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Name of Paper: Computer Fundamental

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Class :B.Sc. First Year

Subject :Computer Sci.(Gen).

Classification of Computers ,Distributed & Parallel computers

Part-5

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Objective

- **Student will learn how computers are classified.**

Classification of Computer

Computers can be can be classified based on

- The logic used by the computer(According to data handling)
 - Analog Computers
 - Digital Computers
 - Hybrid
- The size and capabilities of computer
 - Super computers
 - Mainframe computers
 - Mini computers
 - Micro computers

Classification of Computer

- Mode of Use
 - Palm

 - Laptop
 - Desktop
 - Workstations
- Based on interconnected computers
 - Distributed computers
 - Parallel

The logic used by the computer(According to data handling)

Analog Computers

- The Computers which are operate on the principle of creating a physical analog of mathematical problems.
- These computers continuously measure physical variables.
- These are the quantities that are continuously varied and persistently change from one measurement to another, just like the temperature of a human being or individual.
- Examples of analog computers are thermometers , speedometers ,Analog Clock etc.

Digital Computers

- The “Digital Computers” can complete or perform Arithmetic and logical operation when given to them in a type of binary number system of “0” and “1”.
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- Computer capable of solving problems by processing information expressed in discrete form.
 - They give the results with more accuracy and at a faster rate.
 - Mostly these computers are used for scientific and business purpose.
 - Some of the examples are desktop PC , laptops, smartphones, and calculators.

Hybrid Computers

- The hybrid computer is a combination of analog computer and digital computer because it encompasses the best features of both these computers.

- The hardware components of hybrid computers are usually the mixture of analog and digital components.
- The hybrid computer is also less expensive than the digital computers.
- They are digital computer which accepts Analog signals and converts them to digital form.
- These are generally used for scientific applications, airplanes, and hospitals.
- Some of the examples include electrocardiogram machine, ultrasound machine, monitoring machine.

The size and capabilities of computer

Supercomputers :

- The fastest and most powerful type of computer Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations.
- The performance of a supercomputer is commonly measured in floating-point operations per second instead of million instructions per second.
- Since 2017, there are supercomputers which can perform over 10^{17} FLOPS.
- It have very large main and secondary memory.
- Supercomputer built by interconnecting several high speed computers and programming them to work cooperatively solve problems.
- Supercomputers are used in scientific computing, commercial large database, produce animated movies weather forecasting ,designing supersonic aircrafts, design of drug and play games such as chess.
- Examples : CDAC Param (India) , Fugaku (Japan-top Supercomputer)

