Worksheet 1

**Objectives: This worksheet provides a general idea about the basic components of a computer.**

Submission: Read the worksheet and watch the video listed in the end of the worksheet. Attempt to the questions in the worksheet and submit the answers to the correct link before the deadline.

A computer system is made up of a combination of hardware and software.

Hardware**:** All of the electronic and mechanical equipment in a computer is called the hardware. Examples: Motherboard, Hard disk, RAM, Power supply, Processor, Case, Monitor, Keyboard, Mouse

Software**:** The term software is used to describe computer programs that perform a task or tasks on a computer system. Software can be grouped as follows:

System software: These are the programs that control the operation of the computer system. Operating systems and utility programs are the most common. The Operating System starts the computer, provides a user interface, manages the computermemory, manages storage, manages security and provides networking and internet facilities to mention a few of it's capabilities. There are many OS's on the market including Microsoft Windows, Mac OS, Unix and Linux.
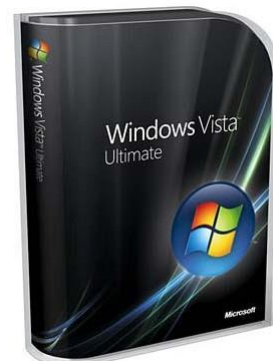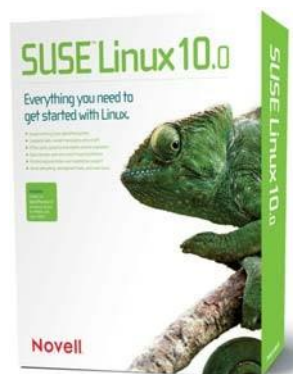

Utility programs perform maintenance tasks on the computer system. This includes file management programs, uninstall programs, disk scanners and defragmenters, backup utilities, antivirus etc. These can be included in the OS or purchased separately.
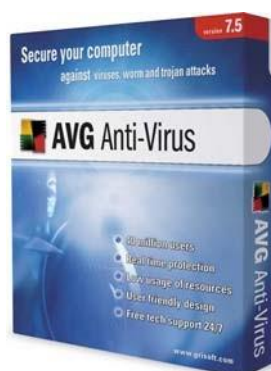
Device drivers are programs that control particular hardware devices. They are supplied with new hardware and must be run so they the hardware can communicate with the OS. They are supplied with printers, graphics cards, scanners etc.

Application Software: This software is used to do non-system-based tasks. Categories include business software, engineering software, medical software, games etc. Sometimes, application software packages are grouped together to form **productivity suites**. Examples include Microsoft Office and OpenOffice. These combine word processing, spreadsheet, database, and presentation software with a common interface making then easier to learn. The Adobe Creative suite combines Adobe Photoshop, Adobe Illustrator etc. as an all-in-one graphics and web design suite. As well as common interfaces, these suites offer great compatibility between the applications.
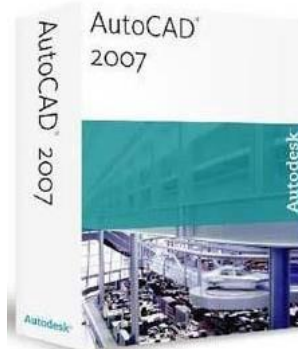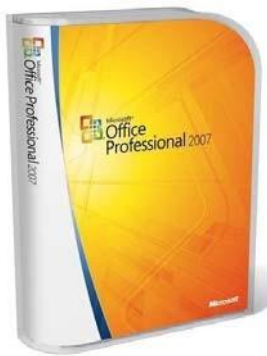
Components of a PC

A **computer system** is a collection of electronic and mechanical devices operating as a unit. These devices can be sorted according to the role they play in the computer system. The main device categories are:

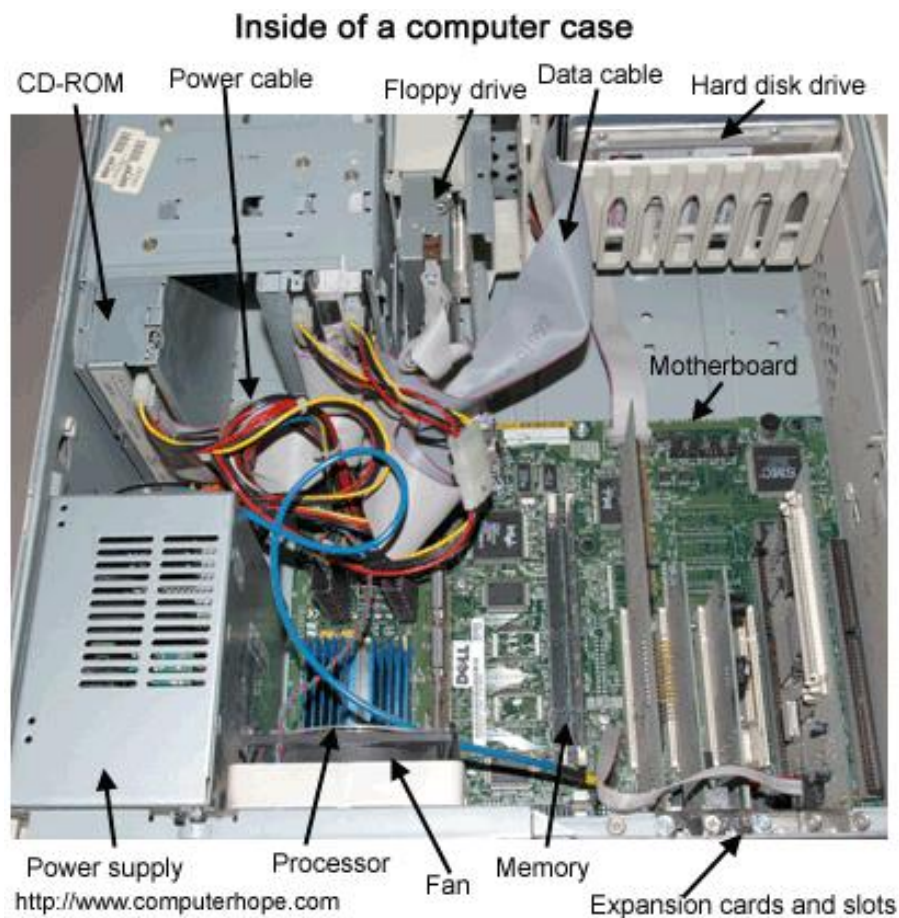|	
Input devices	These devices are used to get data into the computer system
Processing devices	These manipulate the data using to a set of instructions called a program
Output devices	These are used to get data out of a computer system
Storage devices	These can store the data for use at a later stage
Communications devices	These can send the data to another computer system

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 systemusing pointing and clicking
5. Speaker: Used to output sounds and music from the system

Worksheet 1

System Unit Devices and Peripherals

The **system unit** 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 - sound card, graphics card, network card etc., ports - USB etc. and power supply.

Inside of a computer case

CD-ROM   Power cable   Floppy drive   Data cable   Hard disk drive

Motherboard

Power supply   Processor   Fan   Memory
http://www.computerhope.com   Expansion cards and slots

Worksheet 1

The Processor (CPU)

A processor is an **integrated circuit** (IC) supplied on a single silicon chip. All the componentsand pathways necessary for the movement of data around the processor are etched on this single chip.

AMD Processor

The processor's function is to control the activities of the computer system. A computer programis made up of instructions and when the program is run, the processor is responsible for carryingout these instructions in an orderly fashion. The type of instructions the processor can execute includes:

- Arithmetic instructions -   It carries out all the addition, subtraction, multiplication and division requested by computer programs.
- Logical instructions -   It can make decisions by comparing data and acting in a way depending on the result.
- Move operations -   It can move data from place to place within the computer system. This could be from memory to the processor for addition or from memory to a printer or disk drive etc.

The speed of a processor is measured in megahertz (**MHz**) or Gigahertz (**GHz**). This is the speed of the system clock (**clock speed**) within the processor and it controls how fast instructions can beexecuted:

Random Access Memory (RAM)

Known as **primary storage**, it is the main working memory of the computer system. Data and programs currently in use are held in RAM. It is called random access because data can be accessed in any order. RAM is **volatile** which means that when the computer is turned off, the contents of RAM are lost. Therefore, it is essential to save your work on a regular basis. RAM is made in the form of **integrated circuits** (IC's) in the same manner as a processor. These IC's are placed on a circuit board to produce a **memory module**. The most common RAM technology is **dynamic random access memory** (DRAM).
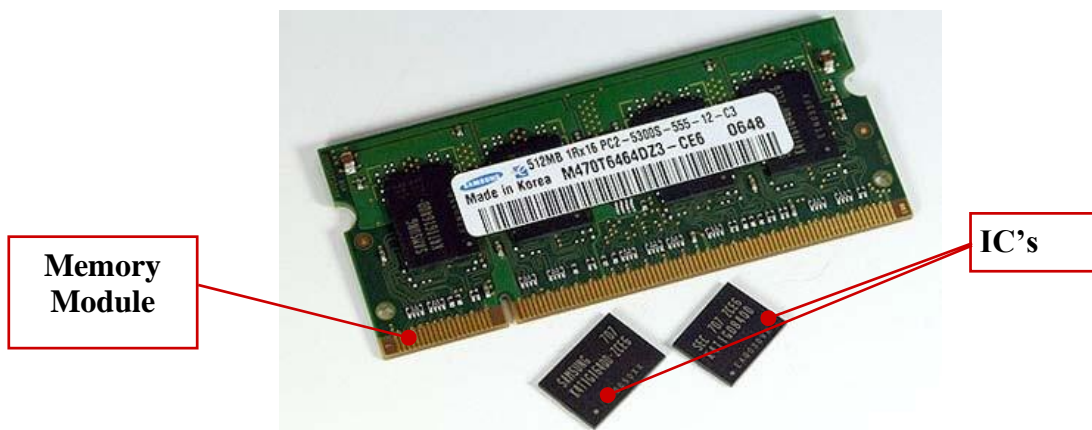
Cache memory

This is a special very high-speed memory. It is used to speed up and synchronizing with high-speed CPU. Cache memory is costlier than main memory or disk memory but economical than CPU registers. Cache memory is an extremely fast memory type 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 CPU when needed.

