

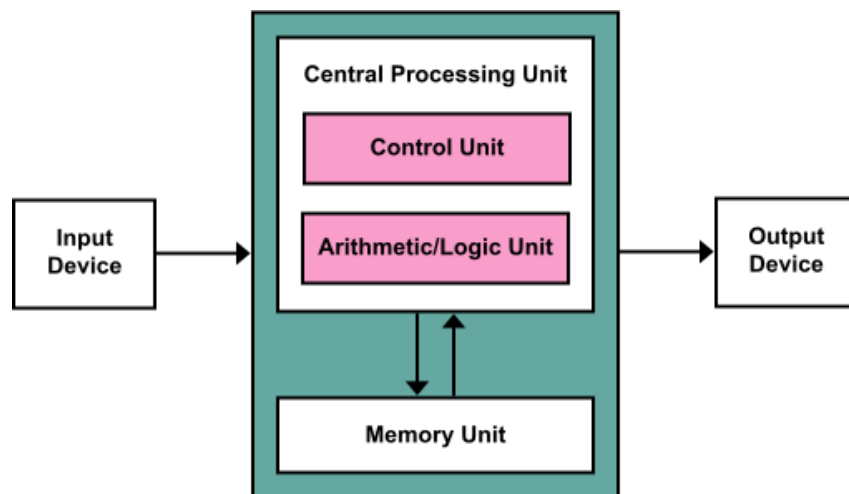
## Introduction

A computer is a high speed electronic data processing machine . It accepts data or instructions as input, process data and generates output. A combination of hardware and software forms a usable computing system.

Major functions of computer are

1. Data or instructions are accepted as input.
2. Data or instructions are stored in memory.
3. Stored data are processed.
4. Control of all operations inside the computer .
5. Results are displayed or printed.

## Basic Structure of a computer



1. **Input Devices:** The input units are used to read the necessary data in to the computer. Information is entered in to a computer through input devices .Eg., a keyboard , mouse etc.
2. **Central Processing Unit (CPU):**It is the brain of any computer system. It controls the operation of all other components. It performs the calculations, comparisons and general data processing of a computer system.The CPU has three major components namely Primary memory , Arithmetic Logic Unit and Control unit.
3. **Memory or Storage Unit:** It is used to store data, programs, immediate and final results. It can be classified in to two types : Primary Memory and Secondary.

### 3.a.Primary Memory or Main Memory

Primary memory also called as volatile memory because it can't store the data permanently. All data and program must be placed in the primary memory before they can be used in processing.

Two most important kinds of Primary memory are read-only memory(ROM) and Random Access Memory(RAM).

- RAM is the area where the Operating system, Application programs and the data in current use are kept temporarily so that they can be accessed by the computer's processor.
- ROM typically contains manufacturer's instructions . It also stores an initial program called 'bootstrap loader' Whose function is to start the operation of computer system once the power turned on.

### 3.b.Secondary Storage Device

It is the additional memory attached to a computer system. It permanently stores the data and programs. Eg., Hard disk, Compact disks(CD), Digital Video Disk(DVD).

### 3.c.Control Unit

Controlling of all operations like input, processing and output are performed by control unit. It takes care step by step processing of all operations inside the computer.

### 4.Output Device

**It enables you to show the output/result of processed data.e.g., monitor, printer etc.**

## COMPUTER HARDWARE

Computer hardware includes the physical parts of a computer, such as the computer case, central processing unit (CPU), monitor, mouse, keyboard, computer data storage, graphics card, sound card, speakers , motherboard etc.By contrast, software is the set of instructions that can be stored and run by hardware.

## INPUT DEVICES

### 1. KEYBOARD

A computer keyboard is an input device that allows a person to enter letters, numbers, and other symbols (these are called characters in a keyboard) into a computer. It is one of the most used input devices for computers. QWERTY layout is maintained keyboard.The Keys on computer keyboards are classified as

- ❖ Alphanumeric Keys – letter and numerals
- ❖ Punctuation Keys –comma, period, Semicolon,and so on
- ❖ Special Keys- Function keys,control keys, arrow keys,caps lock key and so on.



## 2. MOUSE

It is a small handheld device designed to control or move the pointer (computer screen's cursor) in a GUI (Graphical user interface). It allows you to point to or select objects on a computer's display screen. It is generally placed on a flat surface as we need to move it smoothly to control the pointer.