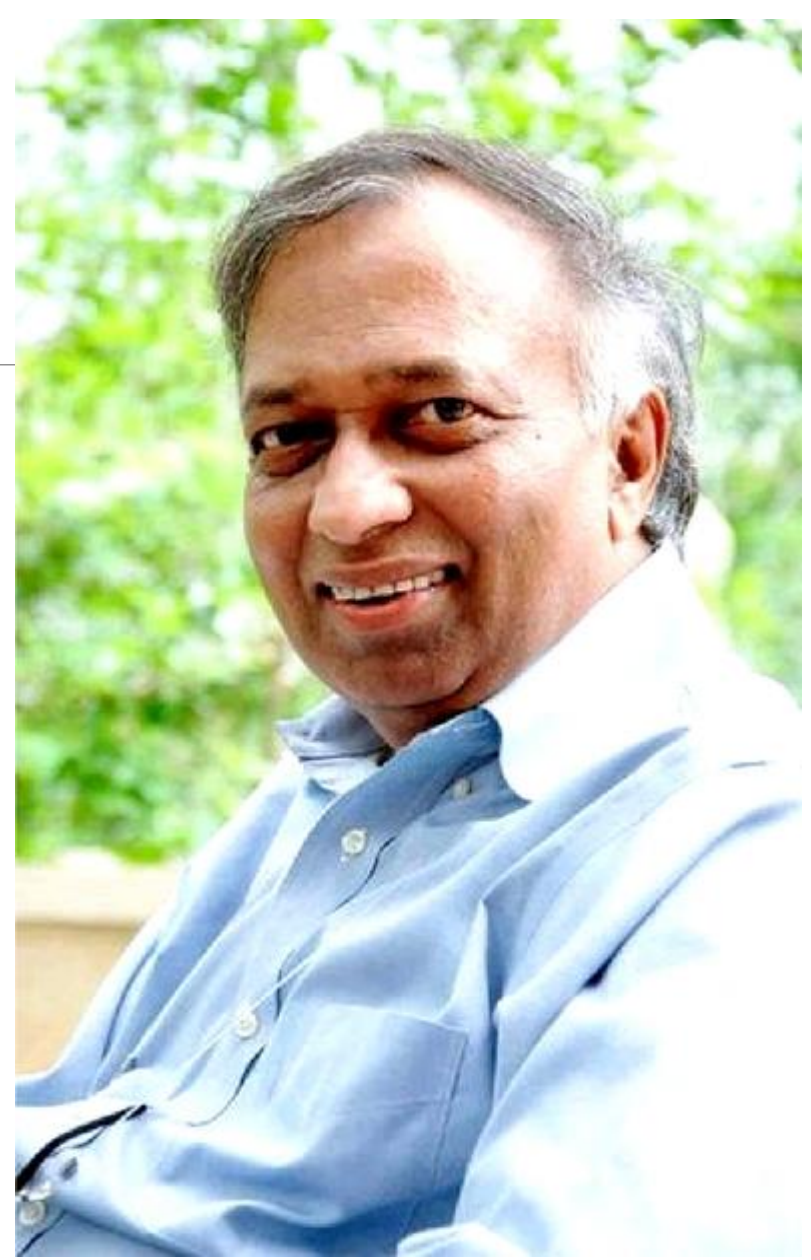
'Made in India' supercomputers



CDAC Param Yuva



Tata CRL Yuva



“Great nations are not built on borrowed technology.” – Vijay Bhatkar, the Father of Indian Supercomputers

Mainframe computers

- The mainframes have more processing power compared to servers and microcomputers (like-laptop, PC, etc...), but have less processing power compared to a supercomputer.
- There are organization such as banks and insurance companies which process large number of transactions on-line.
- It required very large memory disk to store data.
- It transfer data from disk to main memory at several hundred megabytes /sec .
- It process the million transactions per second.
- It is very expensive and use proprietary operating system which provide extensive services such as user accounting ,file security and control.
- Mainframes cannot be used as a normal computer, because they are made for specific task only.
- eg. IBM and Hitachi



MainFrame Computer

Mini computers

- Mini computers are relatively smaller and are less expensive than mainframe computers.
- These are medium sized and support about 10-20 user terminal connected to it.

- They handle database ,statistical problems, accounting etc. using special designed for above uses.
- A minicomputer is a computer which has all the features of a large size computer, but its size is smaller than those.
- Minicomputers are mainly multi-users systems where more than one user can work simultaneously.
- Minicomputer can support multi-users at a time or you can say that minicomputer is a multiprocessing system.
- It is less expensive than mainframe or supercomputer.
- Minicomputer examples: IBM's AS/400e, Honeywell200, TI-990.

Micro computers

- **Micro Computer** is a small computer and Your *personal computers* are equivalent to the **microcomputer**.
- A microcomputer is a computer with a central processing unit (CPU) as a microprocessor.
- They also contain memory in the form of read-only memory (ROM) and random access memory (RAM), input/output ports, and a bus or system of interconnecting wires.
- All housed in a single unit usually referred to as a motherboard.
- Designed for individual use, a microcomputer is smaller than a mainframe or a minicomputer.
- Personal microcomputers are often used for education and entertainment.
- Microcomputers can include video game consoles, computerized electronics and smartphones.
- Microcomputers have been used for applications including data and word processing, electronic spreadsheets, professional presentation and graphics programs, communications and database management systems.

