جامعة الحمدانية

كلية الحاسبات والمعلوماتية

قسم تكنولوجيا المعلومات

المرحلة الاولى

Computer Organization

Case or System Unit

The main parts of a computer system are:

1	**System Unit**	The container for the motherboard, disk drives etc.
2	**Monitor**	The main output device for the system.
3	**Keyboard**	The main input device for the system
4	**Mouse**	An input device allowing interaction with the system using pointing and clicking
5	**Speakers**	Used to output sounds and music from the system

System Unit Devices and Peripherals

The system unit (Case) is the main container for system devices. It protects the delicate electronic and mechanical devices from damage. Typical system unit devices include:

- Motherboard
- CPU (Processor)
- Memory
- Disk drives
- Expansion cards.
- Ports - USB etc.
- Power supply

Peripherals are devices that connect to the system unit using cables or wireless technologies.

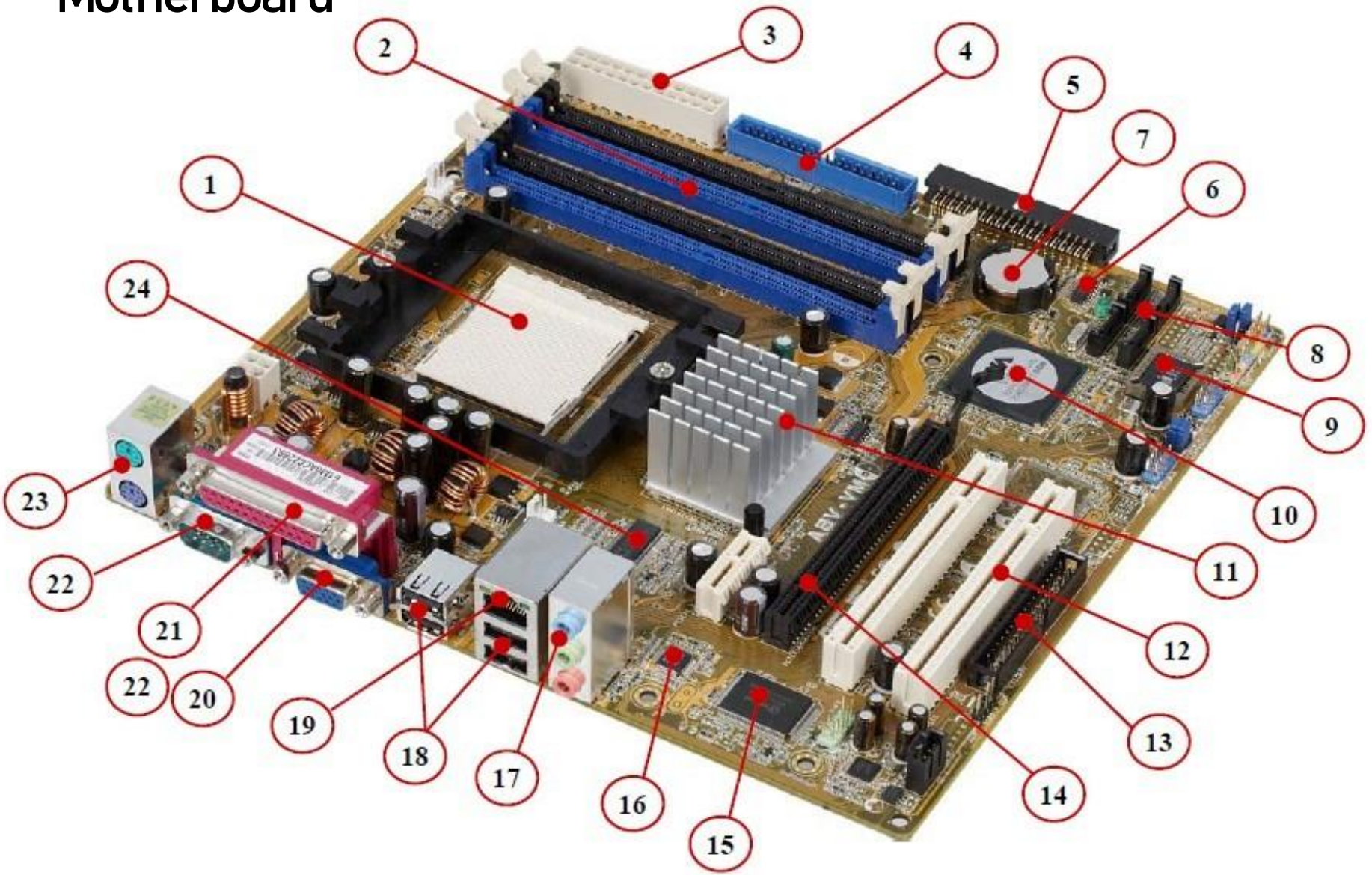
Typical peripherals include:

- Monitor
- Keyboard
- Mouse
- Speakers
- Printer
- Plotter
- Scanner

The Motherboard

Often called the mainboard or system board, it is the main circuit board for the computer system. Every device in the computer system will either be part of the motherboard or connected to it.

The Motherboard



1. Processor socket

This socket is Processor socket. It is designed for the any processor type. Different processors require different sockets and a motherboard must be chosen to suit the processor intended for use.

2. Memory sockets The board has four memory sockets and accepts different types of memory.

3. Power connector The power supply connects here and supplies appropriate power to the different components on the motherboard.

4 . Primary IDE

Hard drives can be either IDE (Integrated Drive Electronics) or SATA (Serial Advanced Technology Attachment). If an IDE hard drive is being used, it should connect to this socket.

5 . Secondary IDE

This could be used to connect a second IDE drive. This could be a second hard drive or an Optical drive - DVD or CD drive.

6 . CMOS RAM chip

A DRAM chip used to store the date and time and any user settings added to the setup screen. Complementary metal oxide semiconductor is the material the chip is made from.

7 . CMOS battery

Because the CMOS chip is a DRAM chip, it is volatile and would loose data when the computer is switched off. The battery preserves the data in the CMOS RAM chip when the computer is powered down.

8 . SATA connectors Used to connect SATA hard drives and optical drives

9 . BIOS chip

Basic Input/Output System. A chip holding the start-up routine for the computer system. It runs a program to test the hardware of the system. It the test is successful, a single beep is sounded. If not, a series of beeps are sounded and these beep patterns can be used to identify the failing component.

10. Southbridge chip
Forms the chipset with the northbridge. Between them they control the buses on the motherboard. Buses are the data pathways between the motherboard components. The southbridge controls the slower buses like the IDE bus, SATA bus, USB bus etc.

11. Northbridge chip
Controls the faster buses on the motherboard. These include the front side bus (between the processor and main memory) and the graphics bus.

12. PCI sockets
Peripheral Component Interconnect sockets used to connect expansion cards like modems, network cards, TV tuner cards etc.

13. FDD connector For connecting a floppy disk drive.

14. PCI-Express The graphics card connects here. Other motherboards have an AGP (accelerated graphics port) slot.

15. Super I/O chip Controls the serial, parallel, mouse and keyboard ports at the back of the computer system.

16. Network chip Controls the network port at the back of the computer

17. Audio ports For connecting speakers, microphones etc.

18. USB ports The current standard for connecting peripherals.

19. Network port Used to connect the computer to a network

20. Video port Connect the monitor to this port if a PCI-Express graphics card is not
being used.

21. Parallel port Largely obsolete. Used to connect printers and scanners.

22. Serial port Largely obsolete. Used to connect external modem etc.

23. PS2 ports The keyboard connects to the purple port and the mouse connects to the green port. Largely replaced by USB.

24. Audio chip Controls the onboard audio system.

Chipset

The flow of data around the computer is controlled by the **Chipset**. This consists of two chips:

▪**Northbridge**: This chip controls the flow of data between memory and the processor. It also controls the flow of data between the processor and the graphic's card.