### Parts of a Mouse

1. Two buttons: A mouse is provided with two buttons for right click and left click.
2. Scroll Wheel: A wheel located between the right and left buttons, which is used to scroll up and down and Zoom in and Zoom out in some applications like AutoCAD.
3. Battery: A battery is required in a wireless mouse.
4. Motion Detection Assembly: A mouse can have a trackball or an optical sensor to provide signals to the computer about the motion and location of the mouse.

### Types of Mouse

1. Mechanical Mouse:-It has rubber or metal ball on its underside that can roll in all directions. Mechanical sensors within the mouse detect the direction the ball is rolling and move the screen accordingly.
2. Optomechanical Mouse:-Same as Mechanical Mouse, but uses optical sensors to detect motion of ball.
3. Optical Mouse:- Uses laser to detect the mouse's movement.
4. Cordless Mouse:- This type of mouse need not physically connected at all. Instead they use infrared or radio waves to communicate with the computer.

## 3. TRACKBALL

A trackball is an input device used to enter motion data into computers or other electronic devices. It serves the same purpose as a mouse, but is designed with a moveable ball on the top, which can be rolled in any direction. Instead of moving the whole device, you simply roll the moveable ball on top of the trackball unit with your hand to generate motion input. computer trackball devices also include

buttons, which can serve as left-click and right-click buttons, and may also be used to enter other commands.



#### 4. TOUCH SCREEN

A touchscreen is both an input and output device and normally layered on the top of an electronic visual display of an information processing system. A user can give input or control the information processing system through simple or multi-touch gestures by touching the screen with a special stylus or one or more fingers.



#### 5. TOUCH PAD

Touchpad (also called a trackpad) is a type of input device for computers that does the same things as a computer mouse. It is made up of a flat, touch-sensitive surface which the user slides one or more fingers on to move the cursor on the screen. Eg., Touchpad usually seen in laptops. Next to the touchpad are push-buttons that work just like mouse buttons, including left-clicking and right-clicking.



## 6. LIGHT PEN

A light pen is a light-sensitive computer input device, basically a stylus, that is used to select text, draw pictures and interact with user interface elements on a computer screen or monitor. The pen allowed users to precisely select individual pixels on the screen and to draw and interact with menu elements in much the same way as users interact with touchscreen displays . Eg., light pen to highlight text on the screen.



## 7. WEBCAMS

A webcam is an input device because it captures a video image of the scene in front of it. It is either built in to the computer (e.g. laptop) or it is connected through an USB cable.



## 8. JOYSTICK

A joystick is an input device that can be used for controlling the movement of the cursor or a pointer in a computer device. The pointer/cursor movement is controlled by maneuvering a lever on the joystick. The input device is mostly used for gaming applications and, sometimes, in graphics applications.



## 9. SCANNERS

Scanner is a device that optically scans images, printed text, handwriting or an object and converts it to a digital image. For example, a scanner may be used to convert a printed picture, drawing, or document (hard copy) into a digital file which can be edited on a computer.

Types of scanners

- Sheetfed scanner - scans paper by feeding it into the scanner
- Handheld scanner - scans text and images by dragging the device over the page you want to scan
- Card scanner - designed to scan business cards.

**10. MAGNETIC INK CHARACTER RECOGNITION (MICR)** : Magnetic Ink Character Recognition system reads characters printed in a special magnetic ink into the computer. The main users of MICR input device are banks. They use it to read information from cheques into their computers so that the cheques can be cashed.



**11. OPTICAL MARK RECOGNITION/READER (OMR)** :It is a special type of optical scanner used to recognize the type of mark made by pencil or pen. It is used in examinations having multiple choice questions.



**12. BARCODE READER** :It is a device used for reading bar-coded data-data in the form of light and dark lines. Bar coded data is generally used in labelling goods, numbering the books etc. It may be handheld scanner or may be embedded in a stationary scanner.



### 13. MICROPHONE

A microphone can be used to input sound. It is used to convert the spoken word to a digital signal for computer input. The microphone is plugged into the back of desktop computers into the computer sound card microphone port.



## OUTPUT DEVICES

### 1. MONITORS

A computer monitor is an output device that displays information in pictorial form. A monitor usually comprises the visual display, circuitry, casing, and power supply.



