

# **ASSIGNMENT**

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**Batch A**

**Roll No:29**

**Q)Prepare note on**

- 1. Components of a Motherboard**
- 2. RAM Modules**
- 3. Daughter Cards**
- 4. Bus Slots**
- 5. SMPS**
- 6. Internal storage devices**
- 7. Interfacing ports**

## **1.Component of MotherBoard**

### **MotherBoard**

Motherboard is the most important component in any personal computer. It contains almost : every important elements of the computer system. Normally, the motherboard contains the CPU, Memory, VGA, expansion slots etc.The motherboard of a computer is the main circuit board within a typical desktop computer, laptop or server. It is the central printed circuit board (PCB) in some complex electronic systems, such as modern personal computers. The motherboard is sometimes alternatively known as the mainboard, system board, or, on Apple computers, the logic board. It is also sometimes casually shortened to mobo.

### **Component of MotherBoard :**

There are so many components present in the motherboard. The main Components are ,

## **Basic Input/output System (BIOS)**

BIOS stands for Basic Input/Output System. BIOS is a "read-only" memory, which consists of low-level software that controls the system hardware and acts as an interface between the operating system and the hardware. BIOS is essentially the link between the computer hardware and software in a system. All motherboards include a small block of Read-Only Memory (ROM) which is separate from the main system memory used for loading and running software. On PCs, the BIOS contains all the code required to control the keyboard, display screen, disk drives, serial communications, and a number of miscellaneous functions. The system BIOS is a ROM chip on the motherboard used during the startup routine (boot process) to check out the system and prepare to run the hardware.

## **Central Processing Unit (CPU)**

The CPU is the computer's brain. It is responsible for fetching, decoding, and executing program instructions as well as performing mathematical and logical calculations. The processor chip is identified by the processor type and the manufacturer. This information is usually inscribed on the chip itself. For example, Intel 386, Advanced Micro Devices (AMD) 386, Cyrix 486, Pentium MMX, Intel Core 2Duo, or Core i7. If the processor chip is not on the motherboard, you can identify the processor socket as socket 1 to Socket 8, LGA 775 among others. This can help you identify the processor that fits in the socket.

## **The CMOS Battery**

Motherboards also include a small separate block of memory made from CMOS RAM chips 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. CMOS devices require very little power to operate.

### **The Computer Memory**

Random-Access Memory is volatile, meaning it loses its contents once power is turned off. This is different from non-volatile memory, such as hard disks and flash memory, which do not require a power source to retain data. When a computer shuts down properly, all data located in RAM is returned to permanent storage on the hard drive or flash drive. At the next boot-up, RAM begins to fill with programs automatically loaded at startup, a process called booting. Later on, the user opens other files and programs that are still loaded in memory.

### **Cache Memory**

Cache memory is a small block of high-speed memory (RAM) that enhances PC performance by pre-loading information from the (relatively slow) main memory and passing it to the processor on demand. Most CPUs have an internal cache memory which is referred to as Level 1 or primary cache memory. This can be supplemented by external cache memory fitted on the motherboard.

### **Expansion Buses**

An expansion bus is an input/output pathway from the CPU to peripheral devices and it is typically made up of a series of slots on the motherboard. Expansion boards plug into the bus.

## **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.

## **Expansion slots**

The expansion slots are the backbone of a computer. Without the expansion slots computer will not be of much use. If we want to add some new peripheral devices to our computer, we need an expansion slot. Expansion slots are long thin connectors on the motherboard, on which one can connect various expansion cards such as display card, usb card, sound card, network card etc. These slots are categorized according to the number of bits that they can transfer at a time and the bus architecture used.

The expansion slots can be divided into the following categories:

- 8-bit ISA
- 16-bit ISA
- MCA
- EISA
- VESA Local or VL Bus
- PCI Local Bus
- PCI Express

- AGP

Modern Pentium based motherboards manufacturers stopped using ISA slots they provide only PCI, AGP and PCI Express slots.

## **Ports**

Ports are used by a motherboard to interface with electronics both inside and outside of the computer. Integrated ports are those that are part of, directly wired to, the motherboard. Internal integrated ports are used to connect devices inside the system unit. External ports may be connected to the motherboard directly (integrated) or by circuit boards that are inserted into slots on the motherboard. It is often possible to add new external ports by inserting such a circuit board into an open slot. The external integrated ports are generally grouped together as shown below. Expansion card ports are arranged in a row of equal sized rectangular slots.

