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Experiment 1

Aim: Study of pc motherboard technology(south bridge and north bridge), various connections and parts used in computer communication

LO & Statement - LO: 1) Demonstrate various components and peripheral of computer system

MOTHERBOARD:-

A **motherboard** is the main printed circuit board (PCB) in general-purpose computers and other expandable systems. It holds and allows communication between many of the crucial electronic components of a system, such as the central processing unit (CPU) and memory, and provides connectors for other peripherals. Unlike a backplane, a motherboard usually contains significant sub-systems, such as the central processor, the chipset's input/output and memory controllers, interface connectors, and other components integrated for general use. A motherboard provides the electrical connections by which the other components of the system communicate. Unlike a backplane, it also contains the central processing unit and hosts other subsystems and devices. A typical desktop computer has its microprocessor, main memory, and other essential components connected to the motherboard. Other components such as external storage, controllers for video display and sound, and peripheral devices may be attached to the motherboard as plug-in cards or via cables; in modern microcomputers, it is increasingly common to integrate some of these peripherals into the motherboard itself. Motherboards are produced in a variety of sizes and shape called computer form factor, some of which are specific to individual computer manufacturers. However, the motherboards used in IBM-compatible systems are designed to fit various case sizes. As of 2005, most desktop computer motherboards use the ATX standard form factor — even those found in Macintosh and Sun computers, which have not been built from commodity components. A case's motherboard and power supply unit (PSU) form factor must all match, though some smaller form factor motherboards of the same family will fit larger cases. With the steadily declining costs and size of integrated circuits, it is now possible to include support for many peripherals on the motherboard. By combining many functions on one PCB, the physical size and total cost of the system may be reduced; highly integrated motherboards are thus especially popular in small form factor and budget computers.

A typical motherboard will have a different number of connections depending on its standard and form factor. A standard, modern ATX motherboard will typically have two or three PCI-Express x16 connection for a graphics card, one or two legacy PCI slots for various expansion cards, and one or two PCI-E x1 (which has superseded PCI). A standard EATX motherboard will have two to four PCI-E x16 connection for graphics cards, and a varying number of PCI and PCI-E x1 slots. It can sometimes also have a PCI-E x4 slot (will vary between brands and models). Some motherboards have two or more PCI-E x16 slots, to allow more than 2 monitors without special hardware, or use a special graphics technology called SLI (for Nvidia) and Crossfire (for AMD). These allow 2 to 4 graphics cards to be linked together, to allow better performance in intensive graphical computing tasks, such as gaming, video editing, etc. In newer motherboards, the M.2 slots are for SSD and/or Wireless network interface controller.



Fig 1



Fig 2

INTEGRATED CIRCUIT (IC):-

An **integrated circuit** or monolithic integrated circuit (also referred to as an IC, a chip, or a microchip) is a set of electronic circuits on one small flat piece (or “chip”) of semiconductor material, normally silicon. The integration of large numbers of tiny transistors into a small chip results in circuits that are orders of magnitude smaller, cheaper, and faster than those constructed of discrete electronic components. An IC can function as an amplifier, oscillator, timer, counter, logic gate, computer memory, microcontroller or microprocessor. An IC is the fundamental building block of all modern electronic devices. In 1958 Jack Kilby of Texas Instruments, Inc., and Robert Noyce of Fairchild Semiconductor Corporation independently thought of a way to reduce circuit size further. They laid very thin paths of metal (usually aluminum or copper) directly on the same piece of material as their devices. These small paths acted as wires. With this technique an entire circuit could be “integrated” on a single piece of solid material and an integrated circuit (IC) thus created. ICs can contain hundreds of thousands of individual transistors on a single piece of material the size of a pea. Working with that many vacuum tubes would have been unrealistically awkward and expensive. The invention of the integrated circuit made technologies of the Information Age feasible. ICs are now used extensively in all walks of life, from cars to toasters to amusement park rides.



