Unit-1: Introduction to Computer System [LH 5 Hrs]

1.1-Introduction to Computers

The word Computer comes from '*compute*', which means to '*calculate*'. The word *'calculate'* means to find out the result of some operation on a number of values (numeric). In computation, however, the meaning is not limited to the result of some operation on numeric values; here, the operations on the non-numeric values are also incorporated. One essential difference is that *computation* involves comparison of values, be it numeric or non-numeric, besides the usual arithmetic operations. In fact, computation involves any kind of operation with any kind of values.

A *computer can be defined as a multipurpose, programmable, electronic data processing device* that is capable of accepting input; processing it and producing a refined data as output.

Input → Processing → Output

Man is today capable of processing information much faster than he was before. Because of this, man has achieved unimaginable achievements in areas such as space technology, communications, etc.

The two principal characteristics of a computer are:

- It responds to a specific set of instructions in a well-defined manner.
- It can execute a prerecorded list of instructions (a program)

1.1.1-Characteristics of computers

- ✓ **High processing speed**: Computers are capable of carrying out the task with enormous speed.
- ✓ **High accuracy**: The accuracy of a Computer is consistently high. The accuracy of the computer is best achieved by programming them in the most efficient manner. When it comes to very complex mathematical or scientific problem the computer's accuracy has no substitute.
- ✓ **High storage capacity**: Computers can store enormous quantity of information. Large volumes of storage occupy much lesser space compared to paper documents and this aspect of computers makes them more powerful.
- ✓ **Versatility**: Computers are versatile in that they can perform almost any task, provided they are given the appropriate logical steps.
- ✓ **Automation**: Computer performs operations automatically. Once a programming logic is initiated the computer performs repeated operations without human interventions until program completion.
- ✓ **Diligence**: Computers are machines and that do not get tired or 'lose concentration' like human beings. If a large number of calculations say million calculations are to be performed the resultant output will remain exactly the same even if operations are repeated any number of times.

Though the computer has become the most powerful tool, it is still a '*Garbage In Garbage Out'* machine. It is totally dependent on us for the way it operates. It is not capable of doing anything if we do not tell it (instruct) how to do it.

1.1.2-Importance of Computers in Business

Computer plays an important role in business environment as every organization adopts it in some form or the other to perform the tasks in effective manner. In the past few years' rapid development in IT, particularly in communications, electronic service networks, and multimedia have opened up new opportunities for corporate. All these are contributing towards new and effective ways of processing business transactions, integrating business processes, transferring payments and delivering services electronically. It has affected the business in the following ways:

1. Office Automation

Computers have helped automation of many industrial and business systems. They are used extensively in manufacturing and processing industries, power distribution systems, airline reservation systems, transportation systems, banking systems, and so on. Computer aided design (CAP) and computer-aided manufacture (CAM) are becoming popular among the large industrial establishment.

2. Stores large amount of date and information

Business and commercial organizations need to store and maintain voluminous records and use them for various purposes such as inventory control, sales analysis, payroll accounting, resources scheduling and generation of management reports. Computers can store and maintain files and can sort, merge or update as and when necessary.

3. Improves Productivity

With the introduction of word processing software, Computers have recently been applied to the automation of office tasks and procedures. This is aimed at improving the productivity of both clerical & managerial staff.

4. Sharing of data and information

Due to networking of computers, where a number of computers are connected together to share the data and information, use of e-mail and internet has changed the ways of business operations.

5. Competitiveness

Computers offer a reliable and cost-effective means of doing business electronically.
Routine tasks can be automated. The customers can be provided support round the clock, which is 24 hours a day. With advancement in IT sector, corporate are spreading business around the world thus, increasing their presence and entering new markets.

6. Security

To provide security to data and important computer programs, almost every organization has some security programs to avoid the illegal access of the company's information by unauthorized persons. The three fundamental attributor of a security program are confidentially, integrity and availability which allow access to only authorized persons in an organization.

7. Cost Benefits

The extensive availability of internet based information means that companies have a wider choice of suppliers which leads to a more competitive pricing. Due to the presence of internet the role of the middleman becomes less important as companies can sell their product or services directly to the customer.

8. Marketing

Corporate engaged in e-business can take help of their respective websites to create brand awareness of their products, thus, creating new avenues of promotion of their products. In addition, companies' websites can also provide better services such as after sales service to the customer.

1.2-Data Processing

Data are a vital organizational resource that needs to be managed like other important business assets. Today's business enterprises cannot survive or succeed without quality data about their internal operations and external environment.

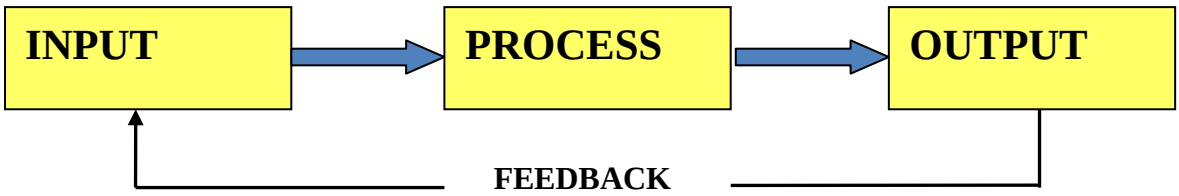
1.2.1-Data versus Information

Data

- ✓ **Data** refers to raw facts, unevaluated facts, figures, symbols, objects, events, etc from which information is generated.
- ✓ Data appear in the form of text, numbers, figures, or any combinations of these

Information

- ✓ Data is processed and converted into a form that is useful to the decision-maker.
- ✓ **Information** is facts, principles, knowledge, experience, and intuition that have been put into a meaningful and useful context and communicated to a recipient who uses it to make decisions.



The function of an *information system* is to change "data" into "information", using the following processes:

- ✓ **Collection**- collecting data through surveys, interviews, sensors, documents, newspapers, or any other appropriate means.
- ✓ **Conversion** - transforming data from one format to another, from one unit of measurement to another, and/or from one feature classification to another
- ✓ **Storing**- data is classified and sorted to arrange it in a meaningful form.
- ✓ **Organization** - organizing or re-organizing data according to database management rules and procedures so that they can be accessed cost-effectively
- ✓ **Structuring** - formatting or re-formatting data so that they can be acceptable to a particular software application or information system
- ✓ **Modeling** - including statistical analysis and visualization of data that will improve user's knowledge base and intelligence in decision making
- ✓ **Summarizing**- When processed data becomes information, it can be condensed and summarized to make it more useful to the decision-maker.
- ✓ **Retrieval and Dissemination**-The information is then retrieved, and circulated to concerned stakeholders for current or further use.

Note: - It is important to note that simply executing all of the steps discussed above does not guarantee that data will become information. If the processing is inaccurate or inappropriate, its output maybe useless to the decision-maker.

Many people use the terms "**data**" and "**information**" as synonyms but these two terms actually convey very distinct concepts. "***data***" is defined as a body of facts or figures, which have been gathered systematically for one or more specific purposes. "***information***" is defined as data which have been processed into a form that is meaningful to a recipient and is of perceived value in current or prospective decision making.

1.2.2-Characteristics of Information

Although data are ingredients of information, not all data make useful information

- ✓ data not properly collected and organized are a burden rather than an asset to an information user
- ✓ data that make useful information for one person may not be useful to another person

The characteristics of good information are ***subjectivity***, ***relevance***, ***timeliness***, ***consistency***, ***completeness***, ***accessibility***, ***reliability***, and ***usability***.

Subjectivity: The value and usefulness of information are highly subjective, because what is information for one person may not be for another. For example even small changes in the price of a stock can be meaningful to a stockbroker, because these changes may influence buying and selling decisions. However, to a layperson, a stock price may be just a number, with little or no meaning.

Relevance: Information is good only if it is relevant- that is, pertinent and meaningful to the decision-maker. For example, suppose a plant manager is trying to determine why a certain machine breaks down frequently. For that plan manager, the number of units that the machine has produced in the last 5 years is probably not relevant to the problem at hand.

Timeliness: Timeliness refers to the currency of the information presented to the users. Information must be delivered at the right time and the right place to the right person. Currency of data or information is the time gap between the occurrences of an event in the field until its presentation to the user (decision maker). When this amount of time is very short, we describe the information system as a *real-time* system. Many organizations produce large volumes of reports without regards to when the information is needed; this greatly diminishes the value of their reports.

Accuracy/consistency: Accuracy is measured by comparing the data to *actual* events. Information must be free of errors, because erroneous information can result in poor decisions and erode the confidence of users. Note, however that accuracy is a relative concept; its meaning varies from context to context. For example, great precision is not required in predicting the number of customers at a restaurant, but is critical for a space mission.

Correct information format: Information must be in the right format to be useful to the decision-maker. For example, if a manager wants to know the total a sale of product x last year, the most appropriate format is an annual summary of sales figure for the product. The format should be such that it can be applied directly to the problem at hand without further processing.

Completeness: Information is said to be complete if the decision-maker can satisfactorily solve the problem at hand using that information. Although completeness of information is highly describe, often-complete information is not available. Managers are compelled to make decisions even when their information is incomplete: this is practically true for problems that require intuition and judgment. However, if most, though not all, of the essential information necessary to make a decision is available, the decision-maker may view the information as essentially complete.

Accessibility: Information is useless if it is not readily accessible to decision makers, in the desired format, when it is needed. Advances technology has made information more accessible today than ever before; however there is also a downside to this development. Sometimes managers feel overwhelmed by the large volumes of information that are readily available to them. Also, if information is easily accessible, it may fall into the wrong hands: this can seriously jeopardize the company. Hence there should be a balance between accessibility and security; we discuss some methods for achieving information security in an organization.

1.3-Classification of Computers

A computer system exists in a wide range of sizes and power. It may be classified into different types according to the principle of operation or on the basis of their work, size, and brand. The classification of computing system varies with the advancement of technology.

CLASSIFICATION OF COMPUTERS

On the basis of work	On the basis of size	On the basis of brand
a. Analog computer b. Digital computer c. Hybrid computer	a. Super computer b. Mainframe computer c. Mini computer d. Microcomputer	a. IBM PC b. IBM Compatible c. Apple/Macintosh

1.3.1-Analog Computers

An analog computer is a form of computer that uses the continuously changeable aspects of physical phenomena such as electrical, mechanical, or hydraulic quantities to model the problem being solved. Computations in analog computers are carried out with physical quantities such as voltage, current, temperature, and etc. The devices that measure such quantities are analog devices example voltmeter (measures voltage), ammeter (measures current), thermometer (measures temperature), and speedometer (measures speed). Analog computers operate by measuring rather than counting.

The main advantage of analog computer is that all calculations take place in parallel and hence these are faster. But their accuracy is poor as compared to digital computers. Analog computers are mostly used in engineering and scientific application.

Features of Analog Computer

- ✓ Operates by measuring voltages and currents.
- ✓ The accuracy of this computer is poor.
- ✓ It has limited memory space.
- ✓ It is not versatile.

1.3.2-Digital Computers

A digital computer is an electronic computing machine that uses the binary digits (bits) 0 and 1 to represent all forms of information internally in digital form.

The digital computers are devices capable of solving problems by processing information in discrete (discontinuous) form and all operations are carried out at extremely fast rate. Digital computer stores data in terms of digits (numbers) and proceeds in discrete steps from one state to the next. In digital computers, even letters, words and whole texts are represented digitally.

Features of digital computer

- ✓ They work by counting numbers.
- ✓ The accuracy of this machine is very high.
- ✓ They have large memory capacity.
- ✓ They are versatile in nature.
- ✓ Digital computers are much faster than analog computers and far more accurate.
- ✓ They are multipurpose machines which many solve several categories of problems.
- ✓ They are generally used for business and scientific application.

1.3.3-Hybrid Computers

Hybrid computers as the name suggests are a hybrid of analog and digital computers. Hybrid computer is developed in such a way that it can perform the task of digital as well as analog computer. These computers utilize the best qualities of both the digital and analog computers. It helps the user to process both continuous and discrete data. In the hybrid computers a converter is fixed to convert the analog data into digital data and vice versa.

Hybrid computers are best used in hospitals where analog part is responsible for measurement of patient's heart beat, blood pressure, etc. and then the operation is carried out in digital fashion to monitor patient's vital science. Hybrid computers are also used in weather forecasting and airplanes.

1.3.4-Microcomputers

A **microcomputer** is a small, relatively inexpensive single-user computer with a microprocessor as its central processing unit (CPU). It includes a microprocessor, memory, and input/output (I/O) facilities. It requires a smaller space and can be placed on the table. It uses a keyboard as a general input device and monitor as output device. Microcomputers became popular in the 1970s and 80s with the advent of increasingly powerful microprocessors. The predecessors to these computers, mainframes and minicomputers, were comparatively much larger and more expensive. Microcomputers are also called personal computers (PC). Typically, only one user could use the system. IBM PCs are the example for microcomputer.

Advantages of micro computer

a) They are small and portable.
b) They are relatively inexpensive.
c) They work as soon as they are switched on.
d) They have excellent graphic capabilities,
e) They do not occupy much space.
f) They do not consume much power.

1.3.5-Minicomputers

A **minicomputer** (colloquially, mini) is a class of multi-user computers that lies in the middle range of the computing spectrum, in between the largest multi-user systems (mainframe computers) and the smallest single-user systems (microcomputers or personal computers). These computers are more powerful and more expensive than microcomputer. These are mainly multi-user systems where many users simultaneously work on the system. Minicomputers possess greater storage capacity and larger memory as compared to microcomputers. These are even capable of handling more input-output devices.

Mini computers were also known as midrange computers. They had relatively high processing power and capacity that mostly fit the needs of mid-range organizations. They were mainly used in universities, industrial establishments, telecommunication, police headquarters, banks etc.

1.3.6-Mainframe Computers

Mainframe computers are computers used primarily by corporate and governmental organizations for critical applications, bulk data processing such as census, industry and consumer statistics, enterprise resource planning, and transaction processing.

These computers are designed to handle huge volumes of data and information. These can support more than 100 users at same time. These are very large and expensive. Mainframe computers have great processing speed and very large storage capacity, memory as compared to minicomputers. These computers even possess and work with more than one processor at the same time. Thus one can say these are multi-users, multiprocessors systems. Very sophisticated operating is needed to control and supervise their operation.

These are costly and they have big capacity of processing task and mainly used by big industries, engineering, universities, banks, and for scientific calculations.

1.3.7-Supercomputers

Super computers are extremely fast computer that can perform hundreds of millions of instructions per seconds. They are most expensive and the most powerful computers made to process complex and time-consuming calculations and are employed for specialized applications that require immense amounts of mathematical calculations. They are designed

to process complex scientific jobs. These consist of several processors running together thereby making them immensely faster and powerful. These computers are capable of handling huge amounts of calculations that are beyond human capabilities. Supercomputers can perform billions of instructions per second. Some of the today's supercomputers have the computing capability equal to that of 40000 microprocessors. These are normally 64-bits machines. They execute about 100 million instructions per seconds (MIPS).

The applications are weather forecasting, nuclear science research, aerodynamic modeling, and seismology, analysis of geological data, graphics and metrology.

1.3.8-IBM PC

IBM PC stands for International Business Machine Personal Computer. The IBM is the one of the largest computers and other electronic equipment manufacturing company in the world. It was established in USA in 1924. IBM PC is a micro-computer produced by IBM Company. The computers produced by this company are reliable, durable and have high capability.

1.3.9-IBM Compatible

Many companies make clones of IBM's Personal Computers which are often called compatibles. IBM compatible can use hardware and software designed for the IBM PC. The internal architecture of IBM compatible is similar to IBM PC. The examples of IBM compatible computers are EPSON, ASER, etc.

1.3.10-Apple/Macintosh

Apple/Macintosh Company is also one of the largest personal computer manufactures, located in California. It was establish in 1976. The internal architecture of these computers is totally different from that of IBM. They have their own software. Apple Company manufactured a new brand of computer popularly known as Macintosh in 1984. Macintosh became notable for popularizing the graphical user interface. The operating system produced by Apple Company for their Macintosh is called Mac OS.

1.4-Anatomy of Digital Computer

1.4.1-Components of a Digital Computer

A digital computer consists of four major components. They are

1. Input devices
2. Output devices
3. Central Processing Unit
4. Auxiliary Storage unit

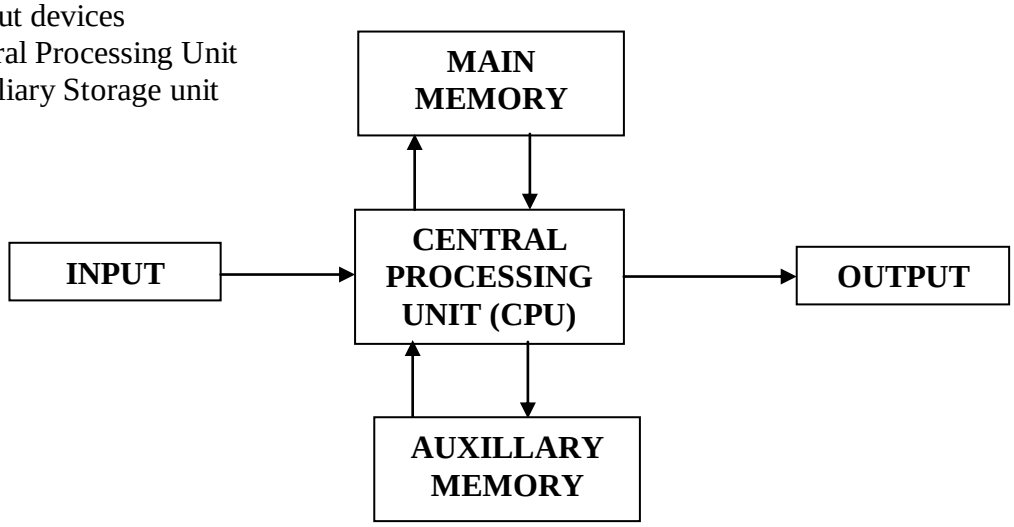
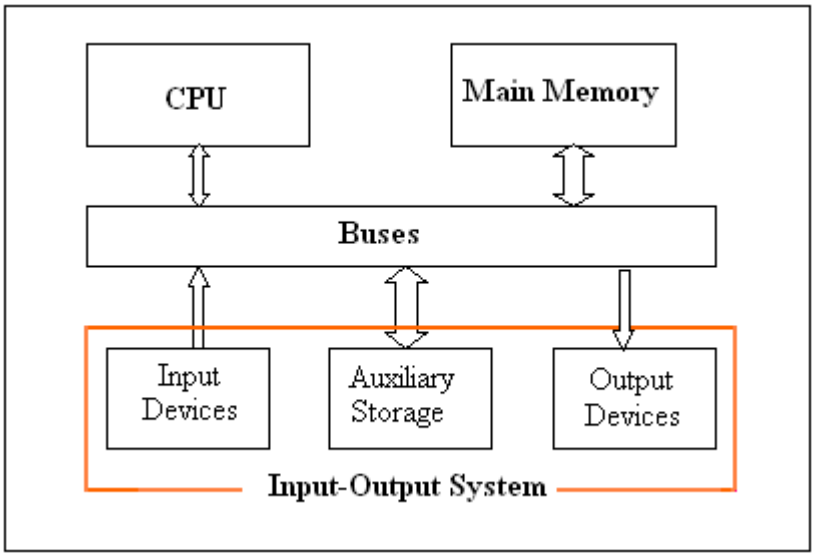


Figure1.1-Block diagram of digital computer with its major elements

1.4.2-Input devices

Input device provides an interface between the users and the machine, for inputting data and instruction into the computer memory. One of the most common examples is the keyboard. Some common input devices are listed below.

- ✓ Keyboard
- ✓ Mouse
- ✓ Light pen
- ✓ Scanners
- ✓ Microphone
- ✓ Communication devices



1.4.3-Output devices

Output device also provides an interface between the user and the machine. They transfer the results (processed data) from computer's memory and present to users. A common example is visual display unit (monitor) of a personal computer. Some of the common output devices are:

- Display screen
- Printer
- Plotter
- Communication devices
- Secondary Storage Devices

1.4.4-Input/Output Devices

CD and DVD drives, USB drives, hard disk drives and floppy disk drives are known as input/output, or I/O, devices. They are not only output devices, but are also used as storage and input devices. The computer sends data to the drive, where it is stored and can be later retrieved. CDs and DVDs are both types of optical discs that stores data in a digital format. Data is placed on the disc, using a laser writer that embeds the data into the disc's coating.

1.4.5-Buses

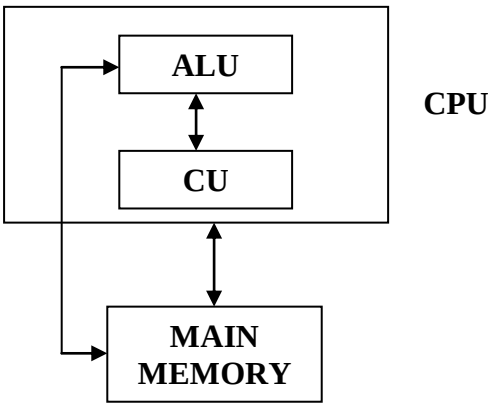
A bus is a subsystem that transfers data or power between computer components inside a computer. The basic function of a computer is program execution. When a program is running the executable binary file is copied from the disk drive into memory. The process of program execution is the retrieval of instructions and data from memory, and the execution of the various operations.