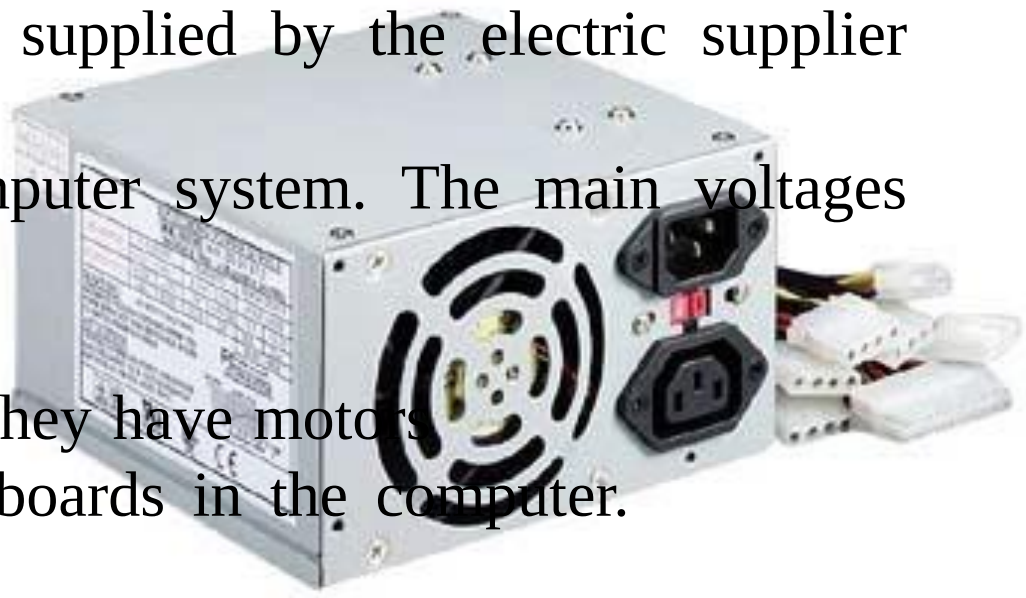
▪**Southbridge**: This chip controls the flow of data to the slower devices. These include USB, IDE, SATA, LAN and Audio devices. It controls the PCI slots and the onboard graphics chip. It delegates control of the keyboard, mouse, parallel and serial ports to the Super I/O chip.

The Power Supply

The power supply can be seen from the back of the system unit. The mains cable is plugged into the power supply. A computer power supply has a number of functions:

•It converts the power from **Alternating current** (AC) as supplied by the electric supplier to **Direct current** (DC) as required by the computer system.

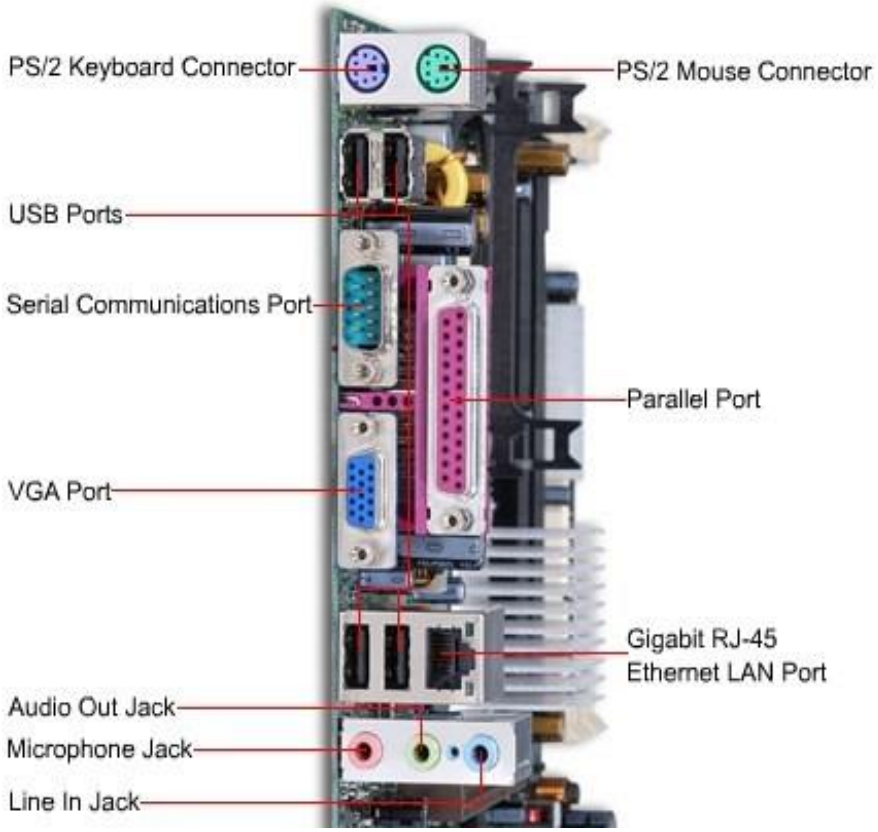
• It transforms the 240 Volts supplied by the electric supplier into the
voltages required by the computer system. The main voltages are:



- **12 volts** for the disk drives as they have motors
- **3.3** and **5 volts** for the circuit boards in the computer.