Micro computers



Desktop PC



Laptop/notebook PC



Netbook PC



Tablet PC



PDA



Smartphone

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- Mode of Use
 - Palm PCs /Simputer
 - Laptop
 - Desktop
 - Workstations
 - Server

- Mode of Use

Palm PCs /Simputer

- **Palm** is the trade name for a popular personal digital assistant (PDA), a form of handheld device that is also known as a palmtop **computer**.
- With miniaturization and high density packing of transistors on a chip with capabilities like PCs.
- It accepts handwritten inputs using an electronic pen.
- It have small storage and can be connected to wireless network.
- It has facilities to be used as mobile phone.
- It used Microsoft Windows CE (Windowds 10) .
- Data appears on a liquid crystal display (LCD) screen.

Simputer

- Simputer: SIMPle compUTER, which expands to Simple, In-expensive Multi-lingual PeopLE's compUTER.
- Simputer made as per Indian people needs by nonprofit Simputer trust.
- Simputer is a mobile handheld computer with input through icon on a touch screen LCD panel.
- GNU/Linux free open source OS used in Simputer.
- Simputer have a smart card reader/writer .



Laptop

- A laptop computer is smaller than a desktop computer.
- Laptop PCs (also known as Notebook computers) are portable computers weighing around 2 KG.
- They have a built-in keyboard ,Colour LCD/LED display and powerful processor (Intel i3,i5,i5 etc.)
- They run using Windows, Linux etc. operating system .
- Laptops are able to be folded flat for transportation.
- Laptops come with hard disk (1TB and more) and it have also DVD RW drive.
- Laptops run using batteries and have several ways of connecting to networks ,a wireless connection, or WiFi, is the most common means of connecting a laptop.

Laptop.....

- Laptops may also have Ethernet ports that allow the computer to connect to a local area network (LAN) through an Ethernet cable.
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- A Bluetooth connection is another means for a computer to communicate with devices or other computers.
 - For example, a Bluetooth mouse or keyboard or smart phone can be connected wirelessly to a laptop.



Desktop Computers

- **Desktop** computers are **personal computers (PCs)** designed for use by an individual at a fixed location.
- IBM was the first computer to introduce and popularize use of desktops.

- A desktop unit typically has a CPU (Central Processing Unit), monitor, keyboard and mouse.
- Introduction of desktops popularized use of computers among common people as it was compact and affordable.
- A microprocessor-based computing device designed to meet the computing needs of an individual.
- It is work with Windows, Linux etc. operating systems and support all types of networks.
- It support secondary storage like Hard disk and DVD.

Desktop Computers..

- It typically provides access to a wide variety of computing applications, such as word processing, photo editing, and e-mail.
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- Desktop's many software and hardware devices were developed specially for the home or office user.

Workstations :

- Workstation are also desktop machines.
- **Workstation**, a high-performance **computer** system that is basically designed for a single user and has advanced graphics capabilities, large storage capacity, and a powerful microprocessor.
- They are more powerful providing processor speeds about 10 times that of PCs.
- Workstations normally use RISC processors MIPS(SIG),RIOS(IBM),SPARC(SUN) or PA-RISC(HP).
- Some manufactures of workstations are Silicon Graphics (SIG),IBM , Sun Microsystem, Hewlett Packard(HP) .
- The standard operating system of workstation is UNIX.
- A system called X windows is provided by workstations to display the status of multiple process during execution .

Workstations ...

- It have built in hardware to connect Local Area Network (LAN) .
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- It is used for executing numeric and graphic intensive applications such as Computer Aided design ,simulation of complex system and visualizing the result of simulations.

Servers

- Server are types of computers used to provide resources, services, and functionality to client computers in a server-client network model.
- Servers are used for specific purposes such as high performance numerical computing ,web hosting ,database store ,printing etc.
- Computer servers have high performance processor with large main memory and have big online disk storage and also support high speed printers.
- Resources provided are based on the functions of a particular server, which may fall under these categories:
 - File server, Database server, Print server , FTP servers , Application server , Web server

Servers..