1.4.5-The Central Processing Unit

The Central Processing Unit (CPU) is considered the brains of the computer. The CPU plugs into the motherboard, which is a central connector point for all devices within the computer. Any commands or functions are calculated within the CPU. Processor (CPU) organizes and carries out instructions (execute program instructions). In a PC, the processor usually consists of one or more microprocessors, which are silvers of silicon or other material etched with many tiny electronic circuits. Microprocessor is connected to a circuit board called motherboard.

The **CPU** also called processor has two components:

- ✓ **Control Unit**
- ✓ **Arithmetic Logic Unit**.



The arrows in the above figures may represent data as well as control information flow.
The functions of the processor are

- ✓ CPU controls the use of the main storage to store data and instruction.
- ✓ CPU can perform arithmetic calculations such as addition subtraction etc.
- ✓ CPU controls the sequence of operations.
- ✓ CPU gives commands to all parts of the computer system.
- ✓ CPU carries out processing

ALU

ALU consist of circuits which performs arithmetical and logical operations. Arithmetical operation includes addition, subtraction, division, and multiplication. Logical operation include comparisons, such as determining whether 1 number is less than, or greater than or equal to another number. The **ALU** includes a group of resisters- high speed memory locations built directly into the CPU that are to hold the data currently being processed

Control Unit

The control unit directs electronic signals between memory and the ALU, and between the CPU and input/output devices. It controls all the other devices connected the CPU, i.e. Input devices, Output devices, Auxiliary Memory etc. Hence, the control unit acts as the nerve center of the computer. The control unit upon receiving an instruction decides what is to be done with it. That is, whether it is to be sent to the ALU for further processing or to the output devices or to the memory etc. In other words the control unit coordinates and controls all hardware operations.

1.4.6-The Main Memory Unit (Primary Storage)

Memory is an area inside computer where data and instructions are held. The main memory is also known as primary memory is a combination of **RAM** and **ROM.**
Physically it consists of chips either on the motherboard or on a small circuit board attached to the motherboard. This electronic memory allows the CPU to store and retrieve data very quickly. When a computer is instructed to execute a program, it picks up the first instruction from the main memory and executes it, then picks up second instruction and execute it, and so on. The result of the program are also stored in the memory temporally before being used again or transferred to devices outside the main memory.

RAM (random –access memory)

RAM is called random access memory also known as main memory. User can read from or write into any location in the RAM. It requires a steady flow of electricity to maintain it's contents. Any information stored in this area is lost when the power supply is switched off. The purpose of RAM is to hold programs and data while they are in use. Physically, RAM consists of some chips on a small circuit board. Inside RAM there are locations to store data and information, each location of memory has it's own address known as memory address.

ROM (read-only memory)

ROM is nonvolatile read only memory. ROM refers to special memory used to store programs that boot the computer and perform diagnostics. User cannot write on ROM.Usually in this kind of memory is done at factory. ROM contains most basic

instructions that computer uses (check memory, check hardware devices, and check for OS on the computer disk drive). Once data has been written onto a ROM chip, it cannot be removed and can only be read. Unlike RAM, ROM retains its contents even when the computer is turned off.

PROM (programmable read-only memory)
A PROM is a memory chip on which data can be written only once. Once a program has been written onto a PROM, it remains there forever. Unlike the RAM, PROMs retain their contents when the computer is turn off.

The difference between a PROM and a ROM (read-only memory) is that a PROM is manufactured as blank memory, whereas a ROM is programmed during the manufacturing process. To write data onto a PROM chip, you need a special device called a PROM programmer or a PROM burner. The process of programming a PROM is sometimes called burning the PROM.

Volatile memory: Memory which lose their contents when the computer power is shut off. RAM is an example of volatile memory.

Nonvolatile memory: Memory which always hold their contents even the computer power is shut off. ROM is an example of nonvolatile memory.

1.4.7-Auxiliary Memory (Mass Storage Devices)

The auxiliary memory (mass storage device), also known as the secondary memory is an external (to CPU) memory. Auxiliary memory holds data that is not currently being used by computer. The secondary memory is permanent in nature, i.e., the information stored in these device is not lost unless specifically deleted. It stores data for further processing. They are also used in transferring data or programs from one computer to another.
All computers require some kind of mechanism to store and retrieve data. Storage of information in primary memory is governed by the existence of a power source. As long as the machine is on, and electricity is flowing through the machine, information is stored in main memory. When the power is terminated, all information in main memory disappears. The internal primary memory of the computer may not be large enough to hold all the required instructions and data. So, we require additional storage facilities to store the information and retrieve it as and when required. This is possible through the use of secondary storage.
There are two major types of auxiliary storage devices.

1. **Magnetic storage device**
2. **Optical storage device**

Distinction between main memory and secondary memory

1. There is more space in storage than in memory.
2. Storage retains it's contents when the computer is turned off, but programs or data inside the memory is lost when the computer is shut down.
3. Storage is cheaper than memory

1.4.8-Magnetic storage

Magnetic storage devices work by polarizing tiny pieces of iron on the magnetic medium. The surface of diskettes, hard disk, and magnetic tape are all coated with a magnetically sensitive material (usually iron oxide) which reads to a magnetic field. Since the surfaces of disks and magnetic tapes are coated with millions of tiny iron particles, digital data can be stored on them and each of these particles can act as a magnet, taking on a magnetic field when subjected to an electromagnet. All magnetic storage medium consists of **read/write heads** which can produce an electromagnetic field while current is passed through. The shifting of alignment polarities would indicate logic **1**, but no change in polarity would indicate logic **0**.

The most common magnetic storage devices are

- ✓ Floppy Diskettes
- ✓ Hard disks
- ✓ Removable hard disks
- ✓ Magnetic tape

1.4.9-Optical disks

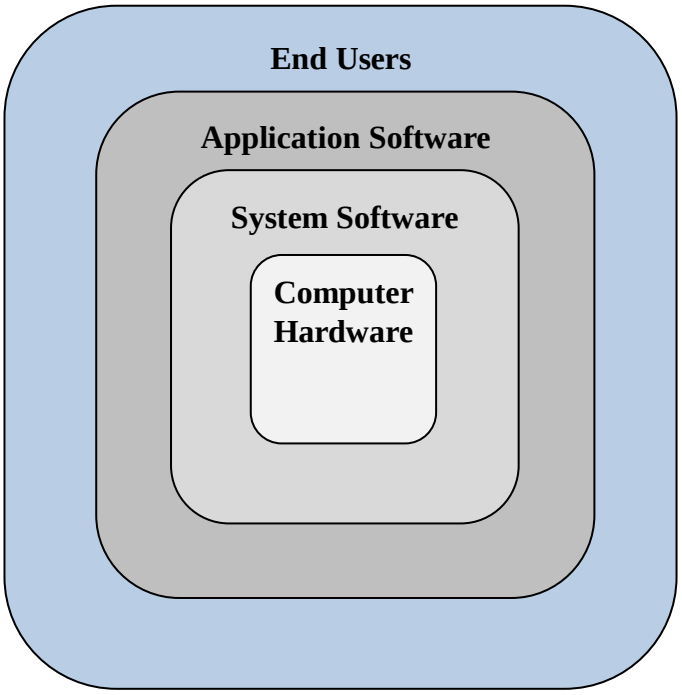
Optical disks are a storage medium from which data is read and to which it is written by lasers beams. They can store much more data up to 10 gigabytes. A laser uses a concentrated, narrow beam of light, focused with lenses, prisms, and mirrors.
The most common optical storage devices are

- ✓ CD-ROM
- ✓ WROM
- ✓ Magneto-optical disks

1.5-Introduction to Computer Software

Computer software, or just **software**, is a collection of computer programs and related data that provide the instructions for telling a computer what to do and how to do it. In other words, software is the general term for various kind of programs used to operate and manipulate computers and peripheral devices. Software is necessary for the computer system to work at the most optimal level. Software enables the hardware to operate. Without software the computer cannot do anything.
Software falls into three major categories.

1. **System software**
2. **Programming software**
3. **Application software**



1.5.1- System Software

System software is computer software designed to operate the computer hardware and to provide a platform for running application software. For example, operating systems and network management programs serve as a vital software interface between computer networks and hardware and application programs.
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System software is responsible for managing a variety of independent hardware components, so that they can work together harmoniously. Its purpose is to unburden the application software programmer from the often complex details of the particular computer being used, including such accessories as communications devices, printers, device readers, displays and keyboards, and also to partition the computer's resources such as memory and processor time in a safe and stable manner.

The most basic types of system software are:

- ✓ **Device drivers** provide basic functionality to operate and control the hardware connected to or built into the computer.
- ✓ **The operating system:** It is the first layer of software loaded into computer memory when it starts up. As the first software layer, all other software that gets loaded after it depends on it for various common core services. An operating system (OS) is a set of software tools designed to make optimum use of a computer, which allows the parts of a

computer to work together by performing tasks like transferring data between memory and disks or rendering output onto a display device. It also provides a platform to run high-level system software and application software. The primary purpose of Operating System is to maximize the productivity of computer system by operating it in the most efficient manner. OS controls the equipment resources of computer such as, processors, main storage, secondary storage, I/O devices and files. Windows, Dos, Unix, O/S2 are some of commonly used operating system.

Following are most common functions of OS in the operation of a computer system.

- **User Interface:** Provides a user interface for system and network communications with users.
- **Resource management:** Managing the hardware resources of a computer system.
- **Task (Jobs) management:** Managing the tasks or jobs waiting to be processed a computer must accomplish. It recognizes the jobs, identifies their priorities, priorities, determines whether the appropriate main memory and secondary storage capability they require is available, and finally runs each job at the appropriate moment.
- **Bach processing:** Data are accumulated and processed in groups.
- **Virtual storage:** The capacity to increase main memory without actually increasing its size.
- **File management:** It is responsible for creation and deletion of files and directories. It also organizes, stores, retrieves, names, and protects all the files.
- **Device Management:** It manages all the devices of the computer system such as printers and modems. If any device fails, it detects the device failure and notifies the same to the user.
- **Data recovery:** Data recovery utility program can recover data files that have been mistakenly deleted.
- **Security Management:** Protects system resources and information against destruction and unauthorized use.
- **Disk Management:** Disk management program includes various system software like disk defragmenter, data compressor and disk formatting tools. De-fragmentation implies putting fragments of files in a sequential order onto the disk which reduces the time to access the file.
- **Virus Protection:** Anti-virus programs are essential system utilities for a computer system functioning in a network. They provide the security to the system form viruses that can damage the computer system.
- **Disk Cleanup:** To keep a computer running smoothly, regular maintenance is vital. Therefore, one should use the disk cleanup utility, which easily determines which files on hard drive are no longer needed, then delete those files.
- **Utilities and other functions:** that provides miscellaneous support services.

Following are some examples of system software

- ✓ **Utility software**: Utility is a program which helps to analyze, configure, optimize and maintain the computer and performs a very specific task, usually related to managing system resources. OS contain a number of utilities for managing disk drives, printers, and other devices.

- ✓ **Network Management Software**: Network management software offers comprehensive performance and fault management for networks and servers. It monitors networks for technical problems caused by overloaded servers, by crashed connections or by the users. Network monitoring software helps to control network usage or server capacity and availability.

- ✓ **Database Management Systems**: Database is a structured collection of data. A computer database relies on database software to organize the data and enable the database users to achieve database operations. Database software allows the users to store and retrieve data from databases. Examples are Oracle, MS. Access, etc.

- ✓ **Application Servers**: Application server provide middleware interface between an operating system and the application programs of users. Middleware is software that helps diverse software applications and networked computer systems exchange data and work together more efficiently.

- ✓ **Performance and Security Monitors**: **Performance monitors** are programs that monitor and adjust the performance and usages one or more computer systems to keep them running efficiently. **Security monitors** are packages that monitor and control the use of computer systems and provide warning messages and record evidence of unauthorized use of computer resources.

1.5.2-Programming Software

A **programming language/software** is an artificial language designed to communicate instructions to a machine, particularly a computer. Programming languages can be used to create programs that control the behavior of a machine and/or to express algorithms precisely.

Programming software usually provides tools to assist a programmer in writing computer programs, and software using different programming languages in a more convenient way. The tools include **compilers, debuggers, interpreters, assembler, programming editor, e.tc.**

1.5.3-Application Software

Application software, also known as an **application** is computer software designed to help the user to perform specific tasks. Application software ranges from games, calculators, and word processors (document creating programs), to programs that "paint" images on screen (image editors). Applications represent real world tasks. They can be easily divided by looking at exactly what function they serve. Examples include enterprise software, accounting software, office suites, and graphics software and media players. Many application programs deal principally with documents. There is a broad category of application software. In general, application software is further classified into following two categories.

1. **General Purpose Application Programs**
   - ✓ **Word Processing Software**
   - ✓ **Spreadsheet Software**
   - ✓ **Image Processors and Image Editors**
   - ✓ **Presentation Software**
   - ✓ **Multimedia Software**
   - ✓ **Web Browsers**
   - ✓ **Electronic Mail**
   - ✓ **Personal Information Managers**
   - ✓ **Groupware**
2. **Application-Specific Programs**
   - ✓ **Transaction Processing**
   - ✓ **Enterprise Resource Planning Application**
   - ✓ **Electronic Commerce**
   - ✓ **Science and Engineering Software**
   - ✓ **Education Software**
   - ✓ **Entertainment Software**
   - ✓ **Geographical information system (GIS)**

Word Processing Software: This software enables the users to create and edit documents by electronically processing text data. The most popular examples of this type of software are MS-Word, WordPad, Notepad and some other text editors. Word Processing Packages also provide other helpful features like a spelling checker capability, and thesaurus feature helps

you find better choice of words to express ideas. You can also suggest grammar and punctuation errors, as well as suggest possible improvements in your writing styles, graphics, photos, and colors on each page.

Word processors vary considerably, but all word processors support the following basic features:

- ✓ Insert text
- ✓ Delete text
- ✓ Cut and Paste
- ✓ Copy
- ✓ Page Size and Margins
- ✓ Search and Replace
- ✓ Word Wrap
- ✓ Print

Word processors that support only these features (and many few others) are called text editors. Most word processors, however, support additional features that enable you to manipulate and format documents in more sophisticated ways. Advanced word processors support following features.

- ✓ File management
- ✓ Font specification
- ✓ Graphics
- ✓ Footnotes and cross-References
- ✓ Headers and Footers
- ✓ Page Numbering
- ✓ Layout
- ✓ Macros
- ✓ Merges
- ✓ Spell Checker
- ✓ Tables of Contents and Indices
- ✓ Thesaurus
- ✓ Windows

Spreadsheet Software: Spreadsheet software organizes data into a table of values arranged in rows and columns. Each value can have predefined relationship with other values. Spreadsheet software allows users to perform calculations, business analysis, planning and modeling. In a spreadsheet, each value is placed in a cell. You can define what type of data is in each cell and how different cells are depending on one another. Excel, Lotus 1-2-3 and Apple Numbers are some examples of spreadsheet software. They simulate paper worksheets by displaying multiple cells that make up a grid (worksheet of rows and columns). Developing a spreadsheet involves designing its format and developing the relationship that will be used in the worksheet. Most packages help you develop charts and graphics displays of spreadsheet results.

Multimedia Software: They allow the users to create and play audio and video media. They are capable of playing media files. Audio converters, players, burners, video encoders and decoders are some forms of multimedia software. Examples of this type of software include Real Player and Media Player.

Presentation Software: The software that is used to display information in the form of a slide show is known as presentation software. This type of software includes three functions, namely, editing that allows insertion and formatting of text, methods to include graphics in the text and a functionality of executing the slide shows. Today a number of software packages are available to the users to conceive, create and deliver visually stunning presentations. Microsoft PowerPoint and Adobe Flash are the best example of presentation software.

Image Processors and Image Editors: Image processors or graphics program enable you to create, edit, manipulate, add special effects, view, print and save images. An image editor is a specialized graphics program that provides a variety of special features for altering bitmap images. They provides features such as filter image, transform image, create image layers. Some examples of image editors are Adobe Photoshop, Corel Paint Shop Pro, etc.

Web Browsers: Web browsers such as Microsoft Explorer, Netscape Navigator, Firefox, Opera, or Mozilla are software applications designed to support navigation through the point-and-click hyperlinked resources of the World Wide Web and the rest of the Internet, as well as corporate intranets and extranets. Web Browsers are becoming the universal software platform from which end-users lunch information searches, e-mail, multimedia file transfers, discussion groups, and many other internet based applications.

Electronic Mail: E-mail application has changed the way people work and communicate with one another by sending and receiving electronic messages and files attachment via the Internet or their organizations' intranets or extranets. Whenever you want to, you can read your e-mail by displaying it on your workstation. With a few minutes of effort a message to one or many individuals can be composed, sent, and received.

Groupware: Group is software that helps workgroups and teams collaborate to accomplish group assignments. For example, groupware products like Lotus Notes, Novell GroupWise, and Microsoft Exchange support collaboration through e-mail, discussion groups and databases, scheduling, task management, data, audio, and video conferencing, and so on. Groupware products rely on the internet and the corporate intranets and externs to make collaboration possible on a globe scale by virtual teams located anywhere in the world.

Educational Software: It has the capabilities of running tests and tracking progress. It also has the capabilities of collaborative software. It is often used in teaching and self-learning.

Enterprise Resource Planning (ERP) Systems: Enterprise systems, also known as *enterprise resource planning (ERP)* systems provide an organization with integrated software modules and a unified database which enable efficient planning, managing, and controlling of all core business processes across multiple locations. Modules of ERP systems may include finance, accounting, marketing, human resources, production, inventory management and distribution.

It is typically hosted on servers and provides simultaneous services to a large number of users, typically over a computer network. Services provided by enterprise software are typically business-oriented tools such as online shopping and online payment processing, interactive product catalogue, automated billing systems, security, content management, IT service management, customer relationship management, resource planning, business intelligence, HR management, manufacturing, application integration, and forms automation.

Geographical Information System (GIS): Data visualization is the study of the visual representation of data, meaning "information that has been abstracted in some schematic form, including attributes or variables for the units of information". According to Friedman (2008) the "main goal of data visualization is to communicate information clearly and effectively through graphical means.

Location-based data visualization employing geographical information system and information visualization provides an advanced means to assist with visual data exploration and decision making. An effective location-based data visualization system can significantly enhance the communication among decision-makers and facilitate the agreement on the most appropriate alternatives.

Computer-Aided Design (**CAD**) is the use of computer technology and systems to design and create 2D and 3D virtual models of goods and products for the purposes of testing. CAD

software, or environments, provides the user with input-tools for the purpose of streamlining design processes; drafting, documentation, and manufacturing processes. CAD output is often in the form of electronic files for print or machining operations. CAD/CAM include various forms of engineering; industrial design and general manufacturing; many disciplines of science, e.g. mathematics, computer science and psychology; arts and creative design; bio-medical areas; CAD/CAM enterprises dealing with large scale product management, multi-national consulting and system building.

1.6-Word Processor (Microsoft Office Word 2007)

Basic Features to practice in lab

Paragraph formatting, font formatting, managing layout of document, editing document, reviewing document (Track changes, Adding comments, Proofing). Inserting pictures, tables, shapes, hyperlink, header, footer, page number, Watermark, Footnote, caption, text box, word art, equations, symbol and chart. Table of Content, Mail Merge, Text wrapping and Templates.

1.7-Presentation Tools (Microsoft Office PowerPoint2007)

Basic Features to practice in lab

Formatting font, paragraph; inserting new slides, pictures, charts shapes, header footer, word art, date and time, slide number; page setup, slide orientation; using different themes for slide; animations: slide transition, custom animation; Slide show; reviewing slides.

1.8-Microsoft Word Shortcut Keys

Keyboard shortcuts can save time and the effort of switching from the keyboard to the mouse to execute simple commands. Print this list of Word keyboard shortcuts and keep it by your computer for a quick reference.

