K RAM, 256B ROM
- OS: BASIC
- Storage: cassette

Apple II, 1977
- Processor: MOS6502, 1MHz
- Memory: 4K RAM, ROM?
- OS: BASIC, DOS
- Storage: 5.25" 140K FD's or cassette

Apple II+, 1977
- Processor: MOS6502, 1MHz
- Memory: 48K RAM, 16K ROM
- OS: BASIC, DOS
- Storage: 5.25" 140K FD's or cassette
Cray supercomputer series

Cray-1, 1976, 136Mflops

Cray-2, 1985, 1.9Gflops

Cray T90 series, 60Gflops

Cray C90, 1991, 16Gflops

Major elements of a computer-and-communications system

People

- Professionals: a person who has had formal education in the technical aspects of using a computer-and-communications system.
- End-users: or simply a user, is someone without much technical knowledge of information technology who uses computers for entertainment, education, or work-related tasks.

Procedures

- Procedures are steps for accomplishing a result.
- Some procedures may be expressed in manuals or documentation. Documentation is also available online.

Data and information

- Data (or Raw data) consists of the raw facts and figures that are processed into information.
- Information is summarized data or otherwise manipulated data that is useful for decision making.

Units of Measurement for Capacity:

- Bit
- Byte (8 bits)
- Kibibyte, KB (2^10 bytes)
- Megabyte, MB (2^20 bytes)
- Gigabyte, GB (2^30 bytes)
- Terabyte, TB (2^40 bytes)

Hardware

Input

- Keyboard
- Mouse
- Scanner

Output

- Printer
- Sound devices
- Video devices

Processing

- CPU
- RAM

Storage

- Hard disk
- Magnetic tape

Communication

- Modems
- Network adapters

2001
**Input Hardware**
- Keyboard
- Mouse
- Scanners

**The basic operations of computing**
1. Input
2. Processing (CPU)
3. Output

**The system unit (motherboard)**
- RAM
- Motherboard
- CPU

**System Cabinet**
- CPU
- Hard disk drive
- CD-ROM drive
- 3.5" floppy diskette drive
- Power supply
- Speaker
- Drive controller
- Cage

**Output Hardware**
- Screen
- Printer
- Sound
Software

Software comprises the step-by-step instructions that tell the computer what to do. There are two categories:

- Application software: software that people use to perform a general-purpose task, such as word processing software used to prepare the text for a document, e.g., office 97, database.
- System software: software used to manage its own internal activities and run applications software, e.g., MS-DOS, Windows 98, Unix.

Communications

Most data we communicate are analog data but variety of suppliers providing data in digital form. The kind of data being communicated is rapidly changing from analog to digital.

Development in Computer Technology

- smaller size
- more power
- less expense

The five major categories of computers

- Supercomputers
- Mainframe computers
- Microcomputers
- Microcontrollers
- Microcontrollers

Development in Communication Technology

- Better Communications Channels
- Better Networks
- Better Sending & Receiving Devices
**Connectivity**
- Voice mail and e-mail
- Telecommuting
- Teleshopping (e-commerce)
- Databases
- Computer online services and networks and the Internet
- Electronics bulletin board system

**Interactivity**
- Multimedia computers
- Personal digital assistants (PDAs)
- Up-and-coming “smart boxes” and “Internet appliances”.

**Information Superhighway**
A vision or a metaphor for a fusion of the two-way wired and wireless capabilities of telephones and networked computers with cable-TV’s capacity to transmit hundreds of programs. The resulting interactive digitized traffic would include movies, TV shows, phone calls, databases, shopping services, and online services.

**The Ethics of Information Technology**
- Speed and scale
- Unpredictability
- Complexity

**The “All-Purpose” Machine**
In the future, we may have an “information appliance” a device that combines telephone, television, VCR, and personal computer. This device will deliver digitized entertainment, communications, and information.

The basis of the information appliance may be the personal computer although it may come in various sizes, shapes, degrees of portability. The device will properly become increasingly “user-friendly” and will have multimedia capability.