Fig 3



Fig 4

NORTHBRIDGE:-

A **northbridge**, (also host bridge, or memory controller hub) is one of two chips comprising the core logic chipset architecture on a PC motherboard. A northbridge is connected directly to a CPU via the front-side bus (FSB) to handle high-performance tasks, and is usually used in conjunction with a slower southbridge to manage communication between the CPU and other parts of the motherboard. The northbridge typically handles communications among the CPU, in some cases RAM, and PCI Express (or AGP) video cards, and the southbridge.^{[9][10]} Some northbridges also contain integrated video controllers, also known as a Graphics and Memory Controller Hub (GMCH) in Intel systems. Because different processors and RAM require different signaling, a given northbridge will typically work with only one or two classes of CPUs and generally only one type of RAM. The northbridge plays an important part in how far a computer can be overclocked, as its frequency is commonly used as a baseline for the CPU to establish its own operating frequency. This chip typically gets hotter as processor speed becomes faster, requiring more cooling.

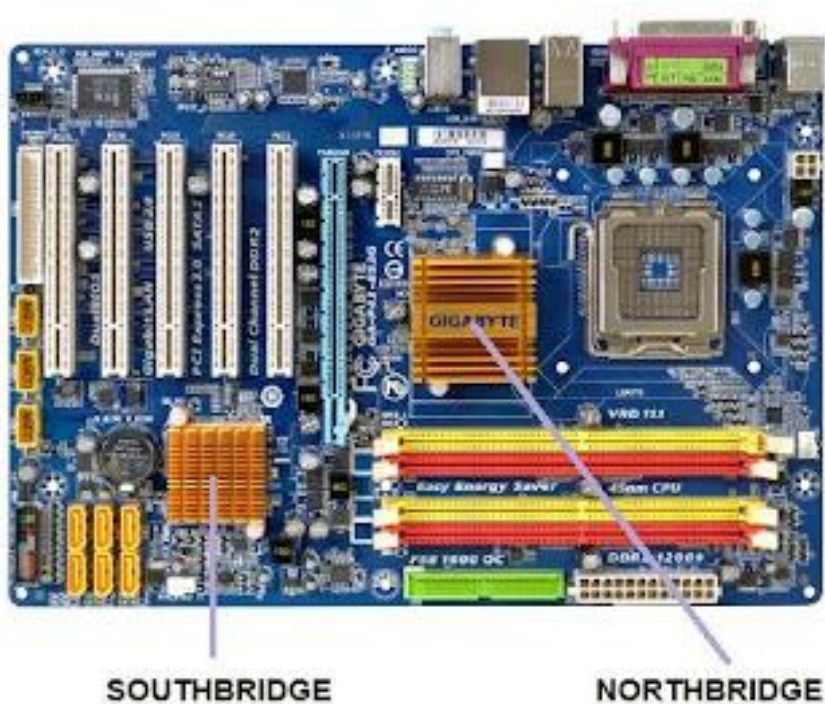


Fig 5

SOUTHBRIDGE:-

The **southbridge** is one of the two chips in the core logic chipset on a personal computer (PC) motherboard, the other being the northbridge. The southbridge typically implements the slower capabilities of the motherboard in a northbridge/southbridge chipset computer architecture. In systems with Intel chipsets, the southbridge is named I/O Controller Hub (ICH), while AMD has named its southbridge Fusion Controller Hub (FCH) since the introduction of its Fusion AMD Accelerated Processing Unit (APU) while moving the functions of the Northbridge onto the CPU die, hence making it similar in function to the Platform hub controller. The southbridge can usually be distinguished from the northbridge by not being directly connected to the CPU. Rather, the northbridge ties the southbridge to the CPU. Through the use of controller integrated channel circuitry, the northbridge can directly link signals from the I/O units to the CPU for data control and access.