Document actions	Keystroke
Open a file	CTRL+O
New file	CTRL+N
Close a file	CTRL+W
Save As	F12
Save	CTRL+S or SHIFT+F12
Print Preview	CTRL+F2
Print	CTRL+P
Show/Hide paragraph symbols	CTRL+*
Spelling and grammar	F7
Help	F1
Find	CTRL+F
Replace	CTRL+H
Go To	CTRL+G

Cursor movement	Keystroke
Select all - entire document	CTRL+A

Text Style	Keystroke
Font face	CTRL+SHIFT+F
Font size	CTRL+SHIFT+P
Bold	CTRL+B
Italics	CTRL+I
Underline	CTRL+U
Double underline	CTRL+SHIFT+D
Word underline	CTRL+SHIFT+W
All caps	CTRL+SHIFT+A
Change case	SHIFT+F3
Subscript	CTRL+=
Superscript	CTRL+SHIFT+=
Make web hyperlink	CTRL+K

Tables	Keystroke
Go to next cell	Tab
Go to previous cell	SHIFT+Tab
Go to beginning of column	ALT+PageUp

Select from cursor to beginning of line	SHIFT+Home
Select from cursor to end of line	SHIFT+END
Go to beginning of line	HOME
Go to end of line	END
Go to beginning of document	CTRL+Home
Go to end of document	CTRL+End

Formatting	Keystroke
Cut	CTRL+X
Copy	CTRL+C
Paste	CTRL+V
Undo	CTRL+Z
Redo	CTRL+Y
Format painter	CTRL+SHIFT+C
Left alignment	CTRL+L
Center alignment	CTRL+E
Right alignment	CTRL+R
Justified	CTRL+J
Delete previous word	CTRL+Backspace
Apply bulleted list	CTRL+SHIFT+L
Indent	CTRL+M
Page break	CTRL+Enter

Highlight to beginning of column	ALT+SHIFT+PageUp
Go to end of column	ALT+PageDown
Highlight to end of column	ALT+SHIFT+PageDown
Go to beginning of row	ALT+Home
Highlight to beginning of row	ALT+SHIFT+Home
Go to end of row	ALT+End
Highlight to end of row	ALT+SHIFT+End
Column break	CTRL+SHIFT+Enter

Miscellaneous	Keystroke
Copyright symbol - ©	ALT+CTRL+C
Date field	ALT+SHIFT+D
Go to footnotes	ALT+CTRL+F
Thesaurus	SHIFT+F7

1.9-Applications of Computer Technology

In less than a generation, computer technology has revolutionized business all over the world. Companies of every size now relay on computers to automate or assist virtually every aspect of commerce. Computers are essential for efficiency and responsiveness. Without computers to provide the accurate, up-to-the-second information needed to make strategic decisions and manage production; many companies would find it impossible to meet the challenge of global competition.

Business and Industry: Computers are flexible tools that most people in the business community use them every day. Office workers use them to write letters, keep employ rosters, create budgets, communicate with coworkers, find information, manage projects, and so on. Computers are also vital in accounting.

Medicine: In medicine today, computers are used for diagnosing illnesses and monitoring patients at their beside to robotic surgical assistant. One of the most interesting is computerized diagnostic equipment that is so small it can be swallowed.

Education and Training: Nowadays computer is as essential to the learning processes as books, paper, and pens. In the classroom, students use computers to develop project, prepare reports, and gather information from electronic resources around the world. Computerized tutorials can teach, test for understanding, and re-teach based on how much the student has learned.

Entertainment: Computers are used for looking movies, listening music, playing 3-D games, chatting with friend and relatives, advertising, arts and many more. Musician can use MIDI (Musical Instrument Digital Interface) to combine or create sounds electronically, either in the recording studio or during live performances.

Science: The scientific community uses computers to do research and to exchange with colleagues around the world. Scientists also use computers to simulate complex events, such as predicating how earthquakes will affect building or how will change weather patterns.

Engineering: Engineers and architects use computers to design objects and structures with the help of CAD (Computer-Aided design) techniques. Specialized CAD systems are available for designing almost anything from houses, cars, and buildings. Knowledge of CAD is now required for many engineering jobs. Project management software are used to manage complex engineering project and EDI technology is used to transfer data from one place to another.

Manufacturing: In some factories, computers control virtually everything. For example, consider a power plant that generates steam for electricity. In this kind of factory, a computer monitors pressures and temperature at hundreds of critical points through the plant.
Automobile plants use robots to perform task such as painting, welding, and cutting, and bending sheet metal for body parts.

Government: In U.S government uses computers to collect, process, and store vast amounts of information about it's citizens are through the social security administration, the bureau of census, internal revenue service.

Military: Today military uses much more compact computers in a variety of ways aboard ships, submarines, and airplanes, as well as on battlefields and in certain weapons and satellites.

Film industry: Computers are used in film to create special effects (Animate Object) and streamline the film editing process.
Computer animation involves creating images of people or other creatures on a computer and then making the images appear to move against the real or computer generated background.
For example a dinosaur in Jurassic Park was created using computer animation. Computer also plays a large role, in film editing which requires a huge variety of techniques.

Unit 2: Accounting through MS Excel [LH 15 Hrs]

2.1-An overview concept of Spread Sheet application

Spreadsheet application software package organizes data into a table of values arranged in rows and columns. Each value can have predefined relationship with other values. Spreadsheet software allows users to perform data calculations, data manipulations, data analysis, business analysis, generating charts and reports, planning, modeling etc. In a spreadsheet, each value is placed in a cell. We can define what type of data is in each cell and how different cells are depending on one another. Once we have defined the cells and formula for linking them together, we can enter data and analyze the result. Furthermore, we can simulate the result by modifying the selected data values to see how the result changes accordingly.

Excel, Lotus 1-2-3 and Apple Numbers are some examples of spreadsheet software. MS Excel is the most popular spreadsheet application. They simulate paper worksheets by displaying multiple cells that make up a grid (worksheet of rows and columns). Developing a spreadsheet involves designing its format and developing the relationship that will be used in the worksheet. Most packages help you develop charts and graphics displays of spreadsheet results. Spreadsheet applications have a wide range of uses-from family business to corporate earnings statements.

2.2-An overview concept of MS Excel and possible uses of MS excel in accounting.

2.2.1-Introduction

Microsoft Excel is an application software developed and manufactured by Microsoft Corporation that allows users to organize, format, and calculate data with formulas using a spreadsheet system broken up by rows and columns. Microsoft Excel usually comes bundled with Microsoft Office and is compatible with other applications offered in the suite of products.

Microsoft Excel is the most popular spreadsheet program on the market today. You can use the program to track and manage large quantities of data, such as inventories, price lists, expenses and expenditures, and much more. You can even use Excel as a database, entering and sorting records.

Microsoft Office Excel was designed to support accounting functions such as budgeting, preparing financial statements and creating balance sheets. It comes with basic spreadsheet functionality and many functions for performing complex mathematical calculations. It also supports many add-ons for activities such as modeling and financial forecasting, and seamlessly integrates with external data to allow you to import and export banking information and financial data to and from other accounting software platforms.

2.2.2-Budgeting and Statements

Microsoft Office Excel ships with templates for creating budgets, cash-flow statements and profit-and-loss statements, which are some of the most basic documents used in accounting. In addition, you can download more complex budgeting and statement templates from the Office website, or purchase specialized templates from third-party vendors and install these in the application. If you need to create complex or custom budgets or financial statements, you can either customize an existing template and re-use its elements, or create one from scratch using the functionality built into Excel.

2.2.3-Spreadsheets

Performing line calculations is a basic accounting task, and Excel spreadsheets are designed to contain data in a tabular format that supports both in-line and summation calculations,

replacing the need for ticker tape and special accounting calculators. The data in the spreadsheet is reusable and storable, making Excel more flexible than an accounting calculator for performing simple calculations and summations. Additionally, you can create charts and graphs from the spreadsheet data, creating a media-rich user experience and different views of the same data. You can also use add-ons to mine the data and create models and financial forecasts.

2.2.4-Present Data

You can use Excel's formatting tools to make your spreadsheet data easier to read and interpret. For example, you can add shading to cells, change the number format, or change the font and size of your data. You can present your worksheet data to others using charts and graphs. Excel's graphing and charting tools make it easy to turn your data into meaningful visuals, such as pie charts, bar charts, and more.

2.2.5-External Data

You can import data from many different data sources into Excel. This is especially useful for accounting as you can pull sales data, banking data and invoices from many sources into one central workbook to support your accounting activities. The data can be stored in different databases and file formats prior to importing, allowing you to access data from many different areas of your business without having to do additional data entry.

2.2.6-Integration

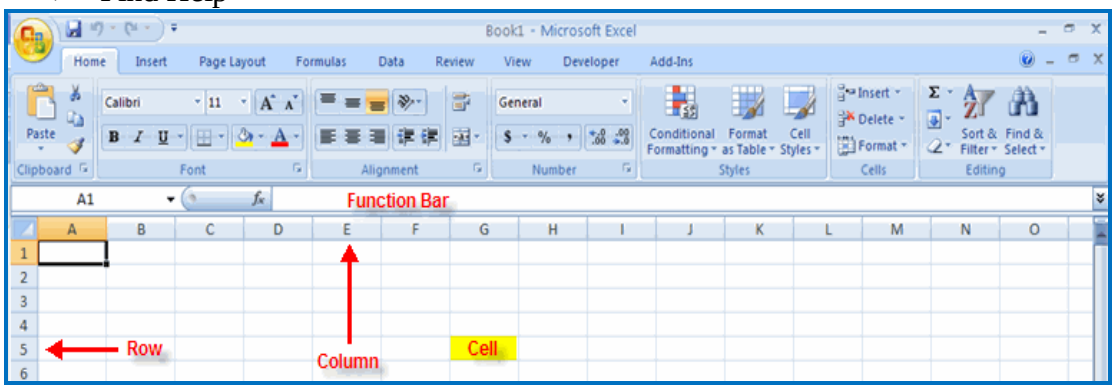
Excel integrates with many popular accounting software applications. For example, you can use the wizards that ship with your preferred accounting software package to map Excel spreadsheets to your accounting data so you can perform push and pull data operations from both Excel and your accounting package on demand.

2.3-Brief Guide for Using MS Excel

2.3.1-Excel Basic

Basic Features

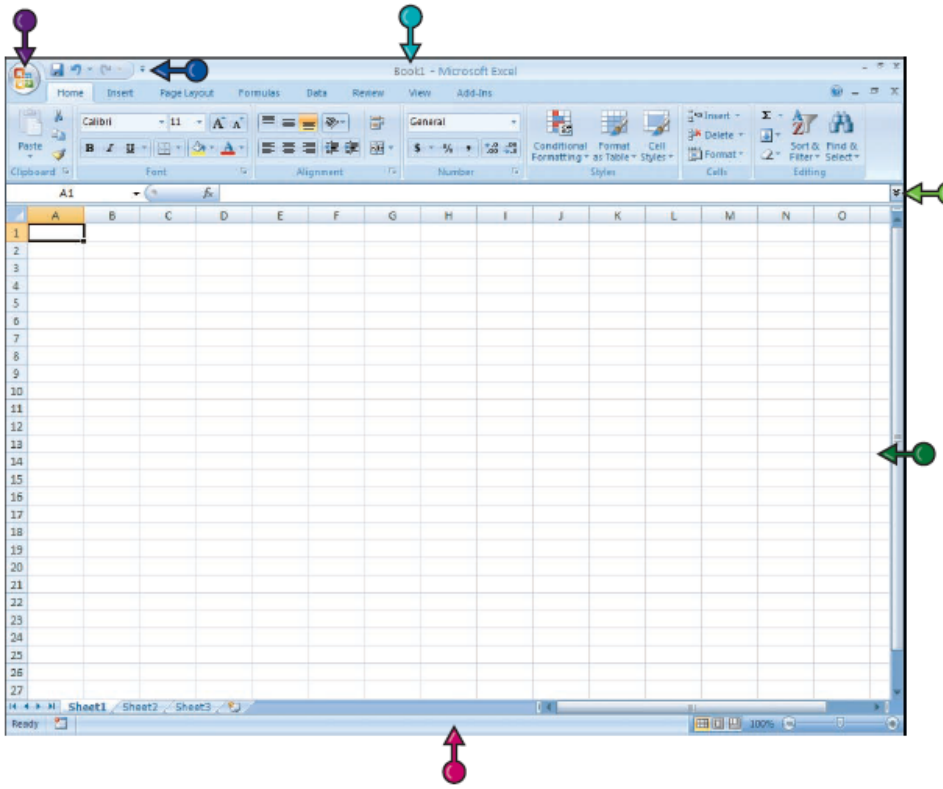
- An Introduction to Excel
- Start and Close Excel
- Navigate the Excel Program Window
- Understanding the Ribbon, Galleries, and Contextual Tools
- Change Views
- Customize the Quick Access Toolbar
- Display Task Panes
- Find Help



Microsoft Office Button
Displays the File menu where you find commands to open, save, print, send, and publish files. In addition you can use commands here to close a file or exit Excel, and set Excel options.

Quick Access Toolbar
Displays frequently used features such as Save, Undo/Redo, and Print.

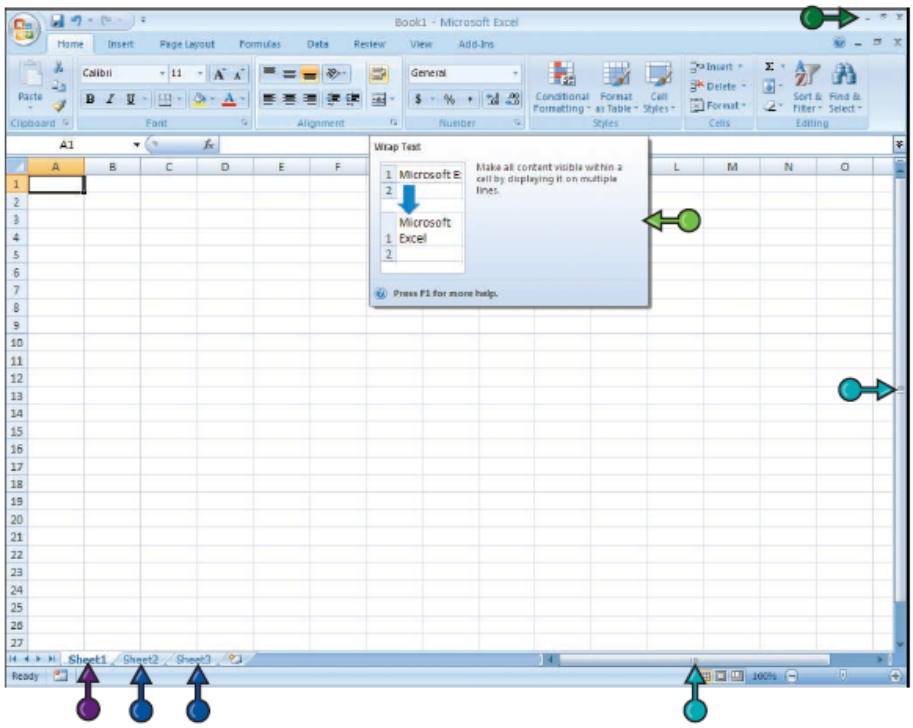
Title Bar
Displays the name of the open workbook file.



Formula Bar
Use this bar to enter and edit formulas and perform calculations on your worksheet data.

Worksheet
The worksheet consists of rows and columns that intersect to form cells. Cells hold your worksheet data.

Window Frame
Displays status information for the current worksheet or file, as well as view buttons and zoom controls.



Program Window Controls
Use these three buttons to minimize, maximize, or close the worksheet window.

Super Tooltip
Appears when you place your mouse over a choice on the Ribbon, explaining what a feature does and providing a link to related help information.

Active Worksheet
The active worksheet appears in the Excel work area, and its tab appears highlighted.

Worksheet Tabs
You can use worksheet tabs to view different worksheets in your workbook file.

Vertical and Horizontal Scroll Bars
Scroll vertically or horizontally through a worksheet.

2.3.2-Workbook Fundamentals

Basic Features

- Start a New Workbook File
- Save a Workbook
- Publish a Workbook as an Excel Binary
- Workbook File
- Open an Existing Workbook
- Close a Workbook
- Delete a Workbook
- Arrange Workbook Windows
  - Open two or more workbooks.
  - Click **View**.
  - Click **Arrange All**. The Arrange Windows dialog box appears.
  - Click a display mode (changes to).
    -Tiled arranges the workbooks like mosaic tiles across the screen.
    -Horizontal arranges the workbooks stacked horizontally.
    -Vertical arranges the workbooks vertically.
    -Cascade arranges the workbooks stacked on top of each other in a cascading display.
- Hide or Show a Worksheet
  - Right-click the tab for the worksheet you want to hide.
  - Click Hide.
  - Right-click the tab area.
  - Click **Unhide.** The Unhide dialog box appears.
  - Click the worksheet you want to unhide.
  - Click OK.
  - The worksheet reappears.

2.3.3-Entering Data in a Worksheet

Basic Features

- Enter Data
- Turn On Text Wrapping
- Resize Columns and Rows
- Select Cells
- Enter Data with AutoFill
- Work with AutoCorrect
- Edit Data
- Check Spelling in a Worksheet

You can enter data into any cell within the worksheet. When you click a cell, it immediately becomes the active cell in the worksheet, and any data you type appears within it. You can type data directly into the cell, or you can enter data using the Formula bar.

Data can be text, such as row or column labels, or numbers, which are called *values* in Excel. Formulas are also values. Excel automatically left-aligns text data in a cell and right-aligns values. By default, Excel also considers numerical dates and times that you enter to be values, and assigns right alignment.

AutoFill a Text Series

1- Type the first entry in the text series.
2- Click and drag the cell's fill handle across or down the number of cells you want to fill.
3- Release the mouse button.
Note:- You can also use AutoFill to copy the same text to every cell you drag over if the text is not part of a commonly used set, such as the months of the year.

Monday
Tuesday

Wednesday
Thursday
Friday

When you make a cell active in the worksheet, a small fill handle appears in the lower-right corner of the selector. You can use the fill handle to create an AutoFill series.

AutoFill a Number Series

1- Type the first entry in the number series.
2- In an adjacent cell, type the next entry in the number series.
3- Select both cells.
4- Click and drag the fill handle across or down the number of cells you want to fill.

AutoCorrect feature

You can use the AutoCorrect feature to quickly correct text you commonly misspell. For example, if you continually misspell the word “autumn” as “autumm,” you can add the word to the AutoCorrect dictionary. The next time you mistype the word, AutoCorrect fixes your mistake for you.

Add a Misspelling

1- Click .
2- Click **Excel Options**. The Excel Options window appears.
3- Click **Proofing**.
4- Click **AutoCorrect Options**.

Perform editing

You can perform editing tasks to the data in your worksheets. For example, you might want to change the number values you entered, or add additional text to a cell.

1-**Double-click** the cell containing the data you want to edit.
2-Make necessary updates.

You can also edit the data in the selected cell by making changes to the data as it appears in the Formula bar.

2.3.4-Working with Worksheets

Worksheets are where all the action takes place in Excel. You use worksheets to enter and edit data, perform calculations, and more.

Basic Features

- Understanding Worksheet Structure
- Navigate Worksheets
- Name a Worksheet
- Add a Worksheet
- Delete a Worksheet
- Move a Worksheet
- Copy a Worksheet
- Format Worksheet Tab Color

Columns and Rows

Worksheets are formatted as a grid formed by columns and rows. Each worksheet has 16,384 columns and 1,048,576 rows. Every column and row has a unique identifier. Columns are labeled by letters arranged alphabetically, and rows are numbered.

Cells and Cell Addresses

Every intersection of a column and a row creates a cell. Cells are the receptacles for your Excel data. Every cell has a unique name, also called an address or cell reference, in the Excel worksheet. Cell names consist of the column and row number, with the column always listed first. For example, cell A1 is the first cell in the worksheet. The next cell to the right is B1.

Active Cell

The active cell in a worksheet is always surrounded by a highlighted border, called the selector. The Name box, located on the far left side of the Formula bar, always displays the name of the current cell.

Cell Ranges

As you work with data in a worksheet, you can group related data into a range. A range is simply a group of related cells that you can connect. A range can also be a single cell or an entire worksheet. By grouping cells into a range, you can apply formatting or printing to the entire collection, or move or copy the range data at once. Ranges are particularly useful when you begin creating formulas that reference groups of cells.

Worksheet Tabs

By default, every Excel workbook starts out with three worksheets. Each worksheet is identified by a tab at the bottom of the sheet. The active worksheet always appears at the top of the stack. You can add more or less worksheets as needed using the Insert Worksheet tab to the right of the three worksheet tabs. You can also give your worksheets unique names to better identify their content.

2.3.5-Calculating Data with Formulas and Functions

Formulas and functions are the real driving force of Excel's spreadsheet capabilities. You can use formulas to perform all kinds of calculations on your Excel data. You can build formulas using mathematical operators, values, and cell references. For example, you can add the contents of a column of monthly sales figures to calculate a total number of sales.

Basic Features

- Understanding Formulas
- Create Formulas
- Reference Absolute and Relative Cells
- Copy Formulas
- Name Cells and Ranges
- Reference Ranges in Formulas
- Reference Cells from Other Worksheets
- Understanding Functions
- Apply a Function

Formula Structure

Ordinarily, when you write a mathematical formula, you write out the values and the operators, followed by an equal sign, such as 2 + 2 =. In Excel, formula structure works a bit differently. All Excel formulas begin with an equal sign (=), such as =2+2. The equal sign immediately tells Excel to recognize any subsequent data as a formula rather than a regular cell entry.

Referencing Cells

Although you can enter specific values in your Excel formulas, you can also easily reference data in specific cells. For example, you can add two cells together or multiply the contents of one cell by a value. Every cell in a worksheet has a unique address, also called a *cell reference*. By default, cells are identified by a specific column letter and row number, so cell

D5 identifies the fifth cell down in column D. To help make your worksheets easier to use, you can also assign your own unique names to cells. For example, if a cell contains a figure totaling weekly sales, you might name the cell Sales.

