Learning Objectives

In this chapter you will learn about:

- Classifications of computers
- Common types of computers today
- Characteristic features of various types of computers in use today
Traditionally, computers were classified by their size, processing speed, and cost.

Based on these factors, computers were classified as microcomputers, minicomputers, mainframes, and supercomputers.

However, with rapidly changing technology, this classification is no more relevant.

Today, computers are classified based on their mode of use.
Based on their mode of use, computers are classified as:

- Notebook computers
- Personal computers
- Workstations
- Mainframe systems
- Supercomputers
- Clients and servers
- Handheld computers
Notebook Computers

- Portable computers mainly meant for use by people who need computing resource wherever they go.
- Approximately of the size of an 8½ x 11 inch notebook and can easily fit inside a briefcase.
- Weigh around 2 kg only.
- Comfortably placed on one's lap while being used. Hence, they are also called laptop PC.
- Lid with display screen is foldable in a manner that when not in use it can be folded to flush with keyboard to convert the system into notebook form.

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Notebook Computers

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- Designed to operate with chargeable batteries
- Mostly used for word processing, spreadsheet computing, data entry, and power point presentations
- Normally run MS-DOS or MS WINDOWS operating system
- Some manufacturers are also offering models with GNU/Linux or its distributions
- Each device of laptop is designed to use little power and remain suspended if not used
Notebook Computers

- Foldable flat screen
- Keyboard, trackball, hard disk, floppy disk drive, etc. are in this unit
Personal Computers (PCs)

- Non-portable, general-purpose computer that fits on a normal size office table
- Designed to meet personal computing needs of individuals
- Often used by children and adults for education and entertainment also
- Generally used by one person at a time, supports multitasking
- Two common models of PCs are desktop model and tower model
- Popular OS are MS-DOS, MS-Windows, Windows-NT, Linux, and UNIX
Common PC Models

(a) Desktop model

(b) Tower model

- Monitor
- System Unit
- Keyboard
- Mouse

Ref. Page 383
Chapter 20: Classification of Computers
Workstations

- Powerful desktop computer designed to meet the computing needs of engineers, architects, and other professionals
- Provides greater processing power, larger storage, and better graphics display facility than PCs
- Commonly used for computer-aided design, multimedia applications, simulation of complex scientific and engineering problems, and visualization
- Generally run the UNIX operating system or a variation of it
- Operating system is generally designed to support multiuser environment
Mainframe Systems

- Mainly used by large organizations as banks, insurance companies, hospitals, railways, etc.
- Used for data handling and information processing requirements
- Used in such environments where a large number of users need to share a common computing facility
- Oriented to input/output-bound applications

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Mainframe Systems

Typically consist of a host computer, front-end computer, back-end computer, console terminals, magnetic disk drives, tape drives, magnetic tape library, user terminals, printers, and plotters.

Typical mainframe system looks like a row of large file cabinets and needs a large room.

Smaller configuration (slower host and subordinate computers, lesser storage space, and fewer user terminals) is often referred to as a minicomputer system.
Mainframe Computer Systems

SYSTEM ROOM (Entry restricted to system administrators and maintenance staff)

Magnetic Disk Drives

Magnetic Tape Library

Back-end Processor

Host Processor

Front-end Processor

Console

User Terminal

User Terminal

User Terminal

Magnetic Tape Drive

Plotter

Printer

USERS ROOM (Entry restricted to authorized users)
Supercomputers

- Most powerful and most expensive computers available at a given time.
- Primarily used for processing complex scientific applications that require enormous processing power.
- Well known supercomputing applications include:
  - Analysis of large volumes of seismic data
  - Simulation of airflow around an aircraft
  - Crash simulation of the design of an automobile
  - Solving complex structure engineering problems
  - Weather forecasting

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Supercomputers

- Supercomputers also support multiprogramming
- Supercomputers primarily address processor-bound applications
Use multiprocessing and parallel processing technologies to solve complex problems faster.

Also known as parallel computers or parallel processing systems.

Modern supercomputers employ hundreds of processors and are also known as massively parallel processors.
C-DAC’s PARAM 10000 Supercomputer
Client and Server Computers

- Client-server computing environment has multiple clients, one/more servers, and a network
- **Client** is a PC/workstation with user-friendly interface running client processes that send service requests to the server
- **Server** is generally a relatively large computer that manages a shared resource and provides a set of shared user services to the clients
- Server runs the server process that services client requests for use of managed resources
- **Network** may be a single LAN or WAN or an internet work
Client-Server Computing

- Involves splitting an application into tasks and putting each task on computer where it can be handled most efficiently.
- Computers and operating systems of a client and a server may be different.
- Common for one server to use the services of another server, and hence act both as client and server.
- Concept of client and server computers is purely role-based and may change dynamically as the role of a computer changes.
Client-Server Computing Environment

- PC (Client)
- Workstation (Client)
- LAN or WAN or an Internet of Networks
- Database Server
- File Server

Ref. Page 389  Chapter 20: Classification of Computers  Slide 20/26
Handheld Computers

- Small computing device that can be used by holding in hand, also known as *palmtop*
- Size, weight, and design are such that it can be used comfortably by holding in hand
- Types of Handheld are:
  - **Tablet PC:** Miniaturized laptop with light weight, screen flip, handwriting and voice recognition
  - **PDA/Pocket PC:** Acts as PIM device with LCD touch screen, pen for handwriting recognition, PC based synchronization, and optionally mobile phone services
  - **Smartphone:** Fully functional mobile phone with computing power, voice centric, do not have a touch screen and are smaller than PDA
Handheld Computers

