

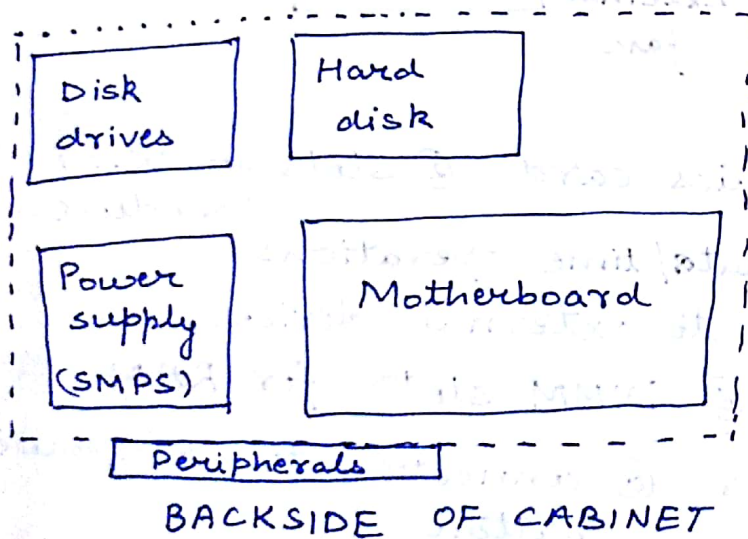
① Identify different parts of a computer.

A typical computer can be divided into the following subclasses of components that work together to achieve a common goal:

① Input ② Output ③ Memory ④ Control ⑤ datapath
where Control and Datapath can be combined into a single component - Processor.

Components involving input and output are normally the hardware visible to the user, while the rest are housed within the cabinet.