Cache memory is used to reduce the average time to access data from the Main memory. The cache is a smaller and faster memory which stores copies of the data from frequently used main memory locations. There are various different independent caches in a CPU, which store instructions and data.

Worksheet 1

Motherboard

The motherboard serves as a single platform to connect all of the parts of a computer together. It connects the CPU, memory, hard drives, optical drives, video card, sound card, and other ports and expansion cards directly or via cables. It can be considered as the backbone of a computer.

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.

Worksheet 1

Buses

A bus is a set of wires through which data can be sent to the different parts of the computer system. Buses connect the major computer derives to each other. The chipset uses the buses to send data around the motherboard. The main buses are:

- **Front side bus**:   Connects the processor to the northbridge.
- **Memory bus**:   Connects the northbridge to the main memory.
- **Graphics bus**:   Connects the northbridge to the PCI-Express or AGP graphics slot.
- **Internal bus**:   Connects the northbridge to the southbridge
- **PCI bus**:   Connects the PCI slots and the onboard graphics to the southbridge
- **LPC bus**:   Connects low bandwidth devices to the southbridge. These include the BIOS chip and the Super I/O chip which controls the keyboard, mouse, parallel, serial ports etc.

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.

- It uses advances power management (**APM**) to allow the computer goes into a standby mode.
- Some have a switch to toggle between 240 Volts supplies and 110 Volts supplies.

Hard disk drive

The **primary storage** (main memory) of a computer system is volatile. This means that when the computer is switched off, the contents of primary storage are erased. A system was needed whereby work could be saved for use at a later time. The hard disk drive is the accepted solution to this problem.

The problem with main memory is that data is stored as electric charges and could not be maintained without electric power. A different approach was needed for **secondary storage** (non-volatile storage). In main memory, different voltages are used to store a binary 1 and a binary 0. Itwas decided to mimic the situation for secondary storage using **magnetism** instead of electrical voltages to represent the binary data.

To achieve this, a metal disk (**platter**) was coated with millions to tiny iron particles. These particles could then be magnetised to **magnetic north** and **magnetic south** to represent the binarydigits 0 and 1. A **read-write head** is used to magnetise the particles on the disk surface and so represent the data held in RAM. The computer can now be switched off and a copy of the data is safe for later use.

Metal disk (platter) covered with iron particles.

Read-write head
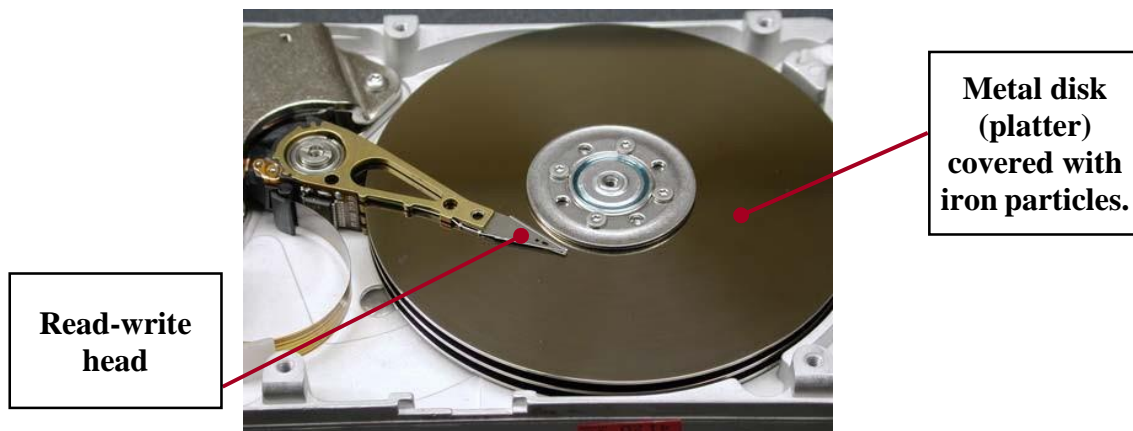
Worksheet 1

Peripherals are devices that connect to the system unit using cables or wireless technologies. Typical peripherals include:

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

Activities:

- Watch the video given at the link in courseweb.

- Answer the following questions and prepare a submission file using the template attached in Appendix 1.

    1. Describe what a computer system is. You can include diagrams with the description to answer this question.
    2. What are two types of software use in the computer? Briefly explain them with examples.
    3. List the characteristics of a computer system.
    4. "CPU is the brain of any computer" Discuss this statement.

Appendix 1.

Use below format to prepare your submission document (cover page) and name the file using your student number.

INTRODUCTION TO COMPUTER SYSTEMS (IT1020)

Year 1, Semester 1

Practical Answer Submission 01

<Student Number>, <Student Name>

<Batch Number>

<Date of Submission>