INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

CSN-101 (Introduction to Computer Science and Engineering)

Lecture 4: Computer Hardware Components and Their Working

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Piazza Class Room: https://piazza.com/iitr.ac.in/fall2019/csn101

[Access Code: csn101@2019]

Moodle Submission Site: https://moodle.iitr.ac.in/course/view.php?id=45

[Enrollment Key: csn101@2019]

Plan for Lecture Classes in CSN-101 (Autumn, 2019-2020)

Week	Lecture 1 (Monday 4-5 PM)	Lecture 2 (Friday 5-6 PM)
1	Evolution of Computer Hardware and Moore's Law, Software and Hardware in a Computer	Computer Structure and Components, Operating Systems
2	Computer Hardware: Block Diagrams, List of Components	Computer Hardware: List of Components, Working Principles in Brief, Organization of a Computer System
3	Linux OS	Linux OS
4	Writing Pseudo-codes for Algorithms to Solve Computational Problems	Writing Pseudo-codes for Algorithms to Solve Computational Problems
5	Sorting Algorithms – Bubble sort, selection sort, and Search Algorithms	Sorting Algorithms – Bubble sort, selection sort, and Search Algorithms
6	C Programming	C Programming
7	Number Systems: Binary, Octal, Hexadecimal, Conversions among them	Number Systems: Binary, Octal, Hexadecimal, Conversions among them
8	Number Systems: Negative number representation, Fractional (Real) number representation	Boolean Logic: Boolean Logic Basics, De Morgan's Theorem, Logic Gates: AND, OR, NOT, NOR, NAND, XOR, XNOR, Truth-tables
9	Computer Networking and Web Technologies: Basic concepts of networking, bandwidth, throughput	Computer Networking and Web Technologies: Basic concepts of networking, bandwidth, throughput
10	Different layers of networking, Network components, Type of networks	Network topologies, MAC, IP Addresses, DNS, URL
11	Different fields of CSE: Computer Architecture and Chip Design	Different fields of CSE: Data Structures, Algorithms and Programming Languages
12	Different fields of CSE: Database management	Different fields of CSE: Operating systems and System softwares
13	Different fields of CSE: Computer Networking, HPCs, Web technologies	Different Applications of CSE: Image Processing, CV, ML, DL
14	Different Applications of CSE: Data mining, Computaional Geometry, Cryptography, Information Security	Different Applications of CSE: Cyber-physical systems and IoTs

Memory:

- ROM: For BIOS (Basic Input Output System)
- CMOS RAM: Battery-backed memory used to store system specific parameters required by the system BIOS to boot. It also stores the system clock information.
- Cache: Static RAM attached to the CPU and used for storing current data. L1, L2, L3 Cache
- RAM: Dynamic RAM and used for storing Data and programs which disappear after task completed or power turned off
- Size: ex. 512MB, 2 GB
- Speed: ex. 533MHz, 667 MHz
- Type: ex. DDR2/3 SDRAM (Double Data Rate Synchronous RAM)
- Packaging: DIMM, SIMM