Cell Ranges

A group of related cells in a worksheet is called a *range.* Cell ranges are identified by their anchor points, the upper left corner of the range and the lower right corner of the range. The range reference includes both anchor points separated by a colon. For example, the range name A1:B3 includes cells A1, A2, A3, B1, B2, and B3. You can also assign unique names to your ranges to make it easier to identify their contents. Range names must start with a letter or underscore and can include uppercase and lowercase letters. Spaces are not allowed in range names.

Mathematical Operators

You can use mathematical operators in Excel to build formulas. Basic operators include the following:

Operator	***Operation***
+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Percentage
^	Exponentiation
=	Equal to
<	Less than
≤	Less than or equal to
>	Greater than
≥	Greater than or equal to
<>	Not equal to

Reference Absolute and Relative Cells

Cell referencing is the method of using cell address in formula. The calculation in the worksheet is very effective by the use of cell referencing because any update of values in the cell automatically updates the result in the other cells. There are three types of cell referencing.

- ✓ Relative cell reference
- ✓ Absolute cell reference
- ✓ Mixed cell reference

By default, Excel treats the cells you include in formulas as relative locations rather than set locations in the worksheet. This is called ***relative cell referencing***. For example, when you copy a formula to a new location, the formula automatically adjusts using relative cell addresses. If you want to address a particular cell location no matter where the formula appears, you can assign an ***absolute cell reference***. Absolute references are preceded with a $ sign in the formula, such as =$D$2+E2. A ***mixed cell reference*** combines both relative and absolute cell references. We can effectively lock either the row or the column in a mixed reference.

Assign Absolute References

1- Click the cell containing the formula you want to change.
2- Select the cell reference.
3- Press **F4**.

Note: - You can also type in the dollar signs to make a reference absolute. Excel enters dollar signs ($) before each part of the cell reference, making the cell reference absolute.

When would I use absolute cell references?

You can use absolute referencing to always refer to the same cell in the worksheet. For example, perhaps your worksheet contains several columns of pricing information that refer to one discount rate disclosed in cell G10. When you create a formula based on the discount rate, you want to make sure the formula always refers to cell G10, even if the formula is moved or copied to another cell.

When would I use mixed cell references?
You can use mixed referencing to reference different relative cells within the same row or column, such as $C6, which keeps the column from changing but leaves the row relative. If the mixed reference is C$6, the column is relative but the row is absolute.

Copy a Relative Formula
1- Click the cell containing the formula you want to copy.
2- Click and drag the cell's fill handle across or down the number of cells to which you want to copy the formula.

Excel copies the formula into each cell you drag over. In the case of relative cell referencing, Excel adjusts the formula relative to each cell into which you copy the formula.

Name Cells and Ranges
You can assign distinctive names to the cells and ranges of cells you work with in a worksheet, making it easier to identify the cell's contents. A *range* is simply a group of related cells, or a range can consist of a single cell. Naming ranges can also help you when deciphering formulas.

Assign a Range Name
1- Click the **Formulas** tab.
2- Select the range you want to name.
3- Click **Name a Range**. The New Name dialog box appears.
4- Type a name for the range.
5- Click **OK**. Excel assigns the name to the cells.

Go to a Range
1- Click the **Name**.
2- Click the range name to which you want to move. Excel immediately jumps to the cells.

Are there any rules for naming ranges?
Range names must start with a letter or an underscore (_). After that, you can use any character, uppercase or lowercase, or any punctuation or keyboard symbols, while hyphens or spaces are not allowed in range names; instead, substitute a period or underscore.

Reference Ranges in Formulas
You can reference an entire group of cells in a formula by referencing the range name. This can speed up the time it takes to build a formula in a worksheet, and range names are much easier to remember than the default range names Excel assigns.

1- Click the **Formulas** tab.
2- Click the cell to which you want to assign a formula.
3- Start or create the formula you want to apply.
Note: See the section "Create Formulas" to learn more.
4- When you are ready to insert a range into the formula, click **Use In Formula**.
5- Click the range name. Excel automatically inserts the range name.
6- Continue creating the formula as needed.
7- Press **Enter**.

Reference Cells from Other Worksheets

You can reference cells in other worksheets in your Excel formulas. When referencing data from other worksheets, you must specify the sheet name followed by an exclamation mark and the cell address, such as Sheet2!D12. If the sheet has a specific name, such as Sales, you must use the name along with an exclamation mark, followed by the cell or range reference, such as Sales!D12. If the sheet name includes spaces, enclose the reference in single quote marks, such as 'Sales Totals!D12'.

Procedure

1- Click the cell to which you want to assign a formula.
2- Create the formula you want to apply.
Note: See the section "Create Formulas" to learn more.
3- When you are ready to insert a cell or range from another sheet into the formula, type the sheet name preceded by an exclamation point.
4- Type ***!G7***, where *G7* is the cell address or range. You can continue creating the formula as needed.
5- When finished, press **Enter**. The formula results appear in the cell.

Understanding Functions

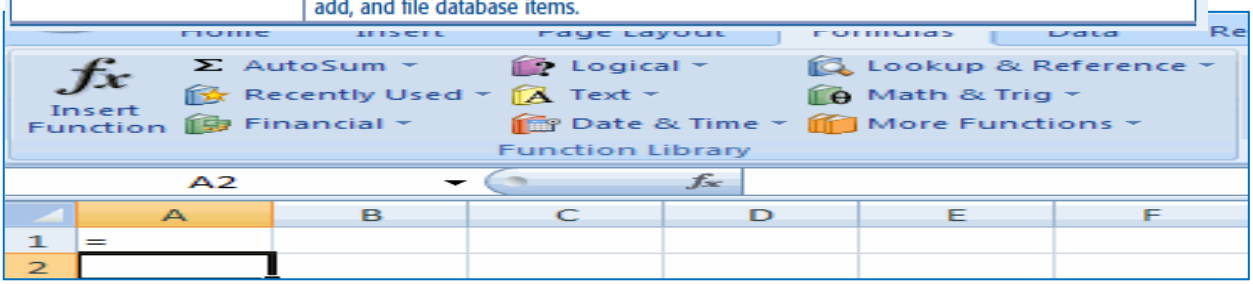
If you are looking for a quicker way to enter formulas, you can tap into a wide variety of built-in formulas, called *functions*. Functions are ready-made formulas that perform a series of operations on a specified range of values. Excel offers over 300 functions you can use to perform mathematical calculations on your worksheet data.

Because functions are formulas, all functions must start with an equal sign (=). Functions are also distinct in that each one has a name. For example, the function that sums data is called the SUM function, and the function for averaging values is AVERAGE. You can type functions directly into your worksheet cells or use the Formulas tab of the ribbon.

Types of Functions

Excel groups functions into eleven categories, and each category can include a variety of functions:

Category	*Description*
Cube	If you are using complex OLAP formulas (such as Pivot Tables), cube functions take the OLAP data and display it in a cell.
Date & Time	Includes functions for calculating dates, times, and minutes.
Engineering	This category offers all kinds of functions for engineering calculations.
Financial	Includes functions for calculating and tracking loans, principal, interest, yield, depreciation, and future values.
Information	Includes functions for testing your data.
Logical	Includes functions for logical conjectures, such as `if-then` statements.
Lookup & Reference	Use these functions to locate references or specific values in your worksheets.
Mathematical & Trigonometric	Includes a wide variety of functions for calculations of all types.
Statistical	This category includes functions for calculating averages, probabilities, rankings, trends, and more.
Text	Use these text-based functions to search and replace data and other text tasks.
Database	If you are using Excel as a database program, you can use the database functions to count, add, and file database items.



Common Functions

The table below lists some of the more popular Excel functions you might use with your own spreadsheet work.

Function	Category	Description	Syntax
SUM	Math & Trig	Adds values	=SUM(number1,number2,...)
ROUND	Math & Trig	Rounds a number specified by the number of digits	=ROUND(number,number_digits)
COUNT	Statistical	Returns a count of text or numbers in a range	=COUNT(value1,value2,...)
AVERAGE	Statistical	Averages a series of arguments	=AVERAGE(number1,number2,...)
MIN	Statistical	Returns the smallest value in a series	=MIN(number1,number2,...)
MAX	Statistical	Returns the largest value in a series	=MAX(number1,number2,...)
MEDIAN	Statistical	Returns the middle value in a series	=MEDIAN(number1,number2,...)
PMT	Financial	Finds the periodic payment for a fixed loan	=PMT(interest_rate,number_of_periods, present_value,future_value,type)
RATE	Financial	Returns an interest rate	=RATE(number_of_periods,payment, present_value,future_value,type,guess)
DAYS360	Date & Time	Returns the number of days between two dates using a 360-day calendar	=DAYS360( )
IF	Logical	Returns one of two results you specify based on whether the value is TRUE or FALSE	=IF(logical_text,value_if_true,value_if_ false)
AND	Logical	Returns TRUE if all the arguments are true, FALSE if any are false	=AND(logical1,logical2,...)
OR	Logical	Returns TRUE if any argument is true and FALSE if all arguments are false	=OR(logical1,logical2,...)

Apply a Function

You can use functions to speed up your Excel calculations.

1- Click the cell to which you want to assign a function.
2- Click the **Insert Function** icon on the Formula bar.

Note: You can also click the **Formulas** tab and click function icon. Excel inserts an equal sign automatically to denote a formula and displays the Insert Function dialog box.
3- Click to select a category.
4- Click the function you want to apply.
5- Click **OK**. The Function Arguments dialog box appears.

Note: After selecting a function, you can then apply the function to a cell or range of cells in your worksheet. You can use the Function Arguments dialog box to help you construct all the necessary components of a function. The dialog box can help you determine what values you need to enter to build the formula.

6- Depending on the function's arguments, select the desired cells for each argument required by the function.

Note: You can select a cell or range of cells directly in the worksheet, and Excel automatically adds the references to the argument.
You can also type a range or cell address directly in the argument text box. The dialog box displays additional information about the function here.
7- If needed, continue adding the necessary cell references to complete all of the function's arguments.
8- When finished constructing the arguments, click **OK**.

2.3.6-Rearranging Worksheet Data

You can rearrange your worksheet data to improve the presentation of your worksheet information.

Basic Features

- Move and Copy Data
- Delete Data or Cells
- Add Columns and Rows

- Delete Columns and Rows
- Center Data across Columns
- Transpose Columns and Rows
- Set Column Width and Row Height
- Hide Columns and Rows
- Freeze a Column or Row
- Split a Worksheet into Panes
- Find and Replace Data

2.3.7-Formatting Worksheets

You can make your worksheets more presentable by applying one or several of Excel's many formatting features. We can improve the appearance of your worksheet data by changing the font and size of the data, adding color and shading, and giving your worksheets a more professional, polished look.

Basic Features

- Apply Bold, Italics, and Underlining
- Change the Font and Size
- Change Number Formats
- Increase or Decrease Decimals
- Change Data Color
- Apply Workbook Themes
- Align Cell Data
- Rotate Cell Data
- Control Text Wrap
- Add Borders
- Add Background Color to Cells
- Assign a Background to a Worksheet
- Copy Cell Formatting
- Apply a Style
- Assign Conditional Formatting

Assign a Background to a Worksheet

You can add a photo background to a worksheet for added interest. For example, if your worksheet documents sales, you might add a picture of a product.

1- Click the **Page Layout** tab.
2- Click **Background**.
Note: The Sheet Background dialog box opens.
You can use the **Look in** to navigate to the folder or drive where the image is stored.
3- Select the image you want to use as a background.
4- Click **Insert**.
Excel applies the image to the worksheet background.

Copy Cell Formatting

You can use the Format Painter feature to copy formatting to other cells in your worksheet. For example, perhaps you have applied a variety of formatting to a range of cells to create a certain look.

1- Select the cell or range containing the formatting you want to copy.
Note: See Chapter 3 to learn how to select cells.
2- Click the **Home** tab.
3- Click **Format Painter** ( ).
To copy the same formatting multiple times, double-click.

4- Click and drag over the cells to which you want to copy the formatting. Excel immediately copies the formatting to the new cells.

Apply a Style

You can use a style to quickly assign formatting throughout a workbook. A style is a collection of formatting, whether you define a font and size or a background color.

1- Select the cell or cells to which you want to apply a style.
Note: See Chapter 3 to learn how to select cells.
2- Click the **Home** tab.
3- Click **Cell Styles**.
The Style gallery opens.
4- Click a style to apply it.

Assign Conditional Formatting

You can use Excel's conditional formatting feature to assign certain formatting only when the value of the cell meets the specified condition.

1- Select the cell or range to which you want to apply conditional formatting.
Note: See Chapter 3 to learn how to select cells.
2- Click the **Home** tab.
3- Click **Conditional Formatting**.
4- Click **Highlight Cells Rules**.
Note that there are other rules you can apply from this menu, depending on what conditions you wish to highlight.
5- Specify the operator you want to assign for condition 1.
Note: The associated dialog box, such as Less Than, opens. If you need to select a cell or range, click here to minimize the dialog box and view more of the worksheet.

Enter a value or text for the condition here.
6- Choose a format to apply and Click **OK**.

2.3.8-Communicating Information with Charts

You can use charts to turn your spreadsheet data into instant, persuasive visual presentations. You can create dozens of different charts in Excel, from pie charts to bar charts and more. If you are new to using charts to visualize data, this section gives you an overview of how charts work in Excel.

Basic Features

- Understanding Excel Charts
- Create a Chart with Galleries
- Move and Resize Charts
- Change the Chart Type
- Change the Axes Titles
- Manipulate 3-D Charts
- Format Chart Objects
- Add Chart Objects
- Change the Chart Data
- Format Charts with Layouts and Styles

Data Series

The foundation of any chart is the worksheet data you use to create the chart. Called a *data series*, chart data is the content of a group of related cells, such as one row or column of data in your worksheet. For example, to make a pie chart of monthly household expenses, your worksheet data needs to consist of columns and rows tracking expenses such as electricity,

gas, water, mortgage, groceries, and so on. You decide which cells to include in the chart, and Excel's chart tools can help you build a pie chart using the cell's contents and labels.

Customize Charts

You can customize any chart you create in Excel. You can make changes to the formatting of the chart text, change the chart type, re-plot the data, and much more. You can angle text, change text color, or adjust the colors and patterns of the bars and lines displayed in a chart. You can also add new chart elements, such as callouts, labels, and titles. Layout and Style galleries feature new to Excel 2007 offers easy-to-apply, predesigned formatting.

Chart Types

Excel offers 11 different types of charts, and each type includes a variety of styles. You can use the following table to help choose the best chart for the type of data you want to present.

Chart Type	*Description*
Column	Compares data in two or more categories, or shows changes over time.
Bar	Similar to column charts. Displays the data horizontally instead of vertically.
Line	Similar to column charts, but instead of bars, the data series appears as dots on lines. Good for showing changes across time.
Pie	Perfect for showing percentages of a whole. You can select several pie chart styles, including 3-D.
Scatter	Shows correlations between two value sets, one on the y-axis and the other on the x-axis.
Area	Shows changes over time but emphasizes the individual contribution of each data part.
Doughnut	Compares multiple data series.
Radar	Depicts separate axes for each data category radiating out from the center, like a spider web.
Surface	Shows how three sets of data interact. Ideal for showing patterns in data.
Bubble	Similar to scatter charts, bubble charts use three columns of data. Each data point indicates a third dimension.
Stock	Ideal for tracking stock market activity.

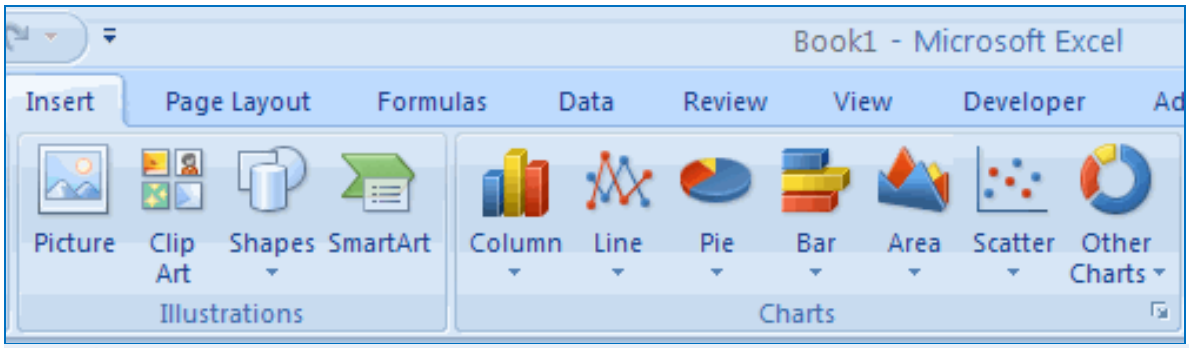


Chart Objects

Charts are composed of a variety of elements, also called *objects*. When you edit a chart, you can edit different elements to give you greater control of the visual representation.

Part	*Description*
Legend	Tells what each data series in your chart represents.
Chart title	Gives a headline to your chart.
Plot area	The background of your chart.
Value axis	The axis listing values for the data series.
Value axis title	A headline identifying the value axis.
Category axis	The axis listing categories for the data series.
Category axis title	A headline identifying the category axis.
Data series	The data you are plotting on a chart.

Create a Chart with Galleries

You can use the chart galleries to quickly assemble and create all kinds of charts in Excel. The galleries offer you a wide variety of charts. You can select the chart category and then the specific type you need for your data.

1- Select the range of data you want to chart.
Include any headings and labels, but do not include subtotals or totals.
2- Click the **Insert** tab.
3- Click an item in the Charts group.
The associated gallery opens.
4- Click a chart sub-type.

Note: The chart appears on your worksheet. Contextual tools (Design, Layout, and Format tabs) appear in the Ribbon. If you want to move the chart to its own sheet, click **Move Chart** on the Design tab and choose **New Sheet**.

Can I select noncontiguous data to include in a chart?
Yes. The data you select for a chart do not have to be adjacent to each other. To select noncontiguous cells and ranges, select the first range and then press and hold while selecting additional ranges to include.

Move and Resize Chart
You can move and resize an embedded chart on your worksheet. For example, you might want to reposition the chart at the bottom of the worksheet or resize it to make the chart easier to read.

Move a Chart
1- Click an empty area of the chart. Excel selects the chart and surrounds it with handles.
2- Position the mouse over the edge of the chart, and it becomes a cursor with four arrows.
You cannot move or resize charts you create on their own sheets.
Move and Resize Charts
3- Click and drag the chart to a new location on the worksheet.

Resize a Chart
1- Click an empty area of the chart. Excel selects the chart and surrounds it with handles.
2- Click and drag a handle to resize the chart.

Change the chart type
You can change the chart type at any time to present your data in a different way. For example, you might want to change a bar chart to a line chart.

1- Click an empty area of the chart to select the chart.
2- Click the **Design** tab.
3- Click **Change Chart Type**.
The Change Chart Type dialog box appears.

4- Click a new chart type.
5- Click **OK**.

Change the Axes Titles
You can change the titles of the x- or y-axis on your chart. For example, you might prefer to give the axes more descriptive titles, or if your titles are too long, you might want to shorten the title text. You can change chart title information using the Edit Data Source dialog box.

1- Select the chart you want to edit.
2- Click the **Layout** tab.
3- Click **Axis Titles**.
4- Click **Primary Vertical Axis Title** or **Primary Horizontal Axis Title**.
5- Select an axis type (for example, Vertical Title or Rotated Title). The title placeholder appears.
6- Click and drag in the placeholder to select the placeholder text and enter new text.

7- Press **Enter** or click outside the placeholder to save the new title. Excel applies the new titles to the chart.

Format Chart Objects

You can change the formatting for any of the elements, called *objects* in Excel, contained within a chart. For example, you can change the background color or pattern for the plot area or change the color of a data series on the chart.

1- Select the chart. The Chart Tool tabs become available.
2- Click the **Format** tab.
3- Click to select the chart object you want to edit.
4- Click **Format Selection**.

A Format dialog box appears. Depending on the chart object you want to edit, the options offered will vary.
Note: For more about chart objects, see the section "Understanding Excel Charts."
5- Make any changes to the chart object, as needed. Depending on the chart object you edit, the dialog box offers different options.
6- When finished with your edits, click **Close**.

Add Chart Objects

You can add additional objects to your charts, such as data labels, gridlines, or a legend. The Layout tab is where you access tools for adding and working with chart objects.

1- Select the chart you want to edit.
2- Click the **Layout** tab.
3- Click an item in the Labels or Axes group of tools.
4- Click the object you want to add.

A drop-down menu offers options to display objects. In this example, both major and minor vertical gridlines are selected to be displayed.

Change the Chart Data

Whenever you make changes to the data referenced in your chart, the chart data is automatically updated. For example, if you change a value, the chart updates to reflect the new value. If you need to add more data to the chart, you can easily update the source cells.

1- Select the chart you want to edit.
Excel surrounds the chart with selection handles and marks the source data in the worksheet with a colored border.
2- Click and drag the corner handle of the source range to add or subtract cells.

