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 - 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) - Lighter and suitable for laptops - Faster data access than HDD

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Cloud Storage

Aspect	Description
Types	-Public cloud (different provider and client companies) -Private cloud (integrated client and provider) -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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