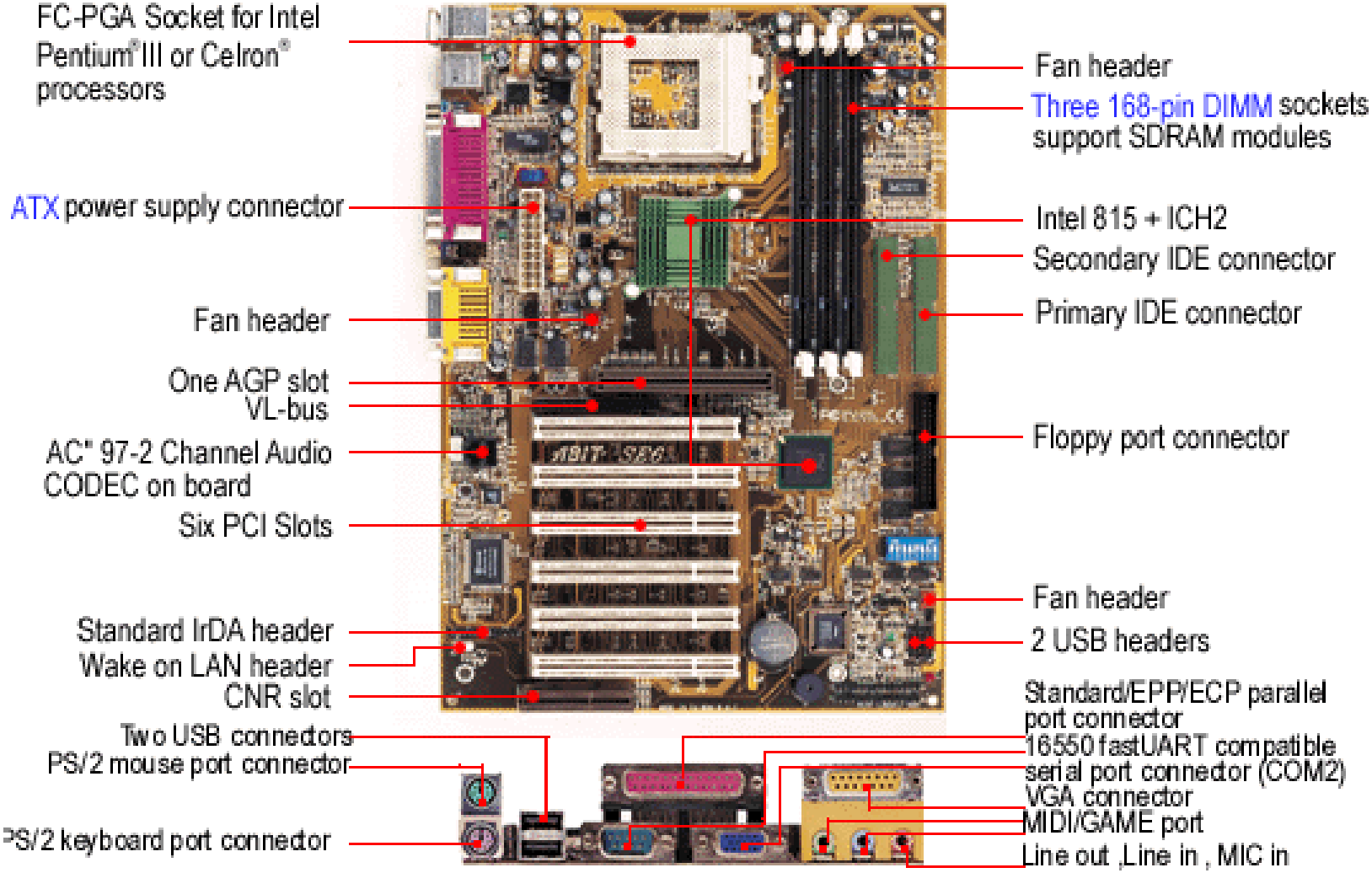
Memory:


REV:1.3
1GB PC3200 DDR400
Warranty Void If Removed
1GB PC3200 DDR400
Warranty Void If Removed
1GB PC3200 DDR400
Warranty Void If Removed
1GB PC3200 DDR400
Warranty Void If Removed
GIGABYTE


WARRANTY VOID IF LABEL REMOVED / TAMPERED
NO WARRANTY FOR PHYSICAL DAMAGE / BURNT
Simmtronics
10915
09360200115111122777267
15-11-12
1GB DDR 400 PC3200
3 YEARS WARRANTY FROM THIS DATE
NANYA
NT5DS32M8AT-7K
SINGAPORE

Mother Board:

- Holds CPU, memory, PCI bays, etc.