Format Charts with Layouts and Styles

In Excel 2007, new features offer you instant formatting of chart elements. Quick Layouts use sets of formatting for gridlines, labels, and settings, such as perspectives to quickly give your chart a new look. Styles apply preset color schemes and backgrounds to add instant design appeal.
1- Select the chart.
2- Click the **Design** tab.
3- Click the Chart Layouts to scroll through chart layouts.
4- Click a layout to apply it.
5- Click to display all styles.
6- Click a style to apply it.

2.3.9-Analyzing Worksheet Data

You can use Excel as a database program to organize, sort, filter, and analyze lists of data. A database is a collection of related information. For example, an address book is a database list of names and addresses of your contacts. A television guide is also an example of a database, listing television programs, channels, and air times. You can create a variety of database lists in Excel to manage sales contacts, inventory, household valuables, and more.

Basic Features

- Understanding Database Lists
- Create a Database Table
- Add Records Using a Data Form
- Search for Records
- Set Data Validation Rules
- Sort Records
- Filter Data with AutoFilter
- Analyze Data with a PivotTable

Fields

You use *fields* to break down your database list into manageable pieces. In Excel, fields are typically the columns you use to define each part of your list. For example, an address database includes fields such as name, address, and phone number. Field names, also called *labels*, appear at the top of a list.

Records

You use rows to enter each database entry for your list of data. Database entries are called *records*. For example, in an inventory database, a single row contains all the information about an item in the inventory. Each row represents one record in the database.

Tables

An entire database list of information is called a *table*. You can create multiple tables in Excel. For example, one table might list customers and addresses, and another might list product items and prices. You might pull information from two tables to create a third table, such as a table listing customers and the items they buy.

Create a Database Table

You can use an Excel worksheet to build a database to manage large lists of data. A database is simply a collection of related records, such as a phone directory, address list, inventory, and so on. After creating a database table, you can perform a variety of analysis, sorting, and filtering techniques on the data.

Type Field Labels

1- Click where you want to insert the first column.
2- Type a field label.
3- Press **Tab**.
4- Type the next field label.
5- Repeat steps **3** and **4** to continue entering as many field labels as your list requires.

Enter Records

1- Click in the first row beneath the field labels.
2- Type the data for the first field.
3- Press **Tab**.
4- Type the next field data.
5- Repeat steps **3** and **4** to continue filling in a complete record.
6- Press **Enter**. Excel starts a new record for the table by moving automatically to the next row.

7- Repeat steps **2** to **6** to continue entering records for your table.

Create a Table

1- Select the data you want to turn into a database table.
2- Click the **Insert** tab.
3- Click **Table**.
The Create Table dialog box opens. By default, the selected range appears here. If the range is not correct, you can select the correct cell references.
Select this option (changes to) if necessary to include the headers in your table.
4- Click **OK**.
Excel turns the data into a table, fills the cells of the table with blue shading, and displays filter arrows ( ) for each field.

Add Records Using a Data Form

Another way to enter database records is to use Excel's Data Form. The Data Form is a handy dialog box you can use to type the data for each field in your table, one record at a time. You are less likely to enter wrong information into a field when using a form than when directly entering data into your worksheet cells.

1- Enter a record in a row.
2- Select the first cell of a record.
3- Click **Form** on the Quick Access toolbar.
Note: If your database has no records yet, a prompt box appears. Click **OK** to continue.
The data entry dialog box opens.
4- Click **New**.
5- Type the data for the first field.
6- Press Tab.
7- Repeat steps **3** to **4** to continue filling in form fields.
You can click **New** to enter another record.
8- Click **Close**.
Excel adds the record or records to the database list.

How do I navigate through my records using a form?

You can use the Data Form dialog box to navigate between all the records in your table. Click **Find Prev** to move backward through the table, or click **Find Next** to move forward. Any time you want to add a new record, click **New** and fill out the fields.

What methods can I use to delete a record?

You can open the Data Form dialog box and navigate to the record. Click the **Delete** button and confirm the deletion, and the record is gone. You can also click and drag your mouse across the fields of the record in the table on the Excel worksheet and then press Delete.
You can edit your database table by making changes to the records. For example, you might need to change a record's details or delete a record you no longer need. You can edit cells, columns, and rows directly in the table or you can use the Data Form dialog box to make changes.

Edit Records

Change a Record

1- Click anywhere in the table and then click **Form** on the Quick Access toolbar.
The Data Form dialog box opens.
2- Scroll to locate the record you want to edit.
3- Click in the field you want to edit and then make your changes.
You can double-click a field to highlight all the data.
Click **Find Prev** or **Find Next** to navigate to the next record you want to change.
4- Click **Close**. The record or records are changed.

Delete a Record

1- Open the Data Form dialog box.
Note: See the previous steps to learn how to open the dialog box.
2- Click **Find Prev** or **Find Next** to navigate to the record you want to remove.
3- Click **Delete**.
A prompt box appears warning about the deletion.
4- Click **OK**.

How do I add a new record using the form?

To add a new record at any time, click **New**. The Data Form dialog box immediately displays a new record, and you can start typing new data into the fields.

Search for Records

You can use the Data Form to help you display only records matching the criteria you specify. For example, if you want to view all the clients from the same city or state, you can use the Data Form to search for matching records.

1- Open the Data Form dialog box.
Note: You can click **Form** on the Quick Access toolbar to open the form. See the section "Add Records Using a Data Form" to learn more about using the Data Form dialog box.
2- Click **Criteria**.
3- Click in the field for which you want to specify search criteria and then type the criteria you want to match.
4- Click **Find Prev** or **Find Next** to navigate through the matches. When you finish searching through records, click **Close** to close the form.

Set Data Validation Rules

You can set up your database table to control exactly what kinds of data are allowed in the cells. This is handy if other people use your list to enter records. You can make sure that they type the right kind of data in a cell by assigning a data validation rule. If they type the wrong data, such as text data instead of numerical data, Excel displays an error box to prompt them about what data can be entered into the cell.

1- Select the range to which you want to apply a data validation rule.
2- Click the **Data** tab.
3- Click **Data Validation**. The Data Validation dialog box opens.
4- Click the **Settings** tab.
5- Click here and then select which type of data you want the cell to allow.
6- Define the data type parameters, if needed, by clicking the **Collapse** button.
7- Click the **Error Alert** tab.
8- Type a title for the error message.
9- Type instructions to help the user remedy the mistake.
10- Click **OK**.
Note: If you or another user type the wrong data in the table's cells, an error alert box ppears.

Sort Records

You can sort your database table to reorganize the information. For example, you might want to sort a client table to list the names alphabetically. An ascending sort lists records from A to Z, and a descending sort lists records from Z to A.

1- Click in the field name you want to sort.
2- Click the **Data** tab.
3- Click **Sort A to Z** (↓) or **Sort Z to A**(↑).
Excel sorts the records based on the field you specified.

Sort with the Sort Dialog Box

1- Click the **Data** tab.
2- Click **Sort**. The Sort dialog box opens.
3- Click here and then select the primary field to sort by.
4- Click whether you want to sort the field in ascending or descending order.
Note: To specify additional fields for the sort, choose criteria from the Sort on drop-down list.
5- To add additional sort levels, click **Add Level** and then make settings for the next sort level.
6- Click **OK**. Excel sorts the data.

Filter Data with AutoFilter

You can use a filter to view only portions of your data. Unlike a sort, which sorts the entire table, a filter selects certain records to display based on your criteria, while hiding the other records that do not match the criteria.

1- Select the field labels for the data you want to filter.
2- Click the **Data** tab.
3- Click **Filter**.
Note: If you used the Create Table command to create a database table, your table already displays the AutoFilter buttons.
Excel adds a dropdown list to your field labels.
4- Click the dropdown list.
5- Click any item you want filtered out. Records that match the checked items remain after you apply the filter.
6- Click OK.
Excel filters the table and replaces the filter arrow with a filter icon.
To view all the records again, display the filter list and click Clear Filter from "Field Name."

In what ways can I customize a filter?

You can activate the Advanced command on the Data tab to open the Advanced Filter dialog box. Here you can further customize the filter by selecting operators and values to apply on the filtered data.

Analyze Data with a PivotTable

You can use PivotTables to gain different perspectives on your data. PivotTables enable you to ask certain questions of your data to help you see beyond the obvious. Rather than examining the data for answers yourself, a PivotTable helps you to quickly analyze the meaning of sets of data.

For example, say you have a sales order table that describes products, quantities ordered, dates, amounts, buyers, and salespersons. You can use a PivotTable to find out which salesperson has the most sales, which buyer buys the most product, what items are the top sellers, and who sold the most product on a given day. These are just a few analysis points you can find out with PivotTables.

1- Click inside the database list.
2- Click the **Insert** tab.
3- Click **PivotTable**. The Create Pivot Table dialog box opens.
4- Click range button to choose the table range.
5- Select a range and then click.
6- Click to specify where to place the table.
7- Click **OK**.

Can I change any options for my PivotTable?

On the PivotTable Tools tab, you can click **Options** to display the PivotTable Options dialog box. Here you can modify the layout and format of the PivotTable, decide whether to show totals or filter data, and more.

How are PivotTables constructed?

PivotTables are made of row fields and column fields that summarize data across rows and fields, respectively. The middle area is where the actual analysis occurs for summarizing different fields of data pertaining to the row and column fields.

After you create a PivotTable, you can drag various fields into the table to perform analyses. It might take some experimenting to figure out how your data works within the PivotTable. As you add and subtract fields and change their position on the table, the data you examine "pivots," hence the name PivotTable.

Note:- Excel opens a new, empty PivotTable and displays the PivotTable Field List.
8- Click a field you want to analyze
9- Drag the field box to the Column Label or Row Label area of the PivotTable Field List.
10- Click another field you want to analyze. Excel adds the field data, which you can then analyze.

To remove a field from the table, click the field to deselect it.

2.3.9-Sharing Excel Data (Data Import Export)

You can share Excel data between worksheets, workbooks, and with other users.

Import Data

You can transfer data from other sources into your Excel worksheet. For example, you can import text files as well as database and Web queries.
1- Click the **Data** tab.
2- Click **Get External Data**.
3- Click **From Text**. The Import Text File dialog box opens.
4- Navigate to the file you want to import.
5- Click the filename.
6- Click **Import**. Excel imports the data.

Export Data

You can use the Save As dialog box to export your workbook data by saving the data as another file format. For example, you might save your workbook as a text file to send to someone who does not use Excel as his or her spreadsheet program.
1- Click Data export Icon.
2- Click **Save As**. The Save As dialog box opens.
3- Navigate to the folder to which you want to save the file.
4- Type a filename.
5- Click the Save as Type and select a file type.
6- Click **Save**. Excel saves the data to the new format.

2.3- MS Excel Practical Exercise

Problem NO-1 [Preparing Bill]

	A	B	C	D	E
1	**S. No:**	**Particular**	**Quantity**	**Rate**	Cost
2	1	TV	20	21000	
3	2	VCD	15	12000	
4	3	Radio	12	5000	
5	4	Cassette player	18	11000	
6				**Total**	
7				**Discount 15%**	
8				**Total Amount**	
9				**Vat 10%**	
10				**Grand Total**	

Solution to Calculate Bill

To find Cost	=C2*D2
To find Total	=sum (E2:E5)
To find Discount	= E6*0.15
To find Total Amount	=E6-E7
To find Vat 10%	=E8*0.10
To fiend Grand Total	=E8+E9

Problem NO-2 [Preparing Employee Salary Sheet]

		A	C	D	E	F	G	H
1	**Salary Sheet of e-Soft Private limited.**							
2	**S.No**	**Name**	**Post**	**Address**	**Salary**	**Bonus**	**P. Fund**	**Net Salary**
3	01	Krishana	Manager	Kapan	12000			
4	02	Shyam	Pro.coordinator	Chabahil	8500			
5	03	Ambika	Accountant	Baneshower	7800			
6	04	Gita	Marketing	Kavre	6000			
7	05	Hari	Driver	Lagnkhel	5000			

Solution to employee prepare salary sheet

To find Bonus	=Salary* Bonus%
Example	=E3*75%
To find provident fund	=Salary*10%
Example	=E3*10%
To find Net Salary	=Salary +Bonus-P.found
Example	=E3+F3-G3

Problem NO - 3 [Calculating Interest]

	Interest Sheet							
	A	**B**	**C**	**D**	**E**	**F**	**G**	H
1	**S.No**	**Name of person**	**Capital**	**Time (YR)**	**Interest Rate %**	**Interest**	**Total Amount t**	
2	01	Sita Ram	100000	3	13			
3	02	Hari	250000	2	14			
4	03	Ram	75000	4	13			
5	04	Puja	100000	3	36			
6	**05**	**Krishana**	**25000**	**2**	**20**			

Soution to calculate interest

Formula	**=Capital*Time*Rate/100**
Example	**=C2*D2*F2/100**
To find total amount	**=Capital + Interest**
Example	**=C2+F2**

Problem: NO – 4 [Preparing Electric Bill]

Inputs data are Consumer Name, Current Month Reading, Previous Month Reading of Electricity consumers.

Billing rate as listed below:

Up to 20 unit	Rs.85
21 to 300 units	Rs. 7 pre unite
Above 300 units	Rs.10 pre unite

	A	B	C	D	E	F
1	**Consumer Number**	**Name**	**Previous Month Reading**	**Current Month Reading**	**Unit Consume**	**Bill Amount**

2	1001	Ameet Shrestha	2357	2467		
3	1002	Rjiv Pradha	1345	1858		
4	1003	Kamal Shai	2691	2698		

Solution to calculate electric Bill Amount

To Find Consume Unit =Current Month Reading –Previous Month Reading

Example

To Find Bill Amount =IF(E2<=20,78, IF(E2<=300, (E2-20)*7 + 78, 78 + 280*7 + (E2-300)*10))

Problem NO – 5 **[If condition complex analysis]**

Input given is Serial Number Name Education Code (EC) of 6 peoples. Find Remarks

EC	Rem
1	Master or Above
2	Diploma
3	Certificate
4	SLC
5	Literate
6	Illiterate

	A	B	C	D	E
1	**S.NO:**	**Name**	**Education Code**	**Remark**	
2	1001	Sagun	5		
3	1002	Niraj	3		
4	1003	Anjan	4		
5	1004	Ismit	1		
6	1005	Ishan	2		
7	**1006**	**Ishani**	**6**		

Solution to find Remark

=If(C2=1,"Master or Above", If(C2 =2,"Diploma", If(C2=3,"Certificate", If(C2=4, "SLC", If(C2=5, "Literate", "Illirete")))))

Problem NO – 6 **[Preparing Students Result Sheet]**

	A	B	C	D	E	F	G	H	I	J	K	L
1	**Microsoft College of Information Technology**											
2	**Bsc CSIT PROGRAM First Semester 2070/2071**											
3	**End Term Exam Result 2070/2071**											
4		**Student Name**	**IntroIT**	**C Prog**	**Math**	**English**	**Prb&Stat**	**Total**				
5		**Full Marks**	**60**	**60**	**80**	**60**	**60**	**320**				
6		**Pass Marks**	**24**	**24**	**32**	**24**	**24**	**128**				
7	**S.N**	**Highest Mark**							**Result**	**Per(%)**	**Div**	**Rank**
8	**1**	**Aastha Timalsina**	**51**	**28**	**68**	**40**	**56**					
9	**2**	**Aruna Shrestha**	**32**	**33**	**30**	**32**	**34**					
10	**3**	**Babita Thapa**	**44**	**24**	**44**	**52**	**49**					
11	**4**	**Bijay Prajapati**	**34**	**33**	**54**	**50**	**50**					
12	**5**	**Bijay Thapa**	**27**	**28**	**37**	**50**	**47**					
13	**6**	**Bikram Shrestha**	**35**	**53**	**41**	**40**	**49**					
14	**7**	**Deb Raj Badal**	**24**	**24**	**49**	**38**	**39**					
15	**8**	**Hemant Raj Singh**	**40**	**33**	**47**	**44**	**48**					
16	**9**	**Manish Shrestha**	**33**	**10**	**44**	**42**	**33**					

17	10	Prabek Rajbanshi	37	30	50	44	41					
18	11	Prabha Thapa	51	50	75	52	57					
19	12	Rojan Manandhar	43	43	72	58	60					
20	13	Sabin K.C.	43	24	62	48	57					
21	14	Sabin Nepal	39	19	42	32	50					
22	15	Sachita Thapa	37	28	52	38	51					
23	16	Suman Humagain	47	44	56	48	58					
24	17	Suraj Deuja	37	31	48	39	51					
25	18	Sushil Chandra Basnet	28	24	53	33	43					
26	19	Utsana Siku Shrestha	54	36	66	55	51					
27	20	Shreesti Kunwar	41	31	63	57	57					
28	**Result Analysis**											
29	**Number of students with Distinction**											
30	**Number of students with First Division**											
31	**Number of students with Passed Division**											
32	**Number of Failed Students**											

<u>Question to solve</u>

Q1-Prepare a result sheet

Q2-Apply appropriate conditional formatting to the cell of result column

a) **Set red color if failed division**
b) **Set blue color if passed division**
c) **Set yellow color if first division**
d) **Set green color if distinction division**

Q-3 Perform following calculation

a) **Number of students with Distinction Division.**
b) **Number of students with First Division.**
c) **Number of students with Passed Division.**
d) **Number of Failed Students.**

Q-4 Apply auto filter to the result sheet and perform result analysis

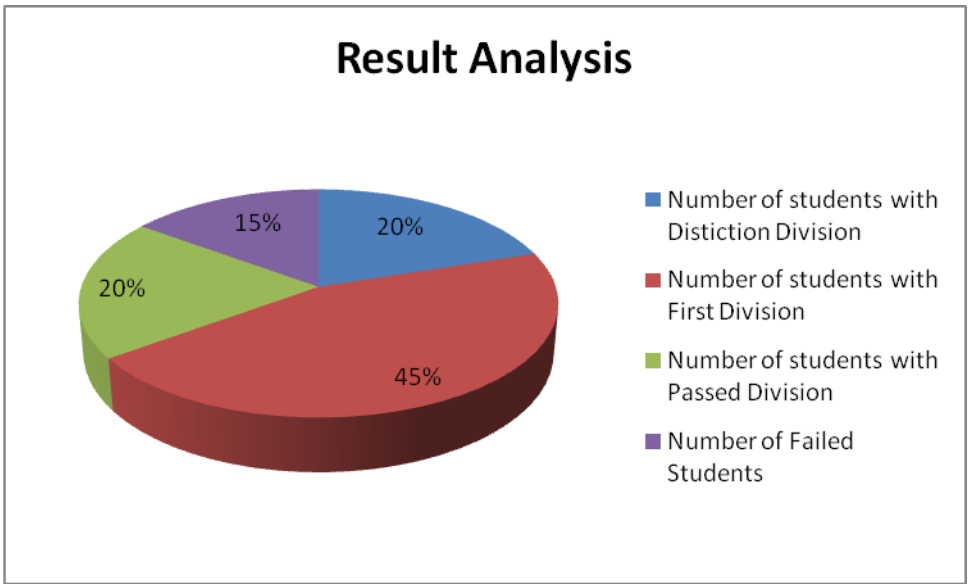
<u>Solution to prepare result sheet</u>

Total =SUM (First subject : Last Subject)
Example =SUM (C8 : G8)
Result = IF (AND (C8>=24, D8>=24,E8>=32, F8>=24, G8>=24), "Passed", "Failed")
Per (%) = 100*H8/$H$5
Division =IF (I8=" Failed ","Failed", IF(J8>=80,"Dist", IF(J8>=60,"First", "Passed")))
Rank = RANK (J8, J$8:J$27)

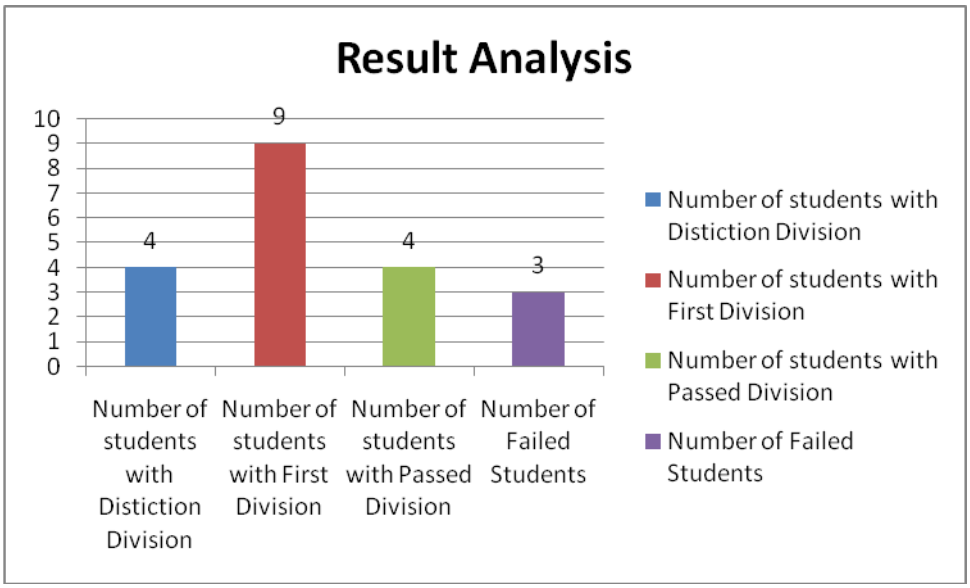
Number of students with Distinction Division = COUNTIF (K$8: K$27, "Dist")
Number of students with First Division =COUNTIF (K$8: K$27, "First")
Number of students with Passed Division =COUNTIF (K$8: K$27, "Passed")
Number of Failed Students = COUNTIF (K$8: K$27, "Failed")

Problem NO – 7 [Generating charts for analysis]

Q1-Generate a pie chart to display following information.