(a) Table PC  
(b) PDA/Pocket PC  
(c) Smartphone

Ref. Page 391  Chapter 20: Classification of Computers  Slide 22/26
## Comparison of Different Types of Computers

<table>
<thead>
<tr>
<th>Types of Computers</th>
<th>Notebook</th>
<th>PC</th>
<th>Workstation</th>
<th>Mainframe system</th>
<th>Super computer</th>
<th>Client</th>
<th>Server</th>
<th>Handheld</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key features</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>Very small (can be placed on one's lap)</td>
<td>Small (slightly larger than PC)</td>
<td>Medium (needs a large room)</td>
<td>Large (needs a large room)</td>
<td>Generally small (may be large if it is also play the role of a server)</td>
<td>Generally large</td>
<td>Generally large</td>
<td>Very small (can be placed on one's palm)</td>
</tr>
<tr>
<td>Processing power</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>Higher</td>
<td>Highest</td>
<td>Generally low</td>
<td>Generally high</td>
<td>Low</td>
</tr>
<tr>
<td>Main memory capacity</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>Higher</td>
<td>Highest</td>
<td>Generally low</td>
<td>Generally high</td>
<td>Low</td>
</tr>
<tr>
<td>Hard disk storage capacity</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>Highest</td>
<td>Higher</td>
<td>Generally low</td>
<td>Generally high</td>
<td>Low</td>
</tr>
<tr>
<td>Has its own monitor, keyboard, and mouse for user interface</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Generally no</td>
<td>Generally no</td>
<td>Yes</td>
<td>Generally no</td>
<td>No</td>
</tr>
</tbody>
</table>

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### Comparison of Different Types of Computers

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<td></td>
</tr>
<tr>
<td>Display facility</td>
<td>Foldable flat screen small display</td>
<td>Medium size display screen</td>
<td>Large-screen color monitor which can display high resolution graphics</td>
<td>Generally not available</td>
<td>Generally not available</td>
<td>Medium to large screen monitor</td>
<td>Generally not available</td>
<td>Small display</td>
</tr>
<tr>
<td>Single/multiple processors</td>
<td>Single</td>
<td>Generally single</td>
<td>Generally multiple</td>
<td>Multiple</td>
<td>Multiple</td>
<td>Generally single</td>
<td>Generally multiple</td>
<td>Single</td>
</tr>
<tr>
<td>Single/multiple – User oriented</td>
<td>Single</td>
<td>Single</td>
<td>Generally single</td>
<td>Multiple</td>
<td>Multiple</td>
<td>Single</td>
<td>Multiple</td>
<td>Single</td>
</tr>
<tr>
<td>Popular operating systems</td>
<td>MS-DOS, MS-Windows</td>
<td>MS-DOS, MS-Windows, Windows-NT, Linux, Unix</td>
<td>MS-DOS, MS-Windows, Windows-NT, Linux, Unix</td>
<td>A variation of Unix, or proprietary</td>
<td>A variation of Unix, or proprietary</td>
<td>MS-DOS, MS-Windows, Windows-NT, Linux, Unix</td>
<td>Windows -NT, Unix or its variation, or proprietary</td>
<td>MS-Windows Mobile, Palm OS, Symbian OS, Linux, Blackbery OS</td>
</tr>
</tbody>
</table>

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## Comparison of Different Types of Computers

(Continued from previous slide..)

<table>
<thead>
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<th>Types of Computers</th>
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<th>Super computer</th>
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<th>Server</th>
<th>Handheld</th>
</tr>
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<tbody>
<tr>
<td>Popular usage</td>
<td>Word processing; Spreadsheet; Data Entry; Preparing presentation materials; and Making presentations</td>
<td>IBM, Compaq, Siemens, Toshiba</td>
<td>IBM, Apple, Compaq, Dell, Zenith, Siemens, Toshiba, Hewlett-Packard</td>
<td>Computing needs of engineers, architects, designers; Simulation of complex scientific and engineering problems and visualizing the results of simulation; and Multimedia applications</td>
<td>Data and information processing of I/O-bound applications</td>
<td>Cray, IBM, Silicon Graphics, Fujitsu, Intel, C-DAC</td>
<td>Same as PC and Workstation vendors</td>
<td>Same as Workstation, Mainframe System, &amp; Super-computer vendors</td>
<td>Computing, Personal Information Management (PIM), cell phone, digital camera</td>
</tr>
<tr>
<td>Major vendors</td>
<td>IBM, Compaq, Siemens, Toshiba</td>
<td>IBM, Apple, Compaq, Dell, Zenith, Siemens, Toshiba, Hewlett-Packard</td>
<td>Sun Microsystems, IBM, DEC, Hewlett-Packard, Silicon Graphics</td>
<td>IBM, DEC</td>
<td>Same as Workstation, Mainframe System, &amp; Super-computer vendors</td>
<td>Manage a shared resource and provide a set of shared user services in a client-server computing environment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Key Words/Phrases

- Back-end computer
- Client computer
- Client process
- Front-end computer
- Host computer
- Handheld
- I/O-bound application
- Laptop PC
- Mainframe system
- Massively parallel processors
- Minicomputer
- Notebook computer
- Parallel computers
- Parallel processing system
- Personal Computer (PC)
- Processor-bound application
- Server computer
- Server process
- Supercomputer
- System board
- Workstation