Typical integrated motherboard ports are

### **1. PS/2**

PS/2 ports were for connecting peripherals such as mouse and keyboard to the computer, but are now outdated. PS/2 based mice and keyboards have now been replaced by USB ports as the popular standard. This trend for USB over PS/2 started in circa 2004.

### **2. USB**

USB, or Universal Serial Bus, is a connectivity specification, currently at version 3 (V3). They are very common today, connecting flash drives and many peripherals. Modern desktop systems have should have 4-8 on the back of the computer and

at least two on the front. USB is one of the most successful interconnect in computing history. V1 operates at 1.5 Mbps (low speed) or 12 Mbps (full speed), V2 (high speed) at 480 Mbps, and V3 (super speed) at up to 5Gbps. It can be found in over 2 billion PC and mobile devices. USB has strong consumer brand recognition and a reputation for ease-of-use. USB connectors are sometimes used to supply power, generally to recharge handheld devices like a smartphone.

### 3. Serial

An outdated piece of technology, serial ports were most often used to connect the mouse and keyboard. By circa 2000, most personal computers stopped relying on serial ports and were replaced by PS/2 and/or USB ports.

### 4. Parallel

Parallel ports are used to connect other peripherals such as joysticks, and more commonly, printers. Similar to the serial port, this technology is slowly being phased out in favor of USB. Parallel ports can still be found in many motherboards today.

### 5. VGA

A VGA, or Video Graphics Array, connector is used to connect a monitor or other video equipment. The same connector is sometimes used for high definition television and is sometimes called an RGB connector.

### 6. Audio

The audio input and stereo output ports connect to external speakers, a microphone, head sets, and possibly a game. The external ports are color coded by industry standard.

## **Firewire**

Technically known as the IEEE 1394 interface, but dubbed by Apple as Firewire this connection medium hoped to surpass USB in terms of speed and popularity. While it did outperform USB v2 in speed tests, uptake was very limited due to the existing widespread use of USB. Firewire is the standard for high definition audio and video transfer and may be found on many digital camcorders. Also known by the brand names i.LINK and Lynx.

## **Modem**

For many years the telephone, or voice band, modem was the primary means of connecting desktop and laptop PCs to the Internet. Modems have not gone away, as broadband connections are not available in all areas. A standard telephone modem uses your existing analog telephone line at speeds up 56 Kbps. The speed is limited by the quality of the phone line connection — extraneous noise lowers the actual throughput.

## **ExpressCard**

The ExpressCard and slot is used primarily on laptop computers. It replaces the older PC Card. The ExpressCard comes in two sizes, although the ExpressCard/34 may be used in an ExpressCard/54 slot. Hardware that may be plugged into a computer via an ExpressCard includes connect cards, FireWire 800 (1394B), USB 3.0, 1Gb/sec Ethernet, Serial ATA external stick drives, solid-state drives, external enclosures for desktop size PCI Express graphics cards, wireless network interface cards, TV tuner cards, common access card (CAC) readers, and sound cards.[src] Other card slots may also be available, such a PC cards, smart cards, and secure digital cards.



## **Graphics Card**

Graphics cards are also called video cards or a video adapter. They are in all PCs, but may be integrated on the motherboard. Graphic cards generate output images that can be displayed on the monitor. While many graphics cards are built into the motherboard these days, enthusiasts will invest in stand-alone graphics cards with more powerful processing capabilities. This allows for heavy image editing, or better rendering and frame rates in computer games.

## **Sound Card**

A sound card, also referred to as an audio card, facilitates the input and output of audio signals to and from a computer under the control of computer programs. Sound cards for computers were uncommon until 1988, which left the single internal PC speaker as the only way early PC software could produce sound and music. Uses of a sound card include the audio component's for multimedia applications such as games, video/audio editing software and music composition. Most computers today have sound capabilities built into the motherboard, while others require additional expansion cards.

## **Network Interface Card**

A Network Interface Card (NIC), also called a network card, network adapter, or LAN Adapter is a piece of computer hardware designed to allow computers to communicate over a computer network. Used for remote communication via cable. Data is transmitted over a cable network. The NIC connects computers to the Internet and other devices, such as printers. Many modern motherboards have NICs built in by default. Most laptops also provide a wireless adapter or wireless network interface controller (WNIC).

## **2.RAM modules**

Alternatively referred to as main memory, primary memory, or system memory, RAM (random-access memory) is a hardware device that allows information to be stored and retrieved on a computer. RAM is usually associated with DRAM, which is a type of memory module. Because data is accessed randomly instead of sequentially like it is on a CD or hard drive, access times are much faster. However, unlike ROM, RAM is a volatile memory and requires power to keep the data accessible. If the computer is turned off, all data contained in RAM is lost.