Q2- Generate a bar chart to display following information.



Problem NO – 8 **[Data analysis]**

Order ID	Product Name	Quantity Ordered	Amount	Order Date	Customer Name	Sales Person
1	TV LG-14	43	900000	9/5/2015	Mical	Tilak
2	VCR-4009	200	450000	12/6/2015	Raj	Tilak
3	DVD Plyar 10	130	240000	12/6/2015	Raj	Tilak
4	Laptop-303	12	600000	11/7/2015	Pranita	Janak
5	Video Camera	55	300000	11/7/2015	Pranita	Janak
6	TV LG-14	12	250000	18/7/2015	Ramesh	Tilak
7	DVD Plyar 10	55	105000	11/8/2015	Raj	Narayan
8	TV LG-14	21	450000	11/8/2015	Raj	Tilak
9	DVD Plyar 10	23	50000	9/10/2015	Shyam	Tilak
10	DVD Plyar 10	40	90000	21/11/2015	Pranita	Narayan

QN-a- Apply AutoFilter with the table below and perform several analyses.
QN-b- Create pivot table from the given table and examine PivotTable to perform analysis (find out which salesperson has the most sales, which buyer buys the most product, what items are the top sellers e.tc).

Problem NO – 9 [Basic Accounting- Preparing Journal and Nominal Ledger]
This is a comprehensive project. You can form a group of 3-4 people and gather annual records of accounting data of a company and perform following activities in excel program.

a) **You are asked to prepare a journal entry of an account in an excel workbook.**
b) **You are also asked to prepare nominal ledger in a separate workbook.**

Note: - **<u>The Journal</u>** is a textual record of events (**Debit and Credit**) that is characterized by the fact that all the records it contains are in a sequential chronological order. **The Nominal ledger** Is made up of separate accounts for each matter (cash, banks, customers and so forth).

c) **You are asked to prepare a trail balance of the nominal ledger in an excel sheet.**

Note: - After transferring the records to the Journal (Journal Entries) and from there to the account in the Nominal Ledger, the balance for each account is found organizing all the transactions and balance in every account in the nominal ledger into a table. This arrangement is called the Trial Balance. In the Trial Balance (balances), the "Total Debit Balances" column must be identical to the "Total Credit Balances" column.

d) **You are further asked to prepare a profit loss statement for the year ending Ashad 2072 & balance sheet for the year ending Ashad 2072 based on the data of trail balance that you have already prepared.**

Note: - At the end of each year, the bookkeeping system produces two statements (directly from the Trial Balance). They are a) **profit loss statement & b) balance sheet.** The Balance Sheet is in fact made up of two parts while: **The total assets of the business (the debit side) = The total obligations to external agencies (the credit side) + the total obligations to the owner of the business.**

Accounting Equation is a mathematical expression of the relationship of property and property rights that is also called the **Balance Sheet Equation**.

The equation may be expressed in three forms:
Assets = Liabilities + Owner's Equity (Capital)
OR
Assets = Liabilities + Beginning Owner's Equity (Capital) + Additional Owner Investments + Revenues - Expenses - Draws

Unit 3: Introduction to MIS [LH 5 Hrs]

3.1-What is an Information System (IS)?

An *Information System* is a set of interrelated components that collect, analyze and disseminate data and information to support decision making coordination, and control to an organization.

Information systems contain information about significant people, places, and things within the organization or in the environment surrounding it. **Data** is streams of raw facts representing events occurring in organization or the physical environment before they have been organized and arranged into a form that people can understand and use.

Three major activities in an information system are ***input***, ***processing***, and ***output***. **Input** is the capture or collection of raw data from within the organization or from its external environment for processing in an information system. **Processing** is the conversion, manipulation, and analysis of raw input into a form that is more meaningful to humans. **Output** is the distribution of processed information to the people who will use it or to the activities for which it will be used. Information systems also require **feedback**, which is output that is returned to the appropriate members of the organization to help them evaluate or correct input.

In fact, Information Systems (IS) are pervasive, versatile, and instrumental in helping organizations achieve their strategic, tactical, and operational goals.

3.2-Components of an Information Systems

- ✓ ***Hardware***, computer equipment used for
  - → input
  - → processing
  - → outputs
- ✓ ***Software***, computer programs that run on hardware:
  - → systems software
  - → applications software
- ✓ ***Databases***: specialized applications software designed to organize data and information on an organization's operations
- ✓ ***Infrastructure***: equipment designed to link hardware across space:
  - → telecommunications
  - → networks
  - → Internet
- ✓ ***People***: IS personnel and users
- ✓ ***Procedures***: rules for developing and using the IS

Formal IS can be either computer-based or manual systems use paper-and pencil technology. Computer-based systems, in contrast, relay on computer hardware and software technology to process and disseminate information. Although computer-based information systems use computer technology to process raw data into meaningful information, there is a sharp distinction between a computer and a computer program on one hand, and an information system on the other. Electronic computers and related software programs are the technical foundation, the tools and materials, of modern information systems. Computers provide the equipment for storing and processing information. Computer programs are sets of operating instructions that direct and control computer processing. Computers are only part of an information system.

3.3-Information Technology vs. Information System

Information system

- ✓ A system that creates, processes, stores, and retrieves information.
- ✓ The input to such a system is data: processed data becomes information.

Information technologies

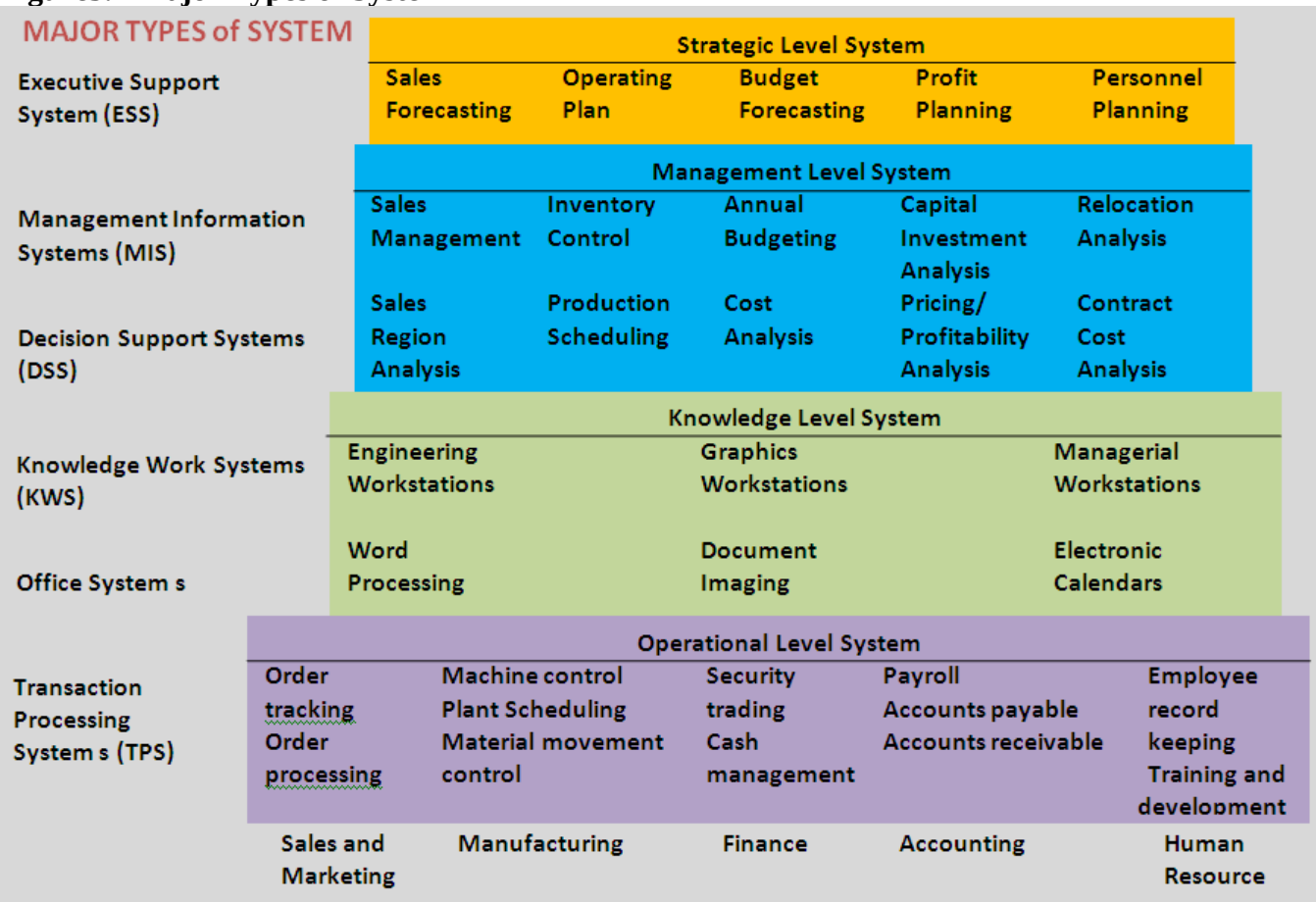
- ✓ Tools and techniques that support the design and development of information systems: these include hardware, software, database, telecommunications, and client servers.

Information systems use Information Technology as tools for the storing and rapid processing of information leading to analysis, decision-making and better coordination and control. Hence information technology forms the basis of any modern information systems.

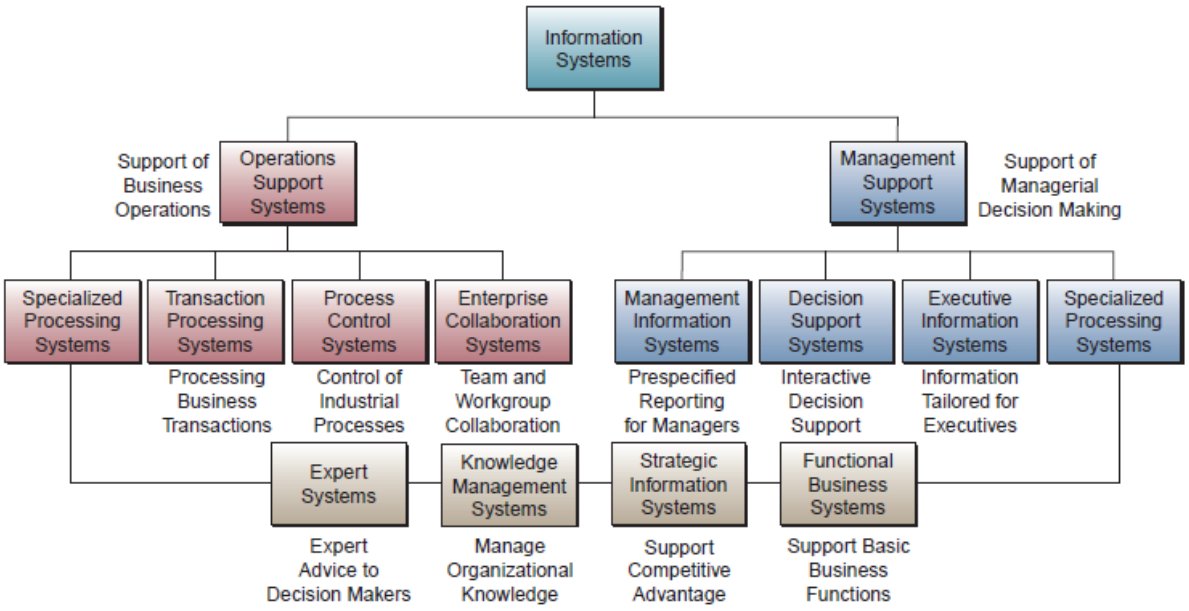
3.4-General Classification of Information Systems

Several categories of information systems can support either operations or management applications. For example, expert systems can provide expert advice for operational chores like equipment diagnostics or managerial-based information systems that support the creation, organization, and dissemination of business knowledge to employees and managers throughout a company.

Figure3.1 Major Types of System

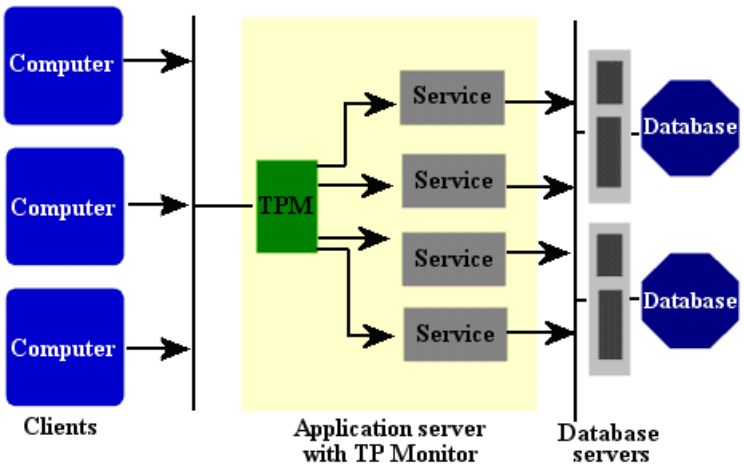


Other Classifications of Information Systems



3.4.1-Transaction Processing Systems (TPS)

Figure3.2Transaction Processing System



Transaction processing is a style of computing that divides work into indivisible operations, called transactions. Transaction Processing Systems (TPS) are the basic business systems that serve the operational level of the organization. A transaction processing system is a computerized system that performs and records the daily routine transactions necessary to conduct the business.

3.4.2-Knowledge Work and Office Systems

Knowledge Work System (KWS) and office systems serve the information needs at the knowledge level of the organization. **Knowledge workers** are people who hold formal university degree and who are often members of a recognized profession, such as engineers, doctors, lawyers, and scientists. **Data workers** typically have less formal, advanced educational degrees and tend to process rather than create information.

Word processing refer to office system technology that facilitates that creation of documents through computerized text editing, formatting, storing, and printing. **Desktop publishing** refers to technology that produces professional-quality document combining output from word processors with design, graphics, and special layout features. **Document imaging systems** refer system that converts documents and images into digital form so that they can be stored and accessed by the computer.

<u>Requirements of Knowledge Work Systems</u>

Knowledge work systems have characteristics that reflect the special needs of knowledge workers. First, knowledge work systems must give knowledge workers the specialized tools they need, such as powerful graphics, analytical tools, and communications and document

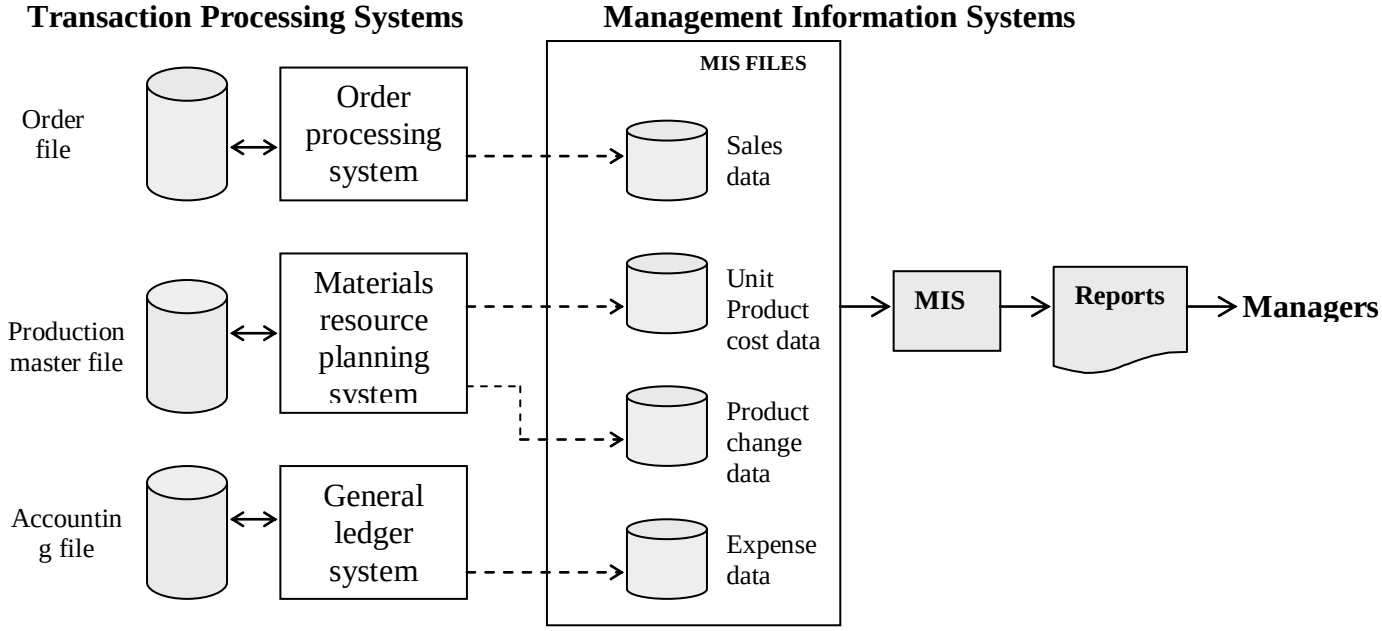
management tools. These systems require great computing power to handle the sophisticated graphics or complex calculations necessary for such knowledge workers as scientific researchers, product designers, and financial analysts. Because knowledge workers are so focused on knowledge in the external world, these systems also must give the worker quick and easy access to external databases.
A user-friendly interface is very important to a knowledge worker's system. User-friendly interfaces save time by enabling the user to perform needed tasks and get to required information without having to spend a lot of time learning how to use the computer. Saving time is more important for knowledge workers than for most other employees because knowledge workers are highly paid.

3.4.3-Management Information Systems

Introduction

Management Information Systems (MIS) refer information systems at the management level of an organization that serve the functions of planning, controlling, and decision making by providing routine summary and exception reports. A **management information system** (**MIS**) provides information needed to manage organizations efficiently and effectively.
In a management information system, modern, computerized systems continuously gather relevant data, both from inside and outside an organization. This data is then processed, integrated, and stored in a centralized database (or data warehouse) where it is constantly updated and made available to all who have the authority to access it, in a form that suits their purpose. Management information systems (MIS) serve the management level of organization, providing managers with reports and, in some cases, with online access to the organization's current performance and historical records. Typically, they are oriented almost exclusively to internal, not environmental or external, events. Generally, they depend on underlying transaction-processing system for their data. MIS summarize and report on the company's basic operations.

Figure3.3Management Information Systems



Importance and benefits of MIS

At the present, organizations realize that information is important as a property. It can add value to organizations. As well as, it helps organizations to survive among intensive competition. Therefore, organizations need information for management. The overall purpose of MIS is to provide profitability and related information to help managers and staffs understand business performance and plan its future direction.

- ✓ MIS is always management oriented and keeps in view every level of management and gets the desired information.

- ✓ Integrated - refers to how diff components (sub systems) are actually tied up together. Example: diff departments of organization linked together.
- ✓ Useful for planning - as every organization makes log-term and short-term plans with the help of information like sales & production, capital investments, stocks etc. management can easily plan.
- ✓ Effective MIS helps the management to know deviations of actual performance from pre-set targets and control things.
- ✓ Its' important for increasing efficiency.
- ✓ MIS provides updated results of various departments to management.
- ✓ MIS is highly computerized so it provides accurate results.
- ✓ MIS adds to the intelligence, alertness, awareness of managers by providing them information in the form of progress and review reports of an ongoing activity.
- ✓ Helps managers in decision- making.
- ✓ Good MIS will show how an operation accords to an organization goal. It's adopted to monitor an operation.
- ✓ MIS reduce organizations' cost because of time, labor and expenses reducing in long run.

Problems with MIS

There is abundant evidence from numerous surveys conducted in developed countries, particularly in the UK and USA, that existing MIS, often using advanced computer equipment, have had relatively little success in providing management with the information it needs. Reasons discovered include the following:

- ✓ Lack of management involvement with the design of the MIS;
- ✓ Narrow or inappropriate emphasis of the computer system;
- ✓ Undue concentration on low-level data processing applications particularly in the accounting area;
- ✓ Poor appreciation by information specialists of management's true information requirements and of organizational problems; and
- ✓ Lack of top management support.

To be successful, an MIS must be designed and operated with due regard to organizational and behavioral principles as well as technical factors. Management must be informed enough to make an effective contribution to system design, and information specialists (including systems analysts, accountants and operations researchers) must become more aware of managerial functions and needs so that, jointly, more effective MIS are developed. Management do not always know what information they need and information professionals often do not know enough about management in order to produce relevant information for the managers they serve. There is no doubt that better communication between management and information professionals and a wider knowledge by both groups of MIS principles would greatly facilitate the task of developing relevant and appropriate information systems.

