Chapter 20

Classification of Computers

Computer Fundamentals - Pradeep K. Sinha & Priti Sinha

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**

Computer Classification

- 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

Types of Computers

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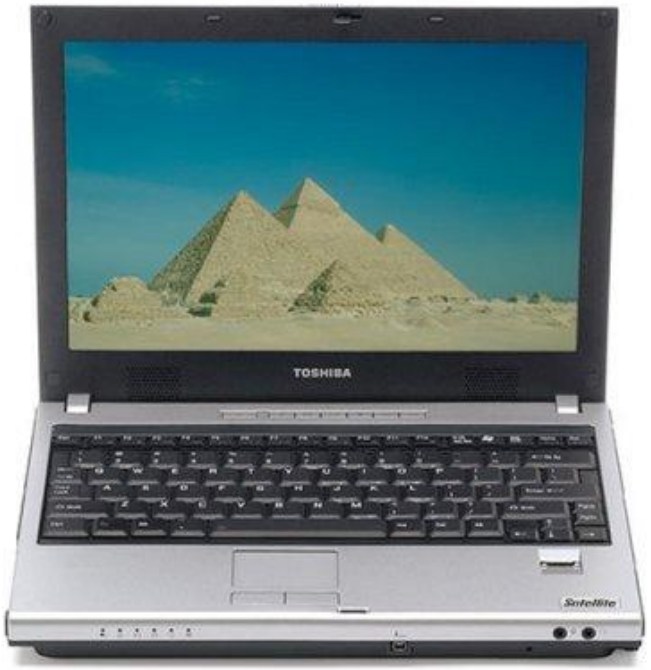
- Designed to operate with chargeable batteries
- Mostly used for word processing, spreadsheet computing, data entry, and power point presentations
- Normally run MS-DOS or MS WINDOWS operating system
- Some manufacturers are also offering models with GNU/Linux or its distributions
- Each device of laptop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

Notebook Computers

Foldable flat screen →

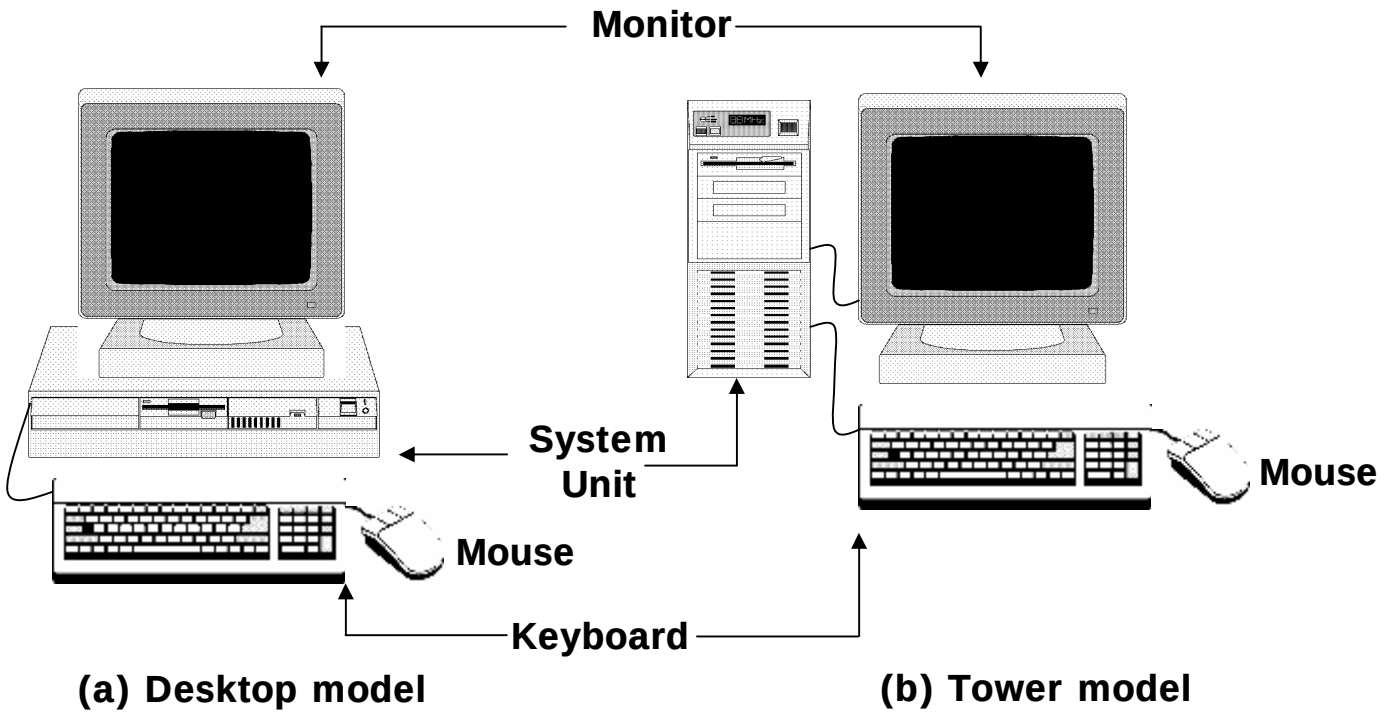
Keyboard, trackball, hard disk, floppy disk drive, etc. are in this unit →



