

SRI SATHYA SAI COLLEGE FOR WOMEN

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Subject - Elective Course

Title- Computer Maintenance and Troubleshooting

CCE - I



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Computer Hardware Components Maintenance and Troubleshooting

Generations of Computers:

1. First Generation Computers = 1940-1956
2. Second Generation Computers = 1956-1963
3. Third Generation Computers = 1964-1971
4. Fourth Generation Computers = 1971-1975
5. Fifth Generation Computers = 1980 - Present.

First generation computers:-

→ The technology behind the primary generation computers was a fragile glass device, which was called a vacuum tube.

Characteristics of first generation computers-

- ① Main electronic component was vacuum tube.
- ② Basic programming language was used.
- ③ Main memory contains magnetic tapes and magnetic drums.
- ④ Slow operating speed and restricted computing capacity.
- ⑤ High power consumption and short life span.



Fig. 1.14 J. P. Eckert and J. W. Mauchly:
The inventor of first computer i.e. ENIAC.

- ⑦ Limited programming capabilities.
- ⑧ ENIAC was the first computer of this category-
 - (i) Electronic Numerical Integrator and Calculator (ENIAC) - The first electronics based machine was made in 1946 by J.P. Eckert and J.W. Mauchly at University of Pennsylvania of U.S.A and was called Electronic numerical integrator and calculator machine (ENIAC). It could perform 5000 additions or 350 multiplications in one second. It contained 18,000 vacuum tubes, 70,000 resistors, 10,000 capacitors, and 60,000 switches and occupied a two-room car garage. It consumed 150 kW of power and had to be water cooled. It weighed 27 tonnes.
 - (ii) UNIVAC-1: It was produced in 1951 by Universal Accounting Company (UNIVAC) set up by Eckert and Mauchly.
 - (iii) IBM-701 and IBM-650: These were introduced in 1963 and 1954 respectively by International Business Machines Corporation (IBM). The IBM-650 was the first modern digital computer produced on a mass scale.

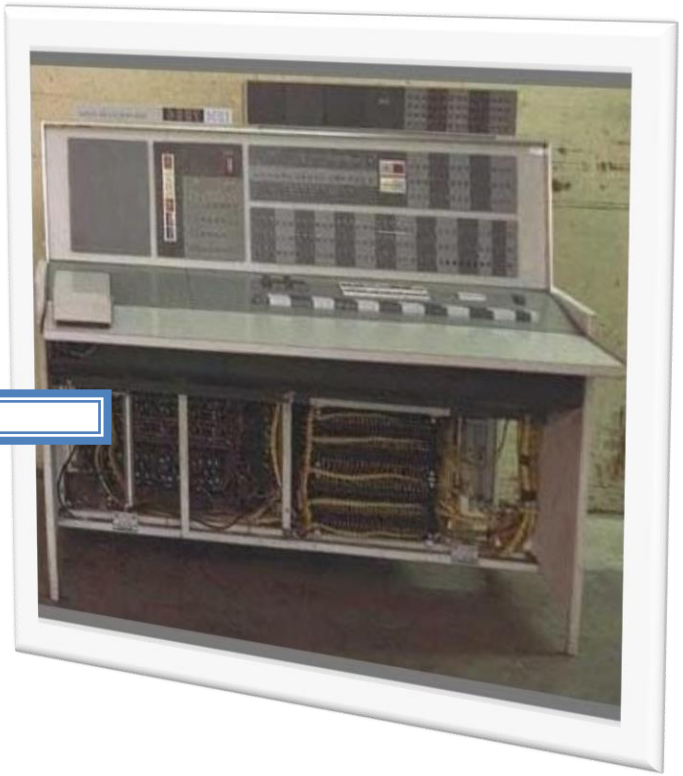
Second Generation Computers:

Nobel Prize Winners John Bardeen, Walter H. Brattain and William B. Shockley who jointly discovered the transistor (short name for transfer resistor) in the laboratories of Bell Telephone. The invention of transistor in 1948 led to the development of second generation computers. Transistors replaced valves completely as they were far more superior in performance on account of their miniature size, smaller power consumption and heat production rate. Although faster, smaller, and more powerful, they were still expensive machines which only large commercial organisations could afford.