### Types of RAM

Over the evolution of the computer, there have been different variations of RAM. Some of the more common examples are DIMM, RIMM, SIMM, SO-DIMM, and SOO-RIMM. A piece of RAM found in older desktop computers. This memory module would be installed into one of the memory slots on a motherboard.

Computer DIMM or dual-inline memory module.

As the computer boots, parts of the operating system and drivers are loaded into memory, which allows the CPU to process instructions faster and speed up the boot process. After the operating system is loaded, programs you open like the browser you're using to view this page are also loaded into memory. If too many programs are open, the computer swaps the data in the memory between the RAM and the hard disk drive.

A computer's performance is largely attributed to the amount of memory contained within it. If a computer does not have the recommended memory to run the operating system and its programs, it results in slower performance. The more memory a computer has, the more information and software it can load and process quickly.

Computer memory is generally classified as either internal or external memory.

Internal memory, also called "main or primary memory" refers to memory that stores small amounts of data that can be accessed quickly while the computer is running.

External memory, also called "secondary memory" refers to a storage device that can retain or store data persistently. They could be embedded or removable storage devices. Examples include hard disk or solid state drives, USB flash drives, and compact discs.

ROM stands for read-only memory. It is non-volatile, which means it can retain data even without power. It is used mainly to start or boot up a computer.

Once the operating system is loaded, the computer uses RAM, which stands for random access memory, which temporarily stores data while the central processing unit (CPU) is executing other tasks. With more RAM on the computer, the less the CPU has to read data from the external or secondary memory (storage device), allowing the computer to run faster. RAM is fast but it is volatile, which means it will not retain data if there is no power. It is therefore important to save data to the storage device before the system is turned off.

There are two main types of RAM: Dynamic RAM (DRAM) and Static RAM (SRAM).

DRAM is widely used as a computer's main memory. Each DRAM memory cell is made up of a transistor and a capacitor within an integrated circuit, and a data bit is stored in the capacitor. Since transistors always leak a small amount, the capacitors will slowly discharge, causing information stored in it to drain; hence, DRAM has to be refreshed (given a new electronic charge) every few milliseconds to retain data.

SRAM is made up of four to six transistors. It keeps data in the memory as long as power is supplied to the system unlike DRAM, which has to be refreshed periodically. As such, SRAM is faster but also more expensive, making DRAM the more prevalent memory in computer systems.

Synchronous DRAM (SDRAM) "synchronizes" the memory speed with CPU clock speed so that the memory controller knows the exact clock cycle when the requested data will be ready. This allows the CPU to perform more instructions at a given time. Typical SDRAM transfers data at speeds up to 133 MHz.

Rambus DRAM (RDRAM) takes its name after the company that made it, Rambus. It was popular in the early 2000s and was mainly used for video game devices and graphics cards, with transfer speeds up to 1 GHz.

The types of DRAM packages are

Single In-Line Memory Module (SIMM)

SIMM modules were widely used from the late 1980s to 1990s, and are now obsolete. They typically had 32-bit data bus and were available in two physical types—30- and 72-pin.

### Dual In-Line Memory Module (DIMM)

Current memory modules come in DIMMs. "Dual in-line" refers to pins on both sides of the modules. A DIMM originally had a 168-pin connector supporting 64-bit data bus, which is twice the data width of SIMMs. The wider bus means that more data can pass through a DIMM, translating to faster overall performance. Latest DIMMs based on fourth-generation double data rate (DDR4) SDRAM have 288-pin connectors for increased data throughput.

There are several DIMM architectures. Different platforms can accommodate different memory types so it is best to check which modules are supported on the motherboard. Here are the most common standard DIMMs, with a typical length of 133.35 mm and height of 30 mm.

### **3.Daughter card**

A daughtercard is also called a daughterboard. A daughterboard (daughter card) is a circuit board that plugs into and extends the circuitry of another circuit board. The other circuit board may be the computer's main board (its motherboard) or it may be another board or card that is already in the computer, often a sound card.

The term is commonly used by manufacturers of wavetable daughter boards that attach to existing sound cards.

A mezzanine card is a kind of daughterboard that is installed in the same plane as but on a second level above the motherboard.

A printed circuit board that plugs into another circuit board .A daughtercard is similar to an expansion board, but it accesses the motherboard components (memory and CPU) directly instead of sending data through the slower expansion bus.