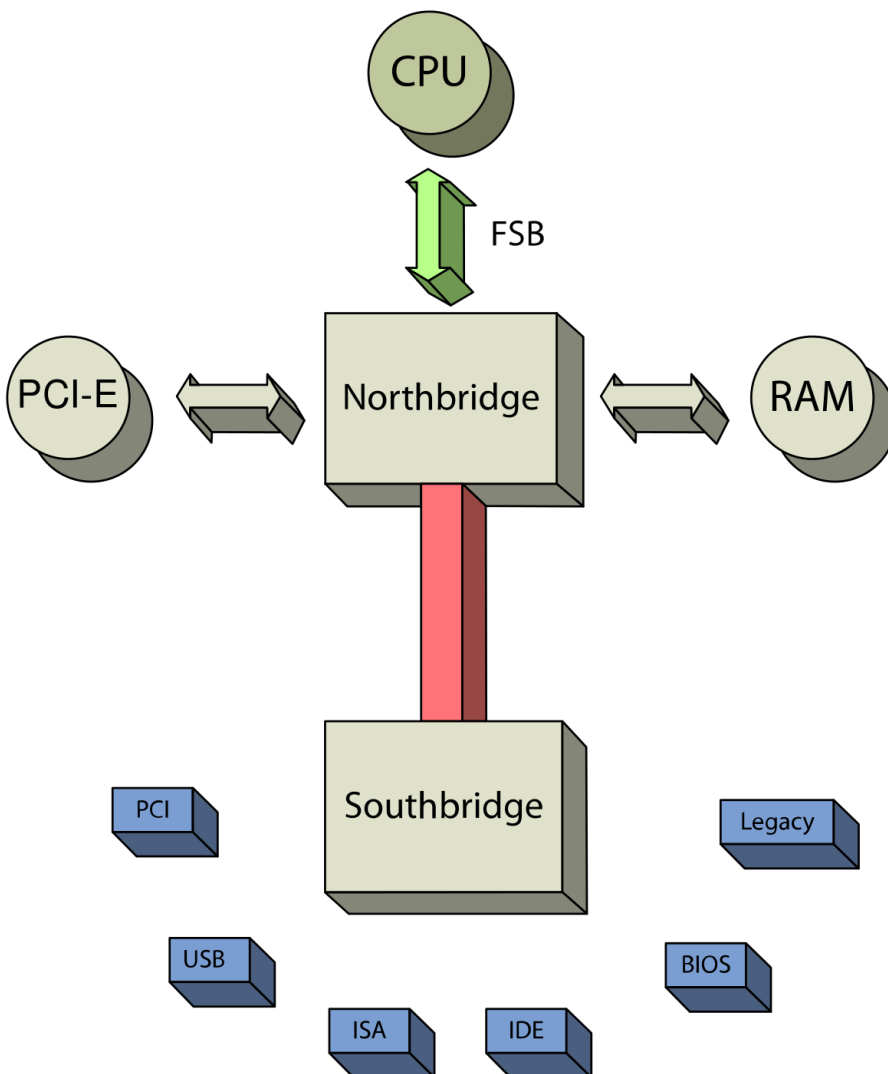


Fig 6

CONNECTORS:-

The CPU socket is the array of hundreds of holes or metal plates to which a computer's central processing unit connects. The CPU socket supplies power to the processor and allows data to be sent to and from the processor from the computer's memory.

A typical motherboard has at least two sockets for **Random Access Memory (RAM)**. RAM acts as a high-speed system for temporarily storing the data needed by programs while they are running. When the processor needs instructions, it receives them from the RAM, and when you save a document or file, it goes from the RAM to the hard drive.