In such computers, transistor circuits called flip flops formed the basis of internal binary operations and storage of binary coded data. The use of transistors reduced -

- (i) size
- (ii) manufacturing and running costs and improved
- (iii) reliability and processing power.

Example - IBM 700, 1401, 1620, 7094, CDC 1604, 3600, RCA 501, UNIVAC 110 B, Leo Mark III, APLAS and ICL1901.



Third Generation Computers:

In 1964, the third generation computers were introduced. These had integrated transistor circuits (I.C.) having higher speeds, large storage capacities and lower prices. These computers were called mini computers. Instead of having one transistor of its own, several transistors could be integrated with the other components and sealed up in a small package. The package was called an integrated circuit, I.C. or more popularly a chip.

Characteristics of third generation computers -

1. Main electronic component - Integrated circuits (ICs)
2. Programming language - High level language
3. Memory - large magnetic core, magnetic tape/disk.
4. Input/output device - Magnetic tape, monitor, keyboard, printer etc.
5. Examples - IBM 360, IBM 370, PDP-11, NCR 315, B6500, ~~IBM~~ Honeywell -6000 series

The IBM-360/370 series is designed to meet the requirements of both scientific computing and business data processing.



Date : _____

Fourth Generation Computers: ICs which have the entire computer circuitry on a single silicon chip are called MICRO-PROCESSORS. The computers using these chips are called micro computers. These are, in fact, the scaled down versions of mini-computers. The advantage of this technology is that one microprocessor can contain all the circuits required to perform arithmetic, logic, and control functions on the one chip.

The computers using microchips were called microcomputers. This generation provided smaller size of computers, with larger capacities. The very large scale integrated (VLSI) circuits replaced LSI circuits. Technologies like multiprocessing, multiprogramming, time-sharing, operating speed, and virtual memory made it a more user friendly and customary device. The concept of private computers and computer networks came into being within the fourth generation.

Characteristics of Fourth Generation Computers.

1. Memory- semiconductor memory (such as RAM, ROM etc.)
2. Example- IBM PC, STAR, 1000, APPLE II, Apple Macintosh, Alter 8800 etc.

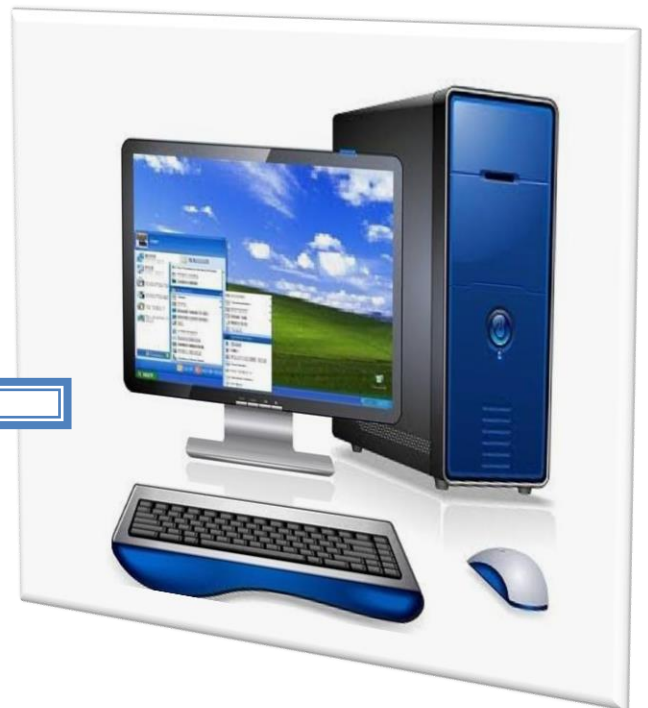
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Fifth generation computer:

The technology behind the fifth generation of computers is AI. It allows computers to behave like humans. It is often seen in programs like voice recognition, codes of medicine, and entertainment. Within the field of game playing also it's shown remarkable performance where computers are capable of beating human competitors. The speed is the highest, size is the smallest and area of use has remarkably increased within the fifth generation computers.