#### **4.Expansion slot**

It is also known as a bus slot or expansion port, an expansion slot is a connection or port inside a computer on the motherboard or riser card. It provides an installation point for a hardware expansion card to be connected. For example, if you wanted to install a new video card in the computer, you'd purchase a video expansion card and install that card into the compatible expansion slot.

Computer expansion slots

AGP - Video card.

AMR - Modem, sound card.

CNR - Modem, network card, sound card.

EISA - SCSI, network card, video card.

ISA - Network card, sound card, video card.

PCI - Network card, SCSI, sound card, video card.

PCI Express - Video card, modem, sound card, network card.

VESA - Video card.

## **5. SMPS: Switched-Mode Power Supply/ Switching Mode Power Supply**

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. This device has the power handling electronic components that converts

electrical power efficiently. Switched Mode Power Supply uses a great power conversion technique to reduce overall power loss.

## **6. INTERNAL STORAGE DEVICES**

Internal storage can different things, but most often refers to a computer's internal hard drive. This is the primary storage device used to store a user's files and applications. If a computer has multiple internal hard drives, they are all considered part of the computer's internal storage.

Another popular type of internal storage is flash memory. It serves the same purpose as a hard drive, but stores data electronically rather than magnetically. Flash memory is the most common type of internal storage used by portable electronic devices, such as mobile phones and portable music players. Some computers now use flash drives rather than hard drives as well.

Internal storage can be contrasted with external storage, which includes devices such as external hard drives, network drives, and removable media, such as CDs and DVDs.

Primary storage is also known as main memory, internal memory or prime memory often referred to simply as memory, is the only one directly accessible to the CPU. The CPU continuously reads instructions stored there and executes them as required. Any data actively operated on is also stored there in uniform manner. This led to modern random-access memory (RAM). It is small-sized, light, but quite expensive at the same time



Processor registers are located inside the processor. Each register typically holds a word of data often 32 or 64 bits. CPU instructions instruct the arithmetic logic unit to perform various calculations or other operations on this data or with the help of it. Registers are the fastest of all forms of computer data storage.

Processor cache is an intermediate stage between ultra-fast registers and much slower main memory. It was introduced solely to improve the performance of computers. Most actively used information in the main memory is just duplicated in the cache memory, which is faster, but of much lesser capacity. On the other hand, main memory is much slower, but has a much greater storage capacity than processor registers. Multi-level hierarchical cache setup is also commonly used—primary cache being smallest, fastest and located inside the processor; secondary cache being somewhat larger and slower.

Main memory is directly or indirectly connected to the central processing unit via a memory bus. It is actually two buses (not on the diagram): an address bus and a data bus. The CPU firstly sends a number through an address bus, a number called memory address, that indicates the desired location of data. Then it reads or writes the data in the memory cells using the data bus. Additionally, a memory management unit (MMU) is a small device between CPU and RAM recalculating the actual memory address, for example to provide an abstraction of virtual memory or other tasks. As the RAM types used for primary storage are volatile a computer containing only such storage would not have a source to read instructions from, in order to start the computer. Hence, non-volatile primary storage containing a small startup program (BIOS) is used to bootstrap the computer, that is, to read a larger program from non-volatile secondary storage

to RAM and start to execute it. A non-volatile technology used for this purpose is called ROM, for read-only memory. Many types of "ROM" are not literally read only, as updates to them are possible; however it is slow and memory must be erased in large portions before it can be re-written. Some embedded systems run programs directly from ROM (or similar), because such programs are rarely changed. Standard computers do not store non-rudimentary programs in ROM, and rather, use large capacities of secondary storage, which is non-volatile as well, and not as costly.

### **Secondary storage**

Secondary storage also known as external memory or auxiliary storage differs from primary storage in that it is not directly accessible by the CPU. The computer usually uses its input/output channels to access secondary storage and transfer the desired data to primary storage. Secondary storage is nonvolatile (retaining data when its power is shut off). Modern computer systems typically have two orders of magnitude more secondary storage than primary storage because secondary storage is less expensive.

### **Tertiary storage**

Tertiary storage is a level below secondary storage. Typically, it involves a robotic mechanism which will mount and dismount removable mass storage media into a storage device according to the system's demands; such data are often copied to secondary storage before use. It is primarily used for archiving rarely accessed

information since it is much slower than secondary storage. This is primarily useful for extraordinarily large data stores, accessed without human operators. Typical examples include tape libraries and optical jukeboxes.

## **7.INTERFACE PORT**

A port is basically a physical docking point which is basically used to connect the external devices to the computer, or we can say that A port act as an interface between the computer and the external devices.

### **✓ Ports**

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