3.4.4- Decision-Support Systems

Decision-Support Systems (DSS) also serve the management level of the organization. DSS help managers make decisions that are unique, rapidly changing, not easily specified in advance. They address problems where the procedure for arriving at a solution may not be fully predefined in advance.

Decision-support systems (DSS) support more non-routine decision making. They focus on problems that are unique and rapidly changing, for which the procedure for arriving at a solution may not be fully predefined in advance.

3.4.5- Executive Support Systems

ESS serves the strategic level of the organization. **Executive support systems (ESS)** help senior management make these decisions. They address non-routine decisions requiring judgment, evaluation, and insight because there is no agreed-on procedure for arriving at a solution. ESS present graphs and data from many sources through an interface that is easy for

senior managers to use. Often the information is delivered to senior executives through a portal, which uses a Web interface to present integrated personalized business content.
ESS is designed to incorporate data about external events, such as new tax laws or competitors, but they also draw summarized information from internal MIS and DSS. They filter, compress, and track critical data, displaying the data of greatest importance to senior managers. Increasingly, such systems include business intelligence analytics for analyzing trends, forecasting, and "drilling down" to data at greater levels of detail.

3.6-Decision Support Systems

3.6.1-Introduction

Decision Making is the process of developing and analyzing alternatives to make a *decision* - a choice from the available alternatives. Most decisions are made in response to a *problem* - a discrepancy between a desirable and an actual decision and involve *judgment* - the cognitive aspects of the decision-making process. Decisions can be classified as either programmed or non-programmed.
Business Decision Making is closely related to, and has its origin, in the field of management science, also called operation research. **Management Science** is the scientific approach to decision making that often uses mathematical models. Operation Management is atypical branch of management science that combines theory and practice emphasizing quantitative and statistical models or approaches for decision making, with the use of computer.

A **decision support system** (**DSS**) is a computer-based information system that supports business or organizational decision-making activities. DSSs serve the management, operations, and planning levels of an organization and help to make decisions, which may be rapidly changing and not easily specified in advance.
Typical information that a decision support application might gather and present would be:

- Accessing all of your current information assets, including legacy and relational data sources, cubes, data warehouses, and data marts.
- Comparative sales figures between one week and the next
- Projected revenue figures based on new product sales assumptions
- The consequences of different decision alternatives, given past experience in a context that is described

A decision support system may present information graphically and may include an expert system or artificial intelligence (AI). It may be aimed at business executives or some other group of knowledge workers.

Some Examples of DSS Applications in Business

- **Forecasting**
  - What will be customer demand in next few weeks/months/years?
  - What will be most likely sales figure in future?
- **Scheduling and planning**
  - What job do we perform next?
  - What is the job process to minimize the processing time and maximize the contribution time from the labor?
  - How to minimize the waste of resources and maximize the production?
- **Inventory management**
  - How much inventory should we have?
  - How much to order and when to order?
- **Supply chain management**
  - Which vendor should we select?
  - Should we in or outsource our product /services?
  - How to distribute the product/services to customers?

3.5-Importance of Information System

Information is a ***critical resource*** in the operation and management of organizations. Timely availability of relevant information is vital for effective performance of managerial functions such as planning, organizing, leading, and control. An information system in an organization is like the nervous system in the human body, it is the link that connects all the organization's components together and provides for better operation and survival in a competitive environment. The system ensures that an appropriate data is collected from the various sources, processed, and sent further to all the needy destinations. The system is expected to fulfill the information needs of an individual, a group of individuals, the management functionaries: the managers and the top management. The IS plays the role of information generation, communication, problem identification and helps in the process of decision making. The IS, therefore, plays a vital role in the management, administration and operations of an organization. Indeed, today's organizations run on information.

- ✓ **Support of Business Process and Operations**: Retail stores use computer-based IS to help their employees record customer, keep track of inventory, pay employees, buy new merchandise, and evaluate sales trends. The IS helps the clerical personnel in the transaction processing and answers their queries on the data pertaining to the transaction, the status of a particular record and references on a variety of documents.
- ✓ **Support of Business Decision Making**: Managers and other business professional use IS for better decisions. For example, decisions about what lines of merchandise need to be added or discontinued and what kind of investments they require are typically made after an analysis provided by computer-based information systems. The MIS (special category of IS) helps the middle management in short them planning, target setting and controlling the business functions. It is supported by the use of the management tools of planning and control.
- ✓ **Support of Strategies for Competitive Advantage**: Gaining a strategic advantage over competitors requires the innovative application of IT. For example, store management might make a decision to install touch-screen kiosk in all stores, with link to the e-commerce Web site for online shopping and buying products provided by such information system. This offering might attract new customers and build customer loyalty.

3.6-Understanding the Business values of Information system

Information has a great impact on decision making, and hence its *value is* closely tied to the decisions that result from its use. Information does not have an absolute universal value. Its value is related to those who use it, when it is used, and in what situation it is used. In this sense, information is similar to other commodities. For example, the value of a glass of water is different for someone who has lost his way in Arctic glaciers than it is to a wanderer in the Sahara Desert.

Economists distinguish value from *cost* or *price* of a commodity incurred to produce or procure the commodity. Obviously, the value of a product must be higher than its cost or price for it to be *cost-effective.*

Information supports decisions, decisions trigger actions, and actions affect the achievements or performance of the organization. If we can measure the differences in performance, we can trace the impact of information, provided that the measurements are carefully performed, the relationships among variables are well defined, and possible effects of irrelevant factors are isolated. The measured difference in performance due to informational factors is called the *realistic value* or *revealed value* of information.

3.7-Information system success and failure

Benefits from information technology investments will be reduced if firms do not consider the costs of organizational change associated with a new system or make these changes

effectively. The alternation of an information system has a powerful behavioral impact. A very large percentage of information systems fail to deliver benefits or to solve the problems for which they were intended because the process of organizational change surrounding system building was not properly addressed. Successful system building requires careful change management.
The major problem areas causing information system failure are information systems' **design**, **data**, **cost**, and **operations**.

Design: The actual design of the system may fail to capture essential business requirements or improve organizational performance. Information may not be provided quickly enough to be helpful; it may be in a format that is impossible to digest and use; or it may represent the wrong pieces of data.
The way in which nontechnical business users must interact with the system may be excessively complicated and discouraging. A system may be designed with a poor user interface. The user interface is the part of system with which the end users interact. For example an input form or an online data entry screen may be so poorly arranged then no one wants to submit data. The procedures to request online information retrieval may be so unintelligible that users are too frustrated to make requests.
An information system will be judged a failure if its design is not compatible with the structure, culture, and goals of the organization as a whole.

Data: The data in a system may have a high level of inaccuracy or inconsistency. The information in certain field may be erroneous, or it may not be organized properly for business purposes. Information required for a specific business function may be inaccessible because the data are incomplete.
Cost: Some systems operate quite smoothly, but their cost to implement and run on a production basis may be way over budget. Other system projects may be too costly to complete.
Operations: Sometimes system does not run well if there is no technically sound person to operate the system. If information is not provided in a timely and efficient manner, information is processing break down and lead to excessive delayed or missed schedules for delivery of information.
Some of these problems can be attributed to technical features of information systems. System builders need to understand these organizational issues and learn how to manage the change associated with the new information system.

3.8-Overview of the System Implementation Process

Steps for Implementing New Systems
Acquisition:- Evaluate and acquire necessary hardware and software resources and information system services.
Software Development:- Develop any software that will not be acquired externally as software packages. Make any necessary modifications to software packages that are acquired.
Data Conversion:- Convert data in company database to new data formats and subsets required by newly installed software.
Training:- Educate and train management, end users, customers and other business stakeholders. Use consultants or training programs to develop user competencies.
Testing:- Test and make necessary corrections to the programs, procedures and hardware used by a new system.
Documentation:- Record and communicate detailed system specifications, including procedures for end users and IS personal and experts of input screen and output displays and reports.
Conversion:- Convert from the use of a present system to the operations of a new system. This may include operating both new and old system in parallel for a trail period.

3.9-Implementing System Conversion Strategies

Conversion is the process of changing from the old system to the new system. Four main forms of system conversion strategies can be employed:

1. **Parallel conversion**
2. **Phased conversion**
3. **Pilot conversion**
4. **Direct conversion**

The **direct cutover** strategy replaces the old system entirely with the new system on an appointed day. It is very risky approach that can potentially be more costly than parallel activities if serious problem with the new system is found.

In a **parallel strategy** both the old system and its potential replacement are run together for a time until everyone is assured that the new one functions correctly. This is safer safest conversion approach; however this approach is very expensive. To execute parallel approach properly, the end users must literally perform all daily functions with both systems, thus creating a massive redundancy in activities and literally double the work.

The **phased approach** strategy introduces the new system in stages, either by functions or by organizational units. Phased conversion is analogous to the release of multiple versions of an application by software developer. Although it has advantage of the lower risk, the phase approach takes the most time.

The **pilot study** strategy introduces the new system to only a limited area of the organization, such as a single department or operating unit. When this pilot version is complete and working smoothly, it is installed throughout the rest of the organization.

3.10-MIS Summery

Management information systems (MIS) provide information in the form of reports and displays to support business decision making for managers and many business professionals. For example, sales managers may use their networked computers and Web browsers to receive instantaneous displays about the sales results of their products and access their corporate intranet for daily sales analysis reports that evaluate sales made by each salesperson.

Decision support systems (DSS) give interactive ad hoc computer support to managers during the decision-making process. For example, an advertising manager may use a DSS to perform a what-if analysis as part of the decision to determine how to spend advertising dollars. A production manager may use a DSS to decide how much product to manufacture, based on the expected sales associated with a future promotion and the location and availability of the raw materials necessary to manufacture the product.

Executive information systems (EIS) provide critical information from a wide variety of internal and external sources in easy-to-use displays to executives and managers. For example, top executives may use touch-screen terminals to view instantly text and graphics displays that highlight key areas to analyze competitive performance, actions of competitors, and economic developments to support strategic planning.

Expert systems are knowledge-based systems that provide expert advice and act as expert consultants to users. Examples: credit application advisor, process monitor, and diagnostic maintenance systems.

Knowledge management systems support the creation, organization, and dissemination of business knowledge within the enterprise. Examples: intranet access to best business practices, sales proposal strategies, and customer problem resolution systems.

Strategic information systems support operations or management processes that provide a firm with strategic products, services, and capabilities for competitive advantage. Examples: online stock trading, shipment tracking, and e-commerce Web systems.

Functional business systems support a variety of operational and managerial applications of the basic business functions of a company. Examples: information systems that support applications in accounting, finance, marketing, operations management, and human resource management.

Unit 4: Enterprise Resource Planning [LH 5hrs]

4.1-E-Business & e-Commerce

The Internet and related technologies and applications have changed the ways businesses operate and people work, as well as how information systems support business processes, decision making, and competitive advantage. Thus, many businesses today are using Internet technologies to Web-enable their business processes and create innovative e-business applications.

'Electronic business, or **e-business**, refers to the use of digital technology and the Internet to execute the major business processes in the enterprise. E-business includes activities for the internal management of the firm and for coordination with suppliers and other business partners. It also includes **electronic commerce**, or **e-commerce**. **E-Business** (electronic business) uses information and communication technologies technology to improve overall business processes. This includes managing internal processes such as human resources, financial and administration systems, as well as external processes such as sales and marketing, supply of goods and services, and customer relationships.

E-commerce is the part of e-business that deals with the buying and selling of goods and services over the Internet. It also encompasses activities supporting those market transactions, such as advertising, marketing, customer support, security, delivery, and payment.

E-business is the use of Internet technologies to work and empower business processes, e-commerce, and enterprise collaboration within a company and with its customers, suppliers, and other business stakeholders. ***E-business' is brooder term referring to how technology can benefit all internal business process and interactions with third parties.***

Electronic commerce commonly written as **e-commerce**, refers to buying, selling, marketing, and servicing of products, services, and information over a variety of computer networks. Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems.

Many businesses now use the Internet, intranets, extranets, and other networks to support every step of the commercial process, including everything from advertising, sales, and customer support on the World Wide Web to Internet security and payment mechanisms that ensure completion of delivery and payment processes. For example, e-commerce systems include Internet Web sites for online sales, extranet access to inventory databases by large customers, and the use of corporate intranets by sales reps to access customer records for customer relationship management.

4.2-What is business process automation?

Business process automation (BPA) is the technology-enabled automation of activities or services that accomplish a specific function or workflow to reduce costs, resources and investment. BPA increases productivity by automating key business processes through computing technology. Business processes can be determined for many different segments of company activities, including sales, management, operations, supply chain, human resources and information technology.

BPA is designed to maintain efficiency and increase the stability and operational productivity of an underutilized workforce by integrating business critical software applications. Business process automation comes in many forms, from literal assembly lines in the auto industry to self-service gas station pumps.

Automation aims to make the entire business process more cost-efficient, streamlined, error-proof and accessible. The goal of BPA is to not only automate business processes, but to simplify and improve business workflows to improve an organization's overall workflow in terms of achieving greater efficiency, adapting to changing business needs, reducing human error and clarifying job roles and responsibilities.
The BPA process is geared toward implementing software applications to automate routine business tasks through initiation, execution and completion, while achieving enterprise-wide workflow efficiency. An Enterprise Resource Planning (ERP) system is often conceived as a BPA implementation outcome.
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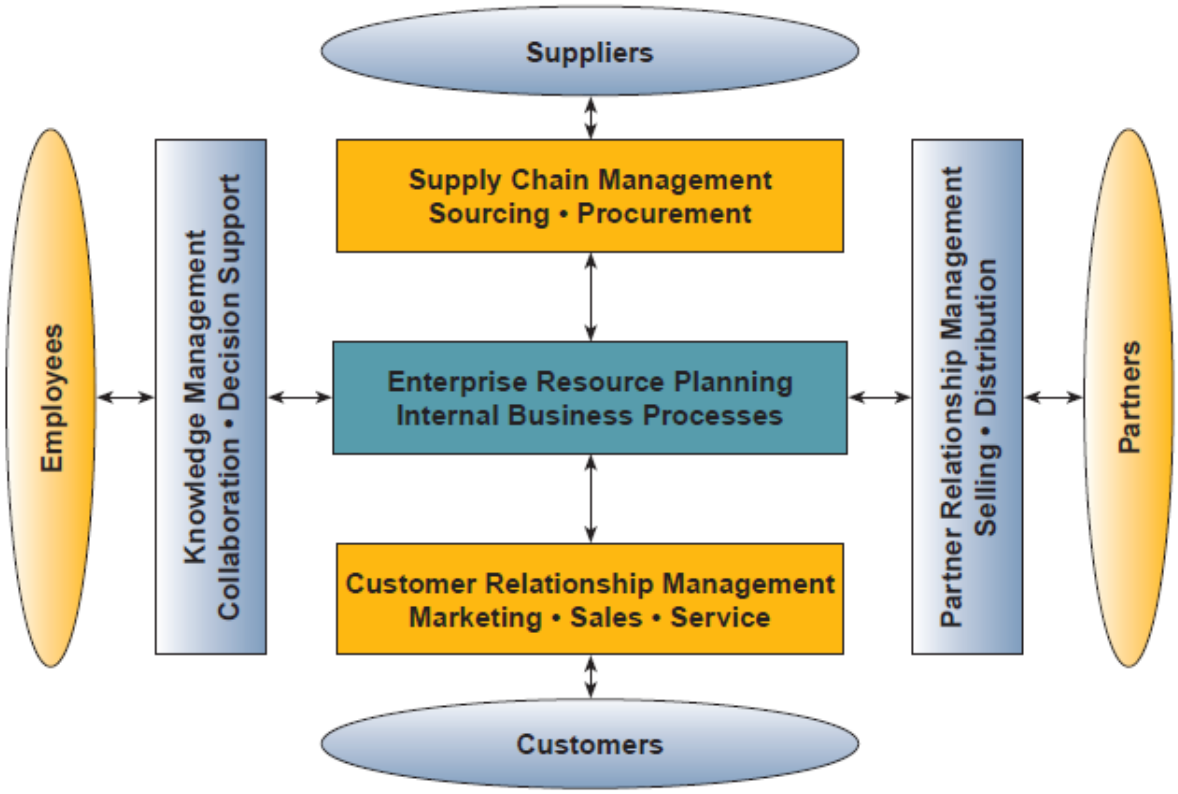
4.3-Cross-Functional Enterprise Applications

Many companies today are using information technology to develop integrated **cross-functional enterprise systems** that cross the boundaries of traditional business functions in order to reengineer and improve vital business processes all across the enterprise. These organizations view cross-functional enterprise systems as a strategic way to use IT to share information resources and improve the efficiency and effectiveness of business processes, and develop strategic relationships with customers, suppliers, and business partners. See Figure 4.1, which illustrates a cross-functional business process.

Figure 4.1 presents an **enterprise application architecture**, which illustrates the interrelationships of the major cross-functional enterprise applications that many companies have or are installing today. This architecture does not provide a detailed or exhaustive application blueprint, but it provides a conceptual framework to help you visualize the basic components, processes, and interfaces of these major e-business applications, and their interrelationships to each other. This application architecture also spotlights the roles these business systems play in supporting the customers, suppliers, partners, and employees of a business.

FIGURE 4.1 This enterprise application architecture presents an overview of the major cross-functional enterprise applications and their interrelationships.



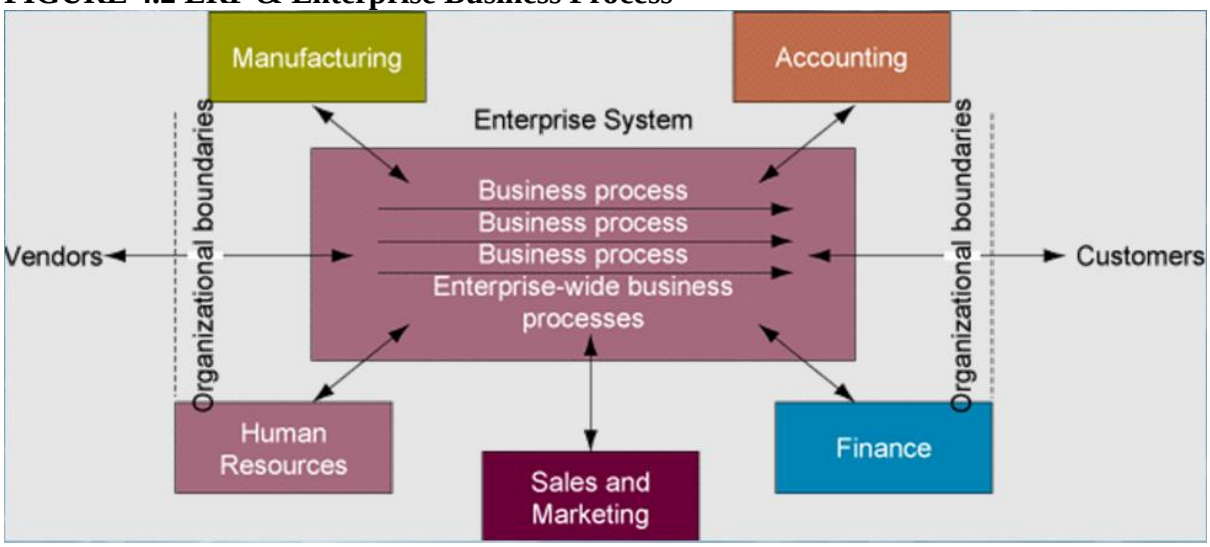
Notice that instead of concentrating on traditional business functions or supporting only the internal business processes of a company, enterprise applications focus on accomplishing fundamental business processes in concert with a company's customer, supplier, partner, and employee stakeholders. Thus, enterprise resource planning (ERP) concentrates on the efficiency of a firm's internal production, distribution, and financial processes. Customer relationship management (CRM) focuses on acquiring and retaining profitable customers via marketing, sales, and service processes. Partner relationship management (PRM) aims to acquire and retain partners who can enhance the sale and distribution of a firm's products and services. Supply chain management (SCM) focuses on developing the most efficient and effective sourcing and procurement processes with suppliers for the products and services that a business needs. Knowledge management (KM) applications provide a firm's employees with tools that support group collaboration and decision support.

4.4-ERP Systems

To integrate all aspects of a business' operation into one easy-to-use system, many companies turn to Enterprise Resource Planning (ERP) solutions. **Enterprise systems**, also known as *enterprise resource planning (ERP)* systems provide an organization with integrated software modules and a unified database which enable efficient planning, managing, and controlling of all core business processes across multiple locations. Modules of ERP systems may include finance, accounting, marketing, human resources, production, inventory management and distribution. ERP solutions store that information in one database, giving businesses a simplified look at how all their systems are running.