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



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

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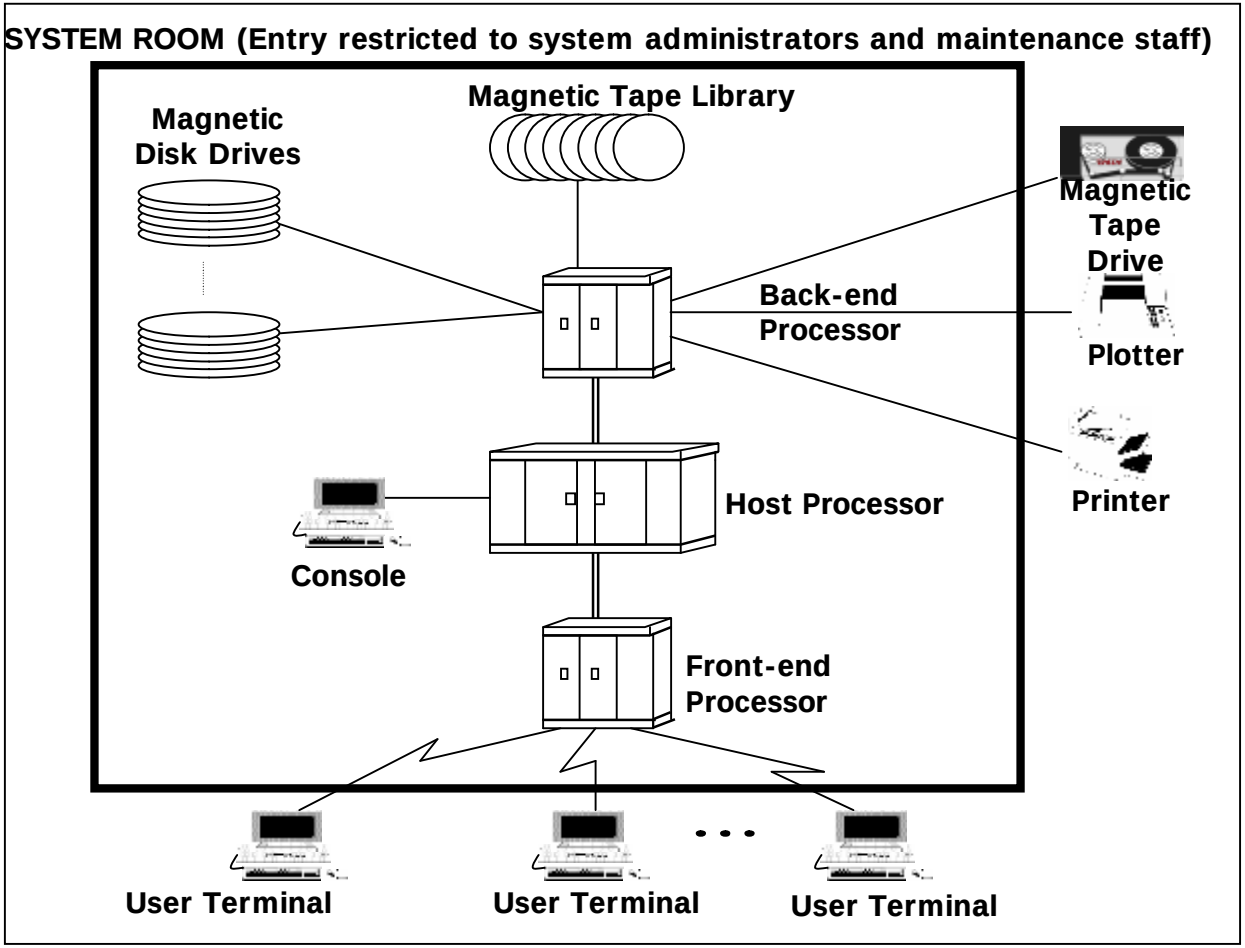
- Typically consist of a host computer, front-end computer, back-end computer, console terminals, magnetic disk drives, tape drives, magnetic tape library, user terminals, printers, and plotters
- Typical mainframe system looks like a row of large file cabinets and needs a large room
- Smaller configuration (slower host and subordinate computers, lesser storage space, and fewer user terminals) is often referred to as a *minicomputer system*

