

Data Storage on the Computer

Hard Disk Drive (HDD)



Video – Hard Disk Drive

- non-volatile magnetic storage device
- one (or more) high-speed spinning disks
- read/write head on moving arm allows for random access to data

How Stuff Works - Hard Drives

Hard Drives – Long Term Storage

- non-volatile magnetic storage
 - all data is stored as a combination of single bits
 - bits are turned on (1) or off (0) using a small electromagnet
 - data is preserved even when power is off
- relatively low cost per megabyte/gigabyte of storage capacity
- slowest random access storage built into the computer

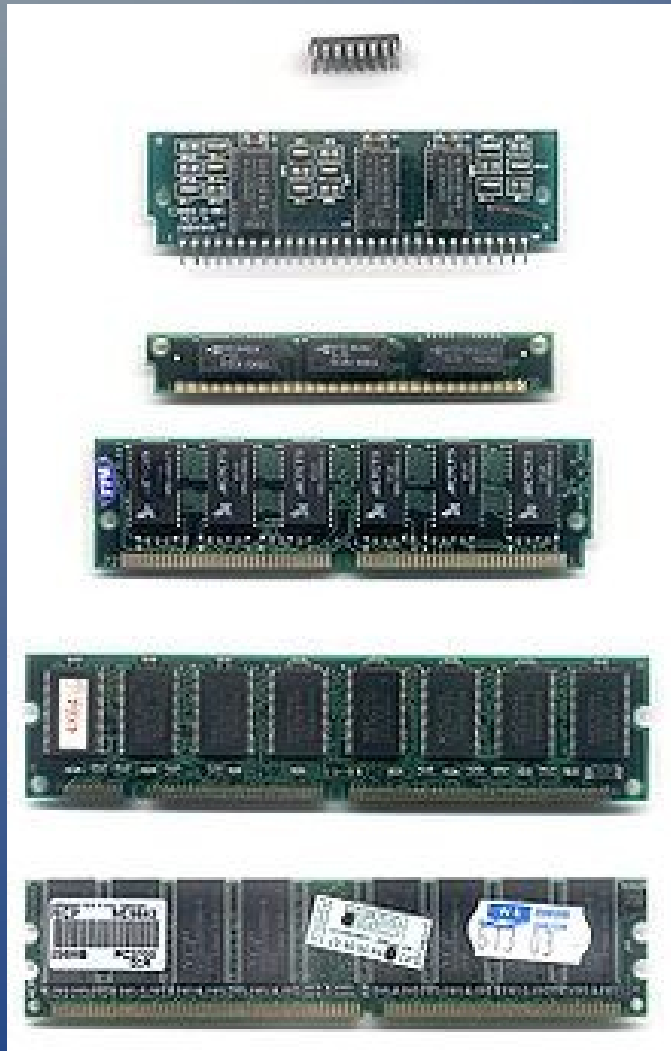
Hard Drive – Solid State Technology

Traditional hard drives are made up of one or more metal disks spinning at high speed.

Newer and faster hard drives are emerging that use no moving parts, and are similar to flash memory (e.g., usb memory sticks, digital cameras).

They currently have less capacity, but higher speed, than traditional spinning platter drives.

Dynamic Random Access Memory (DRAM, or often just RAM)