Power Supply:

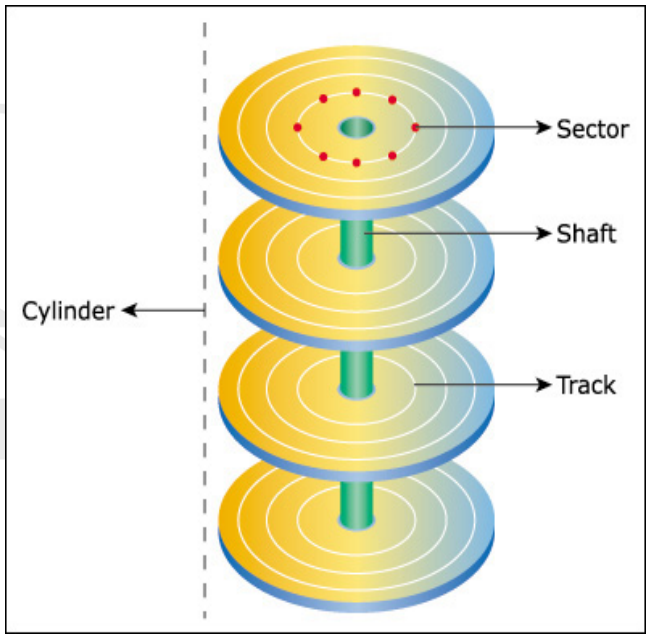
- SMPS (Switched Mode Power Supply)
- AC mains input is converted to DC voltage which feeds the Motherboard, drives and other devices.
- ATX (Advanced Technology Extended)
- Generally 90 - 250 watts

Mother Board:

Mother Board:

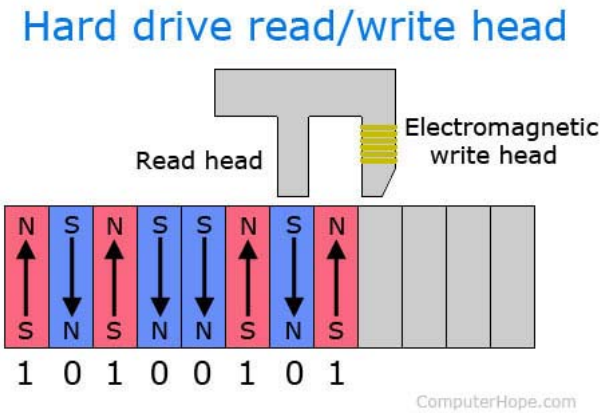
Hard Disk:

- Magnetic storage device. It stores data by magnetizing particles on a disk.
- Used to store operating system, application software, utilities and data.
- Metal, plastic, or glass platter(s)
- 2 magnetic surfaces/platter 1 or more platters per spindle
- 3,600 – 15,000 rpm
- 1 head/platter
- Head(s) move in and out



How Data is Organized on Disk?

- Tracks:
  - Circular areas of the disk
  - Length of a track one circumference of disk
  - Over 1000 on a hard disk
  - Data first written to outer most track
- Sectors:
  - Divides tracks sections
- Cylinders:
  - Logical groupings of the same track on each disk surface in a disk unit
- Clusters:
  - Groups of sectors used by operating system
  - 64 sectors in one cluster
- Data stored in blocks (pages) of 0.5 to 8 KB



Hard Disk:

- IDE: Obsolete, also called PATA (Parallel Advanced Technology Attachment), I/O Rate: 16 MB/s originally later 33, 66, 100 and 133 MB/s
- SATA (Serial ATA): Used in Desktops/Laptops, I/O Rate: 1.5/3 Gbps, 5400/7200 RPM
- SCSI (Small Computer System Interface): Used in Servers, 10/15K RPM, I/O Rate: 160/320 MB/s
- SAS (Serial Attached SCSI): Used in Servers, 10/15K RPM, I/O Rate: 3 Gbps
- FC (Fiber Channel): I/O Rate 4 Gbps, Expensive and used in Storage
- iSCSI: I/O Rate 4 Gbps, Expensive and used in Storage
- Solid State Drive: non-volatile flash memory

Hard Disk:

- Low-level format: organizes both sides of each platter into tracks and sectors to define where items will be stored on the disk.

- Partitioning: divide hard disk into separate areas called partitions; each partition functions as if it were a separate hard disk drive.

- High-level format: defines the file allocation table (FAT) for each partition, which is a table of information used to locate files on the disk.

Continued to Next Class…