CRT



PLASMA



LCD



LED

## TYPES OF MONITORS

- CRT(Cathode Ray Tube) Monitor:

The first computer monitors used cathode ray tubes (CRTs). The cathode-ray tube (CRT) is a vacuum tube that contains one or more electron guns and a phosphorescent screen, and is used to display images.

- LCD(Liquid Crystal Display) Flat Panel Monitor:

It uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.

- TFT-LCD Monitor:

A thin-film-transistor liquid-crystal display (TFT LCD) is a variant of a liquid-crystal display (LCD) that uses thin-film-transistor (TFT) technology to improve image qualities such as addressability and contrast.

- LED Monitor:

An LED display is just the same as LED Panel, it is a flat panel display that uses light-emitting diodes as pixels.

- Plasma Monitor:

A plasma display panel (PDP) is a type of flat panel display that uses small cells containing plasma: ionized gas that responds to electric fields.

## 2. PRINTERS

A printer is an external hardware output device that takes the electronic data stored on a computer or other device and generates a hard copy of it. Printers are one of the most popular computer peripherals and are commonly used to print text and photos. Printers are classified into two types according to whether or not the image printed is formed by striking an ink ribbon against the paper. Impact-printers and Non-impact Printers.

### 2.1 Impact-printers

An Impact printer is a type of printer that operates by striking a metal or plastic head against an ink ribbon. The ink ribbon is pressed against the paper, marking the page with the appropriate character, dot, line or symbol.

Common examples of impact printers include:

- Dot matrix: Dot matrix printers work by striking a grid of pins against a ribbon. Different characters are printed by using different pin combinations.
- Daisy wheel printers: Daisy wheel printer, in order to print each character, the wheel spins to the appropriate petal and a hammer strikes the petal against the ribbon and the page.
- Other examples are Line printers, Drum printers, Chain printers etc





## 2.2 Non-impact Printers

Non-impact printers are printers that form characters and images without direct physical contact between the printing mechanism and the paper. Non-impact printers use a cartridge filled with toner or liquid ink, which allows them to produce fine-quality images quickly and quietly.

Examples of non-impact printers include:

- Laser printers: laser printers have a cylindrical drum that rolls electrically charged ink onto the paper. These type of printers can print 120 to 300 pages per minute.
- Inkjet printers: Inkjet printers form images with tiny dots, they spray tiny drops of ionized ink onto the sheet of paper. A typical ink-jet printers are suitable for producing high quality print. It provides a resolution of 300 dots per inch.
- Thermal printers: with thermal printers, output characters are formed by a special heating element placed with special heat-sensitive waxy paper, forming darkened dots when element reaches a critical temperature.

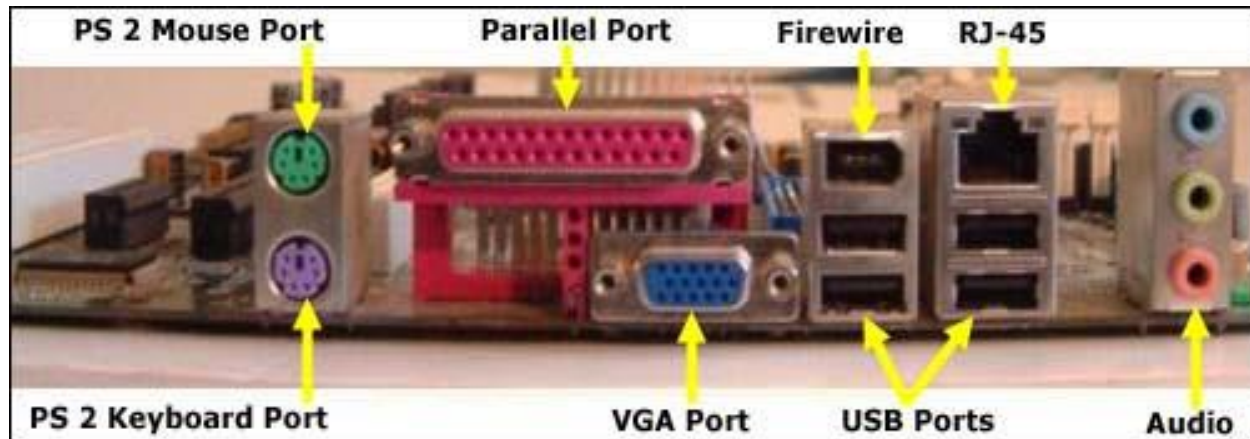
## 3. SPEAKER

A computer speaker is an output hardware device that connects to a computer to generate sound. The signal used to produce the sound that comes from a computer speaker is created by the computer's sound card.