A normal workstation PC cabinet may look as the following

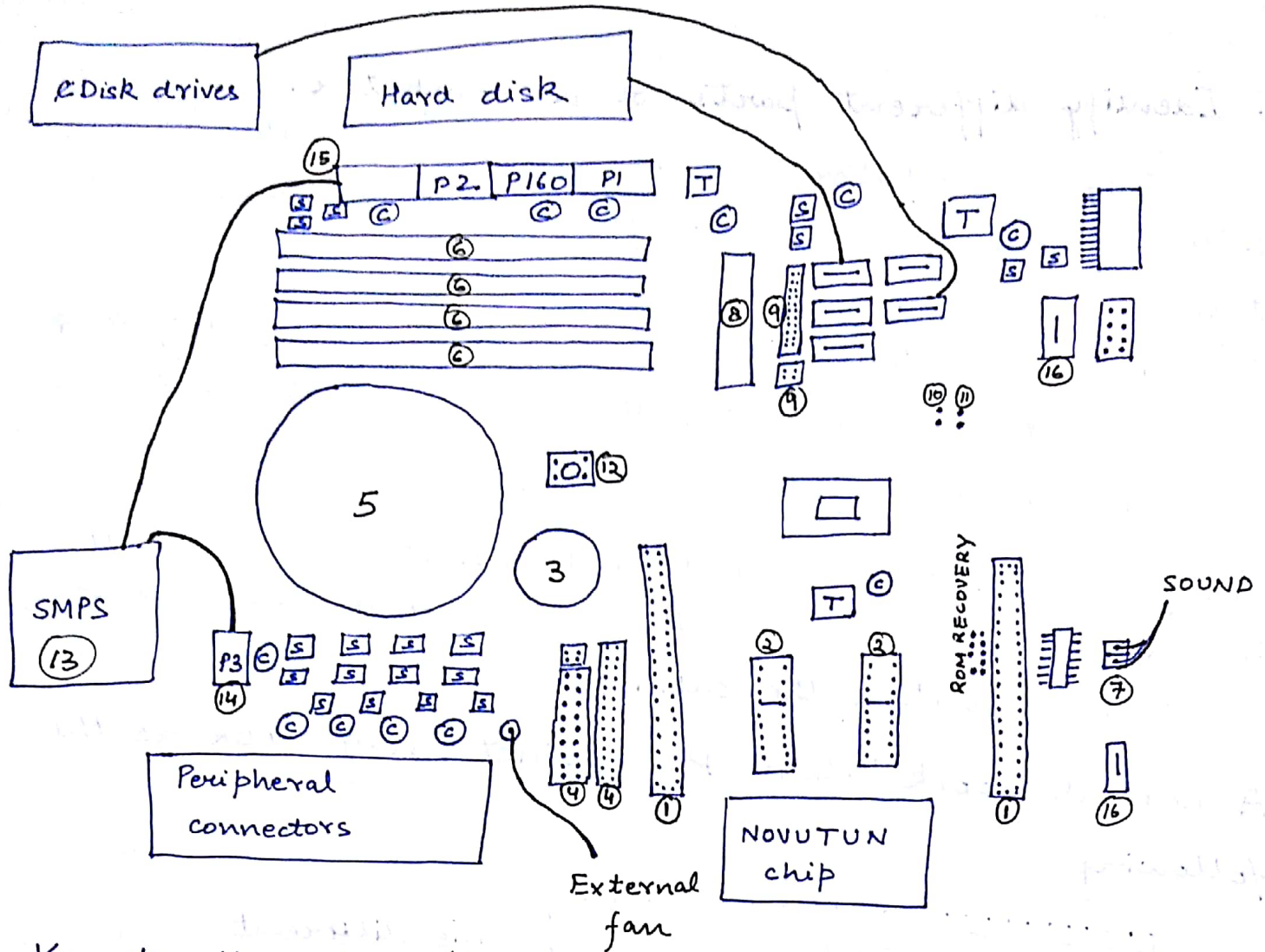


The different components are connected with jumper wires.

The motherboard is the most important component in the cabinet. There are generally three aspects to a motherboard:

- ① Slots - for hardware components
- ② Sockets - installing components directly
- ③ Connections - for power supply

② Schematic of HP SN-208FB/HPJHF cabinet



Key to the schematic —

- ① PCI slots for graphics card ② slots for WIFI module
- ③ battery controlling date/time operations
- ④ slots for connection to external devices
- ⑤ Processor with fan ⑥ DIMM slots for RAM
- ⑦ Sound port connector ⑧ connection to CPU power button
- ⑨ LAN connector
- ⑩ - ⑪ for resetting when BIOS for password is forgotten.
- ⑫ Motherboard reset button
- ⑬ SMPS power supply
- ⑭ P3 wire for st power supply
- ⑮ Power supply wiring ⑯ USB connectors

[S] - represents semiconductor chips on the motherboard

[C] - represents capacitors for charge and current manipulation

[T] - coiled copper tubes; might act as current manipulators.

There are a couple of extra wires P13 and P14 for extra disks to be added, if any.

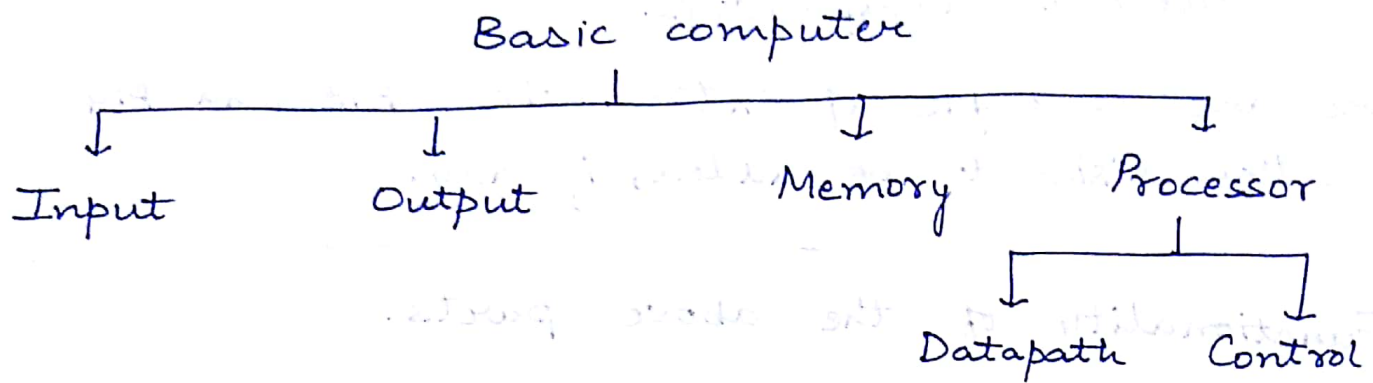
② Functionality of the above parts.