Ports

Computer ports are interfaces between peripheral devices and the computer system. They are hardware devices built into the motherboard or on expansion cards. They are often built into the front of the computer chassis for easy access but will be cabled back to the motherboard.



Video port

Used to connect a monitor to the computer system. There are two types:

- **VGA port**: This is a 15-pin port and is **blue** in colour. It is an analogue port and is being replaced by the DVI port.

- **DVI port**: This is **white** in color and is a digital port. This means that no conversion is necessary between the computer and the monitor and that means that images can be produced more quickly on the monitor.

PS/2 port

PS/2 ports are used to connect keyboards and mice to the computer. The keyboard port is **purple** and the mouse port is **green**.

USB port

The universal serial bus was intended to replace Serial, Parallel and PS/2 ports with a single standard. 127 devices can be connected to a single USB port and computers are often supplied with six to ten ports. USB is **hot swappable** which means that devices can be connected and disconnected without turning off the computer system, something that should never be attempted with parallel or serial devices.

There are different USB standards in use:

- **USB 1**: This is the original standard and can transfer data at **1.5MBps**. This is too slow for external hard disks with capacities of 500GB or more.

- **USB 2**: This is forty times faster than USB1 and has a data transfer rate of **60MBps**. This is the current standard.

- **USB3**: This is ten times faster than USB2 and 400 times faster than the original USB1. it has a data transfer rate of **600MBps** and will be common on new computer systems in 2009.

Modem port

Technically known as an **RJ11** port, it is the common telephone socket used in Ireland. Modems will usually have 2 ports side by side.

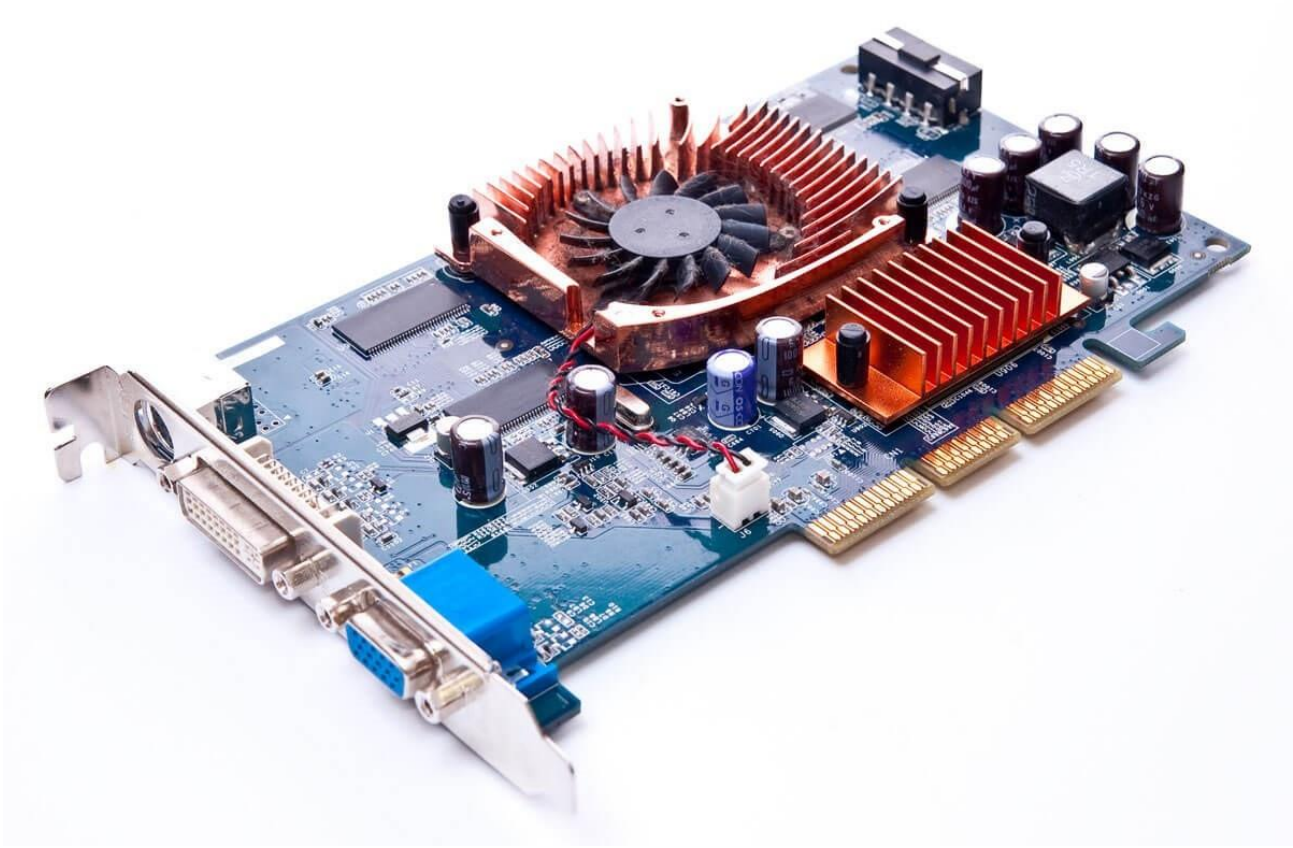
The port marked **Line** should be connected to the wall socket while the port marked **Phone** can be used to connect a telephone. The phone can then be used he when computer is offline or if a V92 modem is used, the Internet can be put on hold while the **incoming** call is taken.