- Their sizes will depend on purpose and tasks in the network.
- Of course bigger and more multitasking installations will require multiple system and storage installation.
- A common desktop systems can be used as servers.
- Far from it, true server systems are specialized computers with abilities far beyond what personal computers can deliver.
- Servers are optimized to run 24 hours and are capable of hot swapping of storage and other hardware without having to shut down the system.
- These type of computer works on Network operating System like Windows Server 2008 ,Linux server etc.
- IBM ,SUN and Dell etc. manufactures the servers.

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- Based on interconnected computers
 - Distributed computers
 - Parallel

Distributed computers

- A configuration in which several computers are interconnected by a communication network is called a distributed computer system.
- A common use of distributed is the client-server computing.
- In this mode several specialized services are provided by servers.
- For example, there may be computer providing high speed CPU for numeric intensive programs, another with high speed printers, third with plotters and a fourth with a large disk store big files.
- A user having a PC may do some local computing ,debug etc., and may then requisition the services of a computer for storing files , providing language translator and carrying out intensive numeric computing.
- The PC requisitioning services is called the client and the computer providing the services is known as a server.

Distributed computers..

- In distributed computer system ,some computers are not fully utilized ,they may idle or no one are logged or use simple word processing which is not fully use the computing power.
- The communication network connecting the computers are in a distributed system is slow and allows only one message to be communicated between two computers at a time.
- The network is usually a LAN for communication.

Parallel computers..

- A set of computers connected together by a high speed communication network and programmed in such a way that they cooperate to solve a single large problem is called a parallel Computers
- Two type of parallel computers :
 - i) Shared memory parallel computers
 - ii) distributed memory parallel computers

i) Shared memory parallel computer

- In this case a number of processing elements are connected to a main memory by a communication network.
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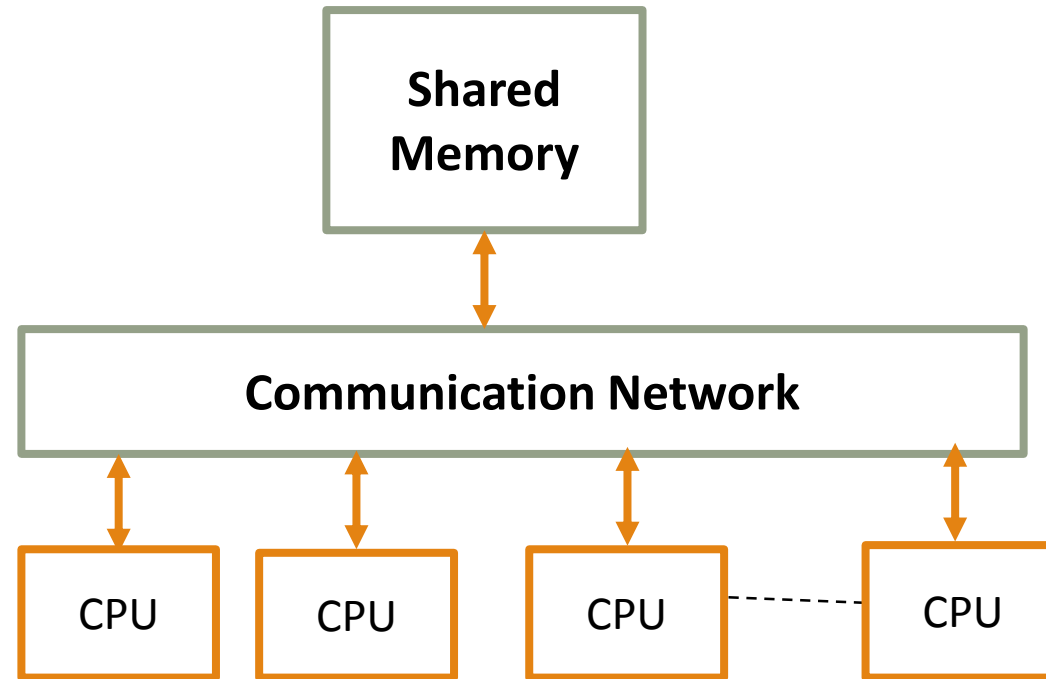