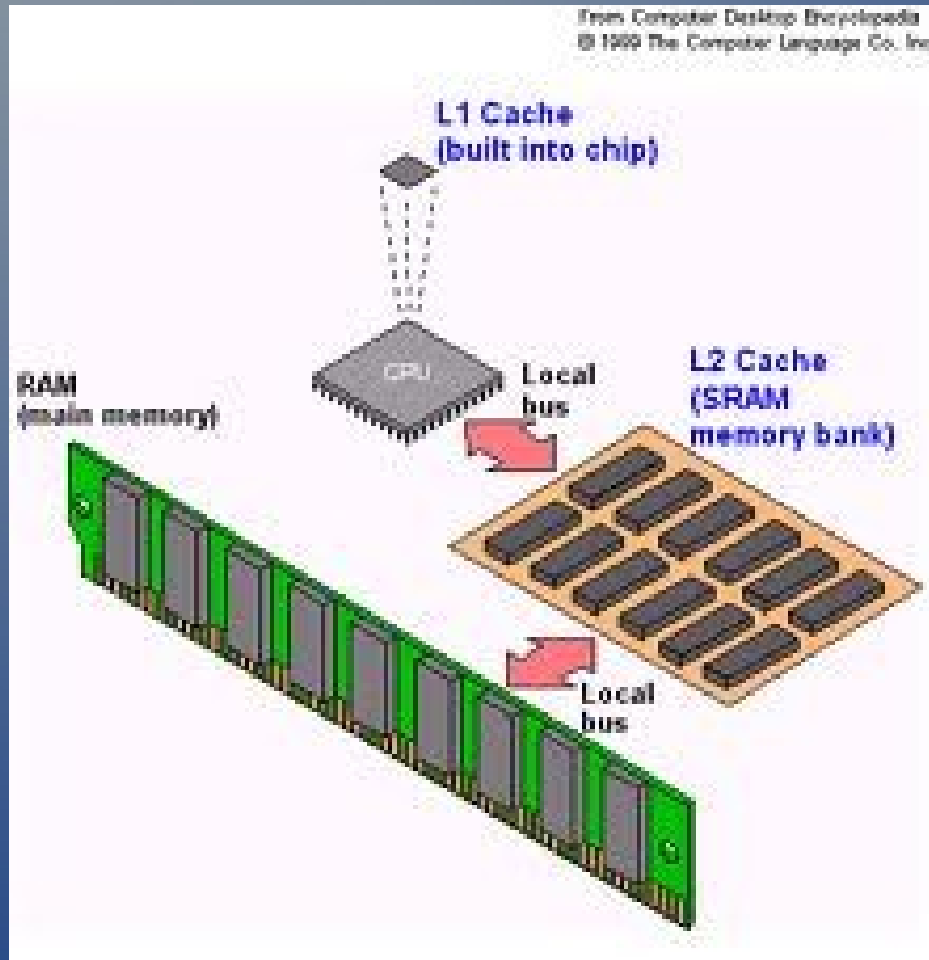
How Stuff Works - RAM

- volatile random access memory
- the "working memory" of the computer
- stores the program(s) and data currently in use

Dynamic Random Access Memory (DRAM)

- volatile electrical storage
 - power must be applied regularly to maintain data
 - once power is disconnected, data is lost
- fast solid-state storage
 - no moving parts
 - mounted directly to computer motherboard
- more expensive, so only used to store active programs and data

Cache Random Access Memory



- very fast random access memory
- three types
 - L1, L2, L3
- very expensive
- can greatly increase performance if used correctly

Cache Random Access Memory

- volatile random access memory
- first used to speed microprocessor activity, but later adapted for use with other hardware
 - many hard disk drives have cache
 - modern video cards
- very fast but very expensive, so only small amounts used

Read Only Memory (ROM)

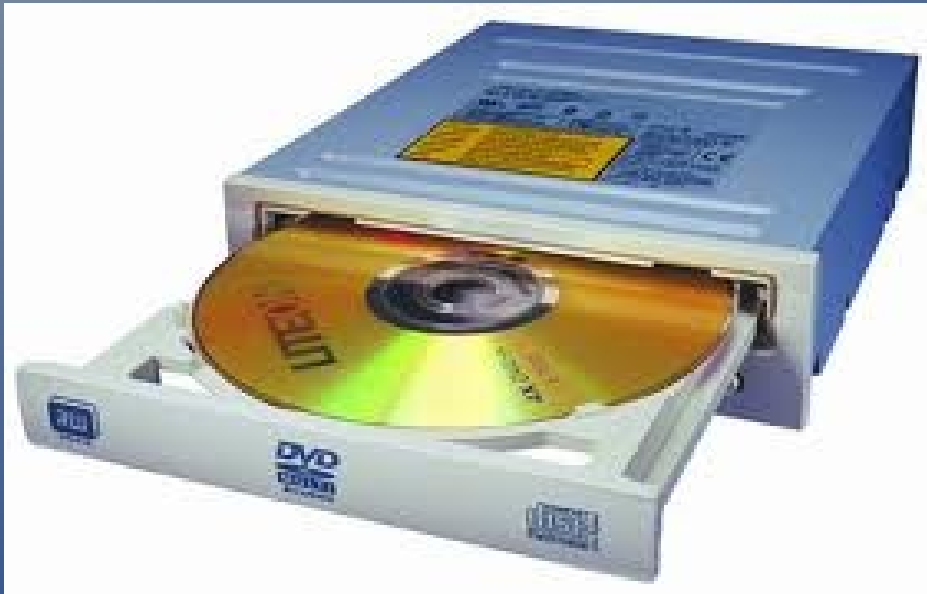
Non-Volatile Random Access Memory (NVRAM)

- non-volatile memory
- also known as firmware
- contains data required by computer as soon as it starts (boots)
 - most common is BIOS
 - basic input output system
 - tells computer how to talk to the rest of the hardware



How Stuff Works - ROM

CD and DVD Read Only Memory



- CD-ROM & DVD-ROM
- optical storage uses lasers to read and write data
- data transfer is slow compared other other storage
- relatively cheap

Storage – Working Together

- computer boots and loads BIOS from ROM to RAM
- running BIOS allows communication with HDD, CD/DVD, USB Storage
- load Operating System from Storage to RAM
 - Operating System takes over
- load other programs from HDD to RAM
 - if there isn't enough DRAM, some data must be left on the HDD
- recent data is stored in cache so the CPU can access it very quickly

Storage – A Student Model

- ROM allows basic activities like reading, talking
- external storage (CD/DVD ROM)
 - notes and textbooks for courses
- hard disk drive (HDD)
 - your long-term memories
- dynamic random access memory
 - your short-term memories
- cache
 - your current train of thought
 - might be gone in a very short period of time!