Ethernet port

This port is used to connect to a network. Technically known as RJ45, it is physically bigger than the modem port. They can either be part of the motherboard or on an expansion card.

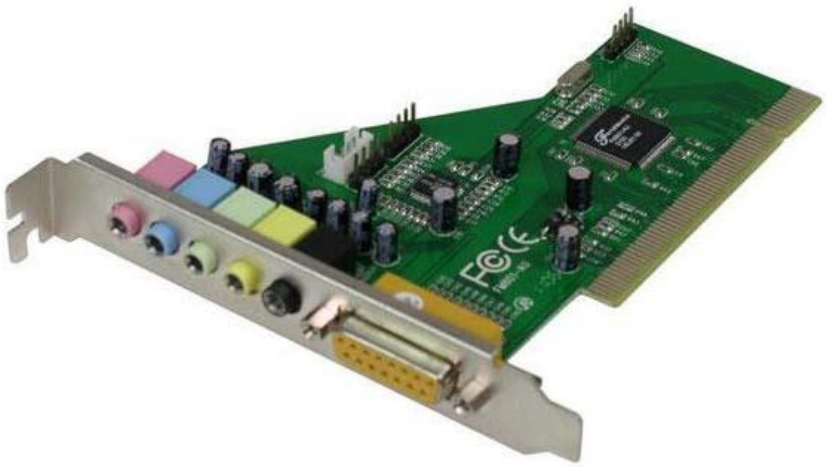
Graphic card

A graphics card will have it’s own processor and memory built in. The faster the processor and the more memory a graphics card has, the faster and more even the display will be. If the on screen image is jerky or blurred, the graphics card is not good enough for the job.



Sound card

The need for good quality sound and even surround sound has made it almost standard on most computers. Most computers are supplied with an integrated sound system and this is sufficient for most applications. A sound card can be fitted to an empty PCI slot and the integrated chip turned off if the extra features of a card are required.



Network card

A network card is designed to allow computers participate in a computer network. This can simply be a home computer connected to a **Broadband** connection or a number of computers connected together to share resources. Network capability is included on most new motherboards, but a different network card can be added if required.

Network cards can offer wired or wireless connection. They can fit into a PCI slot on the
motherboard or even connect to a USB socket. Modern notebook computers have an internal wireless network card as well as the standard wired card.

Network card

The standard used in the majority of networks is called **Ethernet**. This covers wired and wireless networks. Ethernet is controlled by the Institute of Electrical and Electronic Engineers (**IEEE**) and there are a number of standards in use in wired networks:

- **Fast Ethernet**: A wired standard with a transmission speed of **100Mbps**. This is the most common standard and integrated network chips are usually of this standard.

- **Gigabyte Ethernet**: A wired standard with a transmission speed of **1000Mbps**. This is 10 times faster than fast Ethernet and is becoming more common.

TYPE	SPEED	CABLE	CABLE IMAGE
Fast Ethernet	10/100Mbps	Cat5	
Gigabit Ethernet	10/100/1000Mbps	Cat5e/Cat6a