

1. Introduction to RAM

RAM (Random Access Memory) is the **primary, volatile memory** of a computer used to store data and instructions that are currently being processed by the CPU.

- RAM is **read and write memory**
- Data in RAM is lost when power is switched off
- RAM helps the computer work faster

There are **two main types of RAM**:

1. Static RAM (SRAM)
 2. Dynamic RAM (DRAM)
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2. Static RAM (SRAM)

Definition

Static RAM (SRAM) is a type of RAM that **stores data as long as power is supplied** and **does not need to be refreshed repeatedly**.

How SRAM Works

- Uses **flip-flop circuits**
- Each bit is stored using multiple transistors
- Data remains stable without refreshing

Characteristics of SRAM

- Very fast memory
- No refresh operation required
- Consumes more power
- Expensive
- Larger in size

Advantages of SRAM

- Faster access speed
- More reliable
- No data refresh required
- Low latency

Disadvantages of SRAM

- High cost
- Lower storage capacity
- Requires more physical space

Uses of SRAM

- Cache memory (L1, L2, L3 cache)
 - CPU registers
 - High-speed memory applications
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3. Dynamic RAM (DRAM)

Definition

Dynamic RAM (DRAM) is a type of RAM that **stores data in capacitors** and **must be refreshed continuously** to retain data.

How DRAM Works

- Uses **capacitors and transistors**
- Capacitors lose charge over time
- Data must be refreshed thousands of times per second

Characteristics of DRAM

- Slower than SRAM

- Requires periodic refreshing
- Consumes less power
- Cheaper
- Smaller in size

Advantages of DRAM

- Low cost
- High storage capacity
- Efficient use of space

Disadvantages of DRAM

- Slower speed
- Needs constant refreshing
- Data loss if refresh fails

Uses of DRAM

- Main system memory (RAM modules)
- Laptops and desktops
- Graphics memory (special DRAM)

4. Comparison Between SRAM and DRAM

Feature	SRAM	DRAM
Full Form	Static Random Access Memory	Dynamic Random Access Memory
Speed	Very fast	Slower than SRAM
Refreshing	Not required	Required
Storage Method	Flip-flops	Capacitors
Cost	Very expensive	Cheaper

Feature	SRAM	DRAM
Power Consumption	High	Low
Size	Large	Small
Capacity	Low	High
Volatility	Volatile	Volatile
Typical Use	Cache memory	Main memory

5. Why SRAM is Used as Cache and DRAM as Main Memory

- SRAM is **faster**, so it is ideal for cache memory
 - DRAM is **cheaper and denser**, so it is used as main memory
 - Using only SRAM would make computers very expensive
 - Using only DRAM would slow down processing
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6. Diagram Explanation (Textual)

- **SRAM**: Data stored using flip-flop → no refresh → faster
 - **DRAM**: Data stored using capacitor → needs refresh → slower
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7. Conclusion

- Both SRAM and DRAM are volatile memories
 - SRAM provides speed, DRAM provides capacity
 - Modern computers use **both** to balance performance and cost
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Exam Tip

SRAM = Speed
DRAM = Density