Cheatography

# Data Storage Cheat Sheet

by Rachit Murarka via cheatography.com/197487/cs/41670/

## Memory and Storage devices

| Category | Devices |
|---|---|
| Primary Memory | RAM, ROM, Cache Memory |
| Internal Secondary Storage | Hard Disk Drive (HDD), Solid State Drive (SSD) |
| External Secondary Storage | DVD/CD, DVD-RAM, Blu-ray Disc, USB Memory Stick/Flash Memory, Removable Hard Drive |

## Comparison of RAM and ROM

| Feature | RAM | ROM |
|---|---|---|
| Type of Memory | Temporary memory | Permanent memory |
| Volatility | Volatile (contents lost when powered off) | Non-volatile (contents retained) |
| Read/Write | Can be written to and read from | Data stored cannot be altered |
| Usage | Stores data, files, part of an application or OS | Always used to store BIOS and other data |

## Virtual Memory vs. Normal Memory Management

| Feature | Virtual Memory | Normal Memory Management |
|---|---|---|
| RAM Utilization | Programs larger than physical memory can be executed | Limited by the available physical memory |
| Data Movement | Data moved in and out of HDD/SSD as needed | No movement of data between memory and storage |
| Disk Thrashing | Can lead to disk thrashing if not managed properly | No disk thrashing as data stays in RAM |

## DRAM(Dynamic RAM)

| Aspect | Description |
|---|---|
| Composition | Consists of transistors and capacitors |
| Operation | Capacitor holds bits of information (0 or 1); transistor acts as a switch for reading/writing |
| Refresh | Requires constant refreshing (every 15 micros-econds) to prevent data loss |

## Magnetic Storage (Hard Disk Drives - HDD)

| Aspect | Description |
|---|---|
| Data Storage | Data is stored in a digital format on the magnetic surfaces of disks (platters) with read-write heads |
| Latency | Slower data access compared to RAM; latency occurs as the read-write heads search for the correct data |
| Fragmentation | Fragmentation occurs over time, affecting perfor-mance; defragmentation software can improve this |

## Memory Sticks/Flash Memory

Uses solid-state technology; small, lightweight devices suitable for transferring files between computers

## Virtual Memory

| Aspect | Description |
|---|---|
| Purpose | Extends physical RAM, allowing larger programs to run; utilizes hard disk or SSD as swap space |
| Paging | Uses paging to store and retrieve data from HDD/SSD, copying it into RAM |
| Advantages | - Programs can be larger than physical memory<br>- Reduces the need for expensive RAM |

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## Blu-ray Discs vs DVDs

| Aspect | Blu-ray | DVDs |
|---|---|---|
| Laser Color | Blue | Red |
| Wavelength of Laser Light | 405 nm | 650 nm |
| Storage Capacity (Dual-Layer) | Up to 50 GB | 8.5 GB (for dual-layer DVDs) |
| Interactivity | Greater interactivity; high definition movies | Limited interactivity; standard definition movies |
| Data Transfer Rate | 36 Mbps | 10 Mbps |

## Primary and Secondary Storage

| Storage Type | Storage Type |
|---|---|
| Primary Memory | Directly addressable by CPU, contains RAM, ROM, and cache memory |
| Secondary Storage | Not directly addressable by CPU, non-volatile devices (e.g., HDD, SSD, DVD) |

## Comparison of DRAM and SRAM

| Feature | DRAM | SRAM |
|---|---|---|
| Construction | Transistors and capacitors | Flip flops |
| Refresh Requirement | Needs constant refreshing | No constant refreshing |
| Cost | Less expensive | More expensive |
| Power Consumtion | Consumes less power | Consumes more power |
| Memory Capacity | Higher memory capacity | Lower memory capacity |

## Types of Optical Storage Media

| Media Type | Characteristics |
|---|---|
| CD/DVD | Uses laser light to read and write data on metal alloy or organic dye layer |
| Blu-ray | Uses blue laser light, smaller pits and lands, higher capacity, and dual-layering |

## Cloud Storage Benefits and Drawbacks

| Aspect | Benefits | Drawbacks |
|---|---|---|
| Data Redundancy | Increased data redundancy and access-ibility | Security concerns and potential data loss |
| Accessibility | Access data from anywhere with an internet connection | Relinquishing control over data security |
| Cost | Cost-effective storage solutions | Risk of data loss from hacking and security breaches |

## SRAM(Static RAM)

| Aspect | Description |
|---|---|
| Composition | Uses flip-flops to hold each bit of memory |
| Refresh | No constant refreshing needed |
| Speed | Faster data access compared to DRAM (typically, access time for SRAM is 25 ns) |

## SSD(Solid State Drive)

| Aspect | Description |
|---|---|
| Composition | Uses NAND or NOR chips to control the movement of electrons, storing data as 0s and 1s in transistors |
| Advantages | - More reliable (no moving parts)<br>- Lighter and suitable for laptops<br>- Faster data access than HDD |

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## Virtual Memory

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## Cloud Storage

| Aspect | Description |
|---|---|
| Types | -Public cloud (different provider and client companies)<br>-Private cloud (integrated client and provider)<br>-Hybrid cloud (combination of public and private) |
| Reduncy | Data redundancy on multiple servers to ensure availability |
| Security Risks | Risks include physical security, natural disasters, and potential data loss from hacking or other breaches |

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