The functions of the highest level abstraction of a computer:

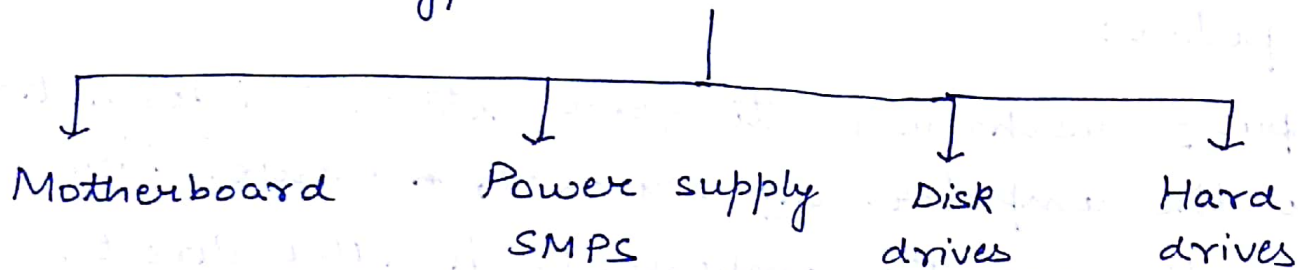
- (a) Input - mechanism to feed external information into the computer. ex. keyboard, * mouse. They generally are the components handled directly by the user.
- (b) Output - mechanism to convey the result of any computation to the desired end, ^{like.} ~~ex.~~ user or network or some disk. Examples include a monitor screen, printer etc.
- (c) Memory - stores the instruction set used to run some task as well as the data needed for the programs that are running.
- (d) Processor - functions as the brain of the computer. It consists of two parts - datapath and control.

(4) (d1) datapath - component of the processor that performs arithmetic operations

(d2) Control - component of the processor commanding the datapath, I/O devices, memory to carry out the instruction set given.



Typical workstation PC cabinet



Motherboard - motherboard coordinates all the tasks performed by a computer. It contains packages of integrated circuits (IC), slots, sockets, connectors, capacitors etc. and houses the processor. It is also responsible for memory and its management by various devices.

Some other functions involve:

- ① central connector for all peripherals
- ② bridge between the peripherals and the processor
- ③ Manages memory, cache memory, and secondary cache memory

⑤ Power supply (SMPS) - It is the switched mode power supply. Its job is to provide power to all other components of a cabinet. It uses switching regulator to convert incoming AC/DC power into DC voltages ~~usable~~ usable by the cabinet components.

Disk drives - slots for external CD-ROMs, Blue ray discs etc. Depending on need, external disk drives may also be added, and their power supply can be ensured using additional connector wires (P13 and P14 for instance).

Hard drives - houses the permanent memory hard drives, and is connected to the motherboard using connector/jumper wires. Here is stored all information that is not to be erased when the system shuts down.

1 Functions of parts of the motherboard (as in the schematic on Page 2):

- ① PCI slots for graphics - The Peripheral Component Interconnect allows connections to the graphics card bus.
- ② WiFi slots - Slots allowing connection to external WiFi modules.
- ③ Lithium battery - preserves the date and time of the system, such that the date/time is not reset once the computer is turned off.

④ External device connection slots — allow for expansion of the computer by allowing connections to other ~~connections~~ computers, modems, or network routers.

⑤ DIMM (Dual-Inline memory modules) — slots that allow insertion of DRAM chips on both sides. For instance, in the motherboard schematic considered, one slot amounts to 8 GB of memory and four DIMM slots amount to 32 GB of memory.

⑥ Sound port connector — connects to the sound hardware described by HDL (Hardware Description Language).

⑦ SATA connectors — The SATA connectors are the storage device connectors to connect to storage devices such as mechanical hard drives and solid state drives. The connectors are connected to the motherboard for data submission and retrieval.

⑧ LAN connector — external slot that aims to connect the external wire for the LAN — the LAN cable.

⑨ BIOS — Basic Input-Output System — helps the computer system get started after the computer is switched on. It also controls all the input/output operations for the attached devices — hard disk, video adapter, keyboard, mouse, and printer.

⑩ Reset button - when pressed resets the entire motherboard configuration

⑪ Central Processing Unit/ Processor - Housed in the motherboard, the processor is the most important component of the computer. The processor contains the control and the datapath mentioned before. It does the various numerical tasks like operations on numbers and signals back and forth from the I/O devices

Major parts of the processor involve -

- ① Control
- ② I/O interface
- ③ Data Cache
- ④ Instruction Cache
- ⑤ Enhanced floating point and multimedia
- ⑥ Integer datapath
- ⑦ Secondary cache and memory interface
- ⑧ Advanced pipeline and hyperthreading support

⑫ Heat sink - arrangement to cool off the processor. Most processors have fans as the cooling system, while others involve metal fins.