Fig.12.2 A shared memory parallel computer

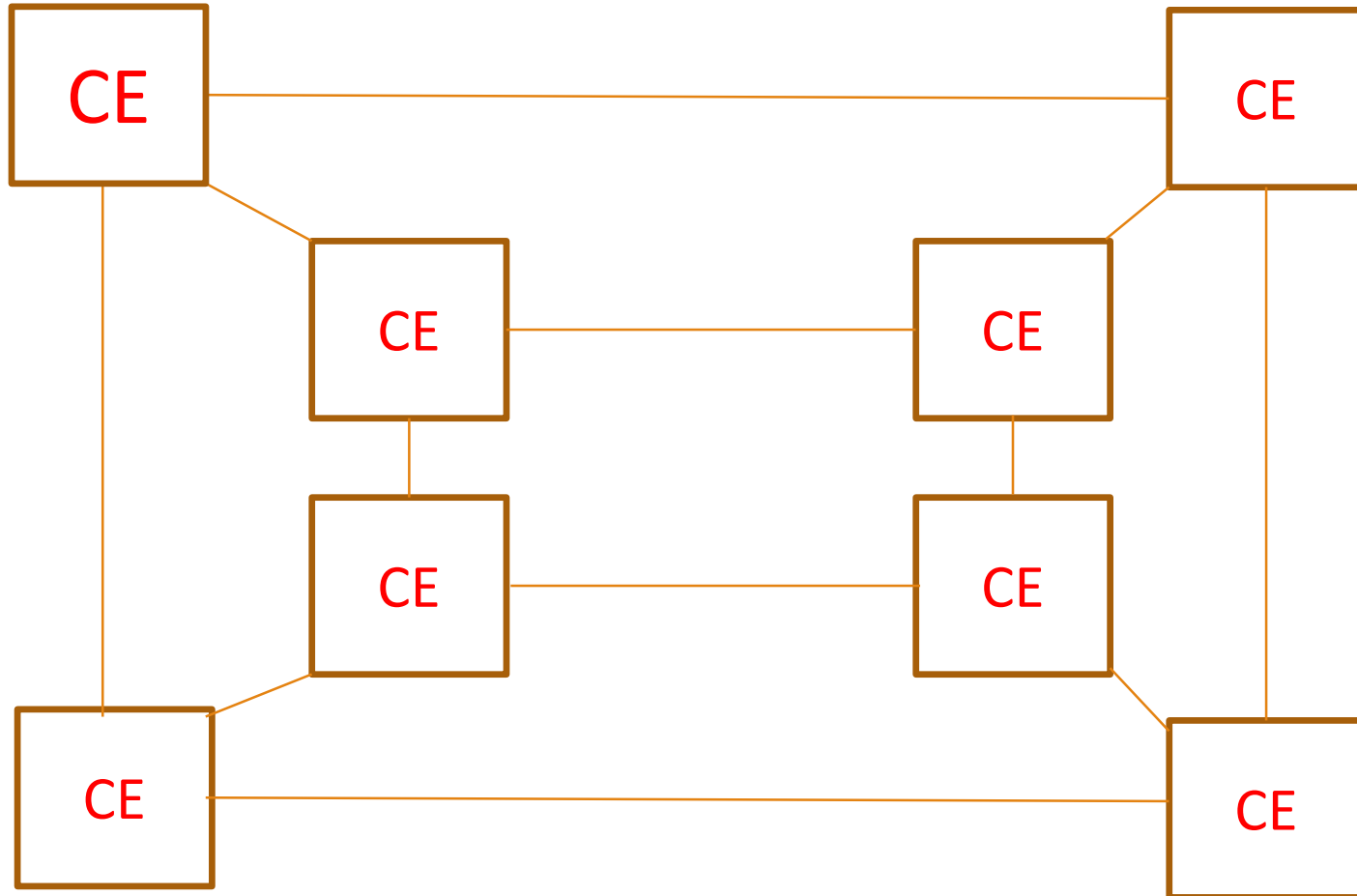
Shared memory parallel computer..