## 4. PORTS

In computer hardware, a port serves as an interface between the computer and other computers or peripheral devices. In computer terms, a port generally refers to the part of a computing device available for connection to peripherals such as input and output devices



- PS/2 Port : The PS/2 (Personal System/2) port, also referred to as the mouse port or keyboard port, was developed by IBM. It is used to connect a computer mouse or keyboard to an IBM compatible computer.
- Serial port : In computing, a serial port is a serial communication interface through which information transfers in or out sequentially one bit at a time. This is in contrast to a parallel port, which communicates multiple bits simultaneously in parallel. The serial port is a type of connection on PCs that is used for peripherals such as mice, gaming controllers, modems, and older printers.
- Firewire : This is high-speed interface found on newer PC. It works well for digital audio and video. It is used for connecting external hard drives or high bandwidth peripherals.
- Parallel Port: It send multiple bits of data at once (parallel communication). The parallel port is found on the back of IBM compatible computers and is a 25-pin (type DB-25) computer interface commonly used to connect printers to the computer.
- Universal Serial Bus (USB): Most popular port used to connect peripherals such as printer, scanner etc.
- VGA Port: A Video Graphics Array connector is a standard connector used for computer video output ie. monitor.

#### OTHER HARDWARES OF A COMPUTER

#### COMPUTER CASE

A computer case, also known as a computer chassis, tower, system unit, or cabinet, is the enclosure that contains most of the components of a personal computer. The computer case is the metal and plastic box. It contains the main components of the computer, including the motherboard, central

processing unit (CPU), power supply etc. The front of the case usually has an On/Off button and one or more optical drives.



### CPU

The CPU Central Processing Unit is the most important part of your Computer. It also called the brain of the computer that responsible for fetching, decoding, and executing program instructions as well as performing mathematical and logical calculations. The CPU is seen as the main and most crucial integrated circuitry (IC) chip in a computer, as it is responsible for interpreting most of computers commands.



### Hard Disk Drive

A hard disk drive (HDD) is a non-volatile computer storage device containing magnetic disks or platters rotating at high speeds. It is a secondary storage device used to store data permanently.



### SSD

A solid-state drive (SSD) is a new generation of storage device used in computers. SSDs replace traditional mechanical hard disks by using flash-based memory, which is significantly faster.

Older hard-disk storage technologies run slower, which often makes your computer run slower than it should.



### SMPS

SMPS stands for Switched-Mode Power Supply. It is an electronic power supply that uses a switching regulator to convert electrical power efficiently. It is also known as Switching Mode Power Supply. It is power supply unit (PSU) generally used in computers to convert the voltage into the computer acceptable range. SMPS is a module that consists of multiple inductors, capacitors and semiconductor devices such as diodes and MOSFETs (Metal Oxide Silicon Field Effect Transistor or Metal Oxide Semiconductor Field Effect Transistor). It converts AC Voltage to DC Voltage.



### OPTICAL DISK DRIVE

An optical disc drive (ODD) is a disc drive that uses laser light or electromagnetic waves within or near the visible light spectrum as part of the process of reading or writing data to or from optical discs. Some drives can only read from certain discs, but recent drives can both read and record, also called burners or writers. Compact discs, DVDs, and Blu-ray discs are common types of optical media which can be read and recorded by such drives.



## GRAPHICS CARDS

The Graphics Card or video card is responsible for rendering an image to your monitor, it does this by converting data into a signal your monitor can understand. Graphics processing unit (GPU), which is the main part that does the actual computations

### TYPES OF GRAPHICS CARDS

Integrated – Graphics built into the motherboard where no add-in card is used.

Discrete – An add-in graphics card that is installed on to the motherboard as an extra component.



## SOUND CARD

A sound card (also known as an audio card) is an internal expansion card that provides input and output of audio signals to and from a computer under control of computer programs.

Typical uses of sound cards or sound card functionality include providing the audio component for multimedia applications such as music composition, editing video or audio, presentation, education and entertainment (games) and video projection. Sound cards are also used for computer-based communication such as voice over IP and teleconferencing.