Mainframe Computer Systems



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

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- Supercomputers also support multiprogramming
- Supercomputers primarily address processor-bound applications

Parallel Processing Systems

- 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

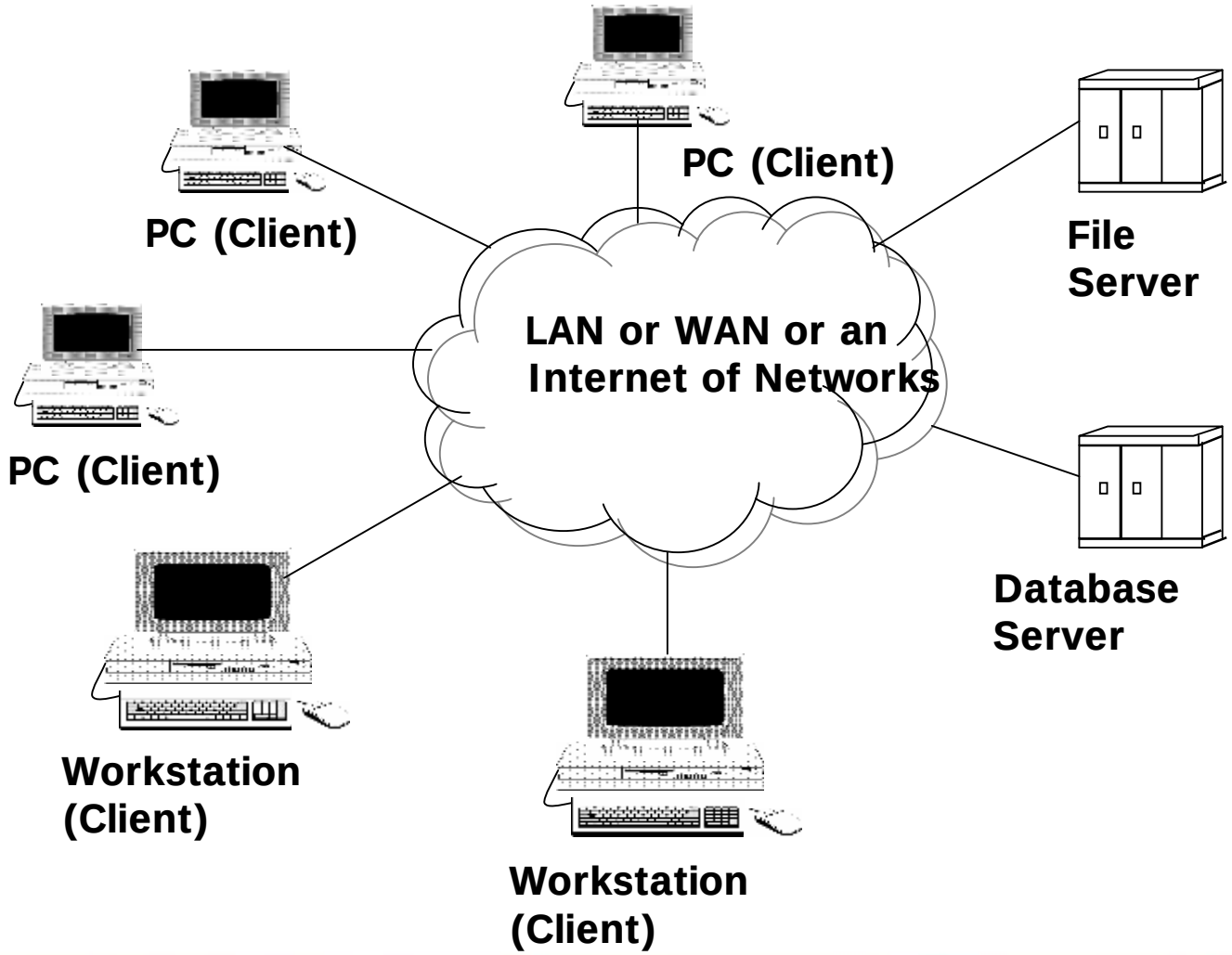
Client and Server Computers

- 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



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

Comparison of Different Types of Computers

Types of Computers Key features	Note book	PC	Work station	Mainframe system	Super computer	Client	Server	Handheld
Size	Very small (can be placed on ones lap)	Small (can be placed on an office table)	Medium (slightly larger than PC)	Large (needs a large room)	Large (needs a large room)	Generally small (may be large if it is also play the role of a server	Generally large	Very small (can be placed on ones palm)
Processing power	Low	Low	High	Higher	Highest	Generally low	Generally high	Low
Main memory capacity	Low	Low	High	Higher	Highest	Generally low	Generally high	Low
Hard disk storage capacity	Low	Low	High	Highest	Higher	Generally low	Generally high	Low
Has its own monitor, keyboard, and mouse for user interface	Yes	Yes	Yes	Generally no	Generally no	Yes	Generally no	No

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Comparison of Different Types of Computers

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Types of Computers Key features	Notebook	PC	Work station	Mainframe system	Super computer	Client	Server	Handheld
Display facility	Foldable flat screen small display	Medium size display screen	Large-screen color monitor which can display high resolution graphics	Generally not available	Generally not available	Medium to large screen monitor	Generally not available	Small display
Single/ multiple processors	Single	Generally single	Generally multiple	Multiple	Multiple	Generally single	Generally multiple	Single