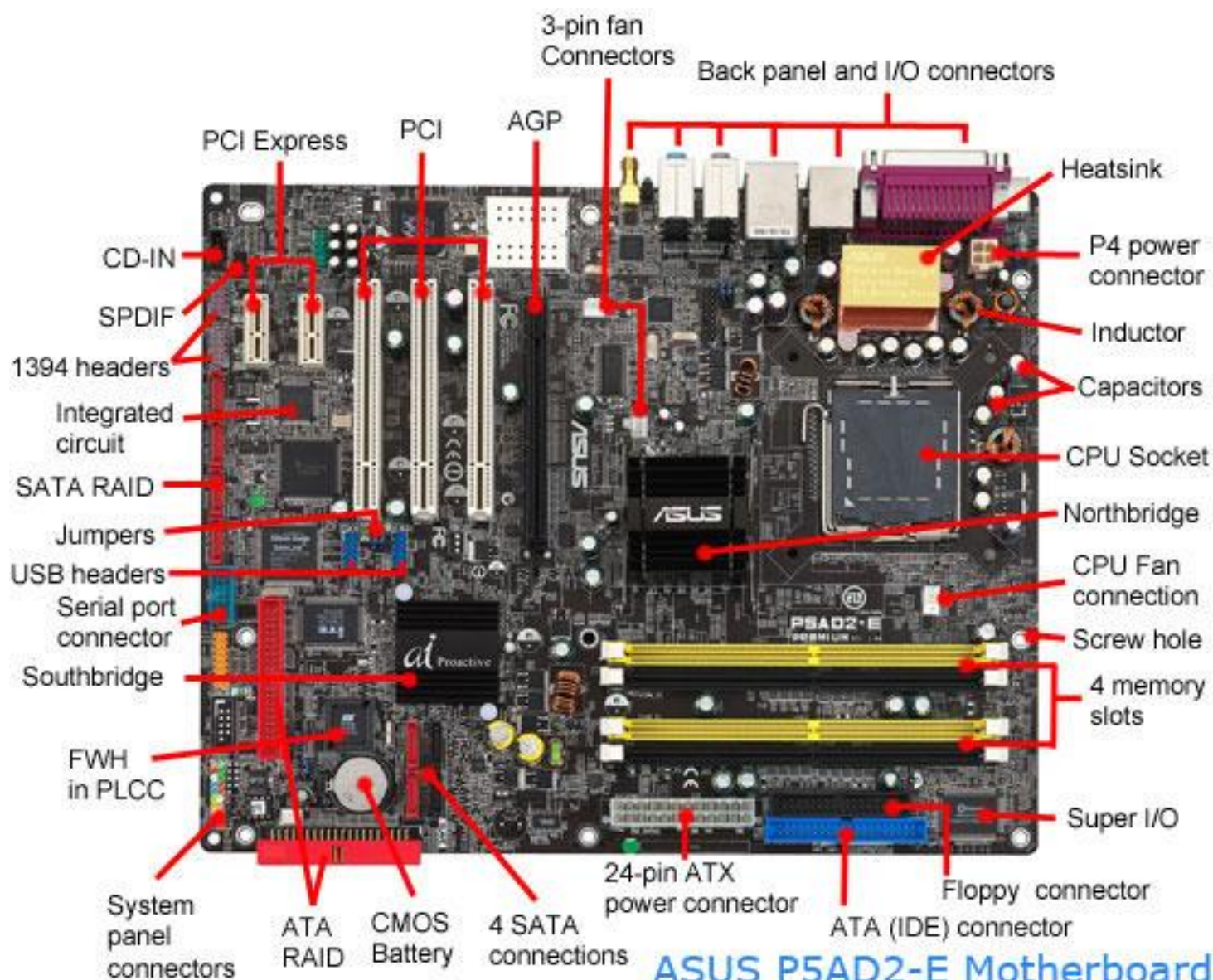
Generally, a motherboard has at least two **hard drive connectors**. Current motherboards use Serial Advanced Technology Attachment (SATA) hard drive connectors, which have L-shaped curves to ensure that cables are connected in the correct direction. The older Integrated Drive Electronics (IDE) connector uses two rows of 20 pins each. Some motherboards have connectors for both SATA and IDE drives. The computer's CD or DVD drive also connects to an IDE or SATA interface.

Motherboards have connectors for different types of **peripherals**, usually located on a back plane that remains exposed on the back of the computer case when the tower is closed. The most common peripheral connection is the Universal Serial Bus (USB) connection, while some motherboards also have connections for audio speakers along with ports for FireWire, serial and parallel devices. Some motherboards have additional "headers," or banks of pins, that can be used to connect additional peripheral ports on the front of the computer case.

Many motherboards have connectors for computer **add-on cards**. These connectors are long slots into which the cards are inserted. There are several types of add-on card connectors. Some of the most common include Peripheral Component Interconnect Express (PCIe) and Accelerated Graphics Port (AGP), used mainly for video cards, and conventional Peripheral Component Interconnect (PCI), used for other types of add-on cards such as sound cards and storage controllers.

Every motherboard has at least one **power connector**. This connector is used to bring power from the computer's main power supply to all of the computer's components. Because some of today's desktop computers have very high power requirements, some motherboards have additional ports for auxiliary power connectors.

A **power supply unit (PSU)** converts mains AC to low-voltage regulated DC power for the internal components of a computer. Modern personal computers universally use switched-mode power supplies. Some power supplies have a manual switch for selecting input voltage, while others automatically adapt to the mains voltage.



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Fig 7