ERP serves as a cross-functional enterprise backbone that integrates and automates many internal business processes and information systems within the manufacturing, logistics, distribution, accounting, finance, and human resource functions of a company. ERP also served as the vital software engine needed to integrate and accomplish the crossfunctional processes that resulted. Now, ERP is recognized as a necessary ingredient that many companies need in order to gain the efficiency, agility, and responsiveness required to succeed in today's dynamic business environment.

FIGURE 4.2 ERP & Enterprise Business Process



What ERP can do?

- ✓ ERP automates the tasks necessary to perform a business process such as order fulfillment, which involves taking an order from a customer, shipping it and billing for it
- ✓ Shares common data bases and business practices
- ✓ Produces information in real time

The major application components of ERP systems are grouped together as ERP modules which include:

a) Manufacturing and production systems
b) Supply chain management (SCM) systems
c) Customer relationship management (CRM) systems
d) Financing and accounting system
e) Human resource management systems
f) Knowledge management system (KMS)

ERP can be highly customized to meet specific business requirements. ERP systems can be integrated with:

- ✓ ***Warehouse management***
- ✓ ***Logistics***
- ✓ ***Electronic catalogs***
- ✓ ***Quality management system (QMS)***
- ✓ ***Project management system (PMS)***

Manufacturing and production systems enable scheduling, assembling product, purchasing, shipping, receiving, checking quality, engineering and operations of the production process. The major application systems are: material resource planning systems, purchase order control systems, engineering systems and quality control systems.

Supply chain management *(SCM)* systems enable more efficient management of the supply chain by integrating the links in a supply chain. This may include suppliers, manufacturer, wholesalers, retailers and final customers.
So supply chain management is a cross-functional enterprise system that uses information technology to help support and manage the links between some of a company's key business processes and those of its suppliers, customers, and business partners. The goal of SCM is to create a fast, efficient, and low-cost network of business relationships, or supply chain, to get a company's products from concept to market.

Customer relationship management *(CRM)* systems help businesses manage relationships with potential and current customers and business partners across marketing, sales, and service.
CRM software helps sales, marketing, and service professionals capture and track relevant data about every past and planned contact with prospects and customers, as well as other business and life cycle events of customers. Information is captured from all customer touch points, such as telephone, fax, e-mail, the company's Web site, retail stores, kiosks, and personal contact. CRM systems store the data in a common customer database that integrates all customer account information and makes it available throughout the company via Internet, intranet, or other network links for sales, marketing, service, and other CRM applications.

Financing and accounting system enables budgeting, cost accounting, general ledger, billing and fund management. Accounting information systems record and report business transactions and other economic events.
Computer-based accounting systems record and report the flow of funds through an organization on a historical basis and produce important financial statements such as balance sheets and income statements. Such systems also produce forecasts of future conditions such as projected financial statements and financial budgets. A firm's financial performance is measured against such forecasts by other analytical accounting reports.

Human resource management systems help organization to store information about personal records, benefits, compensation, labor relations and trainings. The **human resource management (HRM)** function involves the recruitment, placement, evaluation,

compensation, and development of the employees of an organization. The goal of human resource management is the effective and efficient use of the human resources of a company.

Knowledge management system *(KMS)* helps organizations facilitate the collection, recording, organization, retrieval, and dissemination of knowledge. This may include documents, accounting records, and unrecorded procedures, practices and skills.

ERP systems track business resources (such as cash, raw materials, and production capacity), and the status of commitments made by the business (such as customer orders, purchase orders, and employee payroll), no matter which department (manufacturing, purchasing, sales, accounting, and so on) has entered the data into the system. ERP software suites typically consist of integrated modules of manufacturing, distribution, sales, accounting, and human resource applications. Examples of manufacturing processes supported are material requirements planning, production planning, and capacity planning. Some of the sales and marketing processes supported by ERP are sales analysis, sales planning, and pricing analysis, while typical distribution applications include order management, purchasing, and logistics planning. ERP systems support many vital human resource processes, from personnel requirements planning to salary and benefits administration, and accomplish most required financial recordkeeping and managerial accounting applications.
The leader in ERP market share, and the one that invented the market to an extent, is the German company SAP AG with its R/3 software. Other big players include PeopleSoft Inc., Oracle Corp., Baan Co. NV and J.D. Edwards & Co.

The major ERP software companies have developed modular, Web-enabled software suites that integrate ERP, customer relationship management, supply chain management, procurement, decision support, enterprise portals, health care functionality, and other business applications and functions. Examples include Oracle's e-Business Suite and SAP's mySAP. Some e-business suites disassemble ERP components and integrate them into other modules, while other products keep ERP as a distinct module in the software suite. Of course, the goal of these software suites is to enable companies to run most of their business processes using one Web-enabled system of integrated software and databases, instead of a variety of separate e-business applications.

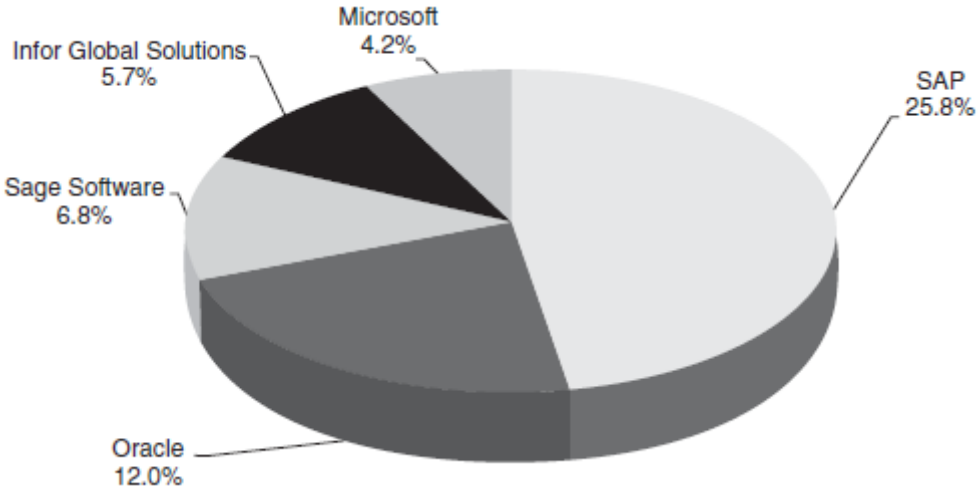


FIGURE 4.3 Market shares of top five ERP vendors

ERP systems attempt to integrate several data sources and processes of an organization into a unified system. A typical ERP system will use multiple components of computer software and hardware to achieve the integration. A key ingredient of most ERP systems is the use of a unified database to store data for the various system modules. The two key components of an ERP system are a common database and a modular software design. A common database is the system that allows every department of a company to store and retrieve information in real-time. Using a common database allows information to be more reliable, accessible, and easily shared. Furthermore, a modular software design is a variety of programs that can be

added on an individual basis to improve the efficiency of the business. This improves the business by adding functionality, mixing and matching programs from different vendors, and allowing the company to choose which modules to implement. These modular software designs link into the common database, so that all of the information between the departments is accessible in real time.

4.5-Advantage and Disadvantage of ERP System

4.5.1-Benefits of ERP software

One of the largest benefits is the picture it gives business owners of their operation. By tying critical data from all parts of a company into one easy-to-understand database, business owners are able to quickly identify areas of strength, as well as spot looming problems before they reach a critical stage. When used properly, the software should provide a better map for future planning.

The software helps businesses cut back on duplication and saves time by better aligning each department. This allows for improved workflow and better efficiency, which can boost the company's bottom line.

ERP software is also advantageous for businesses trying to improve their financial reporting and regulation compliance.

Advantages:

1. Better organizational control, especially in large companies, where the volume of information is more than in a small company.
2. Increased customer responsiveness.
3. Duplication of information is avoided.
4. Increases communication and collaboration between business unites and sites.
5. Company can incorporate improved best processes.
6. Company profitability analysis can be carried out to analyse where costs are higher and where there are more sales.
7. Increases decision-making capabilities within the company.
8. The company is able to react better to any unforeseen problem or situation.
9. Better use of time.
10. May provide a strategic advantage

4.5.2-Drawbacks of ERP software

The biggest downside to implementing an ERP software solution is the cost. Depending on the size of the company, it can cost millions of dollars to install and train employees to use the system. The cost can't just be looked at in terms of purchase price, since it will take a considerable effort to train employees how to use the ERP software and how to make sure managers are looking at the data properly to ensure they're getting the most out of it.

Since the training can be so extensive, businesses that install the software sometimes experience a drop in productivity while employees get brought up to speed. For some, a dip in output isn't very noteworthy, but for others, any decline in productivity can be devastating.

Other expenses include IT infrastructure upgrades that usually need to occur before the software is installed, as well as the cost of maintaining the software and making sure it is running at optimum performance.

Disadvantages:

1. The high cost of implementation and maintenance. (High initial investment)
2. Implementation may require major changes in the company and its processes.
3. It is so complex that may companies cannot adjust to it.
4. It is necessary to train all employees in the company so that the system is used efficiently. This is a cost for the company as well as the time and effort needed for it.
5. Integration with other applications in the enterprise needed.
6. Inflexibility of the system, because this is a generic system.

7. There are few experts in this system.
8. If the system is not applied correctly, it can be very detrimental to the company.

4.6-Summery

- ✓ Recap- ERP is a customized computer software application that integrates all departments and functions across a company by the creation of a single software program that runs off one database
- ✓ Benefits- accurate/ up to date information, decreased errors, improve customer satisfaction.
- ✓ Key players- **Oracle, Bann, Edwards & Co, People Soft, SAP**
- ✓ Targeted to all business but mostly geared towards mid-large size companies
- ✓ Focus in financial, HR, manufacturing industries
- ✓ Every company hires a consultant to address the appropriate ERP software needed to give the company a competitive advantage
- ✓ The software is customized to each individual companies needs

Implementing ERP system

- ✓ Holistic approach to implementation
- ✓ Need re-engineer existing business processes to fit processes embedded in software
- ✓ Increasing use of web-enablement to support global availability of some applications: Supply chain, customer self-help and self-service, e-commerce applications, Internet marketing systems, sales force automation technologies

Discussion Questions

1. Based on the cost and time consumption of implementing ERP, do you think that small companies can truly adopt an ERP system and benefit from it?
2. What do you think some of the reasons for companies using and ERP system?
3. Within the future what other types of industries do you see ERP being geared towards?

Ans1) Due to a global marketplace, many small companies are merging with larger companies in order to survive and gain a competitive advantage. Therefore it is highly unlikely that a small firm will spend $15 million on an ERP system, there revenue is just not large enough to support this large of an investment.

Ans2)

- ✓ Increase customer responsiveness
- ✓ Global enterprise wide information
- ✓ Enhance organizations and systems flexibility
- ✓ Increase decision making capabilities
- ✓ Increase profitability
- ✓ Decrease productive time to market
- ✓ Streamline financial transaction processing
- ✓ Improve decision-making

Ans3) All Industries

Unit 5: Computerized Accounting [LH 5hrs]

5.1-Introduction to Accounting Software Packages

All financial application and accounting software offer features such as accounts receivable, accounts payable, general ledger, billing and a variety of other standard features, covering a vast array of functions and services.

Financial Software can range from personal finance managers to entry level accountant programs and business financial management packages. Financial software can also consist of investment software packages and retirement planning. Financial software is a range of different programs that can be installed onto a computer to aid in the organization of accounts, numbers, employee information, etc.

There are many popular accounting software packages available for small-and medium-sized organizations. Selecting right software for your organization involves many factors, including the design of your chart of account and the structure of your organization. It is important that you understand the capabilities of the software and how closely the software matches your organization's needs. The accounting software that you select must be flexible in selecting the reporting period. Most accounting software also provides added flexibility by allowing you to export the data into a spreadsheet format. You need to select the software package that most closely fits the needs of your organization. Here are some essential features to be considered when you are selecting your accounting software.

1. **Reporting and analysis:** Any accounting program you evaluate must have robust reporting and analysis capabilities. Besides helping users gain insight into crucial financial activities, reporting and analysis functions help companies conform to government and industry regulations.
2. **Graphics:** Graphics, in the form of charts and other illustrative formats, is a powerful tool that can be used to present trends and other concepts in a way that numbers alone can't convey.
3. **Automation:** Support for simple accounting transactions and basic financial management tasks just isn't enough and many companies require the full automation of employee expenses, payrolls and time sheets; company and departmental budgets; purchase requisitions and other complex financial activities.
4. **Automatic updates:** Using out-of-date accounting software is like eating food that has passed its expiration date. Tax laws, regulations and financial practices change over time, so it's vital to use software that receives fast, user-transparent, automatic updates.
5. **Customization:** Chances are that no accounting software will exactly match your business's needs. That's why you'll want to look for a product that allows the easy customization of statements, forms, reports, screens, help systems and other program facets.
6. **Internet connectivity:** With the whole world moving to the Internet, make sure that any accounting software you consider has the ability to send and receive digital documents and handle electronic fund transfers.
7. **Interoperability:** The data entered into your accounting software can be productively used by various business applications in HR, sales, shipping and other key business sectors. Conversely, you may want your accounting program to draw information in from other software products. That's why you'll want to check on an accounting program's ability to interoperate with other software before deciding on whether to purchase it.
8. **Scalability:** Look for a product that accommodates, or can be easily upgraded to accommodate, a progressively larger number of users and a growing amount of financial data and transactions. Ask vendors about their programs' limits in these areas.

9. **Expandability:** Your business may grow in scope as well as size. The accounting program vendor should either offer add-on modules that allow customers to slap extra capabilities to its product, or a migration path to a full **ERP** environment.
10. **Security:** If your company accounting data is lost or tampered, you lose time, money, business secrets (such as sales or profit data). Any vendor should be able to tell you about its software's built-in security features as well as how its product can mesh with your own on-site safeguards (such as anti-malware technology and network firewalls).

5.2-Importance/Benefits of Accounting Software Packages

Accounting software is a class of computer programs that enable you to manage your business's financial transactions. Such programs can vary widely in scope, with some programs designed for little more than simple bookkeeping and some designed to manage the entire financial comings and goings of large businesses. Using accounting software helps companies to use the resources in their accounting departments efficiently, and can reduce costly bookkeeping mistakes.

Accuracy: Accounting software can help to increase the accuracy of your records by reducing or eliminating human errors in calculation. Manual bookkeeping processes involve making a lot of mathematical calculations by hand. An incorrect calculation early on in the in the process could have a great impact on the end balance. Computers, on the other hand, are virtually incapable of making such errors.

Speed: Using accounting software allows businesses to process their accounts with greater speed than manual processing. Part of this speed increase comes from the use of computers, which are able to process figures far faster than the human brain. In addition, accounting software allows organizations to increase efficiency by introducing automation. Say, for example, that a business needs to record sales tax on all of its transactions. Accounting software could be configured to do that for each entry automatically, rather than having a staff member work out the tax longhand.

Data Access: Using accounting software it becomes much easier for different individuals to access accounting data outside of the office, securely. This is particularly true if an online accounting solution is being used.

Reliability: Because the calculations are so accurate, the financial statements prepared by computers are highly reliable.

Automation: Since all the calculations are handled by the software, computerized accounting eliminates many of the complex and time-consuming processes associated with manual accounting.

Cost: The benefits resulting from the speed and efficiency of accounting software often go hand-in-hand with reduced overall costs. The use of an accounting program allows each member of the accounting team to do more in a given time, potentially meaning that a smaller team is needed overall. This, in turn, can reduce the accounting department's payroll and administration costs.

Reports: Accounting software helps businesses to supply the necessary members of staff with timely and accurate financial information. For example, suppose that a company's finance director needs a report of cash-flow to take to a meeting in two hours. Many accounting software systems have built-in reporting modules that enable users to create this type of report by simply filling in a form or clicking a button. However, creating such a report manually would be a time-consuming process.

Tax: Filing your business taxes can be a complex process, requiring you to keep close track of all your business's transactions. Accounting software helps to make this process easier by ensuring that all of your business's financial details are in one place. This allows you to calculate your return itself semi-automatically, rather than spending time and resources working out the necessary details by hand.

5.3-The Advantages of Using Accounting Software

An accounting system is a collection of processes, procedures and controls designed to collect, record, classify and summarize financial data for interpretation and management decision-making.
Computerized Accounting involves making use of computers and accounting software to record, store and analyze financial data. A computerized accounting system brings with it many advantages that are unavailable to manual accounting systems. The accounting software carry out functions such as invoicing, dealing with payments, paying wages and providing regular accounting reports such as trading and profit and loss accounts and balance sheets

The implementation of computerized accounting systems provide major advantages such as speed and accuracy of operation, and, perhaps most importantly, the ability to see the real-time state of the company's financial position.

A typical computerized accounting package will offer a number of different facilities. These include:

- ✓ On-screen input and printout of sales invoices
- ✓ Automatic updating of customer accounts in the sales ledger
- ✓ Recording of suppliers' invoices
- ✓ Automatic updating of suppliers' accounts in the purchases ledger Recording of bank receipts
- ✓ Making payments to suppliers and for expenses
- ✓ Automatic updating of the general ledger
- ✓ Automatic adjustment of stock records
- ✓ Integration of a business database with the accounting program
- ✓ Automatic calculation of payroll and associated entries

Computerized accounting software can provide instant reports for management, for example:

- ✓ Aged debtors' summary – a summary of customer accounts showing overdue amounts
- ✓ Trial balance, trading and profit and loss account and balance sheet
- ✓ Stock valuation
- ✓ Sales analysis
- ✓ Budget analysis and variance analysis
- ✓ GST/VAT returns
- ✓ Payroll analysis

When using a computerized accounting system the on computer, input screens have been designed for ease of use. The main advantage is that each transaction needs only to be inputed once, unlike a manual double entry system where two or three entries are required. The computerized ledger system is fully integrated. This means that when a business transaction is inputed on the computer it is recorded in a number of different accounting records at the same time.

5.4-Overview of Different Types of Accounting Software

Accounting software can be useful in such functions as recording and processing accounts receivable and accounts payable transactions. Some software applications can be used in

payroll processing, the documentation of tax transactions, and the creation of related reports. Accounting software can also be used in billing clients and customers and debt collection. Some accounting programs even provide for timesheet record keeping, useful for professionals who need to keep track of the hours they work.

Accounting software that is designed for home use is often referred to as personal accounting software. This type of software is used mostly in managing household budgets and expenses. Some personal accounting software makes it possible to download bank account information directly from the Internet for use with the software.

There are many types of accounting software applications on the market today. Some applications are intended to perform accounting functions for large corporate organizations. Others are meant for personal use. Still other applications fall somewhere in between, performing functions suited to small businesses, as well as those suited to the average person. Available software ranges from the very simple to the very complex, with much variation in price as well.

Low-end accounting software is generally used by smaller businesses and can typically be found for sale by a variety of retailers. Usually, software in this class is not highly specific and can be used for a wide range of businesses. This type of accounting program is usually adequate for such uses as generating invoices, reconciling accounts, and handling payroll.

The next step up in the realm of accounting software consists of applications capable of performing a variety of functions important to business accounting. Referred to as mid-market software, accounting applications in this class perform general business accounting functions and frequently include integrated management information systems. Many software applications at this level are capable of providing for accounting in several different currencies. **Mid-market accounting software** is usually purchased from a dealer.

Higher-end accounting software is more expensive than other types and is usually much more complex. Generally designed for use by large businesses with millions of dollars in transactions, high-end accounting programs usually have very sophisticated features and options. Software in this class also allows for a high level of customization. Typically, higher-end software is sold through a dealer.

Some companies choose to develop their own accounting software, gearing it completely towards their unique needs. Other companies choose to purchase ready-made software packages. Many organizations employ a combination of the two, purchasing software and applying local modifications to make it more efficient.

Types of accounting software

There are many different types of accounting software packages and applications currently available today. To select the best accounting product you will first need to decide your individual and corporate needs. Small business accounting software functions much differently in many respects that accounting software manufactured as an enterprise resources planning solution for example.

If you are a large enterprise or firm you will want to investigate a comprehensive enterprise solution that offers multi-user capability. Some examples of popular software programs in this field include Oracle People Soft Enterprise One and mySAP All-in-One. If you are looking for a basic accounting software package you may opt for SAP Business One or Microsoft Great Plains software.

Small Business Software and Personal Accounting Software

Small businesses can usually get away with a more basic program like QuickBooks Enterprise or Professional or MS Small Business Financials. If you are looking for an accounting software application for personal use, a basic accounting software program like quicken or QuickBooks or even Peachtree should easily accommodate your every need. Most of these software programs come equipped with accounts payables, account receivables, payroll and general ledger features. Most will also generate basic reports, invoices and keep track of other expenses, assets and small financial items you may want to keep track of from day to day.

The primary difference between these smaller software applications and larger enterprise solutions is the smaller applications won't necessarily integrate to serve multiple operations like manufacturing, marketing and engineering. Most ordinary people or small businesses however will not need this capability in a software accounting package.

A free 90 day trial version of MYOB accounting software can be downloaded from MYOB website.

Review Questions

1. Computerized Accounting represents a technological advancement in the field of business accounting. *Do you use computerized accounting in your business? If yes, how important are the above advantages for the continued survival of your business?*
2. What are different types of accounting software available in market? Make comparative analysis of any three kind of accounting software that you know.