Single/ multiple – User oriented	Single	Single	Generally single	Multiple	Multiple	Single	Multiple	Single
Popular operating systems	MS-DOS, MS-Windows	MS-DOS, MS-Windows, Windows-NT, Linux, Unix	Unix or a variation of it	A variation of Unix, or proprietary	A variation of Unix, or proprietary	MS-DOS, MS-Windows, Windows-NT, Linux, Unix	Windows-NT, Unix or its variation, or proprietary	MS-Wndows Mobile, Palm OS, Symbian OS, Linux, Blackbery OS

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Comparison of Different Types of Computers

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Types of Computers Key features	Notebook	Personal Computer	Work station	Mainframe system	Super computer	Client	Server	Handheld
Popular usage	Word processing; Spreadsheet; Data Entry; Preparing presentation materials; and Making presentations	Personal computing needs of individuals either in their working places or at their homes; and Education and entertain-ment of children and adults	Computing needs of engineers, architects, designers; Simulation of complex scientific and engineering problems and visualizing the results of simulation; and Multimedia applications	Data and information processing of I/O-bound applications	Large processor-bound applications like complex scientific simulations	Provide highly user-friendly interface in a client-server computing environment	Manage a shared resource and provide a set of shared user services in a client-server computing environment	Computing, Personal Information Management (PIM), cell phone, digital camera
Major vendors	IBM, Compaq, Siemens, Toshiba	IBM, Apple, Compaq, Dell, Zenith, Siemens, Toshiba, Hewlett-Packard	Sun Microsystems, IBM, DEC, Hewlett-Packard, Silicon Graphics	IBM, DEC	Cray, IBM, Silicon Graphics, Fujitsu, Intel, C-DAC	Same as PC and Workstation vendors	Same as Workstation, Mainframe System, & Super-computer vendors	Nokia, Sony, Motorola, Dell, Hawlett-Packard

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