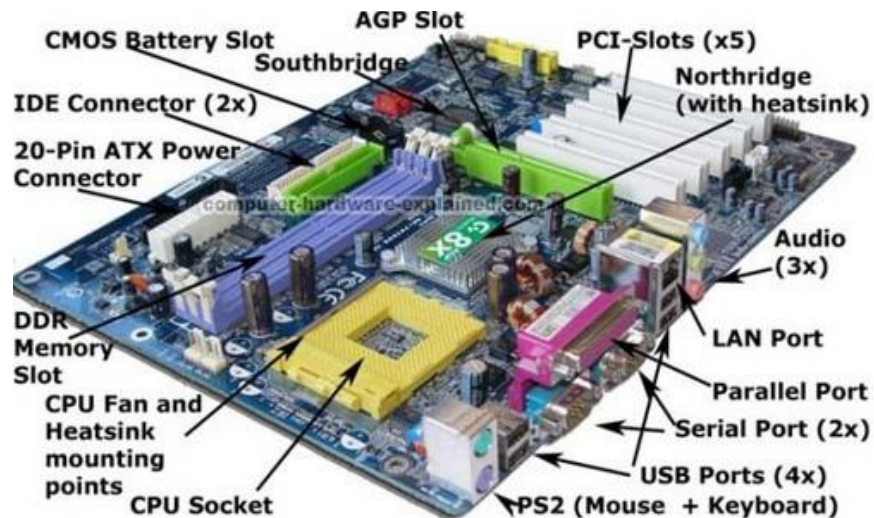


## MOTHER BOARD

The motherboard is a printed circuit board and foundation of a computer that is the biggest board in a computer chassis. It allocates power and allows communication to and between the CPU, RAM, and all other computer hardware components. Motherboard contains ports to connect all of the internal components. The motherboard provides a single socket for CPU, whereas for memory, normally one or more slots are available. Motherboards provide ports to



attach the floppy drive, hard drive, and optical drives via ribbon cables. Motherboard carries fans and a special port designed for power supply.



### CPU Socket

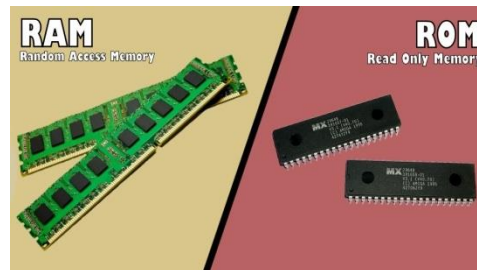
The CPU socket is where your CPU (processor) is installed.



### Main Memory

Two most important kinds of Primary memory are read-only memory(ROM) and Random Access Memory(RAM). RAM is Volatile memory. But ROM is Non-volatile memory. All data and programs must be placed in the primary memory before they can be used in processing. This unit can store instructions, data, and intermediate results. This unit supplies information to other units of the computer when needed. It is also known as internal storage unit or the main memory or the primary storage .ROM typically contains manufacturer's instructions. It also stores an initial program called 'bootstrap loader' whose function is to start the operation of computer system once the power turned on. Eg.,BIOS is a specific kind of ROM.RAM is the area where the operating system, application

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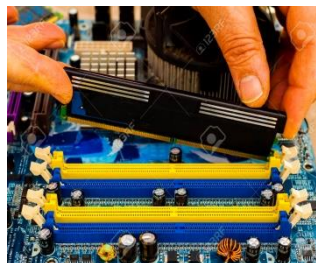


**Storage Capacity of Memory :** Storage capacity refers to how much disk space one or more storage devices provides. It measures how much data a computer system may contain. For an example, a computer with a 500GB hard drive has a storage capacity of 500 gigabytes.

0 or 1	=	1 Bit
8 Bits	=	1 Byte
1024 Bytes	=	1 Kilo Bytes (KB)
1024 KB	=	1 Mega Bytes (MB)
1024 MB	=	1 Giga Bytes (GB)
1024 GB	=	1 Tera Bytes (TB)
1024 TB	=	1 Peta Bytes (PB)

### Memory Slots

A memory slot or RAM slot is what allows computer memory (RAM) chip/stick to be inserted into the computer. Depending on the motherboard, there will usually be 2 to 4 memory slots.