Characteristics of fifth-generation computers-

1. Main electronic component - Based on artificial intelligence uses the ultra large scale integration (ULSI) technology and parallel processing method (VLSI) has millions of transistors on a single microchip and the parallel processing method use two microprocessors to run tasks simultaneously.
2. Language - Natural (Human language)
3. Size - Portable and small in size
4. Example - Desktops, laptops, tablets, smartphones, etc.



AIM = Observe various types of memory modules (SIMM, DIMM, SO-DIMM, RIMM, SO-RIMM)

→ Following are the types of memory modules.

1. SIMM (Single Inline Memory Module):

- Description: SIMM is an older memory module with pins on one side. It has a 32-bit data path.
- Data Storage Capacity: Typically 8, 16, 32, or 64 megabytes (MB).
- Usage: Mainly used in older computers, especially those from the late 1980s to the mid-1990s.
- Variants: FPM (Fast Page Mode) SIMM and EDO (Extended Data Out) SIMM.

2. DIMM (Dual Inline Memory Module):

- Description: DIMM has separate electrical contacts on both sides of the module, providing a 64-bit data path.
- Data Storage Capacity: Commonly ranges from 128 MB to 64 GB.
- Usage: Found in modern computers, including

desktops and servers.

- Variants: DDR (Double Data Rate), DDR2, DDR3, DDR4, and DDR5 DIMM.

3. SO-DIMM (Small Outline DIMM):

- Description: SO-DIMM is a smaller version of DIMM, used in laptops and compact devices.
- Data Storage Capacity: Similar to DIMM, typically ranging from 128 MB to 64 GB.
- Usage: Commonly found in laptops, mini-PCs, and other small form factor devices.
- Variants: DDR, DDR2, DDR3, DDR4, SO-DIMM.

4. RIMM (Rambus Inline Memory Module):

- Description: RIMM is a memory module designed for Rambus DRAM memory technology.
- Data Storage Capacity: Capacity varies, but it was typically found in systems from the late 1990s and early 2000s.
- Usage: Initially used in high-end systems, but later

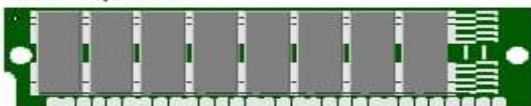
RIMM MODULE

RDRAM (Rambus) - 184-pin - Chips covered with metal heat sink.

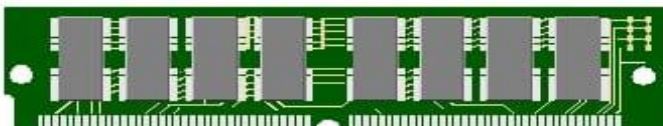


SIMM MODULES

DRAM - 30-pin SIMM



FPM - 72-pin SIMM



phased out due to high costs.

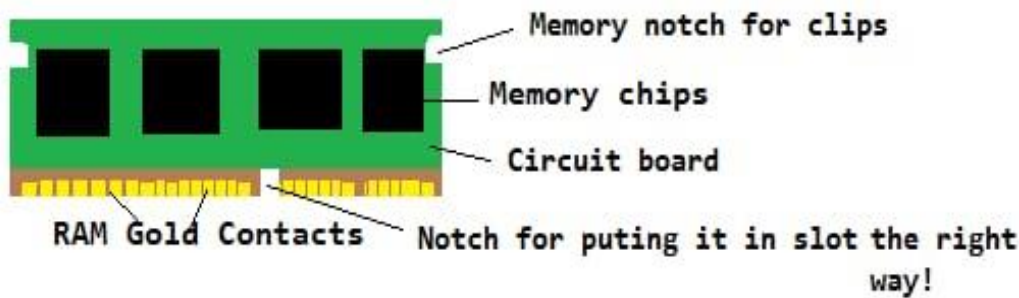
- Variants: RDRAM (Rambus DRAM) RIMM.

5. SO-RIMM (Small Outline RIMM):

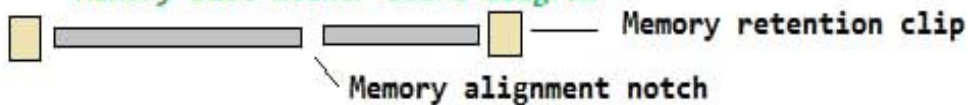


- Description: Similar to SO-DIMM, SO-RIMM is a smaller version of RIMM.
- Data Storage Capacity: Capacity varies, but it was generally used in compact systems.
- Usage: Primarily used in compact systems that required the use of Rambus DRAM.
- Variants: RDRAM, SO-RIMM.

Memory/RAM Diagram



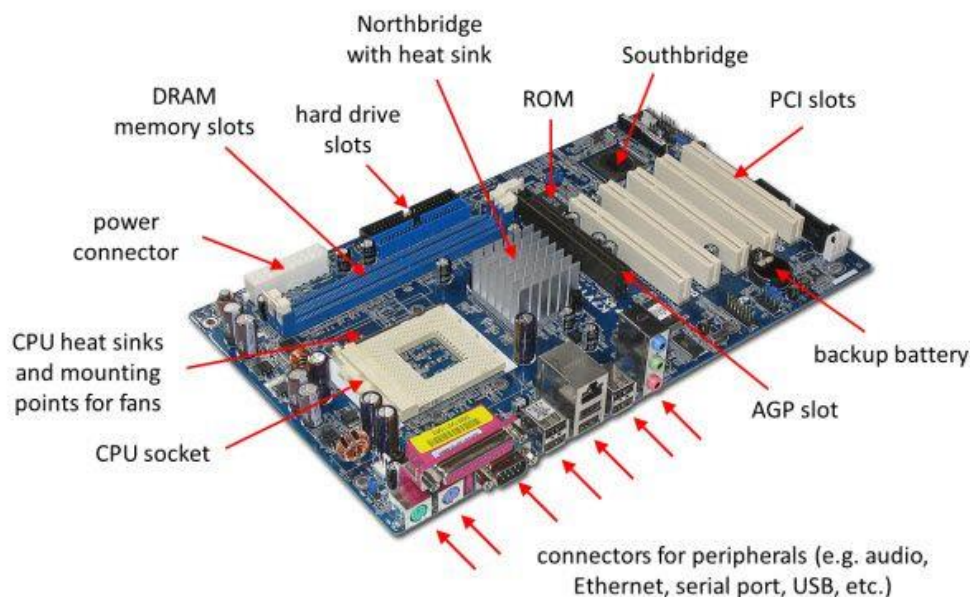
Memory slot mother board diagram



AIM - Prepare a list of various computer peripherals (e.g. CPU, Mother Board, RAM, Hard Drive, Optical Drive, Solid State Drive, Monitor, Keyboard, Mouse, Speaker, Web cam, Printer, Scanner, microphone, speakers, modem, projector etc.)

→ Various computer peripherals are given below:

1. CPU ⇒ Brain of the computer, performs calculations and executes instructions
2. Motherboard - Main circuit board containing the CPU memory, and other essential component.
3. RAM (Random Access Memory) - Temporary memory that stores data and instructions for CPU.
4. Hard Drive - Primary storage device for long-term data storage.
5. Optical Drive - Read and writes data from optical discs like CDs and DVDs.
6. Solid state drive (SSD) - Faster and more durable



alternative to traditional hard drives

7. Keyboard - Input device with keys for typing text and executing commands
8. Mouse - Pointing device for cursor control and user interaction
9. Speaker - Output device for audio, produces sound for music, videos and games
10. Webcam - Captures video and images for video calls and online communication
11. Printer - Produces physical copy of digital documents and images
12. Scanner - Converts physical documents and images into digital format
13. Microphone - Captures audio input for voice recording and communication
14. Modem - Device for modulating and demodulating digital signals for internet connectivity

15. Projector - Displays images and videos on a large screen or surface
16. Monitor - Displays screen for visual output from the computer
17. Graphics card - Enhances graphics performance for gaming and design
18. Network card - Enables wired or wireless network connectivity
19. Sound card - Provides audio processing and improved sound quality
20. Joystick - Input device for gaming and flight simulation