- A program for this computer is written in such a way that multiple processors can work independently and cooperate to solve a problem.

- The processes are allocated to different processors.
- They read and modify data accessible to all of them in memory
- The problem solved concurrently which are broken into parts.
- These machines are easy to program but are not scalable beyond 16 processors.
- It accesses memory via a single communication network which gets saturated when many processors try to read or write from memory .

ii) Distributed memory parallel computer

- In this type a number of processors , each have its own memory , are interconnected by communication network.



CE is a computing element with its own CPU and memory

Fig.12.3 A distributed memory parallel computer

Distributed memory parallel computer..

- Distributed-memory parallel computers are essentially a collection of serial computers (nodes) working together to solve a problem.
- A program is divided into many parts and each computer works independently .
- Processors exchange data through communications network by sending and receiving messages to one another is called message passing multicomputer.
- This type of computers are scalable to over 1000 processors as each computer works reasonably independently and there are multiple communication paths to exchange message .
- A popular interconnection is called hypercube as fig.12.3

Distributed memory parallel computer..

- Building parallel computers is to use off the shelf high performance PCs and interconnect them using high speed Ethernet(1Gbps).
- Linux OS available on the internet for this task.
- Use this type of computers to solve compute intensive tasks and several applications developed.
- The grid computing is to connect a large number of powerful high performance computers distributed throughout a country /world by high speed dedicated communications links.
- Appropriate Hardware and software to be used for grid computing, it provide to client as per their request to use resources in minimal.

Unit No.	Topic Name	Ref.	No. of Lecturers
1	Fundamentals of Computer System : Introduction, Characteristics & features of Computers, Components of Computers ,Organization of Computer.	1/1	3
2	Algorithm and Flowcharts : Algorithm: Definition , Characteristics, Advantages and disadvantages , Examples Flowchart : Definition ,Define symbols of flowchart ,Advantages and disadvantages ,Examples	2/1 3/3 3/4	3 3
3	Computer Generation & Classification Generation of Computers : First to Fifth , Classification of Computers ,Distributed & Parallel computers	2/12	3
4	Computer Languages Types of Programming Languages :Machine Languages ,Assembly Languages ,High Level Languages • Assembler, Linker, Loader, Interpreter & Compiler	2/9 2/9	3

Unit No.	Topic Name	Ref.	No. of Lecturers
5	Computer Memory : <ul style="list-style-type: none"> Memory Cell & Organization Types of Memory (Primary And Secondary) : RAM ,ROM ,PROM ,EPROM, Secondary Storage Devices (FD, CD, HD, Pen drive, DVD, Tape Drive, DAT) 	2/4 2/4	3
6	I/O Devices: Input Devices : Touch screen , OMR, OBR , OCR, Light pen , Scanners , Digitizers Output Devices :Plotters, LCD , Plasma Display, Printers	1/4 1/4	3
7	Processor : Structure of Instruction, Description of Processor , Processor Features ,RISC & CISC	2/5	6
8	Operating system Concepts : Why Operating System , Functions of Operating System, Types of Operating ,System , Batch O.S. , Multiprogramming O.S. , Time Sharing O.S ,Personal Computers O.S. ,Network O.S.	2/9 2/9	3
Core Ref.	1. Fundamentals of Information Technology By Chetan Srivastava, Kalyani Publishers 2. Fundamentals of Computers By V. Rajaraman, PHI Publication, IVth Edition. 3. 3. Fundamentals of Programming By Raj K. Jain, S. Chand Publication		

Fundamentals of Computer System

Core References

1. Fundamentals of Information Technology By Chetan Srivastava, Kalyani Publishers
2. Fundamentals of Computers By V. Rajaraman, PHI Publication, IVth Edition.
3. Fundamentals of Programming By Raj K. Jain, S. Chand Publication

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1. Computer Today By Suresh K. Basandra, Galgotia Publication, Updated Edition
2. Computer Fundamental By B. Ram, BPB Publication.

Thank you !