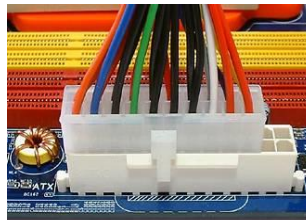
### Accelerated Graphics Port (AGP):

This port is used to connect graphic cards to a computer's motherboard. AGP provides much faster connectivity and throughput compared to PCI. An AGP is primarily designed to be used for 3D graphics, high definition games and engineering/architecture graphics.



### 20 pin ATX Power Connector:

It connects a power supply to an ATX style motherboard. ATX (Advanced Technology eXtended) is a motherboard and power supply configuration specification developed by Intel in 1995 to improve on previous de facto standards like the AT design.



### Basic Input/Output System (BIOS)

BIOS stands for Basic Input/Output System is where all the information and settings for the motherboard are stored. And It can be accessed, updated, and modified via the BIOS mode. BIOS is essentially the link between the computer hardware and software in a system. The BIOS is stored on a ROM chip because ROM retains information even when no power is being supplied to the computer and used during the startup routine (boot process) to check out the system and prepare to run the hardware.





### The CMOS Battery

Complementary Metal Oxide Semiconductor also known as CMOS battery is what's responsible for keeping all the information intact when the entire system is shut down. And all motherboards include a small separate block for CMOS which are kept alive by a battery (known as a CMOS battery) even when the PC's power is off. This prevents reconfiguration when the PC is powered on.



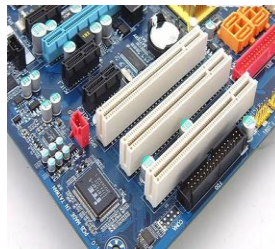
### Cache Memory

Cache memory is a small block of high-speed memory that acts as a buffer between RAM and the CPU. It holds frequently requested data and instructions so that they are immediately available to the processor on demand. Well, Most CPUs have an internal cache memory built into the processor that is referred to as Level 1 or primary cache memory. And this can be supplemented by external cache memory fitted on the motherboard that is the Level 2 or secondary cache.



### PCI slots

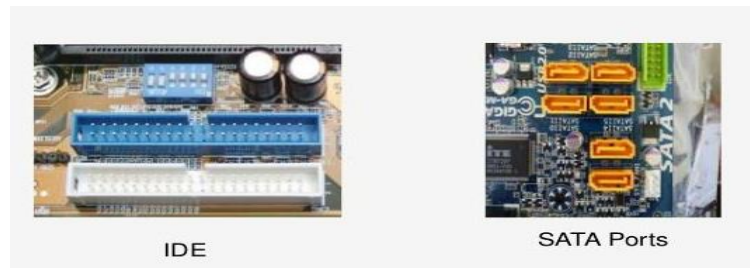
PCI stands for Peripheral Component Interconnect. These are the slots that allow inserting expansion cards such as graphics card, sound card, LAN card or several other functional computer parts. PCI is the most common expansion bus in a PC and other hardware platforms. Buses carry signals such as data, memory addresses, power, and control signals from component to component.



### IDE or SATA Ports

Integrated Drive Electronics (IDE) slots: These are the standard interface for connecting a motherboard to storage devices such as hard drives and CD-ROM/DVD drives.

But now the latest motherboards make use of SATA technology. A serial advanced technology attachment (serial ATA, SATA or S-ATA) is a computer bus interface used to connect host bus adapters (disk drive controllers) with mass storage devices like optical drives and hard drives.



### Computer Chip-sets

A chipset is a group of small circuits that coordinate the flow of data to and from a PC's key components. These key components include the CPU itself, the main memory, the secondary cache, and any devices situated on the buses. A chipset also controls data flow to and from hard disks and other devices connected to the IDE channels.



A computer has got two main chipsets:

- The **NorthBridge** (also called the memory controller) is in charge of controlling transfers between the processor and the RAM, which is why it is located physically near the processor. It is sometimes called the GMCH, for Graphic and Memory Controller Hub.
- The **SouthBridge** (also called the input/output controller or expansion controller) handles communications between slower peripheral devices such as USB, audio, serial, the system BIOS, the ISA bus, the interrupt controller and the IDE channels. It is also called the ICH (I/O Controller Hub). The term “bridge” is generally used to